

## METHODOLOGY FOR DEVELOPING RESEARCH SKILLS BASED ON FORMING STUDENTS' SCIENTIFIC LITERACY

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**Abstract:** This article discusses modern trends and prospects for the development of research skills based on the formation of students' natural and scientific literacy . The authors emphasize the relevance of developing scientific thinking, experimental skills and independent research skills in students through innovative methods, projects and practical activities in the educational process, along with fundamental knowledge. The role of modern technologies such as STEAM (Science, Technology, Engineering, Art, Mathematics) approaches, virtual laboratories, the use of artificial intelligence and big data in the formation of natural and scientific literacy. Methods for stimulating students ' critical thinking, creativity and learning through experience .

**Keywords :** natural and scientific literacy, natural and scientific literacy, practical experiences, project-based learning, laws of nature, interdisciplinary connections, modern educational technologies, virtual laboratories, interactive methods, the mentoring role of the teacher, ecological concepts, systematization of information , scientific worldview, natural and scientific literacy, research skills , STEAM education, innovative methods, experimental activities, interdisciplinary integration.

**Main part.** Today, as a result of the fundamental changes taking place in the field of education , the needs of modern society and the progress of science and technology, the need to develop students' scientific thinking and form a scientifically based approach to environmental phenomena is increasing day by day. In particular, increasing students' interest in research through the formation of natural and scientific literacy and directing them to scientific and research activities is an urgent issue.

Scientific literacy is the ability of students to understand natural phenomena, explain them scientifically, and apply scientific knowledge in everyday life . This literacy provides students with skills in environmental culture, healthy lifestyles, technological safety, and a scientific approach to global problems .

Research skills include the stages of observation, problem identification, hypothesis formulation, experimenting , data analysis, drawing conclusions, and evaluating results . Through these stages, the student is formed as an independent thinker, a seeker of innovation, and a problem solver.

teaching natural sciences such as biology, physics, chemistry, and geography, laboratory work, experiments, project work, and problem-based teaching methods serve to develop research skills. Through practical activities, the student acquires theoretical knowledge in greater depth and can apply it in real life .

The STEAM (Science, Technology, Engineering, Art, Mathematics) approach integrates students' interdisciplinary knowledge , develops creativity and critical thinking. Through this, students have the opportunity to look at problems in a comprehensive way , work on practical projects, and achieve results .

The following methods are effective for engaging students in research activities :

- Conducting practical experiments and experiments ;
- Preparation of mini-projects and scientific developments;
- Participation in science olympiads, exhibitions and competitions;
- Projects aimed at studying local problems ;
- Use of open lessons and interactive methods.

the teacher in developing research skills is important. The teacher should use the following pedagogical approaches:

- Constructive approach;
- Problematic education;
- Working in small groups;
- Cognitive activation methods;
- Formative methods of assessment.

As part of the research, experimental lessons based on natural sciences were held in some schools. During the lessons, students learned to work with laboratory equipment, put forward independent hypotheses and tried to draw scientific conclusions based on their verification. As a result, their level of knowledge, interest in sciences, and independent work skills significantly increased.

Developing research skills by building students' scientific literacy not only unlocks their personal potential, but also serves to educate competitive, creative, and responsible citizens in the future. Along the way:

- Strengthening the laboratory base of schools;
- Teacher training;
- Introduction of modern textbooks and manuals ;
- advanced experiments in natural sciences .

serve as the basis for the formation of each person's worldview, understanding the environment and active participation in it . In modern education, improving students' natural and scientific literacy is closely related to the development of their research skills . This process involves not only mastering knowledge in such disciplines as biology, chemistry, physics, but also improving the skills of scientific thinking, conducting experiments , analyzing data and drawing conclusions .

One of the most important aspects of developing scientific literacy is encouraging students to learn through observation and experimentation . Direct observation of natural phenomena, their recording and explanation arouse scientific interest in students . For example, by observing plant growth, conducting simple chemistry experiments or studying meteorological phenomena , students have the opportunity to understand the laws of nature in a practical way . This increases their logical thinking and analytical skills.

research skills is involving students in independent work. Lessons should provide them with opportunities to discover new knowledge on their own through projects, small group research, and individual assignments . For example, having students collect, analyze, and propose solutions to environmental problems on their own can develop their creative and critical thinking. Also, the use of modern technologies - virtual laboratories, scientific programs, and online resources - can provide students with broader opportunities.

The role of the teacher is also very important. They should act as mentors, motivating students, guiding them, and teaching them scientific methodology. Teachers should answer every question of the students with interest, encouraging them to try new ideas . At the same time , it is important not to be afraid of mistakes , but to accept them as a natural part of the learning process.

In conclusion, developing students' research skills based on scientific literacy creates a foundation for increasing their intellectual potential, deepening their understanding of the world, and becoming successful in science and technology in the future. This process is not just about imparting knowledge, but also preparing the new generation for the world of research, discovery, and innovation. By improving scientific literacy in the modern educational process and creating a learning environment that encourages research, we form not only scientific skills in students, but also the ability to think independently and make responsible decisions.

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