



## Mechanisms For The Development Of Natural Scientific Thinking Of Students

**Fariddun Izatulloyevich Ochilov**

*View. Associate Professor of Chirchik State Pedagogical University,  
Doctor of Philosophy of Pedagogical Sciences (PhD). Uzbekistan.*

**Abstract.** *This article analyzes the mechanism for the development of students' natural science thinking in the process of teaching academic subjects, and also describes the author's methods.*

**Key concepts:** *education, science, student, natural scientific thinking, mechanism, knowledge, skill.*

**Аннотация.** *В данной статье анализируется механизм развития естественнонаучного мышления студентов в процессе преподавания учебных предметов, а также описываются авторские методы.*

**Ключевые понятия:** *образование, наука, ученик, естественнонаучное мышление, механизм, знание, умение.*

Starting from the 2023-2024 academic year, the teaching of natural science subjects based on programs developed on the basis of new approaches has been introduced in secondary schools across the country [2]. The content of this new approach is programs and educational materials developed according to the principle from practice to theory. In this regard, it is important to rely on the mechanism for developing the natural science thinking of secondary school students as a means of teaching natural sciences. Here we will focus on analyzing this problem [3].

**Development of students' natural science play in the classroom.** Today, in the country's secondary schools, the subjects of botany, geography, zoology, biology, chemistry, physics, astronomy, which are part of the natural sciences, are taught, and their basic concepts are taught at the elementary level. From this point of view, it becomes possible to develop students' natural scientific thinking when studying these natural science subjects. To do this, it makes sense to rely on a unique new methodology.

In our opinion, the basics of such a methodology are as follows:



- a) expanding the forms of science lessons;
- b) updating the natural sciences course;
- c) monitoring the effectiveness of science lessons.

It should be noted that there are opportunities to expand the types of natural science subjects taught in secondary schools and to develop students' scientific thinking on their basis. In our country, there is a traditional way of teaching science subjects, that is, the teacher's activities in the classroom and explanation of topics based on rules. This traditional form has proven its effectiveness over the years. In addition, it is advisable to introduce non-traditional types of lessons in secondary schools. In such non-traditional types of classes, the priority is the principle of transition from practice to theory, the priority of student activity in the lesson, and most importantly, the mastery of topics based on additional information. In this regard, the development of students' natural scientific thinking on the basis of traditional and non-traditional types of lessons gives the expected results. For example, teaching debate in non-traditional types of lessons is very important for developing students' scientific thinking. Because in this lesson, students receive additional information from the teacher and their peers, think independently and show creativity. From this point of view, it is possible to develop students' natural science play at the expected level by organizing the main classes of the subject of plant growing in non-traditional forms of classes. In this case, it is appropriate to focus on consolidating students' theoretical knowledge about the plant world (the world of flora). For this, it is very important to provide students with information about the flora of Uzbekistan, plants listed in the Red Book, and the basics of plant protection. As a result, students master the basics of natural science and scientific thinking. Therefore, we consider it appropriate to expand the process and forms of teaching natural sciences in secondary schools. Because it is known that students' scientific thinking is limited in the form of traditional education.

It is necessary to update the content of these science lessons in order to develop students' scientific thinking based on the teaching of science subjects. According to him, it is important to cover each topic based on new approaches, equipment and methods. For example, when updating the content of the curriculum for the subject "Zoology," it is better to focus on providing complete information about the animal world, providing theoretical knowledge about animal species listed in the Red Book, and developing a broad understanding of the animal world. animal world. In this regard, when teaching the basics of this subject, the basis



of the principle of regional characteristics is updating the content of its lessons. As a result, students develop their own natural scientific thinking, fully understanding the animal world of their region. Because the fauna of the regions is well known to students and there is an opportunity to observe it in practice. This is one of the important factors in the development of students' natural scientific thinking.

It is important to monitor the effectiveness of science teaching in secondary schools. Since in the course of such monitoring of students' mastery of the subjects being studied, regardless of whether the educational materials meet the requirements or not, there is a need to update the educational materials. Thus, monitoring the effectiveness of teaching natural science subjects provides a mechanism for the real development of students' natural scientific thinking. For example, it should be noted that in a biology lesson, students have the opportunity to receive compulsory education on nature, plants, wildlife and environmental protection. As a result, students will have specific mechanisms for purposefully developing science games.

It should be noted that in science class, students have a wide range of opportunities to develop their natural and scientific thinking. To do this, you need to pay attention to the following:

- 1) development of students' natural perception skills;
- 2) development of students' scientific knowledge;
- 3) application of natural skills and scientific knowledge of students in practice.

This approach makes it possible to develop students' natural-scientific thinking in science lessons held in secondary schools. Therefore, it is appropriate to focus on non-traditional forms and methods of teaching natural sciences.

**Development of natural science and scientific thinking of students in practical classes.** According to the Decree of the President of the Republic of Uzbekistan dated October 17, 2020 No. PF-162 "On measures for the further development of culture and art," premises for practical training of subjects taught in secondary schools were approved and created [1]. According to it, special training classes were organized for each academic subject and their large-scale implementation was introduced. In this regard, it is advisable to develop students' natural science play through practical exercises. This gives the following expected result:

- a) organization of practical classes in each natural science subject;
- b) conducting practical classes on certain topics;



c) assessment of the result of the practical lesson.

It is advisable to rationally organize practical classes in natural disciplines taught in secondary schools. When organizing such activities, relying on factors of the school situation, regional opportunities and interests of students will give the expected results. In this regard, today a unique educational and communicative situation has been created in all secondary schools in the country, double opportunities have been created for the development of school education in the regions, and students' interest in mastering the natural sciences is noteworthy. Based on these factors, it is advisable to organize practical classes in the natural sciences. As a result, based on school and regional opportunities, through practical exercises it is possible to bring students' science play to the expected level. For example, rational organization of a physics lesson strengthens students' natural understanding, scientific knowledge and practical skills. Because this science is different in that it provides a body of natural and scientific knowledge about the fundamentals of existence. Therefore, through such practical activities, it is possible to purposefully develop students' natural science play.

Conducting organized practical science classes on each topic will give the expected results. To do this, it is important to organize practical classes in the natural sciences and pay attention to their complementarity. For example, it is desirable that the content of practical classes in the subject "Chemistry" correspond to the content of practical classes in the subject "Physics" and complement each other. As a result, the totality of natural and scientific knowledge acquired by students becomes experience. Therefore, it is useful to organize practical classes on natural science topics based on the principle of harmony.

By assessing the effectiveness of practical science classes in secondary schools, it is possible to create opportunities for the development of students' natural science thinking from a practical point of view. To do this, it is advisable to study students' mastery of subjects, monitor their activities in practical classes, and evaluate students' natural science knowledge and skills. Because these factors are the practical basis for the development of students' natural scientific thinking. For this reason, it is important to assess student learning through hands-on activities each quarter. This is a job every science teacher should do. If you pay attention, hands-on activities provide unique opportunities to develop students' natural and scientific thinking. It is important to rely on the following:



- 1) rational organization of practical classes according to the capabilities of students and the school;
- 2) achieving student activity in practical classes;
- 3) assessment of the effectiveness of each practical lesson.

This approach provides practical mechanisms for developing students' natural science thinking through practical exercises.

**Development of natural-scientific thinking of students in the process of laboratory classes.** Today, the process of creating modern laboratories is carried out in secondary schools across the country. It should be noted that today in laboratory work organized in secondary schools, the following activities are carried out:

- a) selection of special premises for laboratories;
- b) providing laboratories with modern technical equipment;
- c) determining the order of laboratory classes;
- g) ensuring the safety of laboratory classes;
- d) advanced training of teachers in conducting laboratory work and their retraining in pedagogical courses.

For this reason, laboratory work at school is of great importance in the development of students' natural scientific thinking. To do this, conducting various experiments in such classes, developing students' research activities, and using their discoveries in the educational process will give the expected results. In this regard, it is important to use existing experience in the regions. For example, in the regions there are secondary schools specializing in natural sciences. They are focused on conducting laboratory work on natural science topics. Such experiences allow students to practically develop their science play. In laboratory classes, it is better to take as a basis for the development of natural-scientific thinking of students:

- 1) conduct regular laboratory work in natural sciences;
- 2) involving students in research work on natural science topics;
- 3) implementation of student discoveries in science lessons.

Laboratory studies provide ample opportunities for the development of students' natural scientific thinking.

Thus, in the process of teaching academic subjects, the mechanism for developing students' natural scientific thinking has its own characteristics. This mechanism is based on the development of students' natural scientific thinking during lessons, practical and laboratory classes.



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