

## CONTENT AND STRUCTURE OF THE PROGRAM FOR THE DEVELOPMENT OF EDUCATIONAL AND METHODOLOGICAL TRAINING OF SCIENCE TEACHERS IN THE TEACHING OF NATURAL SCIENCES (SCIENCE)

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***Abstract.** This article provides information on the structure and content of the training program for science teachers, as well as the criteria set for it.*

***Keywords:** teacher training, curriculum, criteria, factors.*

The most important factor that shows the effectiveness of training in the development of teaching-methodical preparation of science teachers is teaching in the training courses listed in their educational programs, training plans, teaching-methodical sets. is the content. It cannot be created without taking into account the entire set of objective factors that determine it: social pedagogical, psychological, organizational pedagogical, scientific pedagogical, and others.

- Determination of modern requirements for the training level of science teachers;
- To determine the current trends in the development of science education, including the development of the problem of integrating natural sciences;
- Training of science teachers based on a constructive approach;
- Emphasis on scientific-practical training in the direction of research in the teaching of natural sciences (Science) on the basis of integration;
- Identifying professional problems and needs of science teachers.

Science teachers play a key role in improving students' knowledge of science concepts and content. Teachers who are core curriculum practitioners must have sufficient understanding of Science and its content and transfer these science concepts to their classroom practices to develop students' understanding of Science content. . Despite all the methods, reforms, curricula and program activities emphasizing the teaching of natural sciences (Science), the results of studies in this field show that teachers and students do not understand science (Science) and its still have misconceptions about its content [1,2,3]. In addition, teachers face challenges in effectively integrating science into their classroom practices.

On the basis of scientific research, it can be said that initially, the development of continuous professional development training programs for the development of teaching methodical preparation of natural sciences (Science) teachers, the creation of an environment in which teachers constantly interact with the program, and continuous should share and improve their teaching practices by providing feedback [4,5).

It should be noted that all elements of the educational content in science teacher training courses are closely related to each other and form a whole system. A change in one of them affects the level and quality of others.

Another important basis of the state educational requirements (order 121) on the content and quality of retraining and advanced training of the public education system leaders, pedagogues and specialists is the training of science teachers in the context of professional development and their the generalized experience of the organization of professional development is the selection and systematization of the content, methods and tools of teacher training in professional development courses known in the practice of organizing post-secondary education for teachers. The following criteria were developed during the experimental testing of educational programs for science teachers:

1. The main components of the problem of the integration of natural sciences (basic knowledge of physics, chemistry, biology, geography, astronomy, history of natural sciences, genesis of natural sciences) necessary for teaching science on the basis of integration , socio-cultural knowledge, experiment-research) full and integrated reflection in the content of teacher training.

2. To determine the important, professional content for groups of teachers of different profiles participating in professional development courses.

3. Conformity of the content of the curriculum to the needs, professional interests and requirements of teachers, qualification categories.

4. Compliance of the program volume with the time allocated in the educational-thematic plan for the preparation of the course on effective teaching of natural sciences (Science).

5. Taking into account the theoretical and practical research on the problem, as well as the experience of forming the content of training programs developed for the training system.

6. Taking into account the advanced pedagogical experience in the formation of scientific literacy skills in teaching natural sciences (Science) to students.

7. Compliance of the content of teacher training with teaching-methodical, experimental-research and didactic equipment.

Implementation of these criteria is not only to maximize the content of the curriculum, to concentrate the most important ones on the problem of effective teaching of natural sciences (Science) necessary for practical implementation in school, but also to adapt it to the needs of modern science education, its development. trends, as well as the professional interests and requirements of physics, geography and biology teachers.

The selection of educational content and structure in the training system of science teachers is a very complex and uncertain process. Their definition is related to the combination of objective factors and general didactic and specific principles for advanced education system. In this regard, we tried to determine the objective factors that determine the choice of the content of science teacher training, to determine the specific principles of building teacher training programs, in particular, continuous professional development course programs. As a result of approving the content developed for the preparation of science teachers for effective teaching of science based on integration, the following factors were identified:

1) Modern needs for improvement of science education in the 6th grade of the general secondary school, aimed at forming the landscape of natural science of the world;

2) the need for special training aimed at the formation of theoretical and methodological knowledge of teachers and the ability to synthesize and integrate the knowledge of natural sciences, on the basis of which a single natural-scientific view of the world and a dialectical way of thinking can be formed;

3) a suitable model for the activities of teachers in teaching natural sciences, which includes the necessary and sufficient requirements for the knowledge and skills of teachers in the education of a scientifically literate person;

4) the needs of teachers of natural sciences to deepen and improve their knowledge and views within the framework of the problem of the integration of natural sciences, the problem of the integration of education;

5) the level of professional and pedagogical competence of teachers within the framework of this problem with the beginning of training in professional development courses diagnosed by the teacher, the organizer of this training;

6) features of completion of courses, student groups, organized course approach and self-continuous professional development.

N.W.Gruzdeva suggests building the content of training courses for teachers of natural sciences at three levels: the basic training of teachers, which is common to all course participants; a differentiated block built from a system of special courses (or modules) selected depending on the basic education of the students and the selected module of the integrated course; an individually oriented module, within which the training of listeners in the system of individual consultations, analysis of mutual lessons, participation in conferences, various continuous self-development activities, analytical and prognostic work in various forms of diagnostics, etc. [6].

The uniqueness of the program is that its development was carried out taking into account the logical relationship between the content of individual sections and topics. When developing the program, we followed the following basic requirements:

1) that the content of the educational material in the training of natural sciences (Science) teachers is fully consistent with the requirements of the technological model for the development of the educational and methodological preparation of teachers in the teaching of natural sciences (Science);

2) choosing the most important and relevant material for the teacher;

3) coordination between the content of theoretical material and effective teaching of natural sciences (Science) at school, development of 21st century skills in students, practical implementation of integration of natural sciences in teaching.

In developing the science teacher training program, we relied on the general didactic principles of content selection: interrelationship of content with teaching goals and tasks, principles of scientific character, systematicity, continuity, connection between theory and practice. and others. But the specific characteristics of teacher training in the system of professional development make it necessary to take into account certain principles when choosing the content. Among them, we included the following: teaching on a professional and diagnostic basis, connecting oneself with the education of continuous professional development, teaching the creative, critical, logical thinking, communicative potential of teachers. orientation to the development, didactics of teaching based on the constructive approach of the educational content, as well as compliance with modern achievements in the field of natural sciences and natural science education.

Thus, the above bases, criteria, factors and principles of the selection and design of the content of pedagogical education in advanced training courses are aimed at developing the educational and methodological preparation of science teachers on the basis of the integration of

natural sciences. made it possible to develop the "teaching" special course program, curriculum and study guide.

The following structure and content of the special course program was determined based on the components of the selection of the content, teachers' opinions, analysis of the state of science teaching in schools, the state of their preparation for this type of activity, the opinions of the teachers of the natural science departments of the regional centers of professional development (Table 2.2)

*2.2Table*

№	Course content	Hours
1	Theoretical and methodological foundations of interdisciplinary integration in education	4
2	Methodological and didactic aspects of integration of natural sciences in education	6
3	Forming substantive knowledge of science in science teachers based on a constructive approach	6
4	Formation of scientific research skills of science teachers	4
5	Studying knowledge of natural sciences (Science) in a social context	6
6	Improving competence in the use of digital technologies in teaching natural sciences	4
7	The main activity of teachers in the teaching of natural sciences (Science) on the basis of integration	2
8	Assessment of students' knowledge based on the teaching of natural sciences	2
9	Issues of continuous professional development of science teachers	2

Special course program for improving the qualifications of teachers of natural sciences (Science).

The total duration of the special course is 36 hours, and the main tasks of the special course are also defined:

1. To increase the level of psychological-pedagogical, didactic and methodological preparation of science teachers in the teaching of natural sciences (Science) on the basis of integration.
2. Introducing teachers to modern didactic research in the field of science education.
3. To familiarize teachers with the structure, tasks and content of project work, new technologies and teaching models in the context of effective teaching of natural sciences (Science).
4. Improving the necessary skills aimed at the formation of scientific literacy skills in students
5. O‘qituvchilarni tabiiy fanlar (Science) o‘qitishda o‘quv faoliyatini tashkil etishning turli shakllari, ularni amalga oshirish va tahlil qilish metodikasi bilan tanishtirish.
6. Formation of teachers' professional interest in current pedagogical problems.

In this special course program, we tried to consider all the components of the problem of the integration of natural sciences, which serve to form an integrated system of substantive knowledge of natural sciences in the teaching of science and the ability to use them in the practice of teaching science. .

Thus, the special course program helps teachers of natural sciences (Science) master the system of theoretical, methodological and didactic knowledge on the problem of effective teaching of natural sciences (Science) on the basis of integration, and corresponds to the basic requirements for teachers' activities in terms of development of teaching methodical preparation of teachers in teaching practice.

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