METHODS OF IMPLEMENTATION OF INTERDISCIPLINARY COMMUNICATION IN TEACHING MATHEMATICS

Muydinov Khusniddin Nuriddin ugli
1Assistant professor of the Department of social, humanitarian and special sciences, Andijan Branch of Tashkent Institute of Finance, Andijan, Uzbekistan
https://doi.org/10.5281/zenodo.8398156

Abstract: Education in a modern school is implemented as an integral educational process with a common structure and functions that reflect interaction, teaching and learning. The function of learning is a qualitative characteristic of the educational process, which expresses its purposefulness and effectiveness in the formation of the student's personality. Intersubject and intrasubject connections contribute to the realization of all learning functions: educational, developmental and educative. These functions are carried out in interrelation and mutually complement each other. The unity of functions is the result of purposeful construction of the learning process as an educational system.

Key words: Education, integral educational process, interdisciplinary communication, mathematics, students, teaching, condition, mathematical models, programs and textbooks, intersubject and intrasubject connections.

Today, we need such programs and textbooks in mathematics that would effectively differentiate the assimilation of material by students at the mandatory and advanced levels. This is possible due to the implementation in training courses of varying degrees of completeness of intersubject and intrasubject connections. Strengthening intersubject and intrasubject connections should be considered as one of the most important areas of didactic improvement of the mathematics course.[6]

Taking into account intersubject and intrasubject connections in teaching contributes to the systematization and deepening of students' knowledge, the formation of their skills and abilities of independent cognitive activity, the transfer of knowledge acquired at lower levels of learning to higher levels.

Let's define intersubject and intrasubject relations. Communication is the interdependence of the existence of phenomena separated in space and (or) in time.

Interdisciplinary connections play an essential role in ensuring the unity of education and upbringing. They act as a means of strengthening this unity of an integrated approach to learning. The set of functions of intersubject connections is realized in the learning process when the math teacher implements all their diversity. [10]

Intrasubject connections of mathematics are the interrelation and interdependence of mathematical concepts separated by the time of their study. Taking into account intra-subject connections means the expedient organization of the study of interrelated concepts at certain stages of study.

Intra-subject connections are characterized by two main directions in implementation: the first direction is the direction from the initial concepts to the final ones (let's call the connections in this direction sequential); the second direction

is the direction from the final concepts to those initial concepts through which the final ones are realized: the active influence of the final concepts, ideas, methods on the initial concepts, ideas, methods (for convenience, let's call these connections recursive). Intra-subject connections are a combination of successive and recursive connections, supplemented by the relationships between the main lines and ideas of the development of this science.

The role of intra-subject connections in the training course is great, they directly affect the achievement of teaching, developing and educating learning goals. At the same time, intra-subject connections form students' scientific worldview, help to see the world in motion and development, contribute to the establishment of logical connections between concepts, thereby develop students' logical thinking, act as a means of preventing and eliminating formalism in schoolchildren's knowledge, allow them to form such a knowledge system that appears to students not as frozen, but as dynamic, qualitatively changing, reduce the cost of school time, contribute to the elimination of overload of schoolchildren.[7]

Education and training determine the qualitative characteristics of education - the results of the pedagogical process, reflecting the degree of realization of educational goals. The results of education are determined by the degree of appropriation of values born in the pedagogical process, which are so important for the economic, moral, intellectual state of all "consumers" of educational products - both the state, society, and every person. In turn, the results of education as a pedagogical process are associated with strategies for the development of education focused on the future.

The task of teaching mathematics in an educational secondary school is to provide students with solid and social mastery of mathematical knowledge and skills necessary in everyday life, sufficient to study other sciences, to continue their education.

Teaching mathematics should contribute to the formation of students' correct ideas about the nature of mathematics, the essence and specifics of its methods, about the place of mathematics in the system of sciences and its role in science.

The importance of studying mathematics for the general development of students, the formation of their logical thinking skills, the development of spatial representations, imagination, creative thinking is great.

Due to the extreme generality of the reflection of the real world, mathematics finds wide application in practice and in this sense is by its nature a polytechnic science. The polytechnic orientation of the mathematics course provides the content of the program, the nature of the presentation of educational material and the content of exercises, the implementation of interdisciplinary connections.

Interdisciplinary connections, with their systematic and purposeful implementation, restructure the entire learning process, i.e. act as a modern didactic principle.[10]

The principle of learning is the initial guiding requirement for the content and organization of the educational process, resulting from its regularities aimed at

The principle of interdisciplinary connections allows to comprehensively reveal the multidimensional objects of educational cognition and complex problems of

modernity. The principle of interdisciplinary connections as a mandatory requirement for the content and organization of the educational process and cognitive activity of students contributes to:

- formation of systematic knowledge based on the development of leading general scientific ideas and concepts (educational function of interdisciplinary connections);
- development of systemic and dialectical thinking, flexibility and independence of mind, cognitive activity and interests of students (developing function of interdisciplinary connections);
- formation of polytechnic knowledge and skills (educating function of interdisciplinary connections);
- coordination in the work of teachers of various subjects, their cooperation, the development of unified pedagogical requirements in the team, a unified interpretation of general scientific concepts, consistency in conducting complex forms of organization of the educational process (organizational function of interdisciplinary connections).

In the didactic system, built on the basis of the principle of intersubject, all stages (links) of the activity of the teacher and students are rebuilt. The teaching activity of the teacher and the educational and cognitive activity of students have a common procedural structure goal - motive - content - means - result - control. However, the content of these links is different in the activity of the teacher, which has a guiding character, and in the activity of students, which has a controlled character.

Interdisciplinary connections allow us to isolate the main elements of the content of education, to provide for the development of system-forming ideas, concepts, general scientific methods of educational activity, the possibility of complex application of knowledge from various subjects in the work of students.[7]

It is possible to note the following developing possibilities of the lesson with the use of interdisciplinary connections:

Firstly, it allows you to implement one of the most important principles of didactics - the principle of systematic learning (if the complex of educational material corresponds to integrity, structurality, interdependence, hierarchy, multiplicity).

Secondly, it creates optimal conditions for the development of thinking (the ability to abstract, the ability to highlight the main thing, draw analogies, analyze, compare, generalize, etc.), thereby developing logic, flexibility, criticality.

Thirdly, it promotes the development of a systematic worldview, the harmonization of the personality of students.

Also, interdisciplinary connections perform a number of functions in teaching mathematics. These include educational, developmental, educative and constructive.

The educational function of interdisciplinary connections is that with their help, the mathematics teacher forms such qualities of students' knowledge as consistency, depth, awareness, flexibility. Interdisciplinary connections act as a means of developing mathematical concepts, contribute to the assimilation of connections between them and general concepts.

The developing function of interdisciplinary connections is determined by their role in the development of systemic and creative thinking of students, in the formation of their cognitive activity, independence and interest in the knowledge of mathematics. Interdisciplinary connections help to overcome the subject inertia of thinking and broaden the horizons of students.

The educative function of interdisciplinary connections is expressed in their assistance to all areas of education of schoolchildren in teaching mathematics. A mathematics teacher, relying on connections with other subjects, implements an integrated approach to education.

The constructive function of interdisciplinary connections is that with their help the teacher improves the content of the educational material, methods and forms of organization of training. The implementation of interdisciplinary connections requires joint planning by teachers of subjects of the natural science cycle of complex forms of educational and extracurricular work, which presuppose their knowledge of textbooks and programs of related subjects.[10]

The content, scope, time and ways of using knowledge from other subjects can be determined only on the basis of planning. To do this, it is necessary to carefully study the recommendations given by the curricula in the sections "Interdisciplinary connections" for each academic topic of the course, as well as the study of curricula and textbooks of related subjects.

Strengthening the practical orientation of learning, its connection with work, with practice requires teachers of all subjects to pay special attention to the formation of practical skills of students. The teacher in his work focuses on the formation of generalized practical skills with the help of interdisciplinary connections. Such skills correspond to the types of activities common to related subjects. These are the skills of computational and measuring, computational, graphic, experimental, design, applied and labor activity in the subjects of the natural and mathematical cycle. In the subjects of the socio-historical cycle, the practical ones include the skills of speech activity, the ability to work with primary sources, artistic, skills in which practical, cognitive and creative actions are merged. Practical skills characterize the ability of students to apply knowledge in practice, in situations of varying degrees of novelty and complexity. General subject skills are formed on an interdisciplinary basis, when teachers of various subjects impose uniform requirements on students, based on the general structure of skills, the sequence of actions performed and the stages of formation and development of skills (showing a sample of actions, its comprehension, exercise in its application on the material of different subjects, consolidation when performing complex interdisciplinary tasks, in independent works of creative character).

Mathematics penetrates into all areas of science, its practical orientation is important, due to the fact that its subject of study is the fundamental structures of the real world, spatial forms and quantitative relations from the simplest to the most complex. [10]

One of the methods that is used in their lessons in order to implement interdisciplinary communication is the method of expedient tasks. Its essence boils

down to the selection of one or two tasks of interdisciplinary content and their use in the lesson.

The next method is heuristic. With this method, students are given the opportunity to independently draw conclusions, formulate questions, and compose tasks using knowledge of other subjects.

Cross-subject problem questions serve different purposes in teaching. These may be individual situational questions that generalize certain concepts studied in different subjects.

With the help of problematic questions, the teacher can create an intersubject problem situation. Tasks of an interdisciplinary nature encourage students to take a creative approach to choosing a solution.

Thus, interdisciplinary connections are carried out not only in the content, but also in teaching methods and are fixed in the skills of students.[10]

The implementation of interdisciplinary connections in teaching mathematics involves the cooperation of a mathematics teacher with teachers of other subjects, attending open lessons, joint lesson planning, etc.; the implementation of intra-subject connections in the teaching activity of a teacher consists, first of all, in the selection of the material that represents these connections, in the selection of organizational forms, methods and teaching techniques aimed at more successful assimilation of this material.

The implementation of intra-subject connections from the perspective of the student's educational activity consists in his independent work on mastering the connections between the studied parts of the material, on generalization and systematization of knowledge.

References:

1.Antonov N.S., Gusev V.A. "Modern problems of methods of teaching mathematics." - M.: Enlightenment, 1985. p. 201-215

2.Bogolyubov N.N., “On some static methods in mathematical physics”, Lviv, 1945.

3.Krasnov M.L., Kiselev A.I., Makarenko G.I. Ordinary differential equations. Moscow 2009, 259 p.

4.Guter R.S., Yanpolsky A.R. Differential equations, 2nd edition, Minsk, 1965.

5.Gelfand M.B., Berman V.P. Exercises of an interdisciplinary nature to the topic "Derivative". - M.: Enlightenment, 1979. p. 79-88.

6.Muydinov Khusniddin Nuriddin ugli. Methodology and scheme for composing differential equations. International scientific journal “Interpretation and researches” Volume 1 issue 9, p 144.

7. Dalinger V.A. "Methods of implementing intra-subject connections in teaching mathematics." - M.: Prosveshchenie, 1991. p. 83-109.

8. Dalinger V.A. "Geometry helps algebra". //Mathematics at school// No.4, 1996. from p. 59-68.

9. Kolmogorov A.N. "Algebra and the beginning of analysis: Textbook for grades 10-11 of secondary school". - Almaty: Enlightenment - Kazakhstan, 2004. from p. 85-105.

10. Maksimova V.N. "Interdisciplinary connections in the learning process". - M.: Enlightenment, 1989. from p. 17-52.