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Didactic Foundations of Interdisciplinary Connections at Subject Teaching

Key words: *intersubject communication, teaching, concepts, didactics, component, principles, system, knowledge, abilities, activity.*

Annotation: *The article reveals didactic bases of intersubject connections in subject teaching, which allow students to build cognitive activity on the basis of general scientific ideas and methods. And also describes the principles, practical activities of students, the function of information in the process of perception.*

The initial position in the construction of the school subject was identified in the middle of the XX century. M.N. Skatkin saw the role of interdisciplinary connections in providing concentrism and knowledge systems. Concentricism implies "a deeper and more comprehensive coverage of the facts, based on the knowledge acquired by students in this and other academic subjects. Therefore, it would be more appropriate to compare such a construction of programs not with concentric circles lying in the same plane, but with movement upward in a spiral". This spiraling upward movement in the knowledge system is largely provided by the multilateral connections of facts, concepts, theories, and ideas studied in various academic subjects. The concept of an academic subject is, on the one hand, narrower than the fundamentals of science, as it includes only the foundations that meet the goals of general education, and, on the other hand, it is broader, since it contains purely pedagogical means of learning them. Interdisciplinary communication allows students to build cognitive activity on the basis of general scientific ideas and methods. They form the general abilities to study and reveal the general principles of the construction of science (1). Modern didactics is based on the principle of a holistic reflection of science in the content of education: as a system of knowledge, as an activity, in the unity of theory and method, and as a system of its relations with other forms of social consciousness and practice. Science is the result of knowledge, and the activity of acquiring new knowledge. The subject matter is the unity of knowledge, methods and relationships that are formed in students in the process of studying a particular science, branch of human activity. Consideration of a school subject at the abstract level in the form of a generalized model of knowledge, as if "taken out", isolated from activities and the learning process, allows to isolate in it the composition of knowledge: about the object, ways of activity, about values. The basis of these types of knowledge are the following functions of information in the process of human perception: epistemic, revealing the essence of an object, scientific knowledge about it in order to show the subject that there is a given object; instrumental, showing how knowledge of the object, methods of knowledge are established; motivational - evaluative, revealing the value essence of knowledge about an object from the standpoint of the ideology of society, the scientist's worldview, human needs, as a result of which the subject learns why it is necessary to study this object.

Each element of the information structure of the school subject, as shown by the research problem, can serve as an objective basis for interdisciplinary connections in the content of training. In turn, reflecting inter-scientific ideas, they are the source for constructing the content structure of educational material, introducing “inter-scientific components” into it. So, interdisciplinary communication is a factor of formation of the content and structure of an academic subject that is particularly significant in the modern context of scientific integration, and the structure of the academic subject itself serves as one of the objective sources of the diversity of their types and functions. In the traditional division of science into humanitarian, natural, technical, object-subject relations between them are reflected. This separation is enshrined in the cycles of school subjects, which are grouped according to the commonality of the objects of study - society, nature, labor. At the same time, there are intra-cyclic and inter-cyclic connections that systematize the knowledge and skills of students around common objects of knowledge. The consistent improvement of school curricula is aimed at creating a system of mutually agreed upon and mutually complementary subjects. Each school subject has an internal logic of construction, its structure, the violation of which, to please only interdisciplinary connections, can lead to breaking the intra-subject relationship of concepts, the system of subject knowledge, without which there can be no solid mastery and ideas of related subjects. The subject of study is inseparable from educational activities. Many researchers see the essence of learning activity in students' assimilation of objective products of social experience. The essential products of this experience are general scientific concepts and concepts that modern schoolchildren need to learn through interdisciplinary connections. Cognitive activity is focused on the "discovery" of new knowledge and methods. The result of educational activity consists in changing the actor himself, the student. The result of cognitive activity is associated with a change in the ideal images of objects of knowledge. In learning, both results are inseparable, since the change of ideal images takes place in the mind of the student, rebuilding his knowledge, attitudes, ways of activity (2). Therefore, learning activities in education develops into educational and cognitive, into synthetic activities, combining learning and cognitive objectives. Cognitive activity is aimed at transforming the images (concepts, theories, laws) of the objects of the real world that were previously formed in the mind of the student, which is achieved in the process of mastering new knowledge and ways to get it. The operation of knowledge is accomplished in the inner plan, and the student’s cognitive activity is theoretical. Cognitive skills acquired by students under the influence of interdisciplinary connections become generalized, general subject and interdisciplinary. The practical activity of students is the study and transformation of real objects through the application of scientific knowledge in order to obtain new facts, empirical conclusions or materialized products of activity. Practical activity of students is implemented in specific forms: labor, physical, constructive - technical, calculation and measurement, computational, experimental, visual, speech. By practicing, students learn the rules of action. Algorithms of operations and related skills. Value-orientation - this is the evaluation activity of students. It is accomplished in the process of assimilating the valuable aspects of knowledge, ideological ideas, and the links between science and ideology, which serve as reference points in the educational activities of students in teaching all academic subjects. Educational activity also has specific methods of study, forms the skills of independent work with the book, necessary for self-education, and also creates sources of interdisciplinary connections in the line of general educational skills - organizational-cognitive, bibliographic and others. Considering learning

activity as a system of activities, we should not forget about the dialectic of the relations “activity” - “action”. In the process of learning activities, students can perform cognitive, practical, value - orientation activities that meet the particular goals of mastering the system of subject knowledge. "The shift of motive to the goal" was considered as the main mechanism for the emergence of a new activity of the subject. The emergence of appropriate motives and needs among students determines their inclusion in cognitive, practical, “value-oriented” activity, when knowledge of the new, methods of action, value aspects of knowledge become special objects of study and independent objects of activity. The implementation of interdisciplinary relations sets the task of studying the activities of students in the assimilation of these relations. There is a new component of educational activity - "interdisciplinary". Inside the cycles of subjects, "cyclic" skills are born, in which general scientific knowledge, concepts, methods of their acquisition and means of expression are intertwined most closely. The morphological division of skills in accordance with the content of knowledge and their respective activities intersect with their functional division into reproductive, exploratory, creative and interdisciplinary, which reflect a different level of formation of students' skills in the process of educational and cognitive activity. Studies in the field of the formation of students' skills based on interdisciplinary connections revealed the interaction of common, particular, and individual components of actions in skills of different levels of generalization. Interdisciplinary skills - this is their functional quality, acquired in the process of transferring and generalizing methods of action from different academic subjects. Interdisciplinary as the quality of knowledge and skills reflects their genesis, the origin in the process of scientific integration, the generation of new knowledge and methods at the interface of different sciences.

Interdisciplinary skills are the ability to transfer knowledge and skills in student - related issues and to connect and absorb the generalization process (3).

Thus, a school subject and a learning activity are the didactic foundations for the definition of interdisciplinary connections precisely because they, as system objects of the learning process, are a unity of the general and the particular. The commonality of the structural components of academic subjects and educational activities serves as a source of interdisciplinary connections in the learning process. Comparison of the main types of knowledge in the structure of the academic subject and in the structure of the educational activity of students reveals their definite analogy. Therefore, interdisciplinary communication in training can be carried out in the following main areas: the formation of the necessary systems for the formation of a student’s worldview of concepts based on scientific facts, theories, laws, ideas common to related scientific fields; the formation of common skills for adjacent subjects, and above all the elementary ones on which more complex methods of assimilating the ideological connections between objects are based; the formation on the basis of generalized skills of a true evaluative attitude to subject knowledge, in which interfacial relations and worldview educational problems are of particular importance; the formation of polytechnic knowledge and labor skills that require the integrated application of basic knowledge of science in practice.

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