



Interdisciplinary Relations As A Factor For Improving The Professional Competence Of The Future Engineer

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ABSTRACT

The article deals with the issues of improving the professional competence of future engineers related to the application of intellectual abilities in higher education institutions on the example of the specialty.

KEYWORDS

Youth, teaching, knowledge, education, upbringing, future, professional, engineering, computer graphics, design, competence, integration, intellectual, intellectual, practical, creative, cognitive, future, ability, efficiency.

INTRODUCTION

Nurturing qualified personnel for the future has always been one of the top priorities of every state. In our country, too, such work is constantly in the spotlight of the leaders of our

state - we can say the same truth. As the President said: "If we do not bring up our children properly, if we do not pay attention to their behavior every day, every minute, if we do

not teach them science, if we do not find a decent job, we will lose this deposit."¹

The Decree PF-6108 "On measures to develop education and science in Uzbekistan in the new period of development" signed by the President on November 6, 2020 also states that "with new initiatives and ideas for the development of the country, , training of a new generation of high intellectual and spiritual potential, the formation of the necessary skills and knowledge for graduates of educational institutions to become modern professionals "is one of the main directions in this area."²

1. Mirziyoev Sh. Let us be more united and work resolutely for the fate and future of our country. // "Xalq so'zi" gaz., 2017, June 16.

2. Decree of the President of the Republic of Uzbekistan "On measures for the development of education and science in the new period of development of Uzbekistan." T., November 6, 2020 PF-6108

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increase in the effectiveness of "Engineering and Computer Graphics". Therefore, the main issue in the field of education today is the training of qualified teachers who are well versed in the methods and forms of education and can easily apply them in practice. Because educating students, the personality of the teacher and his or her activities are of particular importance in directing them to the engineering profession. Consequently, nothing else can overwhelm the teacher-led open communication-style learning process. Therefore, improving the quality and effectiveness of education is an important factor in the training of qualified teachers, to improve their professional skills.

Interdisciplinary communication in teaching is the use of knowledge and skills acquired in the study of one subject to apply another. A student with the necessary knowledge in different and interrelated subjects consciously chooses what is most needed in drawing. It is a complex multifaceted process of synthesizing knowledge through objectively existing event-analysis of the creative transmission of knowledge and practical actions. Creative processing of knowledge, evidence, concepts, and calculations known from courses in other disciplines is required from the student to solve the problem of the graphics task.

Comparison, analysis and generalization of necessary data and actions lead to the formation of elements of creative research, the choice of rational methods of work. Implementing the science of graphics in the context of interdisciplinary communication is a common method of graphic activity used in solving common problems.

The concept of "interdisciplinary relations" is a purely pedagogical term. According to a number of authors, it serves as one of the principles of didactics, an expression of the existing laws of the objective world, and because of its philosophical and didactic meaning it influences the content, methods and form of teaching in a certain way. This influence is so wide that it can be used not only in teaching all subjects of the faculty, but also in the preparation of curricula, methodical manuals and teaching students in general is also reflected in the development. Researchers define interdisciplinary relationships as one of the principles of didactics and include them in the list of well-known principles of didactic teaching.

Therefore, the system is considered as interdependent internal knowledge not only in the context of a single science, but also in the context of a particular cycle of sciences and the relationships between different cycles. Understanding the real system, as well as real knowledge, is not possible without interdisciplinary and sequential connections. Interdisciplinary relationships, acting as one of the didactic conditions for achieving a set goal, realize understanding. Regular implementation of conscious actions improves knowledge, leads to the generalization of practical actions, the ability to apply knowledge creatively in specific situations.

The implementation of interdisciplinary links leads to the formation of an overall view of the system. The use of theoretical and practical knowledge leads to the solution of various educational and practical tasks, the formation of general methods of mental activity, and,

consequently, to the improvement of the quality of knowledge through special training.

The qualitative aspect of interdisciplinary communication is the acquisition of skills of event analysis in a comprehensive study from the perspective of different disciplines. This ensures the formation of elements of a creative approach in the performance of the task and subsequent professional activity, the desire to increase knowledge.

If the study of "Theoretical Mechanics" allows you to better understand the interrelated principles of any engine parts, the structure of engine parts, which will be discussed in the course "Fundamentals of Theory of Internal Combustion Engines", students' knowledge will expand and deepen. and Computer Graphics " There are attempts to define the role of interdependence theoretically and aesthetically. In terms of graphics and methodological preparation, much less research has been done. Such research is not available at all for the specialties of the faculties of mechanics and engineering-construction faculties of higher educational institutions.

The urgency of the problem of interdisciplinary relations is related to the integration and differentiation that leads to the emergence of different disciplines, complex problems, general scientific concepts.

We move on to the most common definitions of integration and differentiation given in the literature. Integration is the aspect of the development process that involves combining parts of previously scattered elements into one whole. Differentiation is the aspect of the development process associated with the

division of a developing whole into parts, stages, levels, divisions (5,6,7,8). Integration is a leading trend in the development of scientific knowledge in modern conditions. It manifests itself in the synthesis of previously developed knowledge in the emergence of new knowledge that increases the effectiveness of scientific research.

The integration and differentiation of scientific knowledge is reflected in the structural and procedural aspects of education. The integration process in educational institutions cannot be carried out separately from the theory of well-developed and well-organized interdisciplinary relations. However, the theory of interdisciplinary relationships must be significantly linked and supplemented by a specific learning process for a particular specialty.

In our view, interdisciplinary relations are a reflection of dialectical relations that function objectively in nature within the disciplines and are recognized by modern sciences, so interdisciplinary relations should be considered as the equivalent of "scientific relations".

It should be noted that in the pedagogical literature as a pedagogical category there is a variety of knowledge on the problem of interdisciplinary relations.

VA.Usova: "First of all, it is necessary to determine which didactic category of interdisciplinary relations. What is interdisciplinary relations: teaching methodology, form of teaching or didactic assimilation?" (21), he writes.

I.D. According to Zverev, the problem of interdisciplinary relations stems from the following systems of didactic principles:

"Interdisciplinary relations, defined by the nature of each subject, require the creation and selection of materials, such as the optimal goals of education and optimal consideration of educational issues, the harmonization of educational content in different subjects (20).

In the works of V.A.Usova (21) the problem of interdisciplinary relations is fully analyzed. He clarified the essence and content of interdisciplinary communication, highlighted the main directions of teachers' activities on the implementation of interdisciplinary communication, described the tools and methods of interdisciplinary communication, considered some types of training in which interdisciplinary communication is fully implemented. Interdisciplinary links "The didactic conditions for raising the level of knowledge of the requirements, the role of teaching their thinking, the development of positive abilities, the formation of scientific outlook, optimization of the process of knowledge acquisition, the formation of cognitive skills and, finally, the improvement of the learning process.

There are different approaches to the classification of interdisciplinary relations in the pedagogical literature. The classification of interdisciplinary relationships is based on temporal and informational criteria. Based on the temporal criterion, they identified chronological relationships that appear in the form of previous, companion, and prospective relationships. Depending on the information criteria, there are real, comprehensible and theoretical interdisciplinary connections.

Based on the above, in the classification of interdisciplinary relations, we have identified three types of communication based on the

general structure of academic disciplines and the structure of the educational process:

- structural information;
- operational activities;
- organizational and methodological.

We identified four different relationships based on the content of the teaching materials and the scientific knowledge and mental activity methods used:

- On the generality of theories, laws, concepts;
- On the generality of scientific factors related to the same object of study;
- General use of the method;
- On the generality of the methods of mental activity.

Analyzing the learning process in the study of the implementation of the functions of interdisciplinary relations, we identified the following didactic functions of interdisciplinary relations:

- Coordinator (coordination of information on the content and timing of reading in different disciplines);
- Formative (dialectical and materialist worldview, scientific view of the world, natural scientific concepts, knowledge and practical skills and knowledge);
- Systematizer - the formation of a system of scientific knowledge.

It should be noted that didactic and methodologists have focused on the analysis of the systemic function of interdisciplinary relations.

Thus, one of the main didactic conditions that can significantly increase the level of

professional competence of a future engineer is the implementation of didactic-based structured relationships, or as they are called, "interdisciplinary relationships", and we have identified the following ways of interdisciplinary communication:

- Confidence in previous knowledge in the study of other disciplines in the process of formation of new knowledge;
- Research of previously acquired skills in the study of other disciplines;
- Solve tasks that require a comprehensive application of knowledge in the study of various disciplines;
- Disclosure in the process of providing material on the relationship between the events studied in other disciplines and the events studied in this discipline;
- Use in explaining events and features.
- For their specialties on the subject "Engineering and Computer Graphics" we have developed methods and tools for interdisciplinary communication. In improving the professional competence of future engineers in the implementation of interdisciplinary relations, we identify the following areas:
 - Coordinate the teaching of different subjects, taking into account that the study of some subjects helps to prepare others for learning;
 - Continuity in the development of scientific concepts and the formation of generalized skills and abilities of students;
 - Unity of requirements for the acquisition of knowledge and general skills and abilities;
 - Extensive use of knowledge, skills and abilities acquired in the study of other disciplines in the study of one subject;

- Eliminate duplication in the study of the same tasks in different subjects;
- Demonstrate the generality of research and analysis methods used in the teaching of various disciplines, reveal their specific features.

In our opinion, one science uses information acquired by a future engineer from another science. The future engineer must have a deep connection between the disciplines studied in collaboration to create common, interdisciplinary concepts. By complementing the other disciplines of the program, a single discipline should develop some concepts, or group of ideas, in a new enriched and modified form and transfer that knowledge to related academic disciplines.

The requirements for interdisciplinary communication, in our opinion, are of great importance for the subject of "Engineering and Computer Graphics", which is included in the curriculum along with other disciplines.

In order to implement interdisciplinary communication by improving the professional competence of the future engineer, we need to put into practice the following:

1. The interdisciplinary lesson should have a clearly defined educational and cognitive function, to solve it it is necessary to involve knowledge in other disciplines.
2. In the interdisciplinary lesson should be provided high activity in the application of knowledge obtained from other disciplines.
3. The implementation of interdisciplinary relations should be aimed at explaining the cause-and-effect relationship, the essence of the studied phenomena.

4. An interdisciplinary lesson should have a worldview, generalized conclusions based on the connection of the tasks of different disciplines.
5. The interdisciplinary course should arouse students' interest and positive attitude towards learning the connection between knowledge and other courses.
6. The interdisciplinary lesson should always be aimed at generalizing some parts of the teaching materials of different courses.

It should be noted that the problem of purposeful synthesis (analysis) of various interdisciplinary knowledge in the disciplines is not solved by fragments of interdisciplinary relations in the course of lessons.

In our study, we identified three levels of implementation of interdisciplinary relationships: low, medium, and high. In our opinion, a small amount of knowledge is realized at the high and medium level of implementation of interdisciplinary relations. In many cases, the level of interdisciplinary communication in the classroom is low. The reason for this situation, in our opinion, is that the existing programs, textbooks, manuals do not fully take into account the requirements of the specialty, the inability of teachers to make connections between subjects.

In our opinion, to ensure a high level of teaching, it is necessary to use various forms of interdisciplinary communication to increase the professional interest of students: the publication of generalized seminars, interdisciplinary conferences, interdisciplinary optional courses, interdisciplinary methodological developments. All of this work requires the development of a methodology for their preparation and implementation.

There is a need to develop the theoretical foundations of new forms of knowledge in which the synthesis of knowledge in different disciplines can be further expanded. There are several ways to solve this problem:

Transfer of integrated knowledge and other types of training to the educational process of technical universities of the republic without changes, using existing foreign experience;

Carrying out independent research on the organization and conduct of excellent training for the university, taking into account the established educational traditions using the theory of interdisciplinary relations;

Taking into account the experience of interdisciplinary communication by teachers of other educational institutions.

CONCLUSION

In our research, the analysis of the current state of implementation of the improvement of the professional competence of the future engineer of interdisciplinary relations showed the following:

To solve the problem of interdisciplinary relations, methodological research leads to the conclusion that it is necessary to develop a methodology for teaching specialty subjects on the basis of interaction with the subjects studied by future engineers (students) of 1st and 2nd courses;

Curricula of higher education institutions do not provide for the implementation of large-scale interdisciplinary links: planning the study of specialty subjects is carried out unsupervised in the educational process without taking into account the subjects

studied in previous semesters, which leads to duplication of teaching materials;

The disadvantages of the existing programs are that they only allow for indirect communication with certain technical disciplines, which does not help to increase students' knowledge and skills in descriptive geometry and engineering graphics;

The experience of the departments engaged in graphic training has shown a one-sided implementation of the principle of interdisciplinary relations, which is closely linked with the didactic principles;

Textbooks on graphic sciences developed by university teachers do not adequately reflect interdisciplinary connections.

The future engineer should be able to apply a set of knowledge in various disciplines in their professional activities. In our opinion, interdisciplinary communication represents the process of union of academic disciplines, reflecting the unity of professional activity, continuous and holistic phenomena, and defines interdisciplinary integration as a process of combining academic disciplines on the basis of light knowledge and technological problems. For us, the goal of education is to create a broad interdisciplinary interaction of all disciplines of the interdisciplinary integrated educational program, represents a set of principles and meanings. Therefore, training a future engineer begins to develop his professional competence in the first stage of professional knowledge and is aimed at making rapid optimal decisions in any complex professional situation, in which the formation of skills to perform certain actions

independently can be achieved through interdisciplinary communication.

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