METHODOLOGY FOR DEVELOPING STUDENTS' SPATIAL IMAGINATION (BASED ON A MODULAR-COMPETENCY APPROACH)

Khalimov M.K. – Associate professor, PhD,
Nizami Tashkent State Pedagogical University

Abstract: *This article discusses the specific features of developing students' spatial imagination on the basis of a modular-competency approach, as well as related methodological recommendations.*

Keywords: *modular, competency, education, imagination, approach, thinking, space, spatial imagination, perception, drawing, methodology, knowledge, skills, abilities, concept, literacy, features, problem situation.*

imrconf.com

It is well known that, on a global scale, particular attention is being paid to the creation of an educational environment based on advanced foreign experience in teaching technical sciences - specifically, descriptive geometry and engineering graphics - aimed at developing creative competencies in future technology education specialists and at developing their spatial imagination. In particular, developing a methodological system for enhancing students' spatial imagination in creating drawings of simple and complex objects has become especially relevant. These factors make it imperative to develop a scientifically grounded methodology for teaching descriptive geometry and engineering graphics, and for directing students toward independent creative activity and scientific research.

Within the framework of reforms in Uzbekistan's education system, the Concept for the Development of the Higher Education System until 2030 identifies as a priority task “the acceleration of the processes of studying and applying advanced foreign experience in improving the quality of education,

and the improvement of teaching methods."[1] In teaching descriptive geometry and engineering graphics, the modular-competency approach is one of the important tasks: saving time spent on mastering educational material and facilitating student comprehension through the ease of topic explanation.

Furthermore, the relevance of developing the conceptual foundations for implementing the modular-competency approach is connected to the need to create common logic and transparency in designing modular learning materials for developers and consumers of this scientific and methodological product in the vocational education system, as well as to develop an effective technology for designing educational programs based on the modular-competency approach.

The analysis of research enabled the identification of the following contradictions that give rise to problems:

Between the growing demands of the labor market for training qualified specialists in the form of competencies, and the weak development of corresponding conceptual approaches that ensure the achievement of vocational education and training outcomes such as professional competencies;

Between the objective need to increase the flexibility and effectiveness of vocational training, and the lack of modern pedagogical tools to address this problem.

The modular-competency approach in vocational education is a model for organizing the educational process in which a set of professional competencies of the student serves as the goal of teaching, and the modular structure of the content and organization of vocational education serves as the means of achieving it.

An educational program based on the modular-competency approach (modular educational program) is a document (set of documents) reflecting the

[1] Decree of the President of the Republic of Uzbekistan on the Approval of the Concept for the Development of the Higher Education System of the Republic of Uzbekistan until 2030. PF-5847. October 8, 2019. National Database of Legislation, 09.10.2019, No. 06/19/5847/3887.

imrconf.com

content of vocational education and consisting of a set of modules aimed at mastering specific professional competencies required for qualification.

Theoretical and methodological conditions for the topic: developing a competency-based modular approach to training future technology teachers in pedagogical universities, oriented toward quality criteria. It consists of six points: (1) Analysis of problems in teaching the subject and ways to solve them; (2) person-centered approach methods; (3) key aspects of teaching; (4) competency approach; (5) criteria for teaching quality; (6) principles of the modular approach; and the general rules for analyzing problems in teaching the subject for a future technology teacher in a higher pedagogical institution. It also identifies the methodological foundations of the modular-competency approach methodology, as a combination of the foundations of the competency approach oriented toward quality criteria, in which the set of professional competencies of the student serves as the goal of teaching, the means of achieving it being the modular structure of content and the structure of instruction, taking into account the main component as the basis for professional growth throughout life.

The organization of the educational process is considered as a module, which includes an action program and method aimed at ensuring the achievement of indicative didactic goals (P.L.Yusevichene). The educational process is organized using modular technology as a principle of organization, and the author also emphasizes:

The principle of structuring the didactic goals of the module;

The principle of dynamism;

The principle of effectiveness and efficiency;

The principle of flexibility;

The principle of conscious perspective;

The methodological principle of consultation;

imrconf.com

The principle of equality (S.I. Podmazin, M.B. Lebedeva, T.A. Gudkova).

Based on the theoretical and methodological conditions, the author combined the conceptual foundations of the competency approach. The method of forming the principles of modular education defined the professional competencies of the future technology teacher and the general rules of the subject teaching process. The competency-module approach, in which goals and outcomes are expressed, is the level-based structure of forming professional competencies, based on the concept of person-centered education.

In implementing the personal-activity approach in education, attention is focused on teaching methods and forms. In the developmental education model, creating problem situations, searching, and researching are effective methods. The leading concepts of the theory of problem-based learning are: problem situation, state of a problem, and educational problem. By educational problems is meant the reflection of the logical-psychological contradiction in the process of assimilation, determining the direction of mental search, studying (explaining) the essence of the unknown, and awakening interest in learning new methods of activity.

A problem situation arises when a person does not understand something or is deprived of knowledge or methods of action for an activity. Getting out of it has its own value in learning. The decision taken to solve the problem is converted into a problem task in verbal form. Problem-based learning frees itself from the passivity characteristic of many educational methods, since problem situations involve the personality of the learners.

A number of scholars (D.B.Elkonin, V.V.Davydov, G.A.Ball, V.I.Zagvyazinsky, V.V.Serikov and others) believe that all educational activity is presented as a system of learning tasks that help students understand what is unknown to them and learn new concepts and methods of activity.

imrconf.com

In connection with the study of the problem of organizing graphic activity, we often use the term “task.” Since there is no precise interpretation of the concept of “task” in any field of science, it became necessary to study its essence. “V.V. Yudin in his works considers this problem unjustified.”[2]

The author focuses on the didactic aspects of this concept, which allows formulating definitions that encompass the most important aspects of the task.

From a psychological point of view, the definition of the concept of “task” describes human activity in certain directions. A task is a goal defined in relation to the means necessary to achieve it. In such a situation, the means available to a person are needed to achieve it. Such a description of the task mainly corresponds to the definition proposed by A.N. Leontev: “a task is a goal given in certain conditions.”

A narrower definition of the concept of "task" is carried out not in connection with human cognitive activity in general, but only when the cognitive process has an independent goal. The concept can be used as a “technical specification” describing its content. To define the concept of “task,” we clarified its structural composition. All researchers solve the research problem differently.

“Thus, Sh.Abdullayeva describes it as: “the subject of the task” and “the requirement of the task, a model of the necessary state of the task.”[3]

“T.K.Musalimov defines it as follows: a) objects in the field of science envisaged in the task; b) relationships connecting the field of science; c) the requirement of the task needed as a result of solving the problem; d) a set of

[2] Adolf V. and Stepanova I. // In the article 'Designing the Educational Process Using a Competency-Based Approach,' the methods of developing a competency-focused educational process were examined, published in the journal 'Higher Education in Russia,' 2008, No. 3, pp. 158-161.

[3] Abdullayeva Sh.M. Pedagogical foundations for diagnosing the level of upbringing of adolescents and correcting deficiencies in their behavior // Dissertation for the degree of Doctor of Pedagogical Sciences. - Tashkent, 2005. - 325 p.

imrconf.com

actions needed to perform the activity."[4] In each educational session the following must be distinguished: a) requirements ensuring the correct solution; b) objects defining the conditions of the problem; c) their functions; d) instructions on methods and means of solution.

"Taking the above into account, it is necessary to recognize the concept of "task" (as a means of teaching) proposed by Yu.S.Tyunnikov - as a situation containing a contradiction between data and requirements, and its resolution."

In most literature, the concepts of "task," "question," and "assignment" are often confused. For example, a task is understood as a question requiring solution based on some knowledge or idea. A task requires the performance of some cognitive activity. These concepts must be distinguished. "…tasks have commonality with questions, but at the same time differ significantly from them. They require not only a question but also content for obtaining specific information, as well as for solving a problem"; analyzing the second meaning of the question, "a task requiring solution" considers the question a qualitative task.

"The same point of view is advanced by J.Delors." "A question may require general calculations, but never numerical calculations and practical work."[5]

At this point it is particularly important to note that, as N.V. Sosnin has observed, the discovery of digital technologies and the continuous improvement of computer programs undoubtedly indicates that this will require not hundreds of years, but several decades.[6] As a result, today any drawing of any complexity and large scale that was previously created by the manual labor

[4] Musalimov T.K. Theoretical and methodological foundations of professional-graphic training of teachers of drawing and fine arts in a pedagogical university [Electronic resource]: Dissertation for the degree of Doctor of Pedagogical Sciences: 13.00.08. - M.: RSL, 2005. 250 p.

[5] Godwin, A. Kara. 'The Alternative Story: A Critical Examination of Liberal Education in a Global Setting.' New Global Studies 9 (2015): 223-243.

[6] Dilshodbekov Sh.D. Descriptive Geometry and Engineering Graphics (textbook). 'TSPU Risograph,' 19.3 p.a., Tashkent-2023.

of a specialist is now being prepared using special computer programs (in particular, the relatively uncomplicated KOMPAS, INVENTOR, AutoCAD (2D drafting), the somewhat more complex T-FLEX, SolidWorks, AutoCAD (3D drafting), Pro-Engineer, CATIA V5, NX) according to the CDIO (Conceive - Design - Implement - Operate) principles.

In the process of forming knowledge and skills and developing spatial imagination, it is necessary to subsequently expand existing knowledge and apply it in the process of solving educational problems.

"In the content of the model for developing spatial imagination of future technology education teachers, priority teaching methods, forms of higher education institutions, collective forms, and priority importance are given to students' individual activity."[7]

The conditions for organizing personal-activity educational technology (student - subject of education; teacher - organizer of students' educational-cognitive activity; subject-subject interaction, cooperation; constant involvement of students in activity (analysis, generalization of evaluations, etc.)), methods (activation, encouragement to learn, motivation; reproductive, partially search-based, problem-based, heuristic, research; practical; independent work; deductive; self-monitoring) and forms (collective-group; non-traditional; role-playing games; discussions; brainstorming; completing tasks and others).

The process of developing students' spatial imagination on the basis of the modular-competency approach consists of the following stages: defining the goal, improving the content, and evaluating the results. The structural framework of developing students' spatial imagination consists of motivational, value-based, cognitive, practical-activity, and reflective-creative components.

[7] Nigmatjanova G.Kh. The essence of the concepts 'competence' and 'competency' // https://web.snauka.ru/issues/2013/11/28698

imrconf.com

In personal-activity learning, the independent and practical work of students plays an important role; in this process, they not only apply knowledge but also pass through stages of its acquisition: sensing, understanding, and passing through problem situations. They are widely used as a means of enabling students to draw independent conclusions and of introducing research elements into instruction in various organizational forms of education.

REFERENCES

1. Muslimov N.A., Rakhimov Z.T., Khujayev A.A. Professional Pedagogy. Textbook. Tashkent: 'Voris' Publishing House, 2020. 517 p.
2. Yadgarov N.D. Improving the methodology for developing professional skills of future drawing teachers // Tashkent-2023: Dissertation for the degree of Doctor of Pedagogical Sciences (DSc), 200 p.
3. Moxir, X., Nurbek, A., Qudrat, B., Elbek, X. J., & Boburmirzo, K. K. (2020). Chizmachilik va chizmageometriya fanlarida burchak topishning bazi usullari. Физика математика фанлари журнали, 4(1), 47-52.
4. Tursunbaev, S., Ashirbaev, A., Valiev, A. Z., Xalimov, M., & Tashimov, N. (2023). The effect of the amount of lithium in aluminum lithium alloys on the property of fluidity. In E3S Web of Conferences (Vol. 417, p. 04010). EDP Sciences.
5. Xalimov, M. K., & Asanova, A. S. (2022). CHIZMA GEOMETRIYA VA MUHANDISLIK GRAFIKASI FANIDA DIDAKTIK O'YINLARDAN FOYDALANIB TALABALARNING DASTLABKI TUSHUNCHALARINI SHAKLLANTIRISH. In International journal of conference series on education and social sciences (Online) (Vol. 2, No. 1).
6. Xalimov, M. K. (2021). Innovatsion yondashuv asosida o'quvchilar faolligini oshirish (aksonometrik proeksiyalar mavzusi misolida). In International journal of conference series on education and social sciences (Online) (Vol. 1, No. 2).

imrconf.com

7. Karimovich, K. M. (2022). Elements of student space imagination in the teaching of graphic sciences and methods of using it. CURRENT RESEARCH JOURNAL OF PEDAGOGICS, 3(02), 103-116.

8. Xalimov, M. K. (2025). MODULLI KOMPETENTLI YONDASHUV TALABALARNING FAZOVIY TASAVVURINI RIVOJLANTIRISH OMILI SIFATIDA. Inter education & global study, (2), 221-230.

imrconf.com