



FUNCTIONAL-STRUCTURAL MODEL OF FORMATION OF HYPOTHETICAL THINKING IN STUDENTS

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ABOUT ARTICLE

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Abstract: This article is an analysis of the theoretical foundations of the development of a functional-structural model of the process of forming hypothetical thinking in students of technical specialties. The first stage of developing the model involves the identification of interrelated components, including necessary and sufficient elements aimed at achieving the planned result - a transition to a higher level of formation of hypothetical thinking in students. The next stage is the graphic construction of the model, which consists in combining all its elements and visually reflecting the order of interaction of its components.

INTRODUCTION

First of all, it is necessary to note the modern predictive, organizational and innovative significance of modeling in education and pedagogy in general.

The theory of pedagogical modeling has been developed in the works of a number of researchers and scientists.

This article uses a general scientific concept of a model - an artificially created object in the form of a scheme, physical construction, a specific form or formula, which, being similar to the object (or phenomenon) under study, reproduces the structure, properties, interactions and relationships between the elements of this object in a simpler and more crude form.

It is not for nothing that in recent years, the modeling method has attracted the attention of many researchers in many pedagogical studies. Modeling pedagogical systems that meet the new value priorities of higher education is considered one of the most important tasks of modern pedagogy and psychology.

The predictive role of modeling is emphasized: "... modeling allows you to study the process before it is implemented, while at the same time it is possible to identify negative consequences and eliminate or change them before they occur. This allows for a more holistic study of the process, since it is possible

to see not only the elements, but also the connections between them, to consider the situation from different angles.

The organizational role of modeling in pedagogical modeling provides a purposeful, technological description of research activities. Modeling in education can be defined as the study of intrapersonal and interpersonal processes and situations using their real (physical) or ideal models.

The innovative significance of pedagogical modeling is defined as follows: the model "... should provide fundamentally new information, reflect the most important properties of the object, show the structural, functional-content properties of the object [1].

The need to model the process of forming hypothetical thinking in students of technical specialties in the educational process is determined by the need to comprehensively describe the educational process in the form of a system of interconnected elements, to substantiate the theoretical content of the process under study, to identify pedagogical conditions that ensure the achievement of the planned result, and to develop diagnostic tools to confirm or refute the formation of hypothetical thinking.

In accordance with the purpose of modeling the process under study, the following tasks were set: to identify methodological approaches and principles derived from them necessary to substantiate the process of forming hypothetical thinking in students of technical specialties; to develop and implement an appropriate model, identifying the components, their content and relationships.

Pedagogical modeling is aimed at changing the qualitative and personal characteristics of students of technical specialties, and made it possible to imagine and materially present the controlled educational process in the form of a model.

The functional-structural model of the formation of hypothetical thinking in students of technical specialties was developed through a logical, theoretical, hypothetical and analytical structure, which includes, respectively, target, content, procedural and result blocks.

The design of the functional-structural model of the formation of hypothetical thinking in students of technical specialties was carried out taking into account educational and professional standards.

The logical structure of the target block of the model includes state and social orders determined by the need to train qualified specialists who are ready to prevent risks in the professional sphere. The purpose of the modeled process is to develop the need to ensure safety and comply with laws and regulations on risk prevention in the spiritual interrelation of the values of safety culture.

The methodological basis of the study was determined by the competence, activity, axiological, hypothetical approaches and the corresponding basic principles (value orientation, integrativeness, subjectivity, self-expression).

The competence approach is used as the main one in many scientific sources, regulatory documents, and professional education. This approach emphasizes not only the set of learned information, but also, first of all, the educational outcome, focusing on the preparation of a qualified specialist who is ready to prevent risks in typical and non-standard situations in the professional sphere.

The competent approach defines educational goals that correspond to the spirit of the modern era, among which the following can be distinguished: learning, self-determination, self-activation, individual socialization and development.

The instrumental means of achieving these goals are competence, competencies, and meta-qualities.

In our article, the competent approach serves as the basis for determining the process of forming the content of hypothetical thinking of students of technical specialties in order to improve and apply knowledge for acting in hazardous working conditions, to adhere to a safety culture, to develop thinking aimed at eliminating it, and to strengthen positive motivations through reflection.

The competent approach was used in an integrative manner, which is significant for the context of the study. In this case, it is necessary to develop knowledge in the field of ensuring safety and preventing risks, to develop recommendations established in educational and professional standards, to form skills and qualifications for eliminating dangerous situations. As a result, the hypothetical thinking of students is formed and the transition to a higher level is ensured.

The active approach allows us to confirm the need for active cognitive educational activities, which are managed as the “main means and condition for the development of the personality” of students who act as subjects of the educational process in the conditions of the competent approach. The principles of subjectivity and self-expression were used in implementing the active approach.

Under “subjectivity” we understand the set of qualities that characterize a person as “an actively acting person, a driving force of action”, as well as the ability to “act purposefully and reflexively”. Subjectivity is “the highest level of human activity, integrity, autonomy” [2]. “...from a pedagogical point of view, not only the involvement of a person in activity is important, but also the value aspect of this activity, since subjectivity can be defined as the property of a person not only to assimilate, transmit, but also to create the meanings of activity as actual values” is of particular interest.

The process of subjectivity formation should involve the creation of conditions for the implementation of activities in an atmosphere of freedom, mutual respect and responsibility for the personal and professional growth of a student who is filled with inner meaning, has the ability to determine his own identity, express himself, and activate himself.

Active approach - implemented in classes using active and interactive teaching methods and during production practice.

Values in activity are manifested in the absence of direct instructions and guidelines for behavior, decision-making in professional and social activities.

The axiological approach is understood from the perspective of the humanistic orientation of technical education and is included in the study as a means of forming an orientation to the values of safety culture. Personal values are aimed at implementing the guiding function of safety culture in making decisions in the individual cognitive and practical activities of students and assessing their own reflexive abilities, while socially significant values are manifested in implementing the guiding function in making decisions related to ensuring labor protection, industrial, environmental and fire safety.

The axiological approach is aimed at solving one of the most important educational tasks of preparing students of technical specialties for the profession, which serves to activate a valuable attitude to human health and life, the environment and natural resources, responsibility for the results of their activities in ensuring professional and technogenic safety.

The procedural block of the functional-structural model includes the stages of experimental work, the functions of teachers and students, methods, tools and forms of educational activity.

The procedural block reveals the possibilities of the educational environment of higher education institutions for activating the process of forming hypothetical thinking and includes three stages of pedagogical experimental work:

- the recording stage - involves diagnosing the initial level of hypothetical thinking, analysis and reflection of the results obtained;
- the formative stage - aimed at forming a set of knowledge, skills and competencies to ensure the safety of the technosphere, encouraging students to prevent risks at all stages of the process of production facilities, includes conducting classes using modern teaching methods, conducting classroom and independent classes, risk-oriented educational tasks with elements of professional activity carried out

during production practice, conducting an extended seminar on the topic "Analysis of risks in the professional sphere" (its purpose is to develop and correct life priorities (values), personal views on the problems of preventing risks in the professional sphere, and most importantly, ideas that lead to the need for sustainable "safe behavior") and the final level of hypothetical thinking;

- reflective stage - includes analysis of the obtained learning results and, if necessary, consultations using an individualized approach and the most effective teaching methods for different conditions; students were invited to analyze the diagnostic results, self-correct the formation of hypothetical thinking, and identify goals and ways for further self-development.

Teachers and students, as active participants in the process of forming hypothetical thinking, perform a number of functions. At the recording stage, the teacher performs a diagnostic function, the student self-analyzes, gets acquainted with the concepts and indicators of hypothetical thinking, and analyzes the initial state of the process being studied.

At the formative stage, the teacher performs motivational, educational, guiding and developmental functions, the student performs the function of self-control.

At the reflexive stage, the teacher performs the function of analysis and consultation (conducting a final diagnosis, analyzing the dynamics of the degree of formation of hypothetical thinking, reflection, giving advice), and the student performs the function of self-correction.

The effectiveness of introducing the structural-functional model of the formation of hypothetical thinking in students of technical specialties into the educational environment of higher education institutions depends on the creation of appropriate pedagogical conditions.

In the process of implementing the functional-structural model of the process of forming hypothetical thinking, active and interactive teaching methods played an important role. Their implementation included modeling situations related to the need to apply measures aimed at eliminating risks, demonstrating orientation to the values of safety culture, organizing subject-subject relations in the learning process, conducting a seminar on the topic "Analysis of risks in the professional sphere" with the participation of representatives of selected professions and regulatory bodies. Reflective, activating and interactive teaching methods were chosen as effective.

The tools of the educational process of forming hypothetical thinking include theoretical modules, practical work using hypothetically oriented task constructions, instructions for passing production practice, the training manual "Analysis of professional risks", software packages for risk analysis.

The formation of hypothetical thinking as a psychological process is initiated "partly consciously, partly unconsciously, due to habitual skills and other circumstances, as well as motivation, character traits, experiences formed during the previous development of the individual, upbringing, education, and independent learning" [3, 136-b].

The forms of training include combined lectures (lecture-discussion seminar, problem lecture), practical exercises using risk analysis methods, an extended seminar on the topic "Risk analysis in the professional sphere", independent work, production practice.

The analytical structure of the resulting block of the functional-structural model includes the criteria (cognitive, value-motivational, activity, evaluative-reflexive), indicators corresponding to them, levels of formation of hypothetical thinking and the planned result.

The developed functional-structural model of the formation of hypothetical thinking of students of technical specialties of education differs in the following:

- 1) adequacy - the correspondence of the model components to the educational process being organized, the validity of professional education in the real specialty and verification by significant experience data;
- 2) systematicity - ensuring the integrity and targeted specialization of the model components and their interrelationships;
- 3) innovativeness - introducing new results that ensure the effectiveness of vocational education in the formation of hypothetical thinking in accordance with the current social and production needs of industrial production;
- 4) resourcefulness - developing educational and diagnostic tools necessary to solve the problem of forming hypothetical thinking of students of technical specialties.

CONCLUSION

The presented functional-structural model was developed taking into account the unity of purpose and result, the content of education, the functions of teachers and students, the organization of educational activities and diagnostic tools for assessing educational results, contributes to the complex step-by-step formation of hypothetical thinking of students of technical specialties of education, and is provided with the necessary pedagogical conditions.

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