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METHODS OF DEVELOPMENT OF PRODUCTION AND TECHNOLOGICAL COMPETENCE OF FUTURE ENGINEERS

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Abstract
In this article, modelling method in technical higher education institutions is widely used in modern science, including pedagogy.

Keywords: Pedagogy, modelling in pedagogy, improvement of the methodology.

Introduction

Modelling in pedagogy has features inherent only in this discipline, which follows from the fact that the pedagogical process is always directly related to the educational activity of the student and the learner. Modelling in pedagogy is important due to the complexity and multiplicity of factors determining the course of the pedagogical process. The modelling method is integrative, it makes it possible to combine empirical and theoretical research in pedagogical research, that is, to combine experience with the construction of logical structures and scientific abstractions in the process of studying the pedagogical object.

Currently, priority research is carried out on the creation and application of modern didactic teaching tools in the context of world education needs, including the following areas: development of new theoretical concepts based on conceptual design for the creation and application of modern didactic teaching tools; improving the content of the building blocks of the structure of modern didactic means of teaching; Improvement of the methodology of the organization of the educational process with the use of modern didactic means of teaching. In pedagogy, modeling can be described as the study of personal and interpersonal processes and situations using their actual (physical) or ideal models.

Through pedagogical modelling, we understand the reflection of the features of the reconstructed pedagogical system in a particular object. This is called the pedagogical model. The model provides predictive insight into the structure of the system-forming process.

The description of the model, according to V. A. Shtoff, consists of four characters:

1) model - a system that is mentally expressed or materially realised;
2) reflects the object of the study;
3) the ability to replace an object;
4) its study provides new information about the object [155].

A model is understood as a substitute object that retains the most important features of reality, like any reflection of the phenomenon under study. However, any reflection of reality is not a

model, but a model that meets the researcher's goals. It is the choice of a methodological strategy that can be fully reflected in their approach to teaching to be a crucial factor in solving any problem being studied and achieving an important outcome.

One of the main characteristics of a pedagogical phenomenon and process is a systematism. The systematic approach allows us to analyze, research, and develop a particular object as a holistic, unified system and is the most reliable methodological basis for improving the theory of systems for the study of pedagogical theory and pedagogical practice.

The importance of the systematic approach for our article is that it allows:

- consideration of the formation of production and technological competence in students as a complexly organized object, integral system;
- identification of the constituent factor in the model of the formation of students' production and technological competence;
- development of a model for the formation of production and technological competence of students of technical higher educational institutions, identification of its components, place and significance, disclosure of the relationship.

Since one of the main requirements for pedagogical models is conceptuality, the task of determining on which principles the model for the formation of students' productive and technological competence is based naturally arises.

This methodological model consists of four components that are interrelated and predictive: objective, content, methodological, and consequential (Figure 4). The purpose component includes social order and purpose. The content component consists of tasks, approaches, principles, components of developed production and technological competencies and pedagogical conditions, which defines the theoretical basis for the development of future engineers and technological competencies.

The methodological component includes forms of teaching compulsory subjects, components of production and technological competence, methods, competencies, tools. This component reveals the process of development of future engineers and the development of technological competencies completely.

The result component consists of pedagogical experimental stages, evaluation criteria, levels of development and technological competence and results. This component defines the level of development and technological competence of future engineers in carrying out pedagogical experimental works.

Naturally, the process of designing the system of pedagogical practice was aimed at creating an innovative model, primarily to solve new curricula problems and achieve new educational results for developing future engineers and developing their technological competencies.

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For theoretical substantiation, in our article we put forward the following pedagogical conditions for the development of production and technological competence of students in the process of studying specialized subjects in technical universities:

- the content of specialized disciplines is designed in accordance with the indicators of the future specialist's readiness to carry out production and technological activities (readiness for the design of technological processes and production, readiness for the organization of production and technological activities, readiness for the implementation of production and technological activities, readiness for the implementation of innovative production and technological activities, production and technological activities reflection, self-control, and willingness to correct);

The development of production-technological competence is carried out at an informative and process-based activity-based stage, using multi-level and professionally oriented tasks;

- professional - educational environment is created by contributing to the development of current professional personal qualities (socio-professional mobility, responsibility, communication, constructiveness, reflexivity) that dominate in production and technological activities.

The study of the psychological and pedagogical literature can be approached from different theoretical and methodological points of view to the process of preparing students for production and technological activities in technical higher educational institutions.

The principle of a competitive approach in vocational education and in general education implies the creation of a vocational educational environment that ensures the formation of knowledge, skills and qualifications of the student. The competency approach is based on the need to develop professional personal qualities of students aimed at successful self-realization in their subsequent professional activity.

This approach involves the development of the content of production-technological activity in accordance with the holistic set of professional tasks foreseen in the competency model of specialists.

It should be noted that the model of a graduate of a higher educational institution, according to this approach, includes not only "knowledge", "qualifications", "skills" in separate disciplines and objects of labor, but "knowledge", "qualifications", "skills", which form the basis of individual elements of activity.

According to the educational standards developed on the basis of a competency-based approach, each profession acquired in higher education should be reflected in the relevant competencies, since the activities of each specialist differ from another by specific requirements. Considering that the assessment of a specialist is carried out from the point of view of competence, this means that the content of his activities should be evaluated from the same point of view.

Effective formation of operational and technological competence of future engineers in higher education institutions is ensured when certain conditions are met.

We defined one of the conditions as follows: the content of specialized disciplines is designed in accordance with the indicators of readiness for production and technological activities of the future specialist.

The justification of this condition implies the use of the theory of pedagogical design of the content of education.

As you know, the design of the content of educational material is one of the types of pedagogical activity, subject to certain laws of human activity. The design should predict a possible subject of need. The prospects of the project are considered as an opportunity for its implementation, which is determined by the degree of adequate initiation of the need.The study of the psychological and pedagogical literature can be approached from different theoretical and methodological points of view to the process of preparing students for production and technological activities in technical higher educational institutions.

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When reviewing the teacher's design activities, we concluded that the student is distinguished not only by the ability to absorb subjectively new (cognitive tasks that are new to them), but also objectively new but as-yet-unknown scientific knowledge. A feature of the teacher's design activity in higher education is the design of a cognitive, creative system of tasks. Therefore, when designing the content of the curriculum, the teacher must ensure the involvement of students in production-technological, research, rationalization, design and inventive activities.

Effective design of the content of the educational process is associated with the objective nature of the quality of pedagogical knowledge as a complex whole, which has an internal and external structure of the teacher. The qualities of the internal structure of knowledge are completeness, consciousness and robustness.

An important aspect in the design of the educational process is that once the teacher has designed the content, he or she must be able to apply the teaching material to the learning patterns and master different methods of presenting the content.

Taking into account a sequence of stages of pedagogical design (goal setting, forecasting, planning, design), we provide students with stages of development of production and technological competence:

- definition of the goals of students' production and technological activities;
- clarify cognitive issues;
- self-assessment of readiness for production and technological activities;
- Choosing an appropriate course of action that will lead to problem solving;
- design of production and technological activities;
- implementation of the program for the implementation of production and technological activities;
- control over the results of work;
- carry out editing work based on the control results;
- Elimination of errors and their causes.

The above made it possible to distinguish the logic of designing the content of specialized subjects for the development of students' production and technological activities (Fig. 6).

All this implies the implementation of design in accordance with the methodology of organization of production and technological activities. Methodology (according to A.M. Novikov) studies the organization of activities. The organization of activities, including production-technological activities, means their ordering in a cohesive system with clearly defined features, logical structure and process of its implementation.

The second pedagogical conditions: the development of production and technological competence is carried out through the use of step-by-step (informational, process-teachable, active) multi-stage and professionally oriented tasks.

Thus, students need to use a specially designed system of tasks and tasks that allow them to independently deepen and expand knowledge, improve qualifications and skills in order to qualitatively master professional knowledge, develop skills, develop creative abilities.

In the process of solving it, it is necessary to pay attention to the specifics of the terms of reference (problems), in which intellectual activity is carried out. Success in solving technical assignments depends in large part on how theory and practice are combined.

Describing technical thinking, it is necessary to note its most important feature, which manifests itself in the integral unity of theoretical and practical components of activity, in the continuous harmony and interaction of mental (thinking) and practical actions.

Imagination, object, are equal components of thinking, and without using them, it is impossible to complete a task.

As we know, the teacher's activities are carried out through organisational forms that include content, tools, and methods. If the previous organisational forms were aimed at optimising individual components of the educational process, modern forms of the pedagogical process consider the learning situation as a whole dynamically developing. That is, we are talking about

a transition to a new principle of organising the educational process as a whole educational situation. The most important principles are:

- the principle of compatibility with nature;
- the principle of continuity;
- the principle of cooperation;
- the principle of reflection, etc.

Today, the starting position in the choice of pedagogical forms is the model of interaction between teachers and students. This model differs from another model, independent of educational programs, in that the student's position is the focus of the teacher. In this ratio of the relationship between teacher and teacher, organizational forms also change. Here we are talking about a new understanding of the important feature of pedagogical forms, that is, the advantage of a collective teaching method based on the simultaneous application of individual, pair, group, team work in a certain interdependence. At the same time, the organization of the learning process implies a variety of interactions that allow each student to activate his personal experience while maintaining a high level of activity.

When choosing pedagogical forms, the teacher takes into account how each of them provides the formation of a certain competence in future professionals.

Taking into account the foregoing, within the framework of our study, we propose pedagogical forms that create a professional and educational environment that contributes to the development of personal qualities of the future specialist participating in production and technological activities.

With this construction of pedagogical forms, positive interaction, personal interaction, individual responsibility, communication competence and other professional important qualities are achieved, in other words, we create a new professional and educational environment.

In this regard, the most common pedagogical forms in higher education are: problem lectures, seminars-conferences, practical and laboratory-practical classes, teaching and research work of students, coursework and others.

With their help it is ensured that the following three main goals are achieved: the student's mastering of theoretical knowledge; development of technical thinking; formation of cognitive interest in the content of educational discipline and professional motivation of the future specialist.

Practical training: on practical training, students solve problems of a professional track, which is one of the main tools of activating, managing and diagnosing the production and technological activities of students and allows to sufficiently individualize the study of specialized disciplines. The exchange of lecture material and practical activities is of particular importance. In practical training, students consolidate their theoretical knowledge.

The implementation of organizational and pedagogical conditions for the development of production and technological competence of students in the process of studying specialized disciplines and practical training is carried out on the basis of a methodology that contributes

to modeling and implementation of the process of development and development of technological competence in future engineers.

For modeling the professional activities of future engineers, a competency-oriented training tasks have been developed, which is a set of disciplines, practice and professional tasks in the specific disciplines of educational areas. The set of tasks includes a set of tasks aimed at developing production and technological competence of different complexity, taking into account the level of development of students at the stages of competency development.

Tasks aimed at developing students' production and technological competencies develop their professional activity and are aimed at mastering students' knowledge, developing students' personal qualities of professional value.

Training highly qualified specialists in the modern education system requires determining the requirements of future engineers to develop their professional and technological knowledge, based on the originality of the areas of education. At the same time, providing future engineers with transport knowledge requires the constant introduction of new sophisticated technologies and innovative training methods into the education system.

Currently, there is a growing interest in applying interactive methods, innovative technologies, pedagogical and information technologies in education. At the same time, mostly until now, students have been trained to master ready-made knowledge, modern technology teaches them to search for what they have acquired, to independently study and analyze and, where possible, draw their own conclusions. In this process, the teacher creates conditions for the development, formation, acquisition of knowledge and upbringing of the individual, and at the same time performs the function of management, guidance.

Innovation is an English word that means to innovate, to innovate. Innovative technologies are the introduction of innovations and changes in the pedagogical process, student and pedagogical activities, mainly interactive methods are used to the fullest.

Interactive methods are based on team thinking and are methods of pedagogical interaction and are an integral part of the content of education. The uniqueness of these methods is that they are carried out only through joint activities of the teacher and the student. Interactive learning is a special organizational form of the development of cognitive activity, which is characterised by the transformation of the student from the object of teaching to the subject of interaction, active participation in the learning process.

The effectiveness of any educational process, the successful organisation of professional activity depend on the factors that affect it. In this regard, it is advisable to use modern interactive teaching methods by professors and teachers in activities aimed at mastering the necessary professional competencies of students during the research period.

The internships were carried out on the basis of a methodology that helps to model and implement the process of developing students' development and technological competence. A selection of interactive learning methods. Lessons organised with the help of interactive educational methods encourage students to think creatively, actively apply the information received, express ideas freely, take initiative, solve problems in groups, work collaboratively, express ideas in writing.

In the intermediate assessment, organisational forms, personal qualities, as well as teaching methods that contribute to the development of students' industrial and technological competencies were selected by the type of professional tasks aimed at developing students' industrial and technological competencies.

Using the above interactive teaching methods, which includes a system of professional tasks aimed at developing industrial and technological competencies, we present a teaching methodology on the example of a particular topic in a selected specialty discipline.

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