

GENERAL DEVELOPMENT OF EDUCATION IN TECHNICAL HIGHER EDUCATION INSTITUTIONS METHODOLOGICAL PRINCIPLES

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Abstract

The structure of developmental education in the article requires mechanical engineers to acquire new knowledge, skills, competencies and meta-subject competencies, requires the development of new solutions, schemes and new ways of working. As a result, students have the opportunity to develop their intellectual and personal qualities, professional skills in the educational process. The main task of the teacher in the process of developmental education is to organize educational and practical activities aimed at developing the independent knowledge and professional skills of mechanical engineers.

Keywords: Developer, mechanical engineer, metasubject, schema creation, ideas, process, professional qualification, teaching practice.

INTRODUCTION

As the process of integration and globalization of the world economy intensifies, competition in the international arena will also intensify. In this context, the role and importance of developmental education in higher education institutions is one of the most pressing issues today. Developmental education is one of the important areas in the theory and practice of training mechanical engineers. Developmental education means the organization of teaching in such a way that the content, methods and forms of teaching are aimed at the full development

of students. First of all, it is necessary to dwell on important different aspects of developmental education. Developmental education, like information and reproductive education, is carried out through three main pedagogical tasks: teaching (education), development and upbringing. These tasks can be introduced in the study of the topic in each lesson [1].

Literature review

But developmental education is different from information-reproductive education (based only on information transfer, dry memorization, acquisition of ready-made knowledge).

In developmental education:

a) The educational task (teaching, educational task) involves the thorough acquisition of theoretical concepts (laws, laws, theories) and practical skills, rather than dry memorization of ready-made information materials, as in the information-reproductive system. They are studied separately from the educational information according to their important features;

b) the task of development involves giving priority to the creative activity of students at all stages of educational activity in order to master the methods of scientific creativity;

c) The task of education involves the development of students' ability to independently apply the basic technologies of social creativity (or some of their actions. This requires consistent communication and collaboration between teachers and students.

The structure of developmental education consists of difficult subject matter, which

requires students to acquire new knowledge, skills and abilities, requires the creation of new schemes of solutions and the development of new methods of activity. This not only activates previously acquired knowledge and methods of activity, but also puts forward new hypotheses, seeks ideas and develops original solutions. As a result, students have the opportunity to develop their intellectual and personal qualities, professional skills in the educational process. In the process of developmental education, the main task of the teacher is to organize educational and practical activities aimed at developing the independent knowledge and professional skills of mechanical engineers [2].

Research methodology

The task of development of education is carried out by involving mechanical engineers in various activities aimed at enriching their creative imagination, thinking, memory, speech, practical professional skills.

The teacher engages students in a variety of hands-on learning activities to further develop their knowledge, skills, competencies and competencies.

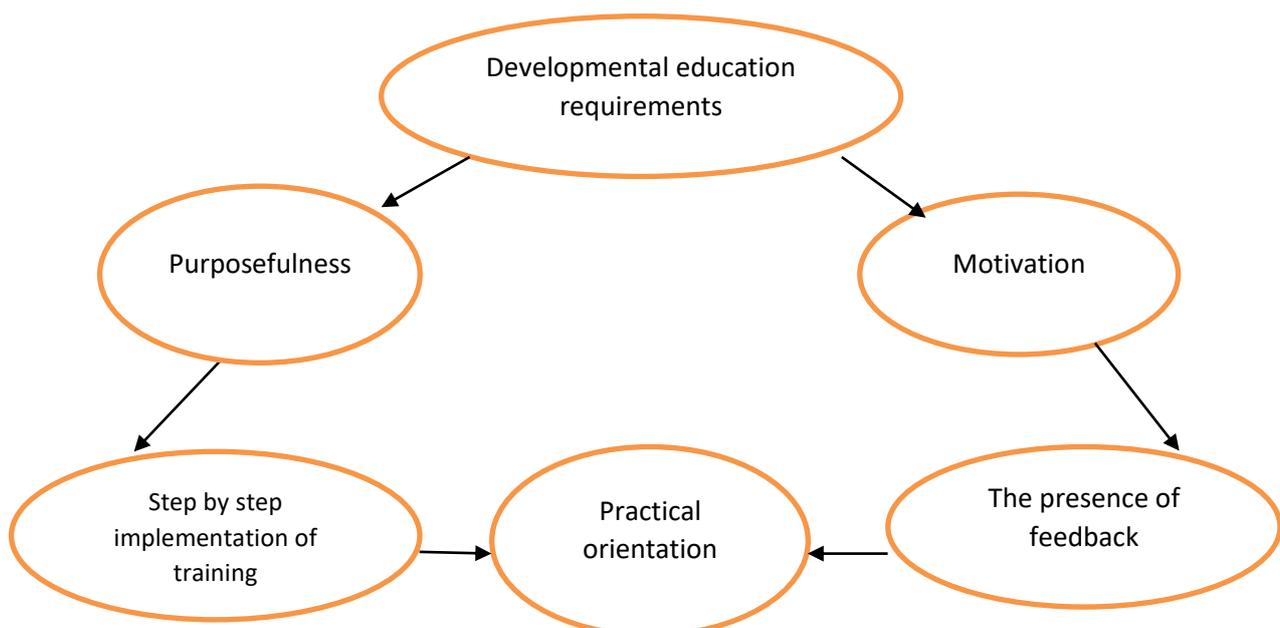


Fig. 1 The general structure of developmental education

One of the most important issues in developmental education is the development of the student's learning activities. In developmental education, the student not only acquires certain knowledge, skills, abilities and competencies, but also learns how to manage their learning activities. There are a number of general requirements for developmental education. The most important of these are (see Figure 1):

- goal-oriented;
- motivation;
- practical orientation;
- Step-by-step implementation of training;
- existence of feedback.

The goal-oriented nature of education implies a clear vision of the purpose of teaching.

Learning motivation can vary: interest in acquiring new knowledge and skills; aspiration to work in the future in his profession; desire to communicate with others, etc.

Practical orientation of education. Industrial training is primarily focused on acquiring the knowledge and skills needed to perform specific practical work in a particular enterprise or organization.

The gradual implementation of training implies the consistency of the program and the integrated implementation of education.

Availability of feedback. The essence of this principle is that the learning outcome should be consistent with its objectives. The effectiveness of education is assessed based on the results of achieving the learning objectives.

In the process of training, it is necessary to constantly develop and train mechanical engineers. To do this, first of all, the teacher must learn to record the level of development of students. If mechanical engineers are given a clear goal and the need to acquire knowledge independently, their mental development will be much more successful. The student thinks, searches to perform a specific task. This work involves several steps. He observes, analyzes,

applies certain rules to solve learning problems. Therefore, the teacher should teach the student to think deeply. This is the task of developing education [3]. Both education and upbringing serve to develop the student's personality.

Therefore, there seems to be no need to talk about the developmental task of education. But today practice shows that the task of developing education can be successfully accomplished in the teaching process. In this case, a special developmental direction of education is formed. Students are involved in activities aimed at developing sensory perception, movement, intellectual, volitional, emotional, motivational, and professional-practical skills and competencies. In this regard, in the sixties of the last century, the term "developmental education" appeared in pedagogy [4]. Developmental education involves not only the acquisition of knowledge and special practical skills in students, but also their general development and the development of special measures in this regard.

According to LV Zankov [10], in order to accelerate the development of students' creative thinking in the educational process, it is necessary to organize teaching in an order of increasing difficulty, to ensure that students understand the content of their educational and practical activities. At the same time, the concept of 'thinking' or 'developing professional skills' in students cannot be equated with the concept of 'shaping'.

Development covers all areas of the individual. And that is why modern didactics is looking for ways to expand the developmental impact of education. The peculiarity of the developmental task of education is that it cannot exist independently, but is the result of the tasks of teaching (education) and upbringing. Student development depends on how successfully educational and pedagogical tasks are introduced in the teaching process [5]. These three functions of education cannot be thought of as "three parallel lines that do not intersect" in the flow of the learning process. , can also activate the first cause. The unity of teaching (education) and upbringing tasks is the basis of the development task of education.

The development task accelerates the educational and pedagogical tasks. The tasks of education are of a dialectical nature.

Russian scientist V. V. Davidov [9] described one of the most important laws of psychology. He acknowledges that education leads to development. A person develops because of the content of education. Learning is an activity. The basis of educational activities is communication and cooperation

We have analyzed a number of psychological-pedagogical and educational literature published in recent years in order to study the state of development of mechanical engineers not only their professional skills, but also meta-subject competencies and creative abilities. They mainly talked about the methods of educating students and training them for professional activities. However, the development of professional and practical skills and creativity is directly linked to practical activities. Therefore, first of all, it is necessary to talk about ways to develop professional skills and creativity.

Analysis and results

In the development of creative abilities and professional skills should pay attention not only to the characteristics of students' thinking (search for innovation, sudden discovery, understanding, sensitivity, etc.), but also to internal factors (interest, passion, will, purposefulness, creative joy, inspiration) . It follows that in the whole process of continuing education, that is, in schools, colleges and higher education institutions, special attention should be paid to the development of professional skills and creativity in students. This is one of the factors in training qualified and creative professionals [6].

Professional skills and creative practical activity require continuous work. The result of creative activity is innovation. But not everyone can create innovation. Below we discuss the levels of novelty of the product of creative activity, the interdependence of creativity, development and education.

In the 1940s, the Russian scientist Heinrich Saulovich Altshuller (1926-1998) asked, "How can new inventions be created in the field of technology for a specific purpose?" seeks an answer to the question. It should be noted that up to that time, almost all inventions in the field of technology, as well as discoveries in science and art were created using the method of trial and error. But at that time there was no science-based technology of creative activity. In order to solve this problem, G. S. Altshuller [8] analyzes the patent fund of technical inventions and, as a result, determines the laws of development of technology. He created the first version of the Inventive Problem Solving Algorithm (IPSA) in the early 60s. Since then, G. S. Altshuller organized training seminars for engineers. At the same time, students were taught how to apply the algorithm to solve technical problems, and at the same time worked to improve the theory of solving inventive problems (IPSA). As a result of many years of research, G.S. Altshuller represents the laws of development of technology [1]. This is how the Inventive Problem Solving Theory (IPSA) was created.

G. S. Altshuller's successors began to use IPSA elements extensively in other areas of science. As a result, new directions have emerged in professional activity: IPSA - pedagogy, IPSA - business, IPSA - art, IPSA - medicine and others. Work in this area has yielded significant creative results. They have been featured in many scientific articles. Currently, IPSA is successfully developing all over the world, and even the International IPSA Association has been established. As a result of the application of IPSA elements in pedagogy, the concept of "developmental education system" has emerged.

The developmental education system includes the following components:

- theoretical substantiation;
- the content of educational activities;
- methodology;
- examples of methods used in teaching academic subjects;

□ textbooks, manuals, methodical manuals.

There are many systems of developmental education. Their theoretical foundations, content and methodological samples are well developed. In the methodology of developmental education systems and other systems, methods of activating thinking are used to solve problems and develop the objects and processes being studied.

It should be noted that developmental education consists of systematic teaching of students. Teaching creativity requires students to be introduced to the methods and technologies of creative activity. Methods of problem solving and system development are the most important. Science-based methods of problem solving and system development are lacking in the developmental education system today. However, an IPSA has been developed for them. Therefore, it is advisable to use the IPSA in developmental education.

In the process of developmental learning, students are given a variety of creative tasks that increase in difficulty. In this case, the levels of creative novelty can be used to assess the creative novelty of the product of activity. Levels of creative novelty of the product of activity G. S. Altshuller developed it as part of his "theory of solving inventive problems". The scientist admits that the levels of creative novelty of the product of activity are as follows [8]:

Level 1 - Replacement of similar parts (elements):

replacing one or more (similar) parts that are exactly the same in structure and function in the system. Such a creation is a very simple creation, a subjective novelty, in which there is no objective novelty. By its very nature, this work is merely copying. It should be noted that true creation always begins with copying. For example, replacing one part of a machine, equipment, or distributor with another part of a machine, equipment, or distributor (replacing a part that is identical in structure and function); make changes to the methods of performance without changing the content of a professional

issue or assignment, a specific description of the places where professional tasks are performed; to carry out the same type of professional activity in different ways and forms.

Level 2 - replacement of compatible elements (homologous):

replacing one or more parts in the system that are structurally different but perform the same function. At this level of creativity, only some details of the element are changed and it is an objective novelty. manufacture of items, details from new materials; replacement of maintenance equipment; describe the workplace differently, decorate.

Level 3 - Add a new element to the system:

in this case, the system itself is not changed, but a new element is added to it. Creativity at this level is characterized by an objective novelty - a new element is created in the system that did not exist before. For example, creating new parts for tractors, excavators, machines; development of new equipment used in professional activities; creating new details; introduction of new directions in professional activity; change working methods.

Level 4 - Structural innovation:

creating a system from previously known or completely new elements; for example, the production of new models of equipment, devices, tractors and machines. The most basic condition for creativity at this level is to create an objective new system that did not exist before.

Level 5 - Discovery (innovation):

creating a system in a new direction. This is a high level of creative activity. For example, K.E.Tsialkovsky's theory of space exploration, M. Ulugbek's mapping of stars; creation of principles of radio and telecommunications; G.S. Altshuller's development of the theory of solving inventive problems (this theory allowed the creation of new inventions and the theory of personality development, with the help of which it is possible to design not only the process of educating the creator, but also a

person's life career); creation of new types of food, medicines and medicinal juices; a new direction in the field of literature - the formation of fiction; modern pedagogical technologies in education and the theory of developmental education.

In the last years of the last century, the famous Russian psychologist V. V. Davidov's collection *Theory of Developmental Education* [7] was published. In it, the scientist analyzes the theories about the relationship between development and education formed at that time. According to the first theory, development is not related to education and it is done according to its own laws.

According to the second theory, education is a development, any education is a developer.

The third theory is the result of a combination of the above two theories, according to which development prepares for education and education allows for development. Based on the analysis of these theories, V. V. Davidov puts forward his hypothesis about the interdependence of education and development. According to him, education creates a "zone of immediate development." According to the 'Near Development Zone', students develop mentally as a result of interacting with adults and peers. In this "zone of immediate development" the student learns new methods and forms of educational activity, first of all, methods of creative activity. Mastering them ensures the development of students' thinking, speech, imagination, skills and other mental functions. The main tasks of education are introduced through practice [7].

Conclusions

The following issues should be considered when considering the interdependence of education, creativity and development: the development of personal and professional practical skills and competencies of the student and the teaching of creative approaches is a more complex evolutionary-evolutionary process, resulting in behavior. , progressive changes in personality, activity, and cognition.

The development of society requires a completely new approach to the development of personal, professional skills, creativity and moral potential of future professionals. This requires the identification of promising areas in education and the development of new strategies.

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