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Production and Technological and Interdisciplinary Saturation Methods of the Educational Environment When Training Future Specialists

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ABSTRACT
The presented article substantiates the need to revise the content, choice of means and technologies for vocational training of students in connection with the formation of a new technological order in society based on continuous changes in the nature of production. The the educational environment specificity is revealed at the semantic level, which acts as the formation of a set of unique traits, features and characteristics inherent only to this subject, and is the basis for the success of professional training of students in the training system of future specialists. It is shown that the production and technological and interdisciplinary saturation of approaches to the organization of vocational training of students involves their transfer from the context of functioning to the area of professional self-realization of the individual. The materials of the article can be used by the authors and developers of new approaches and concepts for modernizing the content and technologies of professional training of future specialists.

Keywords: *Interdisciplinary interaction, Production and technological saturation, Educational environment, Students.*

1. INTRODUCTION

With the advent of knowledge intensive technologies that covered all spheres of activity, a huge need for human resources was identified since production technologies impose rather high requirements on the qualifications of specialists. The industry development is accompanied by a change in the professional composition of specialists in connection with the increase in the technical equipment of the industry, economy digitalization, improvement of technological processes and the formation of new industries. Some professions disappear or undergo changes, new types of activity and new professions appear on account of it. According to rough estimates of specialists, more than 70% of the professions and specialties existing today were unknown 20 years ago.

If earlier certain skills and abilities were required from a specialist, nowadays a qualified specialist needs to have a wide general and polytechnical mental outlook, developed technical and technological thinking. He must be receptive to novelty, mastering the scientific foundations of modern production and the prospects for its development. According to economists, the lack of the necessary personnel slows down the development rates of technical progress, reduces labor productivity and production efficiency. About 70% of defects and 30% of breakdowns of equipment and tools are due to low qualifications and work culture of specialists.

Experience shows that graduates of professional educational organizations are poorly prepared for the "transfer" of theoretical knowledge into production situations, do not have sufficient knowledge of such intellectual components of activities as the justification of the forthcoming technological operations, the assessment of their economic feasibility. They do not have sufficient experience in collective activities in terms of functional interaction with partners when solving technical, organizational and technological problems.

As a result, young specialists often experience difficulties when it is necessary to independently know the ropes in relation to production situations, use the achievements of science and technology in order to rationalize labor and increase its productivity, participate in the most important business and economic activities such as the introduction of cost-effective forms of organization of production, increasing the return on assets of equipment, reduction of material consumption, etc., often the result of training in the future is their unsuccessful professional self-realization.

The indicated realities testify to the tracing deficit of production, technological and interdisciplinary saturation of professional training of specialists and bring to the fore the need to understand the trends of its development. These trends determine the change in the entire complex of components of the educational environment aimed at achieving goals for the formation of a personality capable

of self-realization in various spheres of professional activities.

2. METHODOLOGY

The very formation of the human personality occurs to a large extent in the course of professional activity and under its influence. Pedagogical research that studies the development of professionalism is presented in the works of Russian researchers: E.F. Zeera [1], E.A. Klimova [2], A.K. Markova [3]; foreign researchers R.V. Aguilera, J.C. Denker [4], E. Crowley [5] and others. These studies emphasize that the self-realization of the individual is most fruitfully carried out in professional activity, which gives the maximum potential for the simultaneous and fullest satisfaction of all the basic needs of the individual (the need for social recognition, self-respect, safety, etc.).

Research into the personality of a professional has been conducted in two directions in recent decades. Firstly, a large number of works are devoted to the study of isolated individual psychological characteristics of a person in professional activity. From an experimental point of view, it is easier to carry out an in-depth study of one or several personality traits, trace the manifestation of this property in professional activity, its influence on the process and results of work, rather than investigate an integral personality.

Works in this specialization come from the requests of practice and are devoted to any specific type of professional activity. In this case, the researcher most often relies on the concept of professionally important personality traits, while the set of professionally important qualities can be quite specific for each type of activity.

The second direction is the study of an integral personality. The works of this direction are complex studies that consider an integral complex of professionally important qualities, their relationship and mutual influence in the process of specific professional activities. The expediency of a synthetic approach to the study of the personality of a professional was emphasized by D. Kahneman. The main postulates of the concept he developed consisted in distributing personal resources depending on the tasks put forward in the process of labor actions [6].

Currently, most researchers are inclined to believe that the personal approach is not just taking into account the individual characteristics of a person in professional activity, but, first of all, the study of the educational environment of the formation of the integral personality of a professional. Paying close attention to the phenomenon of the educational environment occurred in connection with the specification of the goals of vocational education. In the broadest sense, the educational environment is a sociocultural space, within which the personality development process is carried out with varying organization degrees. An important contribution to the study of the concept of "educational environment" was made by V.Ya. Yasvin who considers it as a system of influences and conditions for the formation of a personality in a social and spatial-objective environment" [7].

3. RESULTS

Analyzing various approaches to creating an educational environment, we can conclude that the environment becomes educational when it is a combination of material, technical, content and psychological and pedagogical factors of the educational process in the formation of professional competencies of students. All these factors are interrelated, they complement, enrich each other and affect each participant in the educational environment, that is, the more a person uses the capabilities of the environment, the more successfully his/her active self-development takes place. Taking into account these factors, we will consider the main formation stages of the educational environment on the basis of its production, technological and interdisciplinary saturation (fig. 1).

The first stage (organization and design) involves solving the main tasks of transforming federal and regional education goals into specific pedagogical ones of the vocational education system; design of elements of the educational environment with the necessary properties and characteristics that meet the specified requirements; formulation of expected results.

At the second stage (organization and implementation), a set of tasks related to the implementation of real elements of the educational environment is solved on the basis of production, technological and interdisciplinary saturation.

At the third stage (productive and evaluative one), the results of the functioning of the educational environment are monitored and decisions are made regarding its correction or the frequency of its correction according to the lines of further development.

4. DISCUSSION

Without dwelling on the substantive aspects of each stage, we will consider its elements in the context of our research. When implementing the first stage of building an educational environment, the authors were guided by the following positions:

- educational activities are carried out in a specific production and technological context aimed at building up the professionally significant potential of the individual;

- preparation of students focused on interdisciplinary interaction presupposes the coordinated development of

the professional competencies of the future specialist, the formation of not only analytical abilities (strictly grounded thinking) but also synthetic ones (productive imagination).

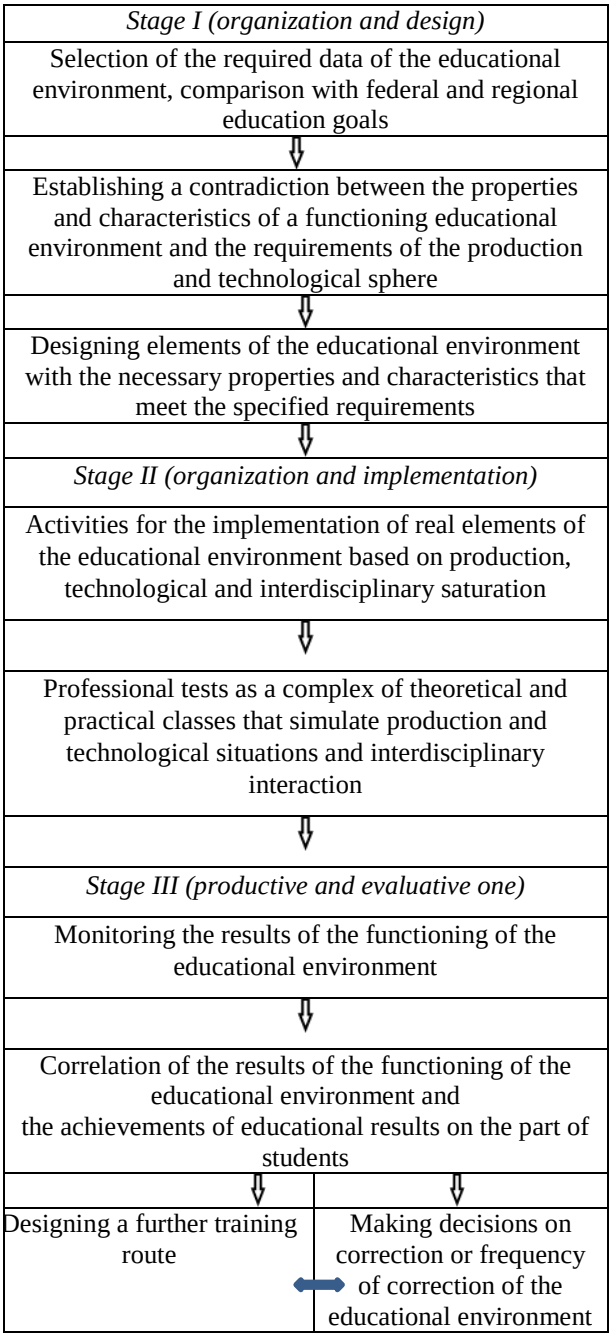

Figure 1 Formation of the educational environment based on its production and technological and interdisciplinary saturation.

As for the second stage (organization and implementation), the main emphasis was placed on the use of teaching aids that contribute to the regulation of the cognitive activity of students in the process of conducting professional tests.

A professional test is a professional examination or a professional check that simulates the elements of a specific type of activity within the framework of the profile orientation of training, which has a completed process that contributes to further professional self-realization. In the process of a professional test, students' ideas about the spheres of production and technological activity are updated, professional skills and ideas about themselves as a subject of professional activity are formed. Accordingly, the theoretical basis of professional tests during the research was the ideas of Professor A. Fukuyama:

– a professional test is the most important stage in the training of future specialists;

– a professional test helps students gain experience of the chosen type of activity and determine the correspondence of the nature of this work to his/her abilities and capabilities [8].

When organizing and conducting professional tests, subjective and objective factors affecting the productivity of their implementation were taken into account. The group of objective factors included those that reflect a rational and qualitative approach to the implementation of professional tests, the group of subjective factors included those that determine the individual psychophysiological readiness of students to perform them.

Professional tests for various types of activities included a set of theoretical and practical classes that simulate production and technological situations, during which opportunities arose for the manifestation of professional competencies, which allowed students to evaluate their own possibilities of mastering the training profile while training and passing through the course.

Professional test programs were developed in accordance with the basic requirements for a training profile. The tests consisted of two parts: a preparatory one, which included a diagnostic and training element, and a practical one, which was represented by tasks of three complexity levels.

– Level I – production and technological tasks requiring from students the formation of primary professional skills sufficient for their implementation at the level of the maker;

– Level II – production and technological tasks of a creative nature providing for interdisciplinary interaction elements;

– Level III – production and technological tasks of a constructive and design nature, involving planning, setting intermediate and final goals, analyzing the results of project activities including rationalization activities based on interdisciplinary interaction.

It should be noted that three aspects are distinguished in professional tests: technological, situational and functional, the integration of which contributes to the

reconstruction of a holistic image of the training profile. The technological aspect is characterized by the operational side of the training profile and makes it possible to identify the formation level of certain professional competencies among students. A characteristic feature of the content of these tasks is the presentation of the objective side of the activity. The situational aspect reproduces the content side of the training profile, determines the subject actions that are part of professional activity. The fulfillment of these tasks requires certain mental actions from the students based on the accumulated experience and acquired knowledge in the process of professional training [9].

According to V.D. Shadrikov, the functional aspect is necessary to reproduce the structural and functional dynamic side of mastering the training profile. Accordingly, the tasks were aimed at modeling activities within the framework of interdisciplinary interaction, which contributes to the activation of needs, attitudes, goals, motives that determine the direction of professional activity in general [10].

The advantage of the third (productive and evaluative) stage is efficiency since the teaching process is based on diagnostic data; flexibility associated with the ability to introduce certain components into the educational environment depending on the training level of students in the process of solving production and technological and interdisciplinary problems. Monitoring the functioning effectiveness verification of the educational environment is necessary not only for the training providers to make changes in order to improve the quality of education but also for students for whom diagnosis can become an important means of reflective understanding of their activities.

During the teaching process, there was a continuous increase in the volume and complexity of tasks when using a combination of both real and virtual teaching aids in the following sequence:

– implementation of practical and laboratory work using real educational equipment with computer control systems;

– adjustment of production and process equipment;

– mastering the programming and virtual execution of the created control programs;

– training practical skills on virtual and real simulators [11].

Experience has shown that the initial steps in mastering the algorithm for solving problems, as a rule, are associated with a significant number of mistakes, therefore the results of the first exercises in solving problems are often unstable. However, the reproduction of various production and technological situations contributes to the extraction of interdisciplinary knowledge for the emergence of a system of connections in a specific practical application: an accurate and selective analysis of the technological situation; reproduction of conclusions from experience in memory, which provide the ability to respond to signals and make corrections and changes when performing techniques and which are based on theoretical knowledge.

Based on the results of completing theoretical and practical tasks, an algorithm for designing a further training route was demonstrated for each student. At the same time, 10% of the number of students were transferred to the previous training level, 86% of the number of students were transferred to the next training stage. Displaying the high-quality mastering of this training stage allowed 4% of the number of students to go several stages forward to study material of a higher complexity level.

5. CONCLUSIONS

Based on the above, one can come to the following conclusions:

– On the one hand, solid knowledge of the fundamentals of science obtained in the process of interdisciplinary interaction and the accumulation of experience in production and technological activities give students the opportunity to be in the know of modern production, on the other hand, solid practical training expands the general horizons of students, raises their cultural and technological level.

– The student is not a passive object of the teacher's influence but an active subject who is involved in the goal-setting process, therefore, an educational developmental environment is created, which is a synthesis of educational, production and technological and interdisciplinary spheres.

– The educational environment having a set of opportunities for realizing the needs of students in accordance with the trends in the development of education, economics, production and technology stimulates the development of professional competencies and in general, contributes to the achievement of students' professional self-realization in the future.

REFERENCES

[1] E.F. Zeer, Psychology of professions, Ural State Pedagogical University, 1997, 244 p.

[2] E.A. Klimov, Professional psychology, Prosveshchenie, 1996, 400 p.

[3] A.K. Markova, Psychology of Professionalism, International Humanitarian Foundation "Znanie", 1997, 308 p.

[4] R Aguilera., J. Dencker. The role of human resource management in cross-border mergers and

acquisitions, International, Journal of Human Resource Management Vol. 8(15) (2004) 1357-1372.

[5] E. Crowley, J. Malmqvist, S. Ostlund, D. Broder., K. Edström, Rethinking Engineering Education: CDIO Approach, Higher School of Economics, 2015.

[6] D. Kahneman, Thinking, Fast and Slow, 2013. Retrieved from: https://hospicofund.ru/books/6444517?gclid

[7] V.A. Yasvin, Educational environment from modeling to design, Smysl, 2001, 365 p.

[8] Sh. Fukuyama, Vocational guidance as the foundation of the human existence, 2-nd International Conference on Vocational Guidance at Ashiya University, Oct. 29-31, 1980, Ashiya, Hyogo, Japan, 1980.

[9] F.A. Zueva, M.Zh., Simonova, S.G. Levina, I.A. Kilmasova, I.N. Likhodumova Influence of the functional relationship between concept, image and action on the process of solving interdisciplinary technology-oriented tasks ,Amazonia Investiga, Iss. 8(23), pp.391-397.

[10] V.D. Shadrikov, Psychology of human activity and abilities, Logos, 1998, 320 p.

[11] F.A. Zueva, M.Zh., Simonova, S.G. Levina, I.A. Kilmasova, I.N. Likhodumova, Basics of production as a system-forming component of professional training of a modern teacher of natural scientific and technological cycles, Revista Inclusiones,Volumen 7, Número Especial, Abril-Junio, 2020,. pp. 334-341.