

Concept of Preparing in-Demand Staff for the Priority Social and Economic Development Areas in Further Education

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Abstract—The article sets out the theoretical foundations and presents the practical results of introducing the concept of staff training demanded Priority Social and Economic Development Areas in the in further education. In substantiating the concept, the authors single out its mechanisms, organizational and pedagogical conditions founding the organizational and pedagogical model of in-demand staff training in the system of higher and supplementary vocational education. It has been established that such organizational and pedagogical conditions include: the creation of educational and production clusters; intensification of student educational activities; an individual approach to each student; involving students in activities close to real professional activities. The article presents the results of testing the proposed model.

Keywords—Demanded personnel, territory of social and economic development, individual educational trajectories, network interaction, interactive technologies, organizational and pedagogical conditions, competencies

1 Introduction

In the globalizing world economy, the creation of priority development areas is one of the effective tools conducive to the development of production and building foreign economic relations. The creation of priority development areas is a common practice for countries seeking to attract not only national but also foreign investors to develop their national economies [9].

On December 29, 2014, Federal Law “On Priority Social and Economic Development Areas in the Russian Federation” was adopted and has introduced into the legal fold a new type of preferential territories - PSEDA. Current conditions arise a need for

specialists of various educational levels: Bachelors, masters, able to quickly adapt to rapidly changing conditions and to master new technological processes, possessing theoretical knowledge and practical skills of working with modern equipment. Modification of socio-economic conditions necessitated a qualitatively new level of training. Higher educational institutions face the challenge of providing not only full-fledged professional industrial staff training but also retraining existing specialists in a short time for sustainable and stable economic growth, bringing domestic high-tech products to the world market, strengthening the international authority and defence capability of Russia [1; 2]. The shortage of engineering staff is a factor limiting the development of the country's industry.

It is possible to overcome the existing problem by transferring higher education institutions to an innovative path of development to ensure increased productivity.

Our analysis of psychological and pedagogical sources by Russian and non-Russian researchers shows that there are scientific and educational prerequisites for the development of the system of further education. The most important works, which reflect various pedagogical technologies for the development of the further education system, are the works by Korshunov I.A., Peshkova V.M., Malkova N.V. [3], Senashenko V.S. [4], Michael Callaghan, Niall McShane [5]. Particular interest is given to the book by V.S. Knowles, where he provides his list of the most important provisions relating to adult education [6]. Austrian researcher Prohaska S. claims that university knowledge is becoming obsolete faster and faster. Therefore, the need for further education is now recognized by most specialists, and the demand for this service is growing [7].

2 Subject and Methods of Research

The study is aimed to develop a concept for the in-demand staff training based on an organizational and pedagogical model of the process of in-demand staff forming in the system of higher and supplementary vocational education.

The purpose of the concept is to select, justify and systematize key tasks and mechanisms aimed at achieving conditions for the sustainable development of the higher professional education system and its adequate response to external requests and incentives.

Materials and Methods

The research methodology includes analysis of scientific publications, normative documents, educational programs and practice, modelling and development of a training model, observation and descriptive analysis.

Among supplementary vocational education students, we checked the effectiveness of the organizational and pedagogical model of the process of in-demand staff forming in the system of higher and supplementary vocational education through diagnostic tests including tasks that require the application of selected professional competencies to increase the competitiveness of future specialists. We conducted a personal observation, studied the degree of individual paths' fulfilment by students and evaluated according to the developed criteria.

In total, 160 students and 8 teachers of the Yurga Technological Institute (branch) of the Tomsk Polytechnic University took part in the experiment.

The experiment was conducted from 2017 to 2019.

3 Survey Results Analysis

We identified the following key mechanisms aimed at achieving conditions for the sustainable development of higher professional education system:

1. Creation of educational and production clusters of all participants in the higher education space.

The educational and production cluster as a form of social partnership is a combination of interconnected vocational education institutions united by industry and partnerships with industry enterprises [13]. The enterprises belonging to cluster serve as a platform for internships, practices and experience of future professional activities.

We believe that networking of enterprises, employment service and educational institutions will have a positive impact on the establishment of a qualitatively new organizational and pedagogical system in higher education. This is due to the formation of a motivational environment between the participants in the social dialogue within the framework of which the subjects of the educational process can realize their intellectual and creative potential, focus on the formation of competitive professional abilities and competencies, personality traits of a young specialist considering the needs of the labour market [12].

Advantages of the educational and production cluster for the educational process:

- Creation of educational programs considers the requirements of third-generation professional standards and the production specifics together with representatives of enterprises
- Creation of conditions for training specialists with various levels of professional education considering the needs of the regional economy
- Integration of education with science and industry.

The structure of the educational-production cluster is shown in Fig. 1.

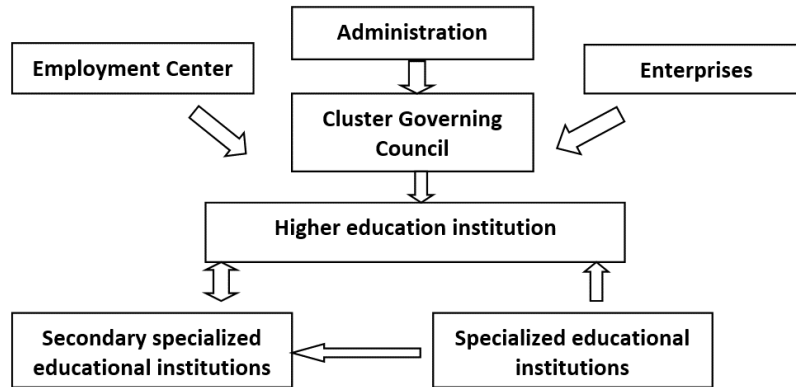


Fig. 1. Participants of the educational and production cluster

Observing the professional activities of existing specialists and taking part in it, the student can get a picture of the future profession. Therefore, from the first year of study, based on previously reached agreements within the educational and production cluster, we recommend the following [15]:

- Organization of students' internships in an existing enterprise and assignment of a mentor from among the enterprise employees in charge of the internship
- Coordination of topics of students' projects with his mentor at the enterprise
- Organization of consultations for personal contact of the student with the mentor
- Mentor's assessment of the results of the student's achievements
- Participation of a mentor in the employment of a graduate
- In our understanding, internship and practices have a difference in their content.

The curriculum based on the Federal State Educational Standards includes the duration and schedule of students' internships that can be set according to the student's needs and the employer's tasks. As a rule, the practice duration is calculated by educational institutions for a month and divided into academic, industrial, and undergraduate. However, normative acts allow to unite all practices types and evenly distribute them throughout the school year. And the most, it is impossible to get around practice within the educational program. An individual plan for students of supplementary vocational education programs includes internships within the framework of the implemented educational and production cluster [16]. A comparative analysis of practices and internships is presented in table1.

Table 1. Criteria for comparing practice and internships

Criteria	Practice	Internship
1. Content	To develop skills for professional activities, to collect the necessary information for final qualification work	To receive supplementary profile education. To learn about the features of a particular company, to be trained for a specific position
2. The period in the structure of the curriculum	It is implemented according to the educational program and only during the study time	The recommended time is the 4th course. It can be implemented during the holidays
3. Responsibilities	Performance of duties within a competitive position	Performance of duties according to an individual practice plan
4. Employment	Subsequent employment	Permanent work is not provided

Thus, during the internship, the employer educates the student and receives the required specialist. Due to the internship, universities implement practice-oriented training, students acquire relevant practical skills and the possibility of real employment.

3.1 Enhancing student educational activities

For the successful formation of a competitive graduate, the higher education should orient the educational process to enhance the cognitive activity, the development of students, which becomes possible with individual educational paths [9].

Individual educational paths can be set up depending on the goals of the subjects of education. Therefore, the characteristics of the individual educational path depend on the tasks solved in this direction.

The analysis of psychological and pedagogical literature identifies three areas of implementation of the individual educational path [10], which is presented in Figure 2.

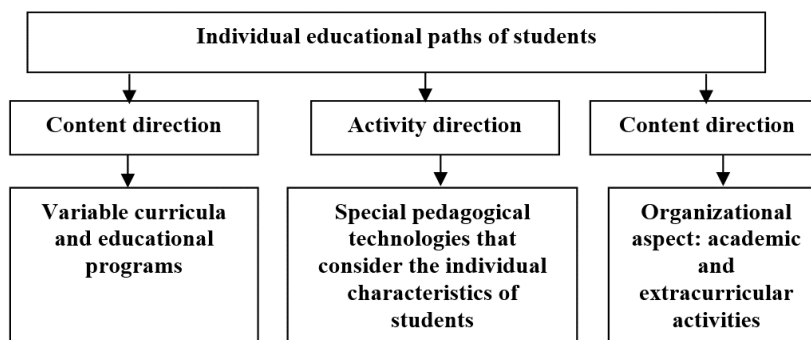


Fig. 2. Individual educational paths of students

Thus, an individual educational development path can include a certain sequence of activity components aimed at realization of student’s cognitive goals. Meanwhile, it should correspond to the abilities, interests and capabilities of the student [19, 20].

3.2 Involvement of students' activities close to real professional activities

To form a sustainable motivation for cognition, a student must be an active participant in the production process, and not be an outside observer.

To engage students in practical activities, we recommend the following:

- To orient projects towards future professional activities
- To apply interactive technologies and simulators of real production processes
- To conduct business games plunging student into the simulated real professional activity
- To justify the importance of the discipline for the development of future specialists' skills
- To accompany the educational process with examples from professional practice using modern electronic information technologies, for example, the organization of direct streaming broadcasts from the production place; organization of conference calls with specialists from existing enterprises.

Thus, obtaining ideas about the practical benefits and applicability of the acquired knowledge, the student increases the motivation for cognition and forms a value-related attitude to future professional activities [17].

3.3 Individual approach to each student

The purpose of the education system is the comprehensive development of personality. The solution to this task is possible only through the identification of the existing potential of the individual and the formation of its individuality as the highest level of development. Only in this case, it becomes possible to obtain not only the necessary skills, abilities and knowledge for a student but also his desire for self-development and self-cognition [13].

The individual approach involves:

- Assignment of a curator for students in their educational activities from among the teaching staff
- Joint identification and determination by the student and curator of the professional interests of the student and their coordination with the basic topics of research projects
- Obligatory compilation of an individual development plan by the student and its coordination with the curator
- Curator's help to a student in the implementation of his development plan
- Regular curator's monitoring employers about the results of the student training in the internship
- Communication between the curator and the student after receiving the results of monitoring student's achievements and developing recommendations for improving professional competencies [21].

Organizational and pedagogical conditions

1. The content conditions are:

- Educational programs, curricula, educational and methodological support for the training and retraining of highly qualified and competitive specialists developed in accordance with the requirements of the Federal State Educational Standard, the needs of the personality of the student and the needs of employers
- The creation of teaching materials that contain copyright recommendations for university teachers on the design and organization of the educational process
- Development of individual educational paths
- Providing a value sense of educational information perception [18].

2. Organizational conditions:

- Designing the formation of key professional competencies on the principles of systematicity and consistency, individuality, adaptability, problematic, professional orientation of training, diagnostics
- Using interactive, innovative teaching methods that have a professional focus and simulate future professional activities
- Interacting of competency, contextual, collaborative, problematic and personality-oriented approaches when organizing the basic educational forms of higher education: lectures, practical, seminars and independent work
- Developing individual internship programs at the enterprise
- Creating an educational and production cluster.

3. Motivational conditions:

- Diagnostics of the level of professional competency formation to choose the appropriate teaching methods and build for each student educational path
- Pedagogical support to students with difficulties encountered in the learning process
- Development of academic performance rating in the discipline considering the individual characteristics of the student
- Self-reflection of the student's activity, that is, awareness and comparison of the achieved results with the tasks outlined earlier [11].

We summarized all the above in the form of an organizational and pedagogical model of forming in-demand staff in the system of higher and supplementary vocational education presented in Figure 3.

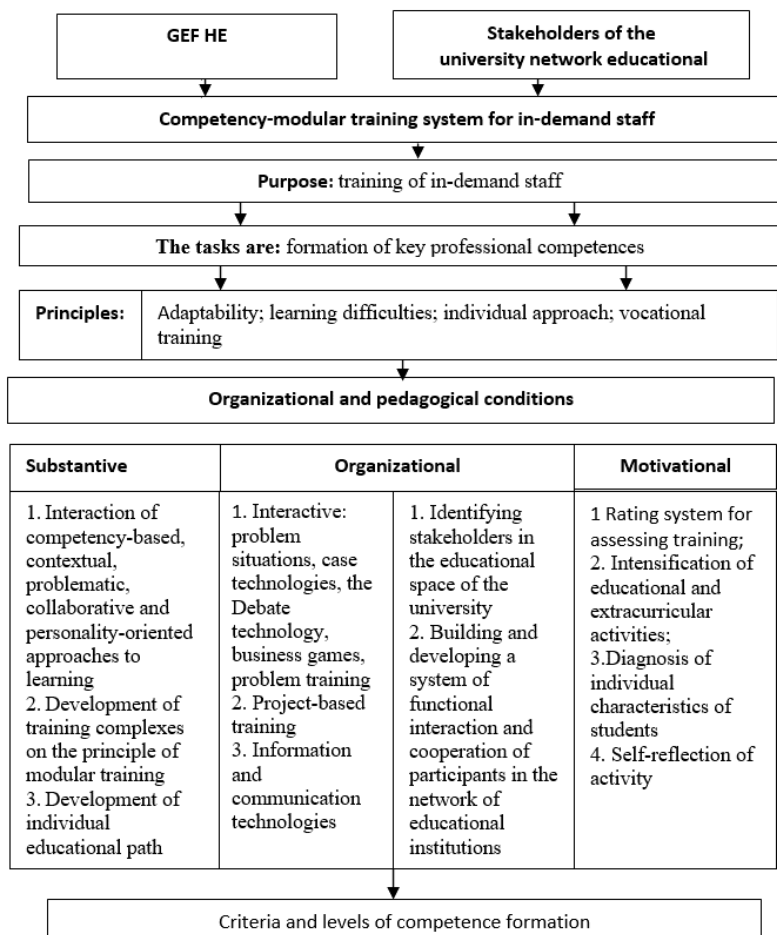


Fig. 3. Organizational and pedagogical model of in-demand staff training in the system of higher and supplementary vocational education

The proposed model of in-demand staff training in the system of higher and supplementary vocational education was introduced into the educational process of the Yurga Institute of Technology of the Tomsk Polytechnic University. For the effectiveness of the proposed model, we formed groups among supplementary vocational education students: control and experimental studying under the further education program. The training load leaves 330 hours.

In the control groups, classes were conducted using traditional teaching methods. In the experimental groups, the educational process was built according to our training model. All the teachers involved in the experiment constantly had working contact. In the control and experimental groups, the classroom load was the same. In total, 160 students and 8 teachers took part in the experiment. 79 students participated in control groups, and 81 students in experimental groups.

As an indicator of assessing the effectiveness of the proposed training model, we selected key professional competencies that are common for all forms of training. Three levels of competency formation (high, medium and low) were identified. The levels were formed in the framework of the requirements of professional standards and expectations of employers. The assessment was carried out through diagnostic tests, personal observation. The degree of fulfilment of individual educational trajectories and the results of the internship according to the developed criteria were studied. The results are presented in tables 2, 3. There the high level is indicated by number 1, the middle by number 2 and the low level by number 3.

Table 2. Levels of professional competencies’ formation before the experiment

Groups	Number of students	Key professional competencies											
		Communicative			Informational			Organizational			Research		
		3	2	1	3	2	1	3	2	1	3	2	1
Test	78	24	42	12	52	20	6	46	22	10	56	18	4
Exper.	82	28	43	11	54	19	9	45	25	12	57	19	6

The table shows that before the start of the experiment, the level of competency formation in the control and experimental groups was almost the same. After the experiment, the results have changed significantly.

Table 3. Levels of professional competencies’ formation after the experiment

Groups	Number of students	Key professional competencies											
		Communicative			Informational			Organizational			Research		
		3	2	1	3	2	1	3	2	1	3	2	1
Test	78	26	38	14	48	20	10	41	23	14	44	25	9
Exper.	82	13	42	27	32	32	18	22	39	21	30	32	20

The results of the experiment led concluding that the implemented organizational and pedagogical model of in-demand staff training in the system of higher and supplementary vocational education leads to a higher result than traditional education.

4 Conclusion

Thus, the model of training in-demand staff implemented in the educational process in the system of higher and supplementary vocational education:

- More efficiently organizes the learning process in the university using the interacting competency, context, problem, collaborative and personality-oriented approaches
- Motivates students to master the competencies necessary for the employer considering the characteristics of the region and individual characteristics and needs
- Forms a value attitude to future professional activity using the interactive methods for involving the student in a simulated future professional activity
- Forms practical skills during the internship

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