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# METHODOLOGY OF EDUCATIONAL PROGRAMMES DESIGN IN ELECTRONIC EDUCATIONAL ENVIRONMENT OF UNIVERSITY

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## *Abstract*

The paper deals with the research results regarding the study of the methodological foundations for the process of designing the basic vocational educational programmes in the context of university electronic information and educational environment. These foundations are the ideas of the systemic, competency-based and modular approaches; their significance and potential for the design of the educational programmes, the construction of the tool base of the electronic information and educational environment are under consideration in the article. The process of designing such programmes in the electronic information and educational environment is a complex integrated system consisting of subsystems interrelated by direct and back connections, having a common goal and fixed links with external environment. The system of design of the basic vocational educational programmes in the electronic information and educational environment is part of the system of the information, technical and educational tools, which provide mastering the educational programmes. The tools for designing the educational programmes should be considered in connection with the tools of the educational process implementation, access to educational materials, education quality evaluation, getting mutual feedback. In the electronic information and educational environment there is a demand for the creation of tools for setting the educational goals, the indicators for achieving them, the means of formal description of activities and labour functions of graduates, vocational competencies and their elements. The tool environment should provide management of separate modules of educational programmes, description of connections and combinations of educational modules for creating integral educational programmes.



**Keywords:** Design, approaches, standards, competency, educational programme.

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## 1. Introduction

Modern ideas about the development of education, state projects and programmes determine the need to create new devices and digital tools for the implementation of the educational process, new methods and technologies of training, deep processing of educational programmes. Development of the new programmes and their subsequent implementation can be carried out with the use of appropriate tools of the electronic information and educational environment, which take into consideration the specific features and logic of the internal organization of the educational programmes, providing relevant documentation, implementation of the learning process and evaluation of the results.

Such devices, however, have not yet been properly developed. Various digital tools of electronic support in the implementation of the educational process are widely used, but special devices for designing, development and evaluation of the quality of the educational programmes are hardly applied. The relevant issue in this regard is to determine the methodological foundations for the design of educational programmes in the electronic information and educational environment, as well as the development of the digital tools necessary for this design. The article presents the research results in identifying such foundations.

## 2. Problem Statement

In the modern pedagogical science there are theoretical premises for scientific understanding of the methodology of designing the basic vocational educational programmes in the context of the electronic information and educational environment of the university. In terms of the competence paradigm in higher education (V.I. Baidenko, I.A. Zimnyaya, A.P. Tryapitsyna, Y.G. Tatur, etc.) there are new results on the design of educational programmes (V.S. Bezrukova, E.S. Zair-Bek, E.F. Zeer, I.A. Kolesnikova, etc.) in terms of the modular principle of their implementation (J. Russell, V.V. Karpov, V.I. Panchenko, etc.). The issues of standardization of higher education (V.I. Baidenko, V.I. Blinov, V.A. Bogoslovsky, etc.) and designing educational programmes that meet the requirements of the vocational standards (V.A. Bolotov, A.K. Markova, G.K. Selevko, M.A. Choshanov, A.I. Chuchalin, etc.) are under thorough consideration.

The issues of development and application of the electronic information and educational environments are discussed in the framework of the wide range of informatization of education. Modern research in this field is associated with the issues of information management of the basic vocational educational programmes, design of the platforms for electronic information and educational environment, the use of public cloud technologies (O.F. Bryksina, E.I. Gornostaeva, Z.U. Imzharova, E.P. Krupoderova, A.N. Levchenko, E.K. Samerkhanova, etc.).

Despite the increasing number of studies on various aspects of the design of the basic vocational educational programmes of the university, there is still the need for scientific substantiation of the methodological guidelines for the implementation of this process in the electronic information and educational environment of the university, providing the possibility of the automated development of the modular competency-oriented educational programmes.

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In this regard, the issue of our research is to find the answer to the question: what are the methodological foundations for the design process of the basic vocational educational programmes in the context of the electronic information and educational environment of the university?

## 3. Research Questions

1) What is the value and potential of the system, competency-based and modular approaches for the design of the basic vocational educational programmes in the electronic information and educational environment of the university?

2) What ideas of the system, competency-based and modular approaches should be taken into consideration in the construction of the tool base of electronic information and educational environment for the design of the basic vocational educational programmes?

## 4. Purpose of the Study

The purpose of the research is to study the systemic, competency-based and modular approaches as the methodological foundations for the process of designing the basic vocational educational programmes in the context of the electronic information and educational environment of the university.

## 5. Research Methods

Theoretical and methodological analysis of the philosophical and pedagogical literature on the issue of research, comparative analysis of vocational and educational standards, content analysis of the term “competency”, synthesis.

## 6. Findings

Based on the understanding of the pedagogical design of the main vocational educational programmes in the electronic information and educational environment of the university as a complex process, which should be comprehended from different angles, the methodological basis of the study is the system, competency-based and modular approaches. The logic of the analysis is suggested as follows:

1) characterizing the key concepts of each approach and their interpretation in relation to the issue of designing the basic vocational educational programmes in the electronic information and educational environment of the university;

2) choosing the basic ideas of each approach as the guideline for further research: identifying the principles of design of the basic vocational educational programmes in the electronic information and educational environment of the university, the construction of the tool base of the electronic information and educational environment for the design of the basic vocational educational programmes.

The systemic approach is one of the methodological directions of the modern science related to the representation and study of the object as a system. The key concept of the systemic approach is the “system”, which is considered to be a set of elements that perform certain functions to achieve a common goal, and which are related to each other, forming a certain integrity, unity (Blauberg, Sadovsky, &

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Yudin, 1978). The systems characterized by a large number of interrelated elements, the possibility of decomposition of the system into subsystems, subordination of the goals of subsystems to the general goal of the system, hierarchical (level) management structure, the interaction with the external environment, are called complex systems (Kagan, 1991). The definition of the concept "system" allows revealing several ideas that should be taken into consideration in the study of the issue of designing the basic vocational educational programmes in the conditions of the electronic information and educational environment of the university.

Firstly, the systemic approach provides the opportunity to consider the object, subject, process, means and result of the pedagogical design as a complex integral pedagogical system containing its subsystems. In relation to this study, this idea allows a systematic search for answers to the questions: what is the essence and structural elements of the educational program? Who designs the educational programmes in the electronic information and educational environment of the university? What are the functions of designers? What tools of the electronic information and educational environment should be used in the design of the educational programmes? What is the algorithm for the design of the educational programmes in the electronic information and educational environment of the university?

Secondly, the systemic approach requires a common goal for all its subsystems. It is important to take into consideration that each subsystem has its own purpose, but it should work to achieve the overall goal of the system, i.e. be subordinate to it. Taking this position into consideration in the design of the basic educational programme of the university allows not only to highlight the overall goal of the system and its subsystems, but also to achieve their complete unity.

Being an ideal representation of the final result, the goal is the guideline of the designing activity. Therefore, we see the fundamental goal of the system of designing the basic vocational educational programme of the university in meeting the social demand – meeting the requirements of the state, society and the labour market, reflected in the Federal state educational standards of higher education. Meanwhile, it is obvious that the social demand is only the initial premise for the pedagogical design, and it is equally important to take into consideration the requirements of internal stakeholders (the administration and teaching staff of the university, as well as students). This requires thorough detailing of each goal of the design activity, which is possible via creating some specialized tools of the electronic information and educational environment for setting and considering the goals, determining the indicators that they have been achieved, the automated evaluation of the quality of the educational programmes and subsequently the educational results.

Thirdly, the systemic approach regulates that none of the systems exists in isolation, it is always part of another, larger system and it is in a mutually subordinated relationship with it. The only way to represent a complex system as a whole is to approach the system as a part of some metasystem, that is, to analyze the environment in which it functions (Kagan, 1991). This implies the idea about the "responsibility" of the system in relation to the higher system, which requires the perception of the essence of the metasystem, which subsystem is the object under study.

In relation to our research, the system of designing the basic vocational educational programmes is a subsystem of the electronic information and educational environment of the university as a system of informational, technical and educational tools that provide students with the opportunity to master the

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educational programmes. It means that the tools of designing the educational programmes in the electronic information and educational environment, according to the systemic approach, should be considered in close relationship with the tools of implementation of the educational process, organization of access to the educational materials, evaluation of the quality of education, feedback.

The competency-based approach, the regulatory framework of which is currently fixed at the state level due to the introduction of the Federal state educational standards of higher education in Russia, provides the focus in the design of the main vocational educational programmes of the university on the results of education.

The leading idea of the competency-based approach is the new vision of the result of education, which is not considered to be a variety of highly specific knowledge and skills, but professional competency and competence as the actual ability to act effectively in a variety of social and practical situations (Zeer, 2015; Lystbaek, 2016; Efremova, 2017).

The basic concepts of the competency-based approach are "competency" and "competence", which are still being discussed.

In the pedagogical theory there are many definitions of the concept of "competence", which is considered by scientists as:

the ability of a person to perform specific activities in accordance with the standard (Hyland, 2001);

a person's possession of the relevant competency, his / her personal attitude to it and to the subject of his / her activity (Khutorskoy, 2017);

the ability of a person to achieve success in vocational activities (Gilbert, 1978; Stoof, Martens, Van Merriënboer, & Bastiaens, 2002; Biemans & Mulder, 2004);

the ability of a person to solve problems and typical tasks he / she faces in real life situations, using knowledge, educational and life experience, values and inclinations (Vereshchagina, Gladkaya, Pisareva, Solomin, & Tryapitsyna, 2016);

the ability of a person to mobilize his / her knowledge, skills and experience in a specific social and professional situation (Zeer, 2015).

In its turn, the competency in most cases is considered as complex, integral (metasubject), personal phenomenon, characterized by a stable motivation of a person to his / her activities. The researchers give special attention to the structure of this phenomenon, defining the concept of "competency" as:

the system of knowledge in a certain field, skills and relationships that affect a significant part of the vocational activity, associated with the activities, can be measured and developed through training (Parry, 1996; Mirabile, 1997);

a set of new formations, knowledge, system of values and relationships that contribute to the creation of the value and semantic, behavioural, emotional and volitional, cognitive results of personal activity of subjects (Zimnyaya, 2014);

a set of knowledge, skills, experience, as well as the student's attitude to this activity (Vereshchagina et al, 2016).

Another approach to the definition of the concept "competency" is associated with the fact that competence is the characteristic of a specialist, and competency is the characteristic of a job. In this

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respect, vocational competency is a predetermined requirement (standard) to education, expressed by a set of interrelated semantic guidelines, knowledge, skills and experience of the student in relation to a certain range of objects of reality necessary for personal and socially significant vocational activities (Borytko, 2007). In terms of this approach competence is the subject's possession of the relevant competency, a personal quality (Khutorskoy, 2002). Meanwhile, it is indicated that competence may include not one, but several competencies, which are manifested in various fields of activity. Thus, the structure of a specialist's competence is determined by a set of competencies that are important for his / her vocational activity. The set of such competencies presented in a certain system can be understood as a competence model of a specialist (Sarantsev, 2015).

In the aspect of the study of the approaches to the design of educational programmes in the electronic information and educational environment of the university, it is highly important to clarify the component structure of competencies. It is necessary for determination of the indicators of achieving the levels of competency formation, as well as the description of the contents of the educational programme, substantiation of its logic through the list of the disciplines (practices), parts and subjects.

In order to provide a more accurate scientific basis for the research we conducted a content analysis of the views of Russian scientists the structural elements of the competency (Khutorskoy, 2002; Tatur, 2004; Bermus, 2011; Blinov, 2011; Zimnyaya, 2014; Zeer, 2015; Vereshchagina et al, 2016; Efremova, 2017).

To carry out the content analysis we used a matrix-type table containing the following parameters: "structural elements of competency" and "scientists' names", "frequency of scientists' ideas (number of coincidences)".

**Table 01.** Competency structure in the viewpoint of Russian scientists

| **Structural elements of competency** | **Scientists' names** | | | | | | | | | | | | **Number of coincidences** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **V.I. Blinov** | **A.G. Bermus** | **N.F. Efremova** | **E.F. Zeer** | **I.A. Zimnyaya** | **E.M. Kon** | **O.O. Martynenko** | **V.V. Serikov** | **Y.G. Tatur** | **A.P. Tryapitsyna** | **A.V. Khutorskoy** | **A.I. Chuchalin** | |
| Knowledge | + | + | + | + | + | + | + | + | + | + | + | + | 12 |
| Abilities | + | + | + | + | + | + | + | + | + | + | + | + | 12 |
| Skills | + | | | + | | | + | | | | + | | 4 |
| Ways of acting | | | | + | + | | | | | | + | | 3 |
| Experience of vocational activity | + | + | + | | + | + | + | + | + | + | | + | 10 |
| Personal qualities: motives, value attitude to the activity | | + | | + | + | | | + | + | + | + | | 7 |

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The results of the content analysis allow identifying three components in the structure of any competency as the result of education based on student mastering of the basic vocational educational programme:

cognitive component – a system of knowledge and skills, i.e. the methods of acting necessary to solve the vocational tasks, as mastered by the subject;

activity – the activity experience mastered by the subject, conscious application of knowledge and skills when solving the tasks of vocational activity as applied to existing conditions;

personal – subject's readiness for the manifestation of competency: activity, initiative, personal interest in solving vocational tasks, positive value and motivational attitude to vocational activity (Chandra & Baikina, 2018).

The described structural elements of the competency are adequately described in the terms "to know", "to be able" and "to possess". Meanwhile, when describing the elements of the latter type ("to possess") it is assumed that it is:

1) possessing the vocational experience;

2) possessing some personal qualities (motives, value attitude to activity);

3) possessing the skills;

4) possessing the methods of acting (Zlatkin-Troitschanskaia, Shavelson, & Kuhn, 2015).

Thus, the application of the competency-based approach in the design of the basic vocational educational programmes in the context of the electronic information and educational environment of the university requires considering the fact that the competency-based approach shifts the focus of the requirements for the design of the educational programmes from the content of education to its results. In the logic of the competency-based approach, the results of education are a set of competencies that perform in details the image of a graduate of the basic vocational educational programme of the university, taking into consideration the actual needs of the labour sphere (Demchuk, Karavaeva, Kovtun, & Rodionova, 2015; Strijbos, Engels, & Struyven, 2015).

The initial information of the system of designing educational programmes in the electronic information and educational environment are the competencies and their components described in the terms "to know", "to be able" and "to possess". These components, which reflect the content of the competencies, determine the logic of the sequence of disciplines (practices), their sections and educational topics. It should be noted that the Federal state educational standards of higher education 3++, based on the competency-based approach, are of the framework nature, provide universities with freedom in the design of the competency model of a graduate of the educational programme, as they establish only its fundamental "core" in the form of listed universal and general vocational competencies (Sarantsev, 2015; Safonova, 2018). The vocational competencies, as well as the contents of the structure of all types of competencies (universal, general vocational, vocational) are determined in universities on the basis of the basic educational programmes and the analysis of the professional standards corresponding to the vocational activities of a graduate of the educational programme. In this case, the design of the educational programmes in the electronic information and educational environment is possible by means of the tools of formal description of the competencies and activities to which the graduates are being trained, as well as labour functions performed by representatives of these professions.

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Modular approach. The competency-based approach presented above determines the interdisciplinary and activity nature of the vocational competency, which cannot be formed and evaluated within the framework of one discipline; it is necessary to combine them with the essential access to the conditions close to the future vocational activity of the graduate. Taking this situation into consideration in the design of the basic vocational educational programmes in the electronic information and educational environment of the university requires the modular approach.

Modular construction of educational programmes involves a set and sequence of educational modules aimed at mastering the competencies necessary for some vocational qualifications (Kashtanova & Kudryavtsev, 2015).

Each module as a relatively independent, logically completed unit of the educational programme should provide the opportunity for:

step-by-step formation of one or several competencies of a graduate (Gryazev, 2014);

student's choice of the individual educational trajectory of development of the educational programme taking into consideration the training profile (Serikov, 2004);

mastering a set of basic disciplines, elective courses and practices aimed at the formation of the graduate's readiness to solve certain vocational tasks (Kashtanova & Kudryavtsev, 2015);

conducting interdisciplinary midterm certification of the module as a whole (Khutorskoy, 2002).

The modular approach involves significant rethinking of the principles of design and further implementation of the educational programmes (Gryazev, 2014). Regarding the design of programmes in the electronic information and educational environment, the modular approach provides the possibility of creating the educational programmes through the description of some separate modules, links between modules, their various combinations. Thus, in the electronic information and educational environment there should be management tools for the modules of the educational programmes, as well as creating integrated educational programmes based on these modules.

## 7. Conclusion

The analysis in the logic of the basic ideas of the systemic approach allows us to study the process of designing the main professional educational programmes in the electronic information and educational environment of the university as a complex integrated system consisting of a set of subsystems interconnected by means of direct and back connections, having a common goal and fixed links with the external environment. The system of design of the basic vocational educational programmes in the electronic information and educational environment is part of the system of the information, technical and educational tools, which provide that students can master the educational programmes. The tools for designing the educational programmes in the electronic information and educational environment should be considered in conjunction with the tools of the educational process implementation, the development of educational materials, quality evaluation, getting feedback.

The potential of the competency-based approach is that it allows to determine the competency model of the graduate, to specify the content of each competency following the current requirements of the labour market, to carry out modular construction of the educational programmes, to develop a competency-oriented system of evaluation tools. The specificity of the design of the educational

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programmes in the electronic information and educational environment requires a formal description of the activities and work functions of graduates, professional competencies and their structural elements.

The modular approach significantly changes the principles of design, development and further implementation of the educational programmes. Considering the fact that the educational module is an independent and logically completed unit, in the structure of the electronic information and educational environment there is an opportunity and a need to create management tools for individual modules, as well as the tools for describing the connections and combinations of these modules to create integral educational programmes.

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