VARIABLE ALGORITHMS OF INFORMATION ENVIRONMENT APPLICATION IN THE EDUCATIONAL PROCESS

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Abstract. From the point of view of variable algorithms of information environment used in the educational process, the article reveals the priorities of the information environment innovation development from the position of the regulation level of performed actions automation and consideration of the most significant levels of automation accepted in the chosen profession.

Keywords: vocational school, system of vocational education, educational activity, information environment, electronic educational resources

Typology foundations of variable algorithms of information environment application by the subjects of the educational system. The sequence of actions, making variable algorithms of information environment application in the educational process, has an operational basis [1] characteristic for definite performers, among which there are not only subjects and groups of subjects of educational system, but also information systems that are included into the technological process of vocational school's objectives achievements. Computer means and electronic educational resources [2] make part of them. They have definite professional-design, educational and information-analytical functions.

We classify variable algorithms, firstly, according to the leading functions, their place and role in the processes of design, realization and analysis of the course and results of educational system implementation [3, 4] when the information environment is applied in the educational process:

- algorithms of electronic educational resources and information subsystems of educational process design,

- algorithms of educational process implementation with the effective use of information environment carried out by the subjects of the educational process,

- algorithms of control and analysis of educational process results with the use of information environment.

Secondly, according to the automation level of actions carried out in the information environment [5]:

- algorithms of processes automatic realization,
- algorithms of processes automated realization,
- algorithms of subjects interaction management realizing the educational process by applying information environment.

The combination of the two groups of grounds given above is reflected in a two-dimensional matrix classification of variable algorithms of the information environment application in the educational process (see table 1).

Table 1.

Two-dimensional matrix classification of variable algorithms of information environment application in the educational process

Grounds of classification		Place and role of algorithms in the educational process		
		Design of educational process subsystems	Implementation of the educational process	Control and analysis of the results
Level of actions automation	Algorithms of automatic realization of processes	Automatic realization of design activity and routine operations of design, transfer of design solutions with the use of a rigid scheme, etc.	Automatic control of the educational process implementation, mailing of standard tasks according to the advance set or casual scheme, etc.	Automatic control of the validity, reliability and diagnostic value of results and their rating analysis, etc.
	Algorithms of automated realization of processes	Algorithms of automated design of educational system components	Algorithms of automated training with the use of electronic textbooks and interactive educational resources	Wide range of algorithms of automated monitoring, control and analysis
	Algorithms of subjects' interaction management realizing the process	Algorithms of social partners' and customers' opinions reflection in the design, including the target and informative blocks, and also in the parameters and ways of their realization	Algorithms of electronic products use and creation of joint educational projects	Algorithms of joint design, operating, analytical and expert-valuation activity experience formation of all participants of training, significant for the work in team

This matrix classification can be brought to a linear type through the choice of one of the grounds as the leading one, corresponding to the solutions of a certain educational problem. Thus the other ground will find its reflection in the parametrical organization of possible variable algorithms and sequence of their description.

In the present work these levels of automation will be detailed in the context of invariant sequence of professionally-designing, educational and information-analytical activity algorithms descriptions [6].

The leading criteria of algorithms application relating to the specific level of automatic, automated or other processes realization in the educational system are:

- the expediency of the unified approach to design, implementation and analysis of a definite process of the educational system [7,8];

- opportunities of corresponding algorithmic means and their development.

Specification of algorithmic groups of information environment application in the educational process. According to the expedient ways of design, educational and analytical processes realization in the information environment [9], their place, role and real opportunities of their automatic, automated or other realization, we will give an approximate distribution of functions in accordance with the suggested grounds of algorithms classification.

1. The group of algorithms of processes automatic realization in the educational system assumes the full transference of functions from a person to a computer means or an electronic resource. Most expedient algorithms of processes automatic realization in the educational system are described below by subsections: algorithms of design activity automatic realization, algorithms of educational process automatic realization, algorithms of automatic control and analysis of training results.

a) Algorithms of design activity automatic realization include: algorithms of electronic textbooks realization on the basis of standard requirements described by a teacher in advance, the realization of function automatic selection of a set of design solutions and systems of requirements applied in the external environment; algorithms of the expert system knowledge formation on the basis of successful educational projects versions; algorithms of designed system expert testing in standard, boundary and changed conditions; algorithms of predesign preparation of standard tables, schemes and forms; algorithms of formalization, formal models manipulation and implementation of standardized actions aimed at formal models transformation; algorithms of design activity implementation according to the model; algorithms of design decisions associative transfer on another regulatory basis or a technological platform; algorithms of educational documentation formation, etc.

b) Algorithms of educational process automatic realization, including the educational process participants registration and mailing of training materials to them; automatic rhythmical presentation of tasks selected in advance to students; automatic display of video lectures in compliance with the time-table; automatic distribution of individual research topics, including the stochastic scheme, etc.;

c) Algorithms of automatic control and analysis of educational process results: on the basis of individual tests presentations and collecting answers to them, correction of answers with the use of the right answer patterns and their syntactic analysis; algorithms of statistical information collection about educational activity rhythm; algorithms of completeness, validity, reliability, diagnostic value of test materials correctness; algorithms of educational documentation verification and its correspondence to the educational standard requirements, development of ranking scores, etc.

2. The group of processes automation algorithms provides the interaction of educational process subjects and program-technical devices in the interactive dialogue. These algorithms are characterized by partial transfer of operating functions,

among them there are algorithms of design automation, selection and analysis of the specific educational trajectory productivity in the electronic resources environment. It is necessary to mention some most expedient algorithms in this group.

a) Algorithms of the educational system automated design components, including interactive improvement and expert assessment of schemes and forms offered by a computer; algorithms of selection and rejection of training materials; algorithms of educational resources managed creation and integration are also transferred to this group; algorithms of monitoring systems design, including some created on the basis of covers for drawing up tests, and also algorithms of educational resources integration (both external, and internal); algorithms of the training material adequate forms and methods automated selection in the educational process, including means of a dialogue selection of their leading parameters; algorithms of educational video materials creation and viewing, constructed on the basis of iterative procedures; algorithms of training design in the conditions of distant technologies, including the development, selection and experimental approbation of the most effective interactive models of dialogue training realization, etc.

b) Algorithms of automated training with the use of electronic textbooks and interactive educational resources are also included here; algorithms realizing the functions of educational actions operated performance, in the structure of interactive laboratory works; algorithms of educational activity realization with the use of individualized training complexes; algorithms with training games application, etc.

c) Besides, it should be noted that there is a wide range of automated monitoring, control and analysis of training results algorithms.

3. Algorithms of interactions in the process of educational system design and realization. Here we have algorithms which are supplemented with control mechanisms of educational process subjects' interaction at the stage when social partners' opinions concerning the pedagogical system design are taken into account, interactions at education self-government managing and intermanaging, and also at the stage of reflection and feedback support.

a) At the stage of design, algorithms of interactions support allow to consider social partners' and customers' opinions concerning the specialist in the process of educational process goal setting, and also in the process aimed to determine the ways of their achievement.

b) Algorithms, aimed to provide joint educational and design activity of educational process subjects, include their interactions organization in the process of electronic products preparation, analysis and use. A person or a group of people are the performers of such algorithms, the result of their performance is information documents and resources created in the process of the joint activity, and also the increase of educational process subjects interaction activity and productivity.

c) Interactions of educational process subjects at the stages of self-evaluation and inter-evaluation of educational process and educational activity current and total results. These interactions are performed on the basis of open educational environment in which the information about educational results and achievements of each student becomes available to the whole educational group; in such conditions algorithms of interactive learning and algorithms of purposeful change of leading

role functions become more active. All this allows to increase the results of educational activity and to develop the participants' experience of design, operating, analytical and expert-valuation activity significant for team work training.

Experimental realization of variable algorithms of information environment application in the educational process. Let us show the examples of information environment application in the educational process, demonstrating the work with the training material of innovative character.

1. The introduction into the educational process of the theme demanding an essential innovation search at the initial introduction of the theme "Innovative educational resources" into the educational process. In the experiment students were offered some tasks, the level of algorithmic performance of which should be referred to the group of interaction management. Firstly, interacting with each other and with the external for the educational process environment, students carried out the search in the network of the most interesting new development of educational character. Secondly, they gave their description according to the suggested scheme. The bank of annotated innovative resources has become the result of the obtained material processing.

2. The application of innovative search results of previous teaching experience in the educational process. Students were offered the tasks concerning the automated realization of processes. Firstly, the bank of annotated innovative resources created in the previous experiment was offered for studying. Secondly, the development and expert assessment of innovative resources in the automated mode, for example, according to the scheme fulfilled in the described experiment "3 - 2 - 1" (to ask three questions, to tell two judgments about advantages and disadvantages, to draw one general conclusion on the perspectives of application) become the result of students' work. Thirdly, students are suggested to evaluate the level of various aspects of innovative information resources development and to give some advice on their improvement.

3. The use of material automatic supply for teaching of the developed educational theme. In the process of designated theme teaching experience accumulation, the training material for automatic supply in the educational process is quite created. In the described experiment it includes a systematized set of innovative resources, algorithms of work with them, examples of their analysis and ways of improvement. At first students are asked to study the automatically given material. Secondly, they have to choose a certain set of innovative resources and to describe their advantages and disadvantages. Thirdly, they have to carry out the task statement aimed at the design of their own resource that will possess the designated advantages and minimize designated disadvantages. Fourthly, they have to realize the resource of their own and to prove its competitive advantages.

The productivity of educational process automation actual levels selection. The experience makes it clear that today automated algorithms have gained the increased application, they are aimed at planning and collaboration performance in the interactive mode, including algorithmic blocks of goals achievement: a) mutual help and exchange of ideas, b) participation in projects as a testee, respondent, expert, c) expertizes and mutual testing, d) collaboration self-

assessments, e) acceptance of a specific role by the subject, f) monitoring of the contribution to the prepared product, g) ranging of priorities, h) evaluation of development efficiency.

According to the actual levels of automation and their experimental verification there have been revealed some indicators of subjects' interaction algorithms comparative efficiency within the system of professional education. In the experiment there has been found out that more than 75% of teachers are ready to delegate their function to the information educational environment. It is connected with the fact that routine functions allow to realize only 10% of the educational program content, but they take more than 80% of teacher's working time.

In the experiment we have managed to direct the released time for the organization of creative problem solution and rendering consulting assistance to choose the ways and means of their solution.

Thus, there have been revealed peculiarities of each type of algorithms connected with the development of the modern society, information science, manufacturing and education.

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