Дидактические основы использования информационных технологий при мониторинге качества высшего образования

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Аннотация: Формирование системы контроля качества образования, управления системой непрерывного образования в целом и ее реализация – одно из приоритетных направлений государственной образовательной политики, самостоятельное крупное направление научного поиска и актуальная задача науки. Именно обоснованию указанной проблемы посвящена работа «Дидактические основы использования информационных технологий при мониторинге качества высшего образования».

Ключевые слова: Качество образование, информационные технологии в образовании, эффективность дидактических процессов.

Didactic principles of using information technologies on monitoring quality of higher education

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Abstract: The formation of a system of quality control of education, management of the system of continuing education in general and its implementation is one of the priorities of the state educational policy, an independent major area of scientific research and an urgent task of science. It is to substantiate this problem that the work "Didactic foundations of the use of information technologies in monitoring the quality of higher education" is devoted.

Keywords: Quality of education, information technologies in education, effectiveness of didactic processes.

Practice has shown that the increments of the numerical values of estimates of motivation at the beginning and end of the study subjects are not the same. Faster formation of dynamic properties are motivated, then the direction of the subject property and slowly varying motives ideological orientation, but at their expense the transition from narrow to wide motivation differentiated system of motives, external determination of increasingly replaced by the ratio of operating as a personal significance, which is one of leading characteristics of professional. Based on identified patterns of change in the properties of motivation can be a prognostic conclusion continuous formation of motivation in learning technology with motivational software leads to a significant increase in students' cognitive activity that mobilizes its internal resources and contributes to creation of a resonant medium in the group is required to improve the quality of training.

A special role is played by information technology for the formation of such professional important qualities (PVQ) of a specialist, as:

- Thinking skills: strategic thinking, dynamic and nonstandard of thinking;

- Organizational skills: making optimal decisions in a competitive environment, the ability to work as part of a balanced creative team, the ability to get along, to negotiate with people;

- Commutative abilities: quick response in interaction with people, persetive abilities and skills, prevention of conflicts and the search for a compromise;

- Personal qualities: responsibility and initiative, motivation to achieve goals, the belief in success, stability at risk and stress.

Unity deployment enrichment, denial of the dynamics and the creative source of dialectical process of continuity in training. The concept of continuity in learning is a category of didactics, which has an independent status. The dynamics of transition from elementary manifestation of succession is as follows: in the previous stage or link clearly shows signs of future (feedback), subsequently maintained previous core, is being developed something new that was in the previous in its infancy, the transition from one phase or link to another part of the previous discarded (denial). In the study should provide continuity: continuity components of pedagogical systems, continuity of teaching and learning.

The process of introducing information technologies in education - is the process of educational innovation, which includes the steps by which the knowledge of the subject, the methodology and pedagogy are transferred to a different reality, which is to graduate and professional personality that has a great social value. Practical implementation of professional orientation training now required at all stages of education include the following qualitative characteristics of training programs:

- Flexibility.

- Integration of training, the availability of interdisciplinary interactions and relationships education cycles.

- Differentiation, the development of different learning options.

- Humanization of education; harmonizing the interaction of training and trainees.

- The orientation of the program to a productive outcome.

All of the above can be optimized through the introduction of information technology training.

Natural-mathematical and technical sciences characterized by a high degree of integration, the vast interdisciplinary connections, system, algorithmic, invariance, hierarchy, solidity.

Computer technology training allow development of expert - training evaluation systems knowledge and skills, based on such expert systems should be based on the principles of the theory of gradual formation of mental actions and skills, and if done right can change the learning process, dramatically reducing the amount of classroom time with simultaneous deepening training.

Methodical complex training quality control include the following:

- Formation of standards of quality of training.

- Development of control on the basis of standards of quality.

- Development, the procedure compared with the level of training achieved the standard of quality.

- Development of control influences the conditions and factors that determine the quality achieved in order to minimize the detected deviations.

The main requirement for the development of goals and objectives of education is diagnostics, i.e. well-defined (single-valued) description of the objectives, methods of detection, measurement and evaluation. In this task diagnostic goals becomes possible when the concepts used satisfy the following requirements:

1. They are clearly defined, i.e. as accurately describe their symptoms, which always refers to the notion of an objective manifestation.

2. Manifestations and the facts referred to the concept, have a category of measure, i.e. of the stock of direct or indirect measurement

3. Measurement results can be correlated to a certain scale, i.e. respectively evaluated.

In the design of learning technologies qualitative numerical allocated seven invariant activities, implementing one function and have the same goal, and we call them functional design blocks or simply blocks. This blocks the objectives, content, tools, techniques and organizational forms of technological support, control, correction and control. Each of these blocks is a complex formation of an integral character. Activities and operations of each unit are focused on final result a certain level of quality. All human activity can be considered as performing a sequence of algorithms, which is made of pre-engineered, genetically embedded.

Structural and functional characteristics of each unit is based on the proposed A.S.Vygotskim, Leontiev, T.V.Gabay approach, according to which any activity can identify a number of invariant units of analysis, through which it can adequately describe any kind of activity. These units include: stakeholder, its object, the product (result), procedure and equipment.

The effectiveness of teaching processes determined by the rate of assimilation of the material (given quality indicators). To compare the effectiveness of teaching didactic process is enough to compare the time required for absorption of a given size materials studied with the required quality.

Table 1.

Time Costs

	β=1	β=2	β=3,4
α=1	1/2 Нэ	2/3 Нэ	2Нэ
α=2	1/2 Нэ	4/3 Нэ	**6Нэ**
α=3	2/3Нэ	**2Нэ**	**7Нэ**

Partition training elements studied the levels of discipline and levels of α β can be useful in the following respects:

1) use in training of all cells of the matrix elements of training means that a teacher can not only move freely from a detailed mathematical analysis to broad generalizations, based on the intuition of the audience and giving the qualitative characteristics of the investigated problem, but also has pre-made sums and exercises, which he demonstrates these transitions;

2) The greater the number of cells of matrix used by teachers at educational process, the more holistic formed in student understanding of the subject under study, the ability of the student to explain the material at different levels of alpha and beta levels is a measure of integrity he has formed the scientific world;

3) to start the development of the work program of the course, the teacher guided the one hand, professional qualifying characteristic, which record the required knowledge, skills and abilities (thus given approximate values α and β), the other - the number of hours allocated for the study of the subject. Knowledge of correlation

of time expenditure (in terms of Ne) will optimally combine α levels and levels of β, so that the most important sections present at higher levels as well, and (3, and within the given time limit. Within the given time without compromising the values α and β may be due to reduction of Ne - through the use of more advanced teaching processes;

4) reliance on the levels α and β levels can more objectively diagnose student (by testing or by personal communication) to identify the true causes of the difficulties (low depth of learning, or do not know the language of science on which to present the material) and the control actions to correct the individual trajectory training;

5) for a beginner to learn the subject may be useful partitioning of the proposed list of references from the values α and β, so that, depending on the needs (a popular exposition to the surface, but completely cover the subject; prescription knowledge as most running formulas and theorems - to solve problems; clarification of certain points of evidence presented in the lecture) to apply to a particular source.

Table 2.

The matrix elements of training on "test for homogeneity χ2».

	β=1	β=2	β=3,4
α1	1. The concept of homogeneity in the examples. 2. The selection of proposed two homogeneous samples. 3.introduction critical limit deviation for each attribute. 4.Algoritm decision (to move beyond the critical limit	1.determination homogeneity in mathematical language. 2. determination law χ2 distribution as a sum of squares of normally distributed random variables. 3. Approval, if homogeneous sample, the proposed statistic is distributed according to χ2, and therefore the terms are normally distributed. 4.Algoritm 1. Decision If the terms of statistics lie on the line of a normal distribution, the sample is homogeneous. 5.Algoritm 2. If the sign of the transformed table values in each row are not significantly different, the sample homogeneous.	1.Approve, that the proposed statistic is distributed according to χ2 2.Formulate principle of practical certainty. 3.Reduce to algorithm hypothesis.
α2		*Qualitative analysis of*	

	1.Critical limit around each character is assigned an expert. 2.Algoritm decision (not exceeding the critical limits for all characteristics means that the samples are homogeneous)	*statistical data.* 1.Basis and working out of algorithm and graphical analysis of data, and the positioning of points (terms of statistics) on the timing of the normal distribution function. 2. Basis qualitative analysis of the transformed table of characters, using the property definition of frequency stability and homogeneity statistics.	1.Conclusion kinds of statistics by $\chi 2$ minimum and maximum likelihood. 2.Proof, the limiting distribution of the statistic - $\chi 2$ distribution. 3.Algoritm hypothesis of homogeneity. 4.Mistakes of the first and second kinds. Selection of the most powerful test.
α3	1.Form single consolidated response mismatch on all grounds. The options are: a) take the sum of the differences of the values of attributes; b) take the sum of modules of these differences; c) take the sum of squared differences of values of attributes. 2. Designate critical for collective characteristics of mismatch.	1. Develop criteria for the quantitative analysis of the hypothesis of homogeneity: a) contingency table; b) the location of points on the timing of the normal distribution function.	1.Suggest new types of statistics that make their distribution law, an algorithm for testing hypotheses.

In terms of the complexity of the implementation and effectiveness of the training is most useful study of computerized training elements of the following levels and stages:

$\beta = 1, \alpha = 1,2,3$

$\beta = 2, \alpha = 1,2$

$\beta = 3, \alpha = 1$

i.e. cells of the matrix, located in (or above) the main diagonal. The effectiveness of computer-based training on the steps of $\beta = 3$, and the level of $\alpha=2$ should be the subject of further research investigations. Invariant part of the course is part of $\alpha = 1, \beta = 3$, because here in a condensed form of the rules formulated to criteria that ensure a guaranteed success. Level elements $\alpha = 2$ are variations, the extent of their inclusion in the course depends on the purpose

of aims how should be justified and carried out by students of the qualifying characteristic determined by a specialist. The levels of α = 3 (heuristic) and α = 4 (creative) are implemented as a rule, with the participation of students in academic circles, special seminars, on doing dissertation, at the process of individual works (or in a small group) with the teacher (the head). Abstraction level of presentation depends on β pool students: β = 1 - students of secondary schools, β = 2 - humanities students, β = 3, students of technical universities, β=3 and β=4 - students of mathematics. Invariance of the course level α = 1 is the rationale in computer tutorial is at this level of assimilation, α β = fundamental level 3 or β = 4 is determined contingent of students - mathematics and engineering students.

The advent of computers, as at the time of printing, and should increase the share of the personal contribution of individual efforts in training. Didactic principles in computer education should be the same as in regular education:

- From simple to complex;

- From the external to the internal awareness of the actions (not to teach the rules, and in the examples, or inductive method of learning);

- The formation of gradually increasing complexity of association;

- Visibility (visualization, animation);

- Problem (training, as a sequence of solutions of gradually increasing complexity and challenges);

- Motivation (interest, inner need to solve the problem, the game forms);
- Goodwill (constant willingness to help and support, the style, convenience, interface);

- The availability of information (networks);

- The integrity of the perception of an object (the student needs to understand the direction of the learning process: why, for what purpose solve this or that problem, we prove, always keep in mind the general plan of the course);

- Confirmation (preferably immediately) the right thing and correct the wrong patch.

In this case, many of the principles of computer training are realized more fully than conventional training (visualization - animation, convenience and accessibility of information - the network hypertexts speed mathematical calculations, numerical experiments, getting tips - immediate confirmation, the use of learning games).

Computer uses in education (as well as training without a computer) must focus on the individual student's independent work, where knowledge and skills are the result of personal, creative effort, thinking, problem solving and trouble to create a professional, prepared for life, specialist, inner essence of which is holistic and creative look at the world, and foreign oriented actions - a relentless and consistent resolution of recurring problems. Since the absence of these qualities is the essence of crisis of education, culture, and society in general.

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