

Monitoring Technology: the Qualimetric Foundations of the Educational Process of the University

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ABSTRACT

The relevance of the research problem is determined by the current discrepancy between the requirements of society to quality of students' training- future specialists with higher education, on the one hand, and level of training received by graduates on the other hand. The tendency of the discrepancies noted is a consequence of the properties of the inertia of the educational process that gives it stability, but also hindering rapid response to the recent changes in the sphere of science, production, culture, industry and other spheres of life. The current controversy requires scientific correction and rethinking of the methodology of quality evaluation of the educational process. In this regard, priority attention in this article is devoted to justification of qualimetric grounds for the projecting and implementation of monitoring technologies in the educational process of the University. A leading research method is a simulation method allowing justification of monitoring technologies as qualimetric bases of educational process of the University and rethinking their valuable content in the students' training. The article presents the discourse of the concept "monitoring technology"; it reveals the essence, structure and content of qualimetric grounds of the monitoring technologies in the educational process of the University; on the basis of the study's results conducted the elective interdisciplinary course "Qualimetric grounds of monitoring technologies" is justified. Productivity of its implementation is proven using the criteria: formation of knowledge of the content of studied course, of the experience in using the acquired knowledge in standard and non-standard situations in the educational process; the integrity of knowledge about the qualimetric basis of the monitoring technologies in the students' training; the students' readiness to be engaged professionally in any activity; formation of competences of the culture of mental labor in accordance with the personal position of the student in self-organization and self-transformation; the personal creativity of the student - future specialist, relevant to qualimetric objectives of the monitoring technology. The paper can be useful to teachers, methodologists, managers of the universities.

KEYWORDS

Monitoring, monitoring technologies, educational process, qualimetric approach, performance criteria

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Introduction

The relevance of the study

An important condition to determine the quality of professional training of modern specialist – University graduate is a systematic, continuous monitoring and objective analysis of this process and its correction, if necessary, and forecasting of results. This continuous observation in the modern theory and practice of pedagogical science is denoted by the term "monitoring" which is borrowed from ecology and sociology (Selezneva, 2001; Kamalova & Raykova, 2016). This complex process is especially important during the critical periods of modernization in world education systems, as confirmed by the materials of UNESCO, the International organization for education. In the early 90-ies of XX century, underlining the importance of the emerging transformations in the system of higher education, UNESCO concluded not only about educational, but also political importance of this process of monitoring technology: "the monitoring technology must be in the Arsenal of effective means for assessing the quality of students' learning, management of education and be applied in formulating of the relevant policies" (Loxley, 1993). The study finds that in the educational practices of the modern universities the attitude towards a monitoring technology is determined only by the situational need for particular information, mainly due to the students' academic performance (Shishov & Kalney, 1999; Kashina et al., 2016). Beyond the boundaries of the subjective perception of teachers and students there is systematic data on the monitoring technologies that create not only the flow of information on specific educational problems, but forming a holistic view on the status and changes of educational process, determining the necessary pedagogical mechanisms and conditions for correction and forecasting, effective management of quality of future specialists' training (Problems of quality of education, 2001). These issues in educational practice of universities still remain without proper scientific and methodological support. Moreover, due to the lack of qualimetric grounds of monitoring technologies, in the public practice of universities they are identified with the process of gathering information about students "just in case" (Vyugina, 2015). So talking about a holistic and systematized understanding of the problem in the educational activities of universities is yet premature. Identified in the course of the research, contradictions necessitate new approaches' using to monitoring technologies' implementation in the educational process of the University. In this regard, priority attention in this paper is devoted to the justification of the qualimetric approach to the projecting and implementation of monitoring technologies which involve the using of priorities, of the quality of the educational process in the University, dictated by the professional educational process, students' academic performance, training and educational and professional activities, the development of personality of students, formation of study groups, professional activities of teachers, development of pedagogical collective. Established tendencies determine the need and feasibility to develop the theoretical - methodical foundations of qualimetric approach to the projecting and implementation of monitoring technologies in the educational process of the University and to create on this basis an interdisciplinary elective course "Qualimetric foundations of monitoring technologies".

The solution to this problem defines the purpose of the study.

Literature review

The essence of the concept "monitoring technology"

The study finds that the discourse of this concept has a significant number of definitions, mainly due to the goals of professional activities (Kuzenkova, 2002; Labeyko, 2008). The results of this study bring new meaning to the concept allowing to understand monitoring technologies as: 1) the continuous process of organizing, collecting, storing, processing and broadcasting of information on the quality of the educational process, which refers to its ability to meet the needs of organizations, institutions, society and state in qualified specialists, and to meet the needs of students in this level of knowledge and skills that will allow them to be demanded by the professional environment, to adapt successfully to social life, to be useful for society and the state (the RF Law "On education", 1996); 2) a systematic analysis and correction of the educational process with the aim of making managerial decisions aimed at improving of the quality of specialists' training. This definition reflects the fundamental purpose of monitoring the development of the information support of the educational process, its conformity to the socio – pedagogical strategies of modern specialists' training on the basis of qualimetric approach to the projecting and implementation of monitoring technologies in the educational process of the University.

Opposite views on the problem of the study

The priority in the development of the issues of monitoring and evaluation of the quality of education belongs to the International organization for education of UNESCO. In 1992 UNESCO in its conclusions writes: "Throughout the world assessment of the quality of education is becoming increasingly important, confirms the necessity of its solution" (Loxley, 1993). The study establishes the importance of the work of J. Raven (1999), which had a revolutionary impact on changing of the traditional assessment tools which had lost their ability to capture the most important learning outcomes. The reason for this position (Raven, 1999) is that all traditional evaluation methods are not capable of solving educational problems in modern way because they are aimed at measuring of cognitive spheres (knowledge, abilities and skills). Outside of the assessment system, remain competences: the ability to work with others, to communicate, sensitivity to the characteristics of the acquired in the learning experience. All this, according to J. Raven (1999), take away the discussion about politics in education from the real pedagogical process to discuss what is easier to measure (Raven, 1999). In the works of other English authors (Stufflebeam & Nevo, 1994; Maclur St. Missing Links, 1991) the authors describe the problems of scientific – methodical and informational support of the educational process, the management of learning process, educational management, know – how in the field of management of educational process, educational – methodical and organizational support of quality control of specialists' training. The study finds that in the most of the works of English authors (Halpern, 2000) a significant number of definitions of monitoring are found. Some authors identify it with the definition of the pedagogical process, others with personal development or academic mobility in the educational process, while highlighting the characteristic peculiarities of each of them: knowledge, skills, abilities, qualities, experience. But virtually all definitions



contain common indicators: tracking of the process of formation of generalized methods of teaching and professional actions.

In Russian literature to the problem of monitoring technologies in the educational process of the University a considerable attention is devoted. It is found that most of the authors (Novikov, 1996; Orlov, 1996; Chepelev, 2000) focus their attention on the objective function of monitoring technologies aimed at improving of the quality of specialists' training. Quality management cannot be effective without a monitoring system, allowing obtaining of reliable and systematic information. Based on these results, the researchers develop a conceptual framework for monitoring of the quality of students' training in the educational process of the University: the content and essence of concepts, determine the role and place of monitoring and evaluation of quality of students' training; determine the structure and content of a model for monitoring of students' training in areas of training (Novikov, 1996; Chepelev, 2000). To a large extent the results of these studies to date define the specifics of the projecting and implementation of monitoring technologies in the educational process of the University. In the course of this study the effectiveness of the use of theoretical and methodological foundations of qualimetric approaches to the projecting and implementation of monitoring technologies in the educational process of the University is proven.

Results

Classification of monitoring technologies

The study proves classification of monitoring technologies focused on quality of students' training. Based on the goals, objectives, functions and principles of the educational process types of monitoring technologies were established, which represent a flexible set of invariant, fundamental parameters with the variable parameters:

- by the purposes of the pedagogical process - strategic, tactical, operational;
- by the stages of students' training - input or qualifying, intermediate, final or finishing;
- according to the typology of information support - retrospective, current, prospective, reflexive;
- by the nature of the observations – the systematic, periodic, local;
- by the observation's object - partial, selective, solid;
- by organizational forms – individual, group and mass;
- according to the interpersonal and intergroup communication – social, interdisciplinary, virtual;
- by used technologies – interactive, projecting, computerized.

Based on the established set of parameters in the study the structure, content and technologies of realization of qualimetric model of monitoring technologies in the educational process of the University was determined (see Fig. 1). The model presented visually displays the step-by-step algorithm of projecting and implementation of monitoring techniques, precluding the collection and analysis of information "just in case". Using of a combination of traditional and qualimetric principles provides not only the collection, storage, operational processing and visualization of volumes of information, but also

contributes to the development of modern information culture of all participants in the monitoring.

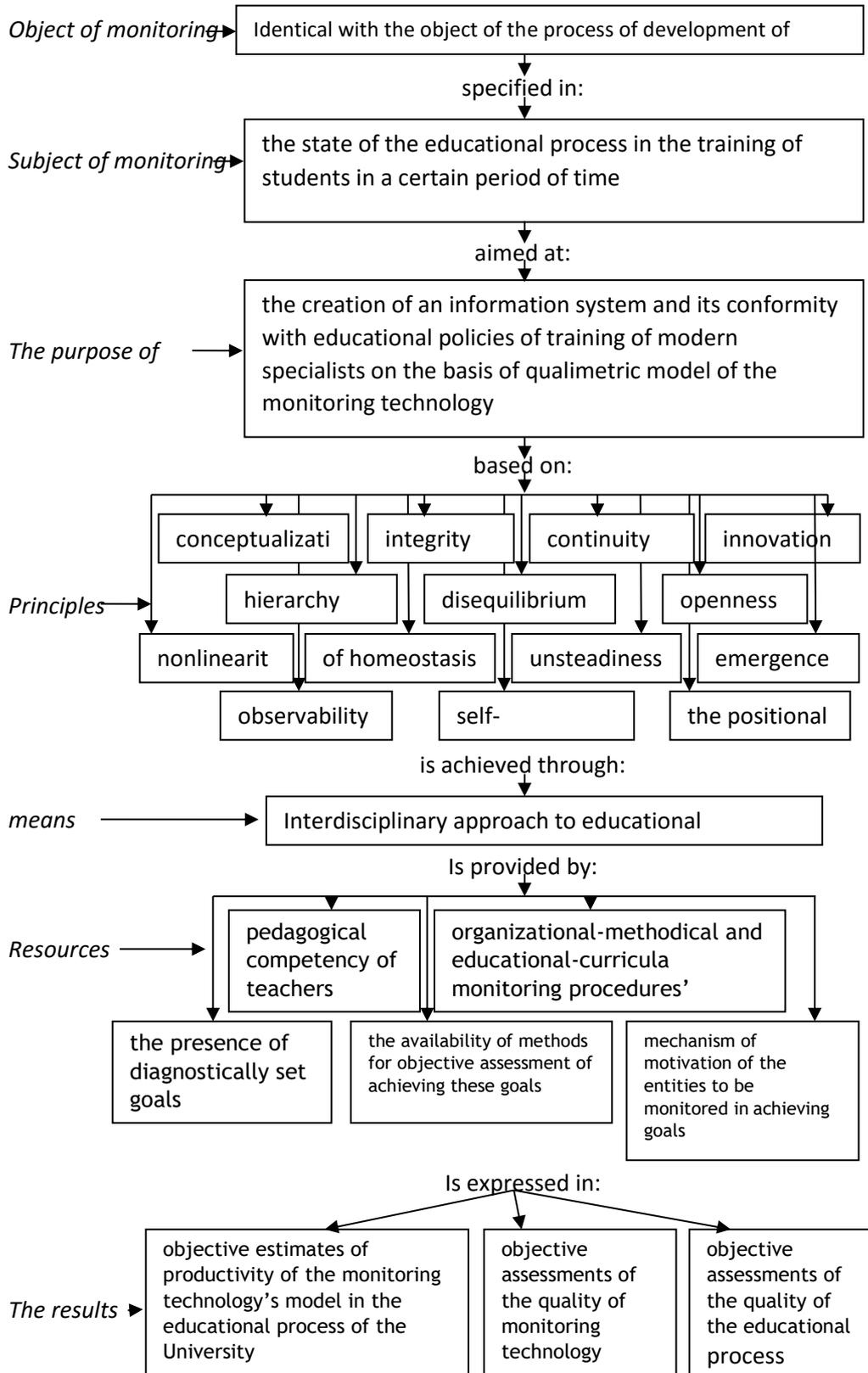




Figure 1. Qualimetric model of step-by-step implementation of monitoring technologies in the educational process of the University.

Selected characteristics of the model define monitoring technology as a mechanism for assessing of the quality of the educational process in the University in students' training, which in turn, requires evidence-based approaches to the use of modern tools for data collection, which ensures the objectivity of measurements.

The structure and content of qualimetric foundations of monitoring technologies in the educational process of the University

The study identifies and determines the effectiveness of the implementation in the educational process of the University of qualimetric grounds of monitoring technologies:

1) goal. Defines the main tasks: tracking of difficulties, misunderstandings, obstacles arising in the process of projecting and implementation of monitoring technologies; obtaining of information on formation of bases of qualimetric technologies and on this basis the adjustment of the educational process; creation of real mechanisms of forecasting of qualimetric grounds of monitoring technologies' implementation in the educational process of the University;

2) functions:

- diagnosis - involves constant monitoring of the state of students' training and its changes' dynamics with the purpose of evaluating of the educational process;

- predictive - is in determination of the main tendencies of modernization of educational process and the prognosis for the near and far prospects;

- correction - assumes that the monitoring results are the basis to identify and resolve problems, coordinated work of all structures and the creation of remedial and preventive measures;

- the motivation - is to enhance the performance of managers and teachers to improve the quality of the educational process;

- self – organization- is based on continuous monitoring of the communication of educational process with the external environment, eliminating the antagonistic setup, resulting from the functional discrepancy of the individual elements of the educational environment with the goals of students' training;

- synergy of contact interaction of the teacher and students - allows to adjust the educational situation, the activity of entities of training, to guarantee the expected outcome;

- information support of technology - enables continuous diagnostics-efficient means of information computer technologies in the educational process and to predict the results in the development of monitoring technologies.

3) principles:

- general principles. Invariants co-ordinate any monitoring activities, regardless of the object, subject, entity of observations. These include the principles of scientific character, objectivity, consistency, representativeness, integrity, personal orientation, dynamism and sustainability.

- qualimetric principles. Variable, their structure, content, target orientation is determined by the problem, object, subject of observations. This group of principles, most of which preserve the continuity of traditional evaluating and innovative qualimetric ideas include: conceptuality, integrity, continuity, creativity, hierarchy, disequilibrium, openness, nonlinearity, homeostaticity, instability, emergence, visibility, self-organization, the positional feature;

4) complex of monitoring tools. Possesses innovative features:

- relies on a particular methodological framework of qualitative approach;
- allows to define a quantitative assessment of the quality of students' training, reflecting the level of quality of the educational process of the University;
- has high adaptability with the position of the procedure of self-observation (self-certification) and possibilities of computer processing of data;
- complies with universal characteristics (with the proposed tools correctly assesses actual level of students' training for the entire set of qualities or certain aspects of personality, study groups, educational system).

These parameters are monitored in the process of systematic observation of the organization of educational (working) places of students, equipping of classrooms with the necessary teaching AIDS, means of clarity, personal computers, tablets, etc.

In the process of monitoring effectively manifest themselves intellectual, interpersonal, procedural tests, practical test tasks.

An important stage of the monitoring is tracking the process of formation of students' readiness to use all types of monitoring technologies in creative learning and cognitive activity. Teachers assess the degree of severity, constantly analyzing the organization of the educational process, tasks' planning, methodic of work with sources, literature, compliance with rules and regulations in the implementation of intellectual abilities of students observing situations in the process of solving them.

Reflected in the monitoring technology levels of student satisfaction with the state of the educational process are recorded in a special form.

During the intermediate phase of projecting and implementation of monitoring technologies the following types of results' fixing manifest themselves effectively:

- the current monitoring is carried out to track changes of personal development under the influence of the content of the educational process and determination of the meaning of formative activities. The effectiveness of monitoring depends on the level of development of the principle of facilitation;

- method of test situations means that the teacher in the classroom creates a special environment in which each of the members and elements of educational-subject environment can express themselves, to appear with their mission;

- explication – deployment of activity's content, focused on the formation of professionally significant competences. This method allows not only to diagnose the changes in the development of mental abilities of students, but also to make quick adjustments to the development process. Explication is carried out by



asking probing questions, helping students in the form of advice, prompts, encouragement. Checking of explicated characteristics is performed by using the method of observation, and fixation – with the help of questionnaires, which reflect empirically observable actions and qualities of students;

- questionnaire methods allow to obtain information about development of entities of educational process on the basis of the analysis of written or oral responses to a standard, specially selected issues. Questionnaires provide an opportunity to determine the level of severity or completeness of the basic elements of professionally important competences of students, qualimetric specifics of the orientation of the monitoring technology on the development of students' abilities, growth of properties, qualities, students' experience, and to identify "problem points" for correction of the educational process;

- analysis of the results of activities in which the pre-planned algorithm examines the learning outcomes of students, the interaction of the qualimetric basis of the monitoring technology and the educational process are determined;

- testing - its priority is the focus on the norm or rule;

- prescription – allows you to map, compare the estimates obtained with the test.

A pilot project of the elective module “Qualimetric grounds of monitoring technologies”

The aim of the module is that through the content to form students' holistic knowledge about their future profession-oriented on high-tech industry; about changing functions of labor activity; a qualitatively new stage of self-development in a renewed educational process of the University; about the process of self-actualization, self-organization, self-transformation and self-reflection.

Objectives: to form students' system of knowledge about the qualimetric basis of the educational process of the University; to systematize knowledge about the structure and content of vocational training and the role of the educational process of the University in its development; to modify traditional pedagogical mechanisms of formation of common cultural and professionally important competences of students of the University taking into account the requirements of the modern labor market.

The educational-thematic plan of the interdisciplinary course is presented in table 2.

Table 2. The educational-thematic plan of the elective training module “Qualimetric grounds of monitoring technologies (8,0 hours).

| № п/п | Name of training modules | Forms of carrying out | | |
|----------|--|-----------------------|-----------|-------|
| | | Theoretical | Practical | Total |
| 1. | Introduction. The justification of the course. The purpose and objectives. | 1 | - | 1 |
| 2. | Monitoring technology: concept, purpose, objectives, functions, principles | 2 | - | 2 |
| 3. | Classification of monitoring technologies. | 1 | - | 1 |
| 4. | The quality of the educational process of the University | 1 | - | 1 |

| | | | | |
|----|---|-----|-----|-----|
| 5. | Master-classes: the development of monitoring technologies; development of the generalized indicators of the quality of the educational process | 1 | 1 | 2 |
| 6. | Mini - conference: conclusions of lessons, creating of projects, blitz - debates, etc. | 1 | | |
| | | 6,0 | 2,0 | 8,0 |

Discussion

The results of the study suggest that the problem of projecting and implementing of monitoring technologies in the educational process of the University is a necessary and effective element of an integrated system of specialists' training quality and management of this quality. The development of such a system implies the existence of three units: categorical unit (theory of the quality of professional education, which reveals the essence of the concept "quality of professional education"); the unit of monitoring and evaluation of quality (qualimetry of quality), which involves the development of the criteria, methods and technologies of measuring and assessing of the quality of specialists' training; unit of quality management (quality management), which contains the development of the content, structure and process of influence on the management's objects to correct identified deviations and for decision-making to improve the quality. In connection with these tendencies identified in the course of the study the theoretical and practical significance of monitoring technologies is substantiated for measuring and evaluating of the quality of training in educational process of the University. Their effectiveness is proven in the process of implementation of elective training module "Qualitative grounds of monitoring technologies" using the criteria: formation of knowledge of the content of the study course ("before" experiment is 1.5 points, "after" experiment – 3.8); experience of using of the acquired knowledge in standard and non-standard situations of the educational process ("before" experiment 1.3 points, and "after" experiment - 3.8 points); integrity of knowledge about the qualimetric grounds of the monitoring technologies in students' training ("before" experiment - 0.8 points, "after" experiment – 3.5 points); the willingness of students to be engaged professionally in any activity ("before" experiment - 2.8 points, after experiment – 4.3 points); formation of competences of culture of mental labor in accordance with the personal position of the student in self-organization and self-transformation ("before" experiment is 2.0 points, "after" experiment – 4,8 points); the personal creativity of the student – future specialist, relevant to qualimetric objectives of the monitoring technology ("before" experiment 2.0 points, "after" experiment – 4, 8 points).

Conclusion

This study confirms the theoretical and practical significance of the problem of projecting and implementation of monitoring technology of students' professional training in the educational process of the University. Based on the results of the study, the paper presents the updated by qualimetric grounds discourse of the concept "monitoring technology"; defines the essence, structure and content of the monitoring technology, proves effectiveness of the monitoring



techniques for evaluating of the quality of educational process and its management; justifies the elective module "Qualimetric grounds of monitoring technologies." Productivity of the developed module is proven by using the criteria: formation of knowledge of the content of studied course, of the experience of using the acquired knowledge in standard and non-standard situations in the educational process; the integrity of knowledge about the qualimetric grounds of the monitoring technologies in students' training; the students' readiness to be engaged professionally in any activity; formation of competences of culture of mental labor in accordance with the personal position of the student in self-organization and self-transformation; the personal creativity of the student – future specialist, relevant to qualimetric objectives of the monitoring technology. This problem as a research direction is not exhausted by solving the problems set. In its capacity, there are available resources, useful for improving of the educational process of the University: planning of the educational environment, improvement of the curriculum, subject content and educational activities.

Disclosure statement

No potential conflict of interest was reported by the authors.

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