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## CHARACTERISTICS OF QUALIMETRIC ASSESSMENT IN THE FIELD OF PEDAGOGICAL PROCESSES

Annotation

The article examines the features of the methods and principles of qualimetry in the context of the pedagogical sphere. The author analyzes in detail the processes of substantiating the choice of quality indicators, developing measurement methods, optimizing standard parameters, as well as the principles of forming generalized quality criteria in educational processes. Special attention is paid to the issues of substantiating the conditions for the use of quality indicators and their integration into standardization and quality management systems in pedagogy. This article is a valuable contribution to the understanding and application of qualimetric approaches in the field of education.

**Key words:** Qualimetry, pedagogical processes, quality assessment, quality indicators, measurement methods, standardization, quality management, generalized quality criteria, optimization of parameters, pedagogical assessment.

## ОСОБЕННОСТИ КВАЛИМЕТРИЧЕСКОЙ ОЦЕНКИ В ОБЛАСТИ ПЕДАГОГИЧЕСКИХ ПРОЦЕССОВ

Аннотация

В статье рассматриваются особенности методов и принципов квалиметрии в контексте педагогической сферы. Автор подробно анализирует процессы обоснования выбора показателей качества, разработки методов измерения, оптимизации стандартных параметров, а также принципы формирования обобщенных критериев качества в образовательных процессах. Особое внимание уделяется вопросам обоснования условий использования показателей качества и их интеграции в системы стандартизации и менеджмента качества в педагогике. Данная статья является ценным вкладом в понимание и применение квалиметрических подходов в области образования.

**Ключевые слова:** Квалиметрия, педагогические процессы, оценка качества, показатели качества, методы измерения, стандартизация, управление качеством, обобщенные критерии качества, оптимизация параметров, педагогическая оценка.

## PEDAGOGIK JARAYONLARNI KVALIMETRIK BAHOLASH XUSUSIYATLARI

Annotatsiya

Maqolada pedagogik soha kontekstida kvalimetriya usullari va tamoyillarining xususiyatlari ko'rib chiqilgan. Muallif sifat ko'rsatkichlarini tanlashni asoslash, o'lchash usullarini ishlab chiqish, standart parametrlarni optimallashtirish jarayonlarini, shuningdek, o'quv jarayonlarida umumlashtirilgan sifat mezonlarini shakllantirish tamoyillarini batafsil tahlil qiladi. Pedagogikada sifat ko'rsatkichlaridan foydalanish shartlarini asoslash va ularni standartlashtirish va sifat menejmenti tizimlariga integratsiyalash masalalariga alohida ye'tibor qaratilgan. Ushbu maqola ta'lim sohasida kvalimetrik yondashuvlarni tushunish va qo'llashga qimmatli hissa qo'shadi.

**Kalit so'zlar:** Kvalimetriya, pedagogik jarayonlar, sifatni baholash, sifat ko'rsatkichlari, o'lchash usullari, standartlashtirish, sifat menejmenti, umumlashtirilgan sifat mezonlari, parametrlarni optimallashtirish, pedagogik baholash.

**Introduction.** Increasing the effectiveness of assessing the quality of pedagogical processes is closely related to the level of formalization of pedagogical knowledge and its theoretical generalization. Modern scientific literature affirms the postulate that the more mathematics there is in a humanitarian discipline, the higher its accuracy and scientific character [p 1, 109].

At a certain stage in the development of any experimental science, an intensive process of mathematization begins. Initially, this affected the natural sciences, and then spread to the humanities, including pedagogy. Investigating the process of mathematization in psychology, V.Y. Krylov identified three stages that any science goes through. The first stage includes the use of standard mathematical methods for analyzing and processing data, identifying the simplest quantitative patterns. At this stage, statistical methods of information processing are often used. The second stage is characterized by attempts to construct mathematical models based on a ready-made mathematical apparatus. For example, methods of Markov random processes can be used to model learning processes. However, this approach may be limited because the apparatus developed for one science may not be entirely suitable for another. The third stage involves the creation of a specialized mathematical apparatus for research and modeling of processes and phenomena characteristic of a specific scientific field. This stage is associated with the development of a systems approach [2].

Currently, a scientific direction aimed at a quantitative description of the quality of objects, known as qualimetry, is actively developing. This is an area of scientific knowledge that studies the methodology and problems of developing complex, and in some cases, systematic quantitative assessments of the quality of any objects, including objects, phenomena and processes.

**Literature review.** G.G. Azgaldov is considered the initiator of the creation of the scientific discipline "Qualimetry". He has been involved in quality assessment issues for many years in various fields such as manufacturing, construction, architecture, engineering and management. He defined the problems of qualimetry as:

rationale for choosing quality indicators:

Rationale for the selection of quality indicators is a process of analysis and decision aimed at validly identifying specific criteria that will be used to measure and evaluate the quality of an object, product or process. This stage plays a key role in the qualimetry system, since correctly selected indicators are the basis for subsequent quantitative assessments.

Basic steps to justify the selection of quality indicators may include:

Evaluation object analysis: The study of the characteristics of the object for which the quality assessment is carried out in order to identify the key aspects that need to be measured.

Objectives and requirements: Definition of assessment objectives and quality requirements that must be taken into account when selecting indicators.

Expert opinion: Consulting with experts in the relevant field to obtain their opinion on the most relevant and representative indicators.

A well-founded choice of quality indicators provides a reliable basis for subsequent qualimetric procedures and contributes to a reliable assessment of objects or processes.

development of methods for measuring product quality:

In the context of pedagogical qualimetry, the development of methods for measuring the quality of "products" corresponds to the creation of effective tools for assessing and analyzing the results of the educational process. Instead of the term "products," here we consider the products of pedagogical activity, such as students' knowledge, the level of their skills, mastery of educational material, etc. Below are the main steps and aspects that can be taken into account when developing methods for measuring quality in pedagogy:

Determination of key indicators: Identification of the main parameters that reflect the quality of the educational process. These could be standardized tests, student activity indicators, final grades, etc.

Creating headings and evaluation criteria: Developing clear and objective headings to evaluate various aspects of learning. The criteria should be specific, measurable and consistent with the goals of the educational process.

Application of assessment methods: The use of a variety of methods to measure the level of achievement of educational goals by students. This may include testing, practice assignments, projects, self-assessment, and other forms of assessment.

Standardization of the assessment process: The introduction of common assessment standards to ensure uniformity and objectivity in the process of measuring the quality of education.

The development of quality measurement methods in the pedagogy of qualimetry is aimed at creating an assessment system that is objective, reliable and meets the goals of an educational institution.

optimization of standard sizes and parametric product ranges:

In the context of pedagogical qualimetry, the optimization of standard sizes and parametric product ranges is associated with the rationalization and improvement of key elements of pedagogical processes. Instead of "products", here we are talking about the components of pedagogical impact, such as curricula, methods, evaluation criteria, and so on.

Optimization of standard sizes and parametric series in the pedagogy of qualimetry includes the following aspects:

Curriculum Structure Analysis: A study of the curriculum content in order to identify key elements and identify those that can be optimized to improve the quality of learning.

Clarification of methods and evaluation criteria: Development of more accurate and effective methods for assessing students' knowledge, textbooks and criteria in order to better meet the requirements and goals of the educational process.

Standardization of learning processes: The establishment of common standards and norms for the main pedagogical processes to ensure their uniformity and consistency.

Optimization of standard sizes and parametric series in the pedagogy of qualimetry is aimed at improving the effectiveness of educational practices and improving student learning.

development of principles for the formation of generalized quality criteria:

The development of principles for the formation of generalized quality criteria in the context of pedagogical qualimetry involves the establishment of a system of universal and unifying assessment standards that can be applied to various aspects of the educational process. The following are the basic principles for the formation of such generalized criteria:

Taking into account multiple dimensions: Generalized criteria should take into account many dimensions and aspects of the educational process, including cognitive, social, and emotional spheres.

Integrity of the educational process: Criteria should reflect the integrity of the educational process, including both formal assessments and broader aspects such as the development of critical thinking, creative skills and meta-knowledge.

Relation to educational goals: Generalized criteria should be directly correlated with the educational goals and objectives of the curriculum, ensuring an adequate measurement of student achievement.

Inclusion of comprehensive indicators: Quality criteria should include comprehensive indicators that combine various aspects of the educational process to ensure a complete understanding of its effectiveness.

The development of principles for the formation of generalized quality criteria in the pedagogy of qualimetry is aimed at creating a structured, objective and universal assessment system that reflects the versatility of the educational process and meets modern educational standards.

– Substantiation of the conditions for the application of quality indicators and their use in the tasks of standardization and quality management [3]:

Substantiation of the conditions for the application of quality indicators and their use in the tasks of standardization and quality management in the pedagogy of qualimetry is an important stage ensuring the effective functioning of the assessment system. The following are the basic principles and justifications for using quality indicators in this context:

Compliance with educational goals: quality indicators should directly correspond to the educational goals and objectives of the educational process. Compliance helps to measure how effectively an educational program achieves its goals.

The substantiation of the conditions for the application of quality indicators and their use in the tasks of standardization and quality management in the pedagogy of qualimetry are aimed at improving the effectiveness of the educational process, providing a systematic and purposeful approach to the assessment and management of the quality of education.

**Research Methodology.** Pedagogical qualimetry, which evaluates psychological, pedagogical and didactic objects, is based on the synthesis of various sciences such as pedagogy, psychology, sociology, mathematics and cybernetics. An important element of pedagogical qualimetry is mathematical statistics, which includes descriptive statistics and the theory of statistical inference. Descriptive statistics are used to characterize pedagogical objects using the average score, variance, various correlation indicators and factor analysis. Statistical inference theory, a more powerful research tool, is used less frequently.

The main task of quantitative analysis of pedagogical phenomena is the development of measurement procedures. In pedagogy, measurement is considered as a cognitive process aimed at "experimentally determining the numerical values of quantities characterizing certain signs of pedagogical objects or phenomena" [4].

In pedagogical research, the following scheme of measurement and scaling processes is often used:

1. Identification and qualitative description of the characteristics of pedagogical objects;
2. Creation of measuring criteria, indicators and selection of methods (tests, control tasks);
3. Scaling - development of scales corresponding to measuring instruments;

4. Pedagogical experiment or observation - obtaining primary measurement data;
5. Mathematical and statistical processing of primary data;
6. Meaningful interpretation of measurement results.

Measurement theory makes it possible to quantify the characteristics of an object, describe qualitative indicators, and use statistical analysis methods, which raises the teacher-researcher to a higher level of rigor and evidence, providing mathematically sound conclusions. Measurement and scaling are included in the stages of developing a model of a pedagogical phenomenon, following the theory of modeling.

In most cases, the objects of pedagogical research turn out to be poorly amenable to formalization. Nevertheless, the use of mathematical modeling methods brings significant advantages to research teachers [5]. Even at the initial stage, such as the identification of factors affecting the characteristics of an object, the use of mathematical methods clarifies the procedure for further research and helps to avoid mistakes associated with a misunderstanding of the structural connections of the phenomenon under study.

The use of modeling methods in pedagogical research provides several advantages. Firstly, it allows you to formulate the problem more precisely, highlighting factors that are not essential for a specific task. Secondly, it provides an opportunity to identify the connection of this problem with others having a similar internal structure [6, 7]. Note that these relationships can be detected and justified only at the level of the object model, discarding secondary characteristics. Thirdly, the construction of a mathematical model plays an important role in verifying research hypotheses, increasing the level of evidence-based reasoning.

As follows from the above, the inclusion of methods of mathematical statistics, measurement theory and modeling theory in the qualimetric approach can bring undeniable advantages to teachers, providing objective data on the studied pedagogical phenomenon.

**Analysis and results.** The experience of the author, who studies the pedagogical process of interaction between teachers and students of the university, indicates that the qualimetric procedure for evaluating the studied pedagogical object (process, phenomenon) can be implemented according to the following scheme: real object - system representation - mathematical form of description - pedagogical interpretation [8, 9]. This scheme is implemented in a number of stages:

Analytical-synthetic stage: a thorough study of the object of study, highlighting its properties and structure, integration of various ideas about the object.

Stage of theoretical modeling: identifying the essential elements of the object, their properties, and relationships and constructing a theoretical model of the object.

Criteria-methodological stage: development of interrelated criteria and indicators, selection or development of research methods, as well as means and procedures for measuring the properties of an object [10, 11].

Development of a mathematical model: formalization of the theoretical model, statistical and/or expert analysis of the model, assessment of unknown model parameters and verification.

Analytical-forecasting stage: interpretation of research data, conclusions, forecast of the possible dynamics of the development of the object, testing of the hypothesis (forecast).

Our observations allow us to conclude that the key point in the qualimetric procedure is the scaling of properties and the assignment of weight coefficients (stage 4 in the proposed scheme). The effectiveness of the object model depends on the adequacy of the weighting coefficients.

**Conclusion.** In conclusion, it can be noted that the introduction of qualimetric procedures in the study of pedagogical processes makes it possible to give rigor and clarity to the understanding of the initial data, the formulation of research tasks, their solution, and the interpretation of results and the implementation of forecasts.

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