

**A RATING SYSTEM FOR THE KNOWLEDGE ASSESSMENT WITHIN
COMPETENCE FORMATION OF A UNIVERSITY GRADUATE**

**UM SISTEMA DE CLASSIFICAÇÃO PARA AVALIAÇÃO DE CONHECIMENTOS NA
FORMAÇÃO DE COMPETÊNCIAS DE UM GRADUADO UNIVERSITÁRIO**

**UN SISTEMA DE CALIFICACIÓN PARA LA EVALUACIÓN DEL CONOCIMIENTO
DENTRO DE UNA FORMACIÓN POR COMPETENCIA DE GRADUADO
UNIVERSITARIO**

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ABSTRACT: Assessment of educational achievements of university students on the basis of rating and competence-based approaches is an urgent issue of pedagogy, psychology and methodology and requires research of various approaches and the search for effective methods of such an assessment. The main emphasis in the article is made on the study of the existing problems of the formation of a competence model of a university graduate, the formation of key competencies, the development of professional skills and their assessment. The author proposes a competence model and a method for assessing the level of competence formation of university students based on the apparatus of fuzzy logic, the author proves the expediency of its use, describes the features of analyzing and processing data, identifies further areas of research on this issue.

KEYWORDS: Competence-based approach. Competence. Education. Fuzzy logic. Fuzzy logical conclusion.

RESUMO: A avaliação do desempenho educacional de estudantes universitários com base em avaliações e abordagens baseadas em competências é uma questão urgente de pedagogia, psicologia e metodologia e requer a pesquisa de várias abordagens e a busca de métodos eficazes de tal avaliação. A ênfase principal do artigo é colocada no estudo dos problemas existentes de formação de um modelo de competências de um graduado universitário, a formação de competências-chave, o desenvolvimento de competências profissionais e sua avaliação. O autor propõe um modelo de competências e um método para avaliar o nível de

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formação de competências de estudantes Universitario com base no aparato da lógica difusa, o autor prova a conveniência de seu uso, descreve as características de análise e processamento de dados, identifica outras áreas de pesquisa nesse assunto.

PALAVRAS-CHAVE: *Abordagem baseada em competências. Competência. Educação. Lógica difusa. Conclusão de lógica difusa.*

RESUMEN: *La evaluación de los logros educativos de los estudiantes universitarios sobre la base de enfoques basados en la calificación y las competencias es un tema urgente de pedagogía, psicología y metodología y requiere la investigación de varios enfoques y la búsqueda de métodos efectivos de tal evaluación. El énfasis principal en el artículo se hace en el estudio de los problemas existentes de la formación de un modelo competencial de un egresado universitario, la formación de competencias clave, el desarrollo de habilidades profesionales y su evaluación. El autor propone un modelo de competencia y un método para evaluar el nivel de formación de competencias de los estudiantes universitarios basado en el aparato de la lógica difusa, el autor demuestra la conveniencia de su uso, describe las características del análisis y procesamiento de datos, identifica otras áreas de investigación en este tema.*

PALABRAS CLAVE: *Enfoque basado en competencias. Competencia. Educación. Lógica difusa. Conclusión lógica difusa.*

Introduction

Deep transformations associated with the processes of democratization inherent in almost the entire world community, with the acceleration of scientific and technological progress, with the emergence of an "information" society, put fundamentally new requirements for the education system. In modern conditions, the goals of education are being corrected: along with the need to ensure the interests of the state, more and more attention is paid to meeting the needs of the individual in self-development, the formation and development of the younger generation's need for active mastery of the basics of science. Ability to independently analyze problems that arise in certain situations, find alternative solutions and produce criteria for their justification.

For the education system in general and higher education in particular, the issue of standards is of fundamental importance. In the context of the introduction of innovative technologies into the educational process, the provision of educational institutions of all levels with broad rights in the formation of the content of education, the creation of flexible multifunctional educational systems, state educational standards are gaining special importance, which are designed to become the foundation for an objective assessment of the level of education of university graduates.

The standards should become the basis that links the different levels and sublevels of the lifelong learning system. Along with the standards of levels of education, standards for the quality of training are also being developed - uniform requirements for the final results of training. The implementation of these goals is possible only by ensuring an objective assessment of the levels of preparedness of students, checking the compliance of the requirements for the training of university graduates with knowledge standards, identifying gaps in the training of students during their educational activities.

The purpose of the article is to highlight the approaches to assessing the educational achievements of university students based on a competence-based approach, generalization of experience and the formation of a mathematical model for measuring the formation of competencies.

Methodology

The foundations of the competence-based approach were first laid in psychology by B. Ananiev, L. Vygotsky, I. Cold, A. Leontiev, S. Rubinstein. The personality was considered by them as a subject of activity, which, being formed in this activity and communication with other people, determines its character. This position was defended by such teachers as Yu. G. Ignatiev, A. R. Samigullina, I. K. Mishchenko, T. N. Zavyalova, O. V. Sukhoveeva, I. E. Savostina, A. P. Degtyarev and others. In the future, scientists-educators S. G. Chaldaeava, E. A. Skorodumova, I. S. Sineva, O. V. Rudenko, V. V. Nikulin, V. S. Dubrovin and others were actively involved in the development of the competence-based approach. This approach in education covers, along with specific knowledge and skills, such categories as readiness to learn through professional life, professional skills etc.

The problems of implementing the competence-based approach, determining the set of competencies/abilities found a response in the works of such scientists as Yu. K. Rodygina, V. M. Kurmyshov, S. B. Pashkin, V. S. Berezhnyatsky, M. G. Nikitenko, D. R. Krasnova, E. A. Velikorodnaya, N. P. Korovkina, N. N. Pustovalova, V. P. Kobrinets, O. G. Barashko and others.

Researchers such as N. K. Boris, N. L. Bogomazova, G. V. Valeeva, A. V. Slobozhanin, V. A. Boykov and others studied issues related to the use of a point-rating system for assessing students' knowledge in "blended" learning.

We note also that this study should distinguish between competency and competence. Both words come from the Latin *competentia* - a range of issues in which a person is aware,

has knowledge and experience (BOYKOV, 2017). Competence is an integral characteristic of a student, that is, a dynamic, a set of knowledge, abilities and skills, competences and personal qualities, which the student is obliged to demonstrate after completing part or all of the educational program. Competence is a student's personal characteristic has already been formed (BORIS, 2018).

Results

The current system for assessing the quality of educational achievements of students is difficult to combine with modern requirements for the modernization of education, since it is aimed at external control and assesses part of the reproductive level of assimilation. Therefore, one of the main conditions for updating the system for monitoring and assessing students' educational achievements is the introduction of new methods, forms and means of assessing the dynamics of students' movement in educational activities.

The main terms and definitions of this article.

The European Credit Transfer System (ECTS) is a systematic way of describing educational programs by assigning credit units to its components (credit modules). The ECTS system is based on considering the total labor intensity of a student's work when mastering a certain credit module of the training program and the results of this work (SKORODUMOVA; SINEVA, 2017).

Credit module (ECTS module) is an academic discipline (part of a full-semester discipline), which is studied in a certain semester. The credit module has a certain volume in ECTS credits, and the level of its assimilation must be determined in the ECTS grading system.

ECTS credit is a conventional unit (credit unit - cr.) Measurement of the labor intensity of a certain part of the higher education program. Credit unit price (kr.) It is 36 academic hours of a student's academic work (including time for classroom studies, independent work, semester control and practice).

Credit credits are a characteristic of the volume, labor intensity of a certain part of the training program and the quality of its assimilation by the student. Students receive credit credits only after mastering a certain credit module and a positive assessment of the achieved learning outcomes.

The rating system of assessment is a system based on operational control and the accumulation of rating points for versatile educational and cognitive activities of a student from a certain credit module (DEGTYAREV, 2019; KOROVKINA *et al.*, 2020).

Educational (substantive) module - a logically completed part of the educational material (section of the curriculum) of a separate credit module provides for the mastery of certain knowledge and skills.

Rating points (rk) - a quantitative assessment in points of the results of a certain educational activity of a student, considering its significance (weight) and quality.

Credit module rating (RD) is a quantitative assessment on a multi-point scale of the level of mastering by a student of a certain credit module, considering the quality of educational activities during the semester.

The ECTS assessment system is a European system for assessing the success of a student's mastering of credit modules. The system provides a seven-point scale (A, B, C, D, E, FX, F) and a dual (descriptive and statistical) definition of these assessments.

In our country, there is still no single instrument for measuring and to assess the learning outcomes and the level of formation of acquired competencies, although it exists at the international level (for example, TIMSS, PISA, CIVIC Education Project) (BOGOMAZOVA *et al.*, 2020), which Ukrainian students can use if they wish.

Abroad, it is customary to distinguish three main approaches to the definition and introduction into the practice of education of a competence-based interpretation of the quality of learning outcomes: a behavioral approach (USA), a functional approach (Great Britain) and a multidimensional and holistic approach (France and Germany). These approaches appeared independently of each other, first in the USA, then in Great Britain, and lastly in France and Germany (BOGOMAZOVA *et al.*, 2020).

In the United States, competency tests are being developed to assess competencies. Allowing to predict efficiency in work after graduation from training by high predictive validity (BOGOMAZOVA *et al.*, 2020). In contrast to the USA, where clusters of competencies are aimed exclusively at the behavioral characteristics of learning outcomes related to the specifics of the future professional activity of a graduate of an educational institution, in the UK, functional characteristics are considered as basic knowledge and learning outcomes.

The UK is characterized by the pursuit of integrity and functionality by integrating knowledge, values, understanding and skills that are appropriate for those who have matured as a professional after graduation. In France, the assessment based on the competence-based approach is built in two directions: personal, focused on the characteristics of the behavior of each student, and collective, aimed at building the competencies necessary for the effective organization of the work of teams and participation in this work as one of the team members (NIKITENKO, 2018). A feature of the approach in Germany is that at the beginning of each

plan a set of competencies specific to each discipline is placed and mainly determines the priority areas of study, as well as plans for the assimilation of knowledge, skills and abilities.

Considering the foreign experience and principles of the Bologna process, it is proposed to use a fundamentally new paradigm of higher education instead of the ZUN education paradigm (knowledge, abilities, skills), which is based on the formation of certain competencies in students and diagnostics of the competence level of specialists-graduates of universities as a result of higher education (IGNATIEV; SAMIGULLINA, 2015).

In the context of the continuous development of the education system, the multilevel and rating of educational processes in modern general education secondary schools, the steady improvement of the content of education, the introduction of new didactic technologies of ever more tangible development, acquire an integrative nature of the content of education, the complex nature of monitoring the educational activities of students. At the same time, in universities, the assessment of the quality of the results of educational achievements of students, as a rule, is carried out using an insufficiently differentiated, "discrete", five-point system, which does not provide satisfactory objectivity. The contradictions between the main goals and objectives of secondary general education and the methods, means and forms of control of the student's educational activities have led to the problem of finding ways to create an objective control system in a modern differentiated education system, which would be based on methods and forms adequate to the tasks of implementing the personality-activity approach in educational process (ZAVYALOVA *et al.*, 2018; KRASNOVA; VELIKORODNAYA, 2016).

The following features of the concept of competence can be distinguished:

- Not the sum of knowledge, skills and abilities;
- are not limited to a separate academic discipline;
- Integrative - combine knowledge, abilities, skills, readiness to mobilize them in specific situations;
- Reflect social order - focused on the needs of the labor market;
- Diagnostic - the fact and the degree of their formation can be diagnosed based on certain criteria.

The optimal way to form systems for assessing the quality of student training in the implementation of a competency-based approach is a combination of traditional methods and means of testing knowledge, abilities and skills and innovative approaches focused on a comprehensive assessment of the competencies that are being formed. At the same time, traditional means of control should be gradually improved, ranked in line with the competence-

based approach, and innovative means should be adapted for widespread use in university practice (CHALDAEVA, 2015).

Requirements for the means of assessing the level of competence formation:

- Integrativeness - interdisciplinary in nature, the connection between theory and practice;

- Problem-related activity;

- Focus on the application of knowledge and skills in atypical situations;

- Actualization in the tasks of the content of professional activity;

- Linking criteria to planned results.

The main tasks for improving the system for assessing students' academic achievements:

- orientation of the educational process to the results of education - a clear definition of what exactly a student will know and be able to do so that after graduation he will be in demand on the labor market;

- changing the form of presentation of learning outcomes: instead of the traditional description of them in the formulations of knowledge, skills and abilities (ZUNs) - the characteristic of the acquisition of competencies by students (produced by the student integrative behavioral models of professional and social activity);

- continuous and multidimensional control over the learning process - creation of methodology and methods for assessing the quality of education.

In the post-Soviet space, the taxonomies of V. P. Beshpalko (MISHCHENKO, 2014) and V. P. Simonov [eleven]. V. P. Beshpalko developed a taxonomy containing four levels of assimilation: the level of recognition, activity in a standard situation, activity in a non-standard situation, activity in a new area (research). This classification is hierarchical, rank-based, and each next level includes the previous ones. V. P. Simonov identified five levels of assimilation, where each next level of assimilation also includes all the previous ones: recognition, memorization, understanding, the simplest skills and abilities (reproductive level), creative level.

The assessment of the level of formation among university students of the corresponding competence can be carried out using Bloom's taxonomy, which allows us to assess the degree of training of each student. In order to fully assess the attainable efficiency of student training, we will consider four levels of competence formation among university students: threshold - the student reproduces terms, basic concepts, knows methods, procedures, properties, gives facts, identifies, gives an overview description; average - the student applies his knowledge, skills and abilities to solve problems in new and unfamiliar situations, has the skills of

independent learning; sufficient - the student shows interconnection, classifies, organizes, interprets, plans, applies laws, implements, uses; high - the student analyzes, diagnoses, evaluates, predicts, designs and the like (RUDENKO, 2014).

Based on the selection for each competence of the signs of its appearance, according to the thinking skills described in Bloom's taxonomy, it is possible to construct a matrix of indicators for assessing the competencies of students. In the future, this will provide an opportunity to create an assessment matrix and simplify the conduct of a comprehensive assessment. These approaches are thoroughly considered by T. Pismenkova, V. Salov (RUDENKO, 2014).

To measure the level of formation of the necessary competencies among students, each of them must be separately assessed according to the appropriate criteria.

At the same time, there is not enough research that would reflect an integral system of transformations of basic theoretical positions on this issue into a specific procedure for their implementation within the framework of the professional training of future teachers in a professional orientation, for example, for the disciplines of the philological cycle involved in the formation of a complex of communicative competencies. This problem is of particular importance in the context of the formation of a credit-transfer system for professional training of a teacher, since the development of meaningful modules should consider the main functions of professional activity, ensure the integrity of this process, and form not only knowledge, skills, and abilities, but also the experience of performing activities.

Training modules in the study of a specific discipline must be structured in such a way as to provide both in the target, content and procedural terms of the formation of an individual program of student's educational competencies. The program, built based on valid theoretical foundations, comprehensively comprehended by the student in terms of target, content and technological components, which has gained practical experience in implementing targeted professional education in adequate conditions, will certainly transfer to the level of self-organization and self-regulation upon completion of training. The main guarantor of ensuring this process will be the fact that the main subject of the formation and development of educational competence is the student, not the teacher. Therefore, the formula - not to accumulate knowledge, but to form professionally and personally significant competences on their basis - acquires special significance in the process of transition to a personality-oriented concept of education (BOYKOV, 2017). The process of ensuring the implementation of this approach is extremely complex and multidimensional, rating.

It is in the conditions of the credit-transfer technology of teaching that it is possible to qualitatively prepare a student, since this system creates space for establishing contacts, enhancing cognitive activity and self-education (KOROVKINA *et al.*, 2020). Students have the opportunity to demonstrate their knowledge, erudition, culture of speech, the level of independent analysis, judgments, conclusions, generalize their novelty and originality, identify the ability to formulate sentences, new approaches, justify their own decisions.

The teacher's function in this training system changes from information-control to consultative-coordinating. The concept of a coach, or even better - a mentor, appears, or it is better to say in scientific language - is actualized. Mentoring is a very important direction in the development of modern pedagogy, for the development of this concept it is necessary to collect the experience of the past, when mentors were in production in the Middle Ages in particular. Mentors were also in religious life, in monasteries, and in churches there was the concept of a spiritual father, confessor. But these aspects of mentoring will be discussed in new articles. So, the new educational value indicators come into conflict with the classical, in general, for some time now considered classical educational standards, although this requires a separate study, but within the framework of our research, we will consider the current standards as classical. So, among the contradictions between the "classical" and new imperatives in education, the following can be distinguished:

- contradictions between the social form of the implementation of educational activities, the collective nature of labor and communication of its subjects and the personal approach in training specialists;

- the contradiction between the direction of the content of educational activities towards the study of past experience and the orientation of the subject of learning towards the full realization of the knowledge and skills acquired in the learning process;

- the contradiction between the information environment for training a future specialist and his ability to independently form a new, relevant model of professional self-realization;

- the contradiction between the focus of professional education on the formation of a student's personality, his professional competence and the determination of the level of acquired knowledge and skills, which are considered as a necessary quality of professional and general preparedness of a future specialist. A broad outlook is very important for a modern specialist.

Conclusion

Considering the essence of the process of lifelong vocational education is to increase the levels of education, reflecting various degrees of a person's readiness for professional activity (IBATOVA *et al.*, 2016). An important aspect is tracking the intermediate results of the process at different stages of training.

The organization of the educational process using a rating system for assessing the quality and level of knowledge is a pedagogical innovation, which is aimed at stimulating the student's independent educational and cognitive activity (IBATOVA; IPPOLITOVA, 2018), helps to increase his intrinsic motivation in gaining knowledge through the use of various forms of analysis, a clear organization of the educational process. A forecast of the development of ways to improve self-education and motivation for training future specialists in the process of studying at a university will help improve control over the direction of the specialist's creative and professional activities.

Modern pedagogical science, considering the issues of motivation for learning as an internal motivation of a student, proceeds from his internal interest in studying a subject, an understanding of the need for this knowledge or skills in later life, then external motivation is typically stimulated by assessment, reward for significant educational achievements, rating points, and the like (CHALDAEVA, 2015).

The implementation of the rating assessment system in the educational process contributes to the fact that:

1. it eliminates bias in assessing knowledge of future specialists;
2. it acts as a good positive means of encouraging educational and cognitive activities;
3. it increases the student's responsibility for the results of their learning;
4. it contributes to the implementation of the principle of individualization of training;
5. it eliminates the problem of attending classes and gives more time for hobby classes;

Thus, an educational rating is that external motivational stimulus that encourages ambitious students to make more significant shifts and achievements. Each student with any level of training has the opportunity to express himself, to feel his progress, to take his gradual step towards the better, and the feeling of success is at the same time the best incentive for further work and study.

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