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Pedagogical Conditions of Using Binary Approach to Optimization of the Control and Diagnostic Functions in the Training of Students

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ABSTRACT

The purpose of this article is theoretical substantiation and development of pedagogical conditions of using binary approach to the optimization of the control and diagnostic functions in teaching students in "General pedagogy". In order to realize this purpose, the study used a range of complementary theoretical, empirical and statistical methods. The article presents a pedagogical conditions of the binary approach, including: incentives and motivation of interest to teachers and students to the process and the results of control and self-diagnostics and self-test; cost optimization time to implement the control and diagnostic functions; optimal number of control "points"; the optimal number of the applicability of methods of diagnostics and self-test; the most optimal and self-evaluation General pedagogical competence; clear reasoning on the part of the teacher and a deep understanding by students of the basic criteria of assessment of knowledge and competencies. Study materials are the basis for the development and using the system of test control and self-control of students' knowledge using IKT, as well as packets of control and diagnostic tasks and assignments for students in the discipline "General pedagogy"

KEYWORDS
Control and diagnostic functions, binary approach, optimization of the control and diagnostic functions, teaching students, information and communication technologies (IKT)

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Introduction

Urgency of the problem

One of the components of improving the quality of education is the modernization of the system of assessment of quality of professional teacher education. The present evaluation system requires large-scale changes, including finding new approaches to building effective models for optimization of control and diagnostic functions in the system of higher education. Federal

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universities should play an important role in the process of creating a new system of assessing the quality of teacher education. This is due to the fact that they focused considerably on human and scientific potential, accumulated intellectual resources, created modern research and educational laboratories, develop sustainable linkages with domestic and foreign partners.

During the implementation of the Federal state educational standards of higher education, a teacher must not only learn the technology of professional competences formation, but also to build its own system work aimed to ensuring the highest quality professional education that meets international standards.

The problems, which require solutions

The currently used diagnostic system, monitoring and evaluation were established long time ago, in the other conditions of educational system functioning. Its main disadvantages can be considered the following:

Insufficient, often biased and fragmented control, which does not give accurate information about students ' knowledge, but only partially reveals it.

The lack of self-control and self-test of students, without which it is difficult and inefficient to monitor and diagnose the most optimal way.

Oral questioning during seminars as a form of control of learning activities and outcomes is often selective and random. This creates conditions for non-permanent operation of individual students. The teacher using such kind of control does not know what is actually learned and not learned by each student.

External diagnostics, monitoring and evaluation of the teacher are the main and often the only means of testing knowledge. And as a consequence there is no formation of the students ' subject-oriented motivation on self-control and self-diagnosis of the knowledge, skills, competencies and personal qualities.

All of this doesn't contribute to the formation of the importance of personal motivation, responsibility of the student for their academic activities and its results.

These short disadvantages of comings diagnostics system, monitoring and evaluation of the knowledge, competencies and other qualities of the students in the learning process allow us to conclude that this system needs to be improved. All this relates to the educational activity of the students.

Literature Review

Analysis of the degree of investigation and development problems of pedagogical conditions for performing a binary approach to optimization of control and diagnostic functions the teachers of the higher school, presents research V.P. Bespalko (2006), V.S. Lednev (2002), M.A. Choshanov (2012), V.V. Serikov (2008), V.I. Andreev (2010), E.A. Klimov (2004) and others, as well as in the practice of pedagogical activity, showed the following. Currently, the questions associated with the structure and organization of the process of implementation of control and diagnostic functions in the training of students demand issues; there is an acute problem of creating effective technologies of diagnostics of the quality of education and level of professional competence of students through the development of new pedagogical concepts of monitoring and diagnosis in education in terms of a binary approach, guaranteeing the highest educational result.

The analysis of scientific literature allowed us to determine that in the system of higher education was increased the attention to the problems of diagnostics and self-test of the quality of education based on the identification and registration of personal, group characteristics of students in order to determine the most appropriate methods of educational activities. This is evidenced by studies of I.A. Zimnyaya (2004), A.M. Novikov (2010), A.A. Rean, N. Bordovskaya & S. Rozum (2004), V.A. Yakunina (1998), F.G. Yalalov (2012), N.V. Telegina, E.G. Galimova, & A.R. Masalimova (2015) and others. At the same time promising areas of development of the system of pedagogical conditions of use binary approach to the optimization of the control and diagnostic functions in the training of students is still not identified, and the modern University practice has no invariant system of diagnostic means and methods of evaluating the educational process effectiveness.

The purpose of the study

The purpose of the study: development of pedagogical conditions of using binary approach to the optimization of the control and diagnostic functions of students learned "General pedagogy", and experimental verification of its effectiveness.

The hypothesis of the study

The hypothesis of the study was set of provisions that significantly increase the effectiveness of the training students will be able to if based on a binary approach to optimization of control and diagnostic functions:

activate and optimize the motivation of both teachers and students in the process of implementation of control and diagnostic functions;

to optimize time of teacher and students in the process of implementation of control and diagnostic functions;

to optimize the number of control-diagnostic study cases, activities, indicators and criteria for the practical implementation of the control and diagnostic functions in the students teaching.

Materials and Methods

The methods of Researching

During developing the system of optimization of control and diagnostic functions have been used such methods of pedagogical research, as a theoretical analysis of the pedagogical literature, Russian and foreign educational experience, questioning. To determine the quality of knowledge and level of pedagogical competence was used testing methods, problem situations and written survey. To assess the effectiveness of the system of pedagogical conditions of a binary approach to optimization of control and diagnostic functions in the training of students was used experimental methods (search, ascertaining and forming experiment) and statistics methods for estimating measurements and mathematical processing of experimental data, system and qualitative analysis, graphics interpretation. The combination of used methods and their complementarity ensure the reliability of research results.

The Experimental database of research

The process of teaching the students studied at the faculty of Economics, history, Philology, faculty of mechanics and mathematics, computational mathematics and Cybernetics, Oriental studies faculties of "Kazan (Volga region) Federal University to "General pedagogy" become experimental database. In research took part 395 students, more than 25 teachers and student groups supervisors and facilitators.

Results

The essence of a binary approach

The binary approach to the optimization of the control and diagnostic functions of students' study process is a set of general principles in goals definition, criteria, diagnostic tools, technologies and organizational structure of the process of assessing the quality of educational outcomes based on a combination of diagnostics and self- diagnostics, control and self-planned learning outcomes.

The binary approach to the optimization of the control and diagnostic functions in learning is a conceptual strategy that is different from mainstream traditional education. It offers a fundamentally new model for solving problems of quality of education, including analysis of objective and subjective reasons of available indicators and criteria of quality of education; pedagogical strategy of guaranteeing the quality of education within the State of higher education and professional standards; non-traditional models of understanding relations between the subjects of education, that is, teachers and students, and their role in assessing the quality of the planned and achieved learning outcomes.

The system of test evaluation

The system test evaluation of the knowledge and competencies of students in "General pedagogy" was developed and tested the effectiveness of its practical application in teaching students to "General pedagogy". To optimize amplification functions of control and self-control, diagnostic and self-diagnostic of students in educational activities were selected tasks and jobs.

However, a greater emphasis was placed on methods of stimulating interest and motivation of students as to study the "General pedagogy" so to the procedures of self-control and self-diagnosis. The empirical material for the research problem was accumulated.

Pedagogical conditions of optimization of control and diagnostic functions

It was found and experimentally established that the binary approach to optimization of control and diagnostic functions gives a positive effect if the following pedagogical conditions: the optimum time for the implementation of the control and diagnostic functions must be of the order of 3-5 % of the total instructional time; the optimal number of control points must be for a term ranging from 3 to 5; optimally the number of the applicability of the diagnostic assessment and diagnosis must be for a term ranging from 5 to 7; the most optimal and self-evaluation General pedagogical competences during the semester is a "cumulative" system matrix type; the efficiency of a binary

approach in the implementation of control and diagnostic functions increases substantially with clear reasoning and deep understanding by students of the basic criteria of assessment of knowledge (scientific, depth, consistency, transfer to a new conditions and competencies.

Significantly were increased the indicators in motivation area (interest) of students to the diagnosis and self-diagnosis process and result (Figure 1).

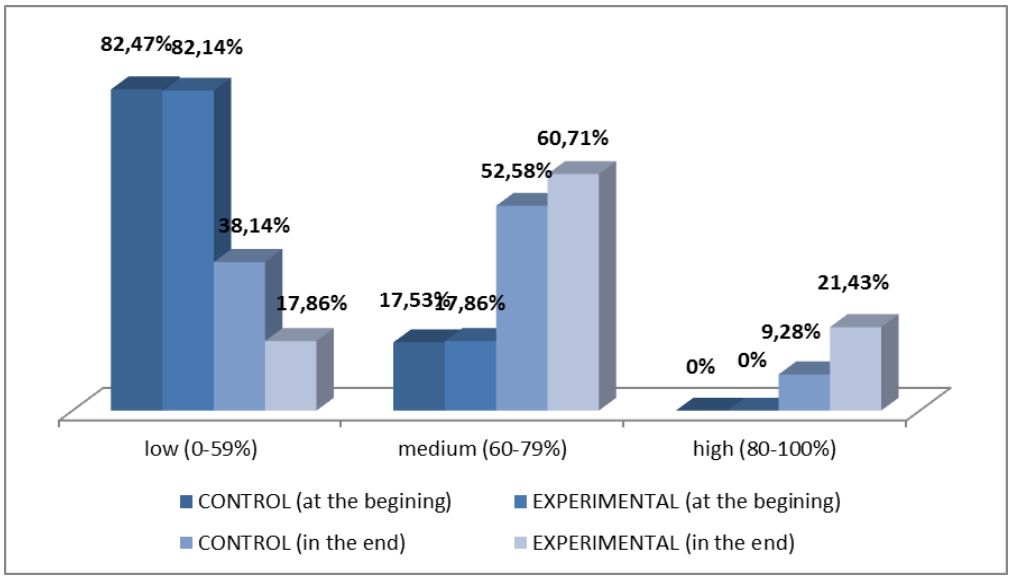

Figure 1. Development of students' motivation (interest) to study "General pedagogy".

It is important to note that the optimization of conditions of control (self-control) in the development of knowledge and common competencies for the course in General pedagogy, including the using of Information Computer Technology (ICT) has an impact on students' attitudes to study "General pedagogy". Students' interest to study "General pedagogy" in the experimental group increased significantly. In the control group, which did not used a binary approach to the optimization of the control and diagnostic functions of control (self-control), diagnostics (self-test), a statistically significant change has not occurred.

It should be noted that the figures in the development of the ability to adequately self-esteem in the experimental group were much nearer to the assessment of the teacher and the score given by other students, as evidenced by the correlation coefficient 0.793 between teaching evaluation and self-evaluation, with a correlation coefficient 0.872 between self-assessment and evaluation issued by other students.

It was found that students more deeply aware of the criteria and indicators of control (self-control) and professional teaching competencies. In addition, the introduction of situational tasks and tasks with the use of system evaluation and self-assessment based on the matrix approach has enabled us to

accumulate a database on the development of competencies that are included in the list of Federal State Educational Standard.

Also it was important for us to determine whether there are statistically significant changes in the development of such skills as the ability to exercise control (self-control) through the allocation of students' criteria and indicators helping them to assess their knowledge and competence (Figure 2).

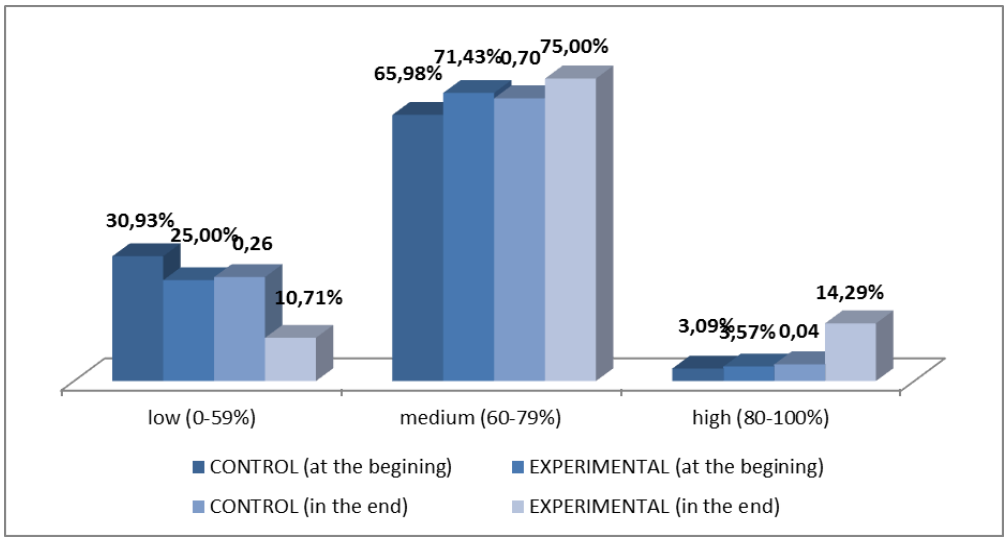

Figure 2. Development of students' competencies (self-monitoring, self-management) in learning "General pedagogy".

In terms of optimization of control and diagnostic functions in teaching students to "General pedagogy" also significantly increased the efficiency of the process of formation of students ' knowledge of course that display the results of the final stage of discipline (Figure 3).

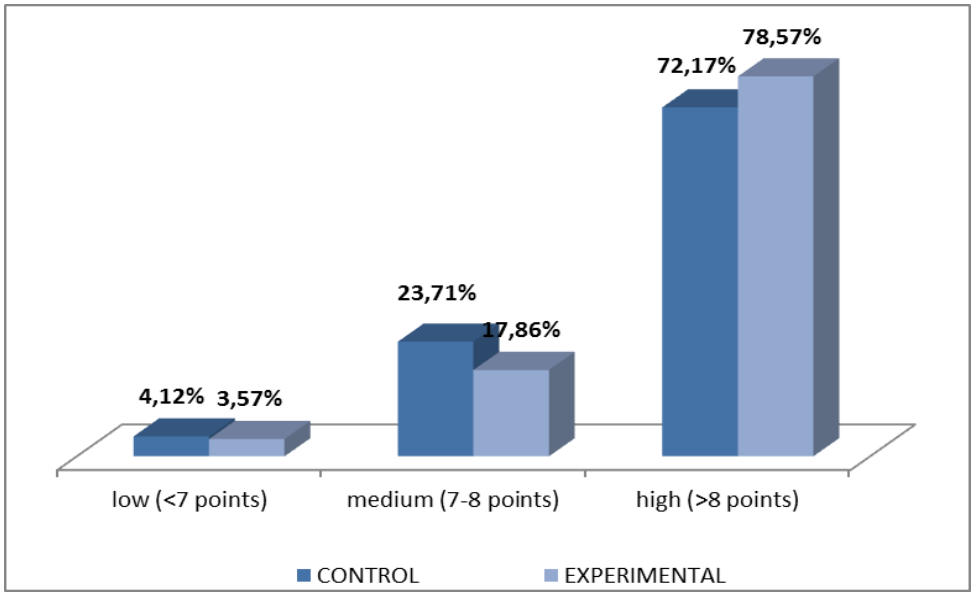

Figure 3. The levels of development of the students ' knowledge of "General pedagogy" at the end of the course.

Discussions

The essence of a binary approach for optimization of pedagogical conditions of control and self-control of students' knowledge using Information Computer Technology (ICT) is to define and organize objectives, structure and content of interrelated and interdependent processes of diagnostics and self-test, control and self-control of the learning process and its results. The structure of this process includes the content and model of the designed knowledge on the studied discipline, and the output has the quality of education, which is formed by the teacher in the minds of students achieved in the process of teaching and learning, the level of which is determined during diagnostics (self-test) and control (self-control).

Self-management, self-diagnosis and self-monitoring the quality of student learning outcomes made on the basis of feedback. It is provided by developing during the research, control and measuring materials based on ICT and software products, which enable the objective assessment of educational outcomes in the discipline, but also to streamline the system of self-knowledge, to enhance the process of self-education students to increase their learning motivation.

The system of pedagogical conditions of using binary approach to optimize the control and diagnostic functions includes the following structural components: development and using the infrastructure and unified test control and self-control of students' knowledge using ICT; the set of criteria and indicators of efficiency of application of the control and diagnostic tasks and assignments using ICT for students studying the discipline; scientific-methodical recommendations for teachers to use ICT in the framework of a binary approach to optimize control-diagnostic functions in the higher education system; educational-methodical recommendations for students on the application of the control and diagnostic tasks and tasks for self-preparation for

tests and exams and self-knowledge to the study of the discipline; students and teachers positive motivation to use a binary approach for optimization of control and diagnostic functions with using ICT.

Control and diagnostic activities within the testing is an effective means of increasing motivation inclusion of students in the learning process, as well as one of the effective means of managing the learning process of the student. This means the monitoring activity is only in the case of using a binary approach in the assessment of learning outcomes.

Conclusion

Pedagogical conditions of using binary approach to the optimization of the control and diagnostic functions of "General pedagogy" students helped to make the process and the training of students on discipline "General pedagogy" more effective and in some extent confirmed the feasibility of establishing a system more quality-assured professional education on the binary approach basis.

The study, based on a binary approach opens new possibilities in the direction of further research issues associated with the integration and optimization of control and diagnostic functions. For example, based on task-competence approach in other disciplines of pedagogical cycle through various forms and methods of teaching students at the University with wide using of IKT basis, in order to improve the quality warranty of higher pedagogical education.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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