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THE ANALYSIS OF RESEARCH RESULTS OF STUDENT EVALUATIONS WHEN CONSIDERING THE SECTION "ELECTROMAGNETISM" IN UNIVERSITIES

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Abstract

This article is devoted to the analysis of the results of students ' assessment studies when considering the section of electromagnetism in Universities. The urgency of introduction of modern system of control of knowledge is shown. The main purpose of the educational work of these universities is to implement a comprehensive system of professional training of highly qualified specialists, allowing them to be in demand in any of the above areas of engineering. It is proved that the quality of education is one of the priorities in Universities. Based on the results of the study, a new system of knowledge control is proposed. The comparison of system and traditional approach of mastering by students ' materials is considered, the analysis of research results is carried out. Also, as a result of the research, a comparative analysis of the evaluation results for different Universities in different countries was carried out.

Keywords: evaluation, electromagnetism, education, system, traditional method, system method.

Аңдатпа

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ЖОҒАРЫ ОҚУ ОРЫНДАРЫНДА "ЭЛЕКТРОМАГНЕТИЗМ" БӨЛІМІН ҚАРАУ КЕЗІНДЕ СТУДЕНТТЕРДІҢ БАҒАЛАРЫН ЗЕРТТЕУ НӘТИЖЕЛЕРІН ТАЛДАУ

Бұл мақала университеттердегі Электромагнетизм бөлімін қарау кезінде студенттердің бағалау зерттеулерінің нәтижелерін талдауға арналған. Білімді бақылаудың заманауи жүйесі ненгізудің өзектілігі көрсетілді. Бұл университеттердің тәрбие жұмысының негізгі мақсаты-инженерлік қызметтің жоғарыда аталған бағыттарының кез-келгенінде сұранысқа ие болуға мүмкіндік беретін жоғары білікті мамандарды кәсіби даярлаудың кешенді жүйесін жүзеге асыру. Білім беру сапасы жоғары оқу орындарындағы басымдықтардың бірі болып табылатыны дәлелденді. Зерттеу нәтижелері бойынша білімді бақылаудың жаңа жүйес іұсынылды. Студенттердің материалды игеруінің жүйелі және дәстүрлі тәсілдерін салыстыру қарастырылды, зерттеу нәтижелеріне талдау жасалды. Сондай-ақ, зерттеу нәтижесінде әртүрлі елдердің әртүрлі университеттері үшін бағалау нәтижелеріне салыстырмалы талдау жүргізілді.

Түйін сөздер: бағалау, электромагнетизм, білім беру, жүйе, дәстүрлі әдіс, жүйелік әдіс.

Аннотация

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АНАЛИЗ РЕЗУЛЬТАТОВ ИССЛЕДОВАНИЙ ОЦЕНОК СТУДЕНТОВ ПРИ РАССМОТРЕНИИ РАЗДЕЛА "ЭЛЕКТРОМАГНЕТИЗМ" В ВУЗАХ

Данная статья посвящена анализу результатов оценочных исследований студентов при рассмотрении раздела электромагнетизма в вузах. Показана актуальность внедрения современной системы контроля знаний. Основной целью воспитательной работы этих вузов является реализация комплексной системы профессиональной подготовки высококвалифицированных специалистов, позволяющей им быть востребованными в любом из вышеперечисленных направлений инженерной деятельности. Доказано, что качество образования является одним из приоритетов в вузах. По результатам проведенного исследования предложена новая система контроля знаний. Рассмотрено сравнение системного и традиционного подходов к усвоению студентами материала, проведен анализ результатов исследования. Также в результате проведенного исследования был проведен сравнительный анализ результатов оценки для разных университетов разных стран.

Ключевые слова: оценка, электромагнетизм, образование, система, традиционный метод, системный метод.

Introduction

Improving the quality of education is currently one of the priorities of higher education [1]. This is especially true for universities that provide training in various fields of radio electronics and communication technology, and primarily for universities studying electromagnetism [2]. Indeed, there is no side of life of modern man, where would not find the application of the achievements of a particular direction, household electronic and computer technology. All these remarkable achievements of human thought became possible thanks to the invention and continuous improvement of electronic equipment, which is the material base of radio electronics.

The range of tasks solved by graduates in their practical activities is very wide - from the development of electronic systems to their production and operation. Accordingly, the main purpose of the educational work of these universities is to implement a comprehensive system of professional training of highly qualified specialists, allowing them to be in demand in any of the above areas of engineering.

Thus, the system of evaluation of students when considering the issues of electromagnetism in Universities is a really relevant area of research [3].

Main part

The features of the modern economic development of the state encourage the correction of the paradigm of vocational education, the vector of which is aimed at the transition from socially-oriented educational activities in the person-oriented through the humanization of the education system, the recognition of the individual trajectory of learning activities, the formation of the need for self-education, self-development, self-education and self-realization [4]. Various documents of the XXI century emphasize the need to justify the new model and the definition of the main directions of modernization of education. It should be noted that an integral component of the modernization of education and evaluation system in particular is the improvement of professional training, which is achieved by reorienting the content of vocational training to the personality of the future skilled worker for the purpose of its social protection in market conditions, personal development and creative self-realization in training and professional activities [5].

Knowledge of terminology is an integral part of education. Without appropriate knowledge, students are not only unable to solve problems and scientifically explain natural phenomena, but also do not understand the texts of the textbook and lectures of the teacher. Control over the level of assimilation of the terminological apparatus in many cases or not carried out, or carried out in the form of physical dictates to reproduce the definitions. moreover, the test of knowledge of the terms takes place at the initial stage of development of a new topic. It is necessary that the terminology relating to electromagnetism be assimilated and it is only necessary to check the knowledge of laws, theories, methods of solving problems, etc.

We would like to draw attention to the fact that the study of the actual material on electromagnetism can go in two fundamentally different ways. These paths are related to how the processes of storing, saving and playing information. Psychologists distinguish biological (mechanical) memory and verbal-logical memory, which is inherent only to man, as successive stages of development in ontogenesis.

The transition to logical memory should occur in adolescence [6]. However, studies have shown that only a part of students use the logical memory of an adult cultural person when mastering physical knowledge, while the rest are satisfied with mechanical memory. What is the result? Those who use mechanical memory can very well write dictations with a small amount of material, and after a very short time is not able to reproduce the same definitions, not to mention the application of knowledge of terminology to specific more complex tasks. And when these more complex students do not perform at the usual control works, it seems that the difficulties arose in the application of knowledge. In fact, knowledge is no longer there, because they are forgotten, and the text becomes simply incomprehensible.

Thus, we come to the idea that we need to learn to distinguish between the knowledge acquired mechanically, and those that will remain for a long time. This is what the system of assessment of students ' knowledge in Universities studying the sections of electromagnetism should be focused on.

It should also be emphasized that the significant increase in information has led to the fact that the training was not a separate period of human life, and accompanies his whole life. The purpose of education, in particular for students studying electromagnetism, is a broad, conceptual education that can give the necessary specific knowledge about the structure and development of inanimate and living nature, the nature of the laws of nature and the disclosure of the content of the main categories of natural science (space, time, matter, movement, energy, life, information, evolution).

As you know, knowledge is only a means of developing thinking, and the mind develops in activity. Therefore, everything that stimulates active mental activity (enthusiasm, interest, consciousness of the need

for the studied), creates conditions for it, promotes the development of thinking [7]. At the same time, the learning process is impossible without monitoring the results of this activity and is one of its components, allows you to get information about the activities and their results, that is, provides feedback between the teacher and those who are trained.

We came to the conclusion that one of the significant drawbacks of the traditional system of knowledge control in Universities is that it usually does not stimulate the student to systematic work, anticipating only the final examination control. In the world of modern needs of education it is necessary to create such a system of control of knowledge and skills, which not only stated the level of assimilation of the material, but stimulated the cognitive activity of students [8].

In the Strategies "Kazakhstan-2030" and "Kazakhstan-2050", in the Concept of education development in the Republic of Kazakhstan, and a number of other policy documents, education is recognized as one of the most important priorities of the country.

The necessity of modernization of the education system, increasing its mobility to meet the needs of the economy and society. The aim is to form a model of multi-level continuing education integrated into the world educational space, providing flexible, multi-level training in accordance with the needs of the labor market [9].

Although there is no single concept of lifelong learning adopted at the national level, the main provisions of the Concept formed the basis of the law on education (2007, 2015), the State program for the development of education (2011-2020), the Messages of the President of Kazakhstan and other strategic documents, and are consistently implemented. Some of them are worth mentioning: free access to new skills for the unemployed, the creation of guidance and counselling services in educational institutions, as well as for the unemployed, the creation of national and regional centres for the award of qualifications and other mechanisms.

The state policy on the implementation of the principles of lifelong learning is implemented by the MES and the MHSD within the Framework of the law on education, the Labor code and the employment Roadmap 2020. The main types of training are lecture, practical (seminar), laboratory, all types of professional practice, preparation and passing of final certification, independent work of the student.

Training sessions are conducted mainly in active creative forms (case studies, business games, trainings, debates, round tables, seminars) at the choice of teachers, as well as in accordance with the specifics of the program and educational material. Modular educational undergraduate programs are developed on the basis of the competence model of training. Learning outcomes are determined on the basis of Dublin descriptors of the relevant level of education [10].

Now control of educational achievements of students includes current, boundary and final control, carrying out educational and production practices, preparation of the thesis; final state certification – the state examination in the specialty (GEK) and protection of the thesis.

The final certification of undergraduates is carried out in the form of a comprehensive examination and defense of the master's thesis by the state certification Commission (SAC). Master student who passed exams and graded tests with grades "A", "A-", "B+", "B", "B-" and having an average grade (GPA) for the entire period of study is not less than 3.5, as well as passed all state exams and defended a thesis (project) with grades "A", "A-", is awarded a diploma with honors in the absence of repeated exams during the entire period of training (excluding military training). As a result of research on different countries, it is believed that one of the most popular models for Universities studying electromagnetism is a rating system.

However, it is characterized by very significant shortcomings that are fundamentally irreparable. In particular, the setting itself is quite the noble goal of encouraging ongoing student work, this control system ultimately reduces everything to the desire of getting "machine" on the exam. The system control, which has some similarities with the rating system, but its main purpose is to focus students not on a "machine", or extra points on the exam, and on the formation of his sustained interest in the subject and the target language and a desire to learn new knowledge and skills. The main feature of this system is that at all stages of control there is an indissoluble connection between the studied and the studied earlier. The main attention is paid to the formation of students ' ability to build logical connections between different phenomena of nature.

A significant influence on the activity of students in the learning process and their interest in the study, has the form and method of control of this material. Usually, when solving standard problems, a student should follow a certain algorithm to get a numerical answer [11]. In this case, the goal for him is a specific result, although in fact the purpose of practical training should be mastering the techniques of using known theoretical facts in practice. As a result, there is a substitution of one goal of learning completely different [12].

Achieving this goal, that is, the ability to generalize theoretical knowledge and use them in practice, can be achieved through the use of non-standard tasks. As academician P. L. Kapitsa emphasized, "a student should analyze and quantitatively describe a given phenomenon on the basis of known physical laws".

The first step in this study is qualitative tasks, for which the student needs not just knowledge of individual formulas, but understanding of the theory in general, logical thinking.

Qualitative tasks allow more flexibility to control the assimilation of the material passed. In addition, in terms of quality tasks used seemingly the simplest phenomena of life. First, it awakens a much greater interest in the solution, that is, the explanation of physical phenomena, and this in turn makes use of additional literature and broadens the mind; secondly, such tasks show that physical phenomena surround us everywhere, and this fact also contributes to the interest of the studied.

People get used to many phenomena so much that they do not pay attention to them. Solving qualitative problems, the student, by freely begins to look for an explanation of everything that happens around. It is on this basis that qualitative tasks are included in the system control.

The first stage of control is to determine the level of training of students and the formation of the basis on which the accumulation and assimilation of new material will be based. To this end, at the beginning of the semester it is proposed to conduct entrance testing of students on universal test problems, which include testing both knowledge and skills to apply this knowledge in practice. Then, throughout the semester, there is a continuous control of students ' knowledge and skills, which is as follows: in practical classes, a short control is carried out on individual tasks, which include tests to check the formal knowledge of students, allows to assess the degree of their preparation for solving practical problems. Then a short front-end survey is conducted to clarify students ' knowledge of definitions and concepts of both current and previous material.

When solving problems, the activation of the educational process is carried out by involving the whole group in the discussion of ways to solve the problem and the results. In laboratory classes, the control is carried out on individual tasks, which in addition to test tasks to test knowledge and skills related to this laboratory work, contain qualitative tasks on the topic under study. This structure allows individual tasks to increase the motivation of students because of qualitative problems, developing in them an interest in the subject of the target language [13]. At the end of the semester, the final testing and credit for laboratory and practical classes. The final stage is the exam, which evaluates the knowledge and skills of students. According to the results of continuous monitoring, the graphs of each student's academic performance are built, allowing to clearly see the overall picture of academic performance and predict the results of examinations.

Such continuous monitoring allows time to fix all the "Gaps" in the training of students, and on the one hand, to prevent shortages of direct communication between the teacher and the student, and on the other hand it eliminates the subjective assessment of the examiner. Students have a real opportunity to plan their individual schedule of preparation for the exam and the emphasis is transferred not in getting the "machine" on the exam, but on a deep and meaningful assimilation of the studied. Thus, each student has a real opportunity to improve their level of training and authority in the study group, as well as activates the learning process. In this research, a comparative analysis of the control and evaluation system in teaching the course of electromagnetism with a total number of 110 students was carried out. They were randomly divided into two groups (55 people each). The first used system control, and the second - the traditional. The evaluation was carried out according to Table 1.

Table 1-Assessment System

Based on the traditional system Letter equivalent rating %content	*Based on credit system*	
	Letter equivalent rating	*%*
Excellent	*A (A+)*	*95-100*
	A-	*90-94*
Good	*B+*	*85-89*
	B	*80-84*
	B-	*75-79*
Satisfactorily	*C+*	*70-74*
	C	*65-69*
	C-	*60-64*
	D+	*55-59*
	D	*50-54*
Unsatisfactorily	*F*	*0-49*

The evaluation results for the traditional system are shown in figure 1. The evaluation results (system control) are presented in figure 2.

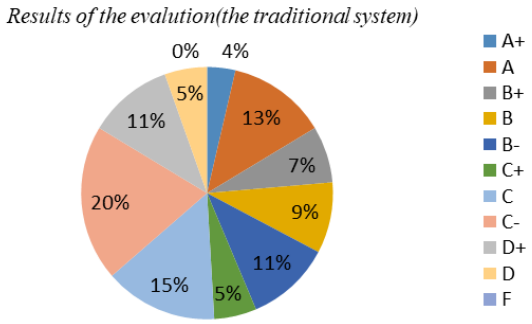

Figure 1. Evaluation Results (traditional system)

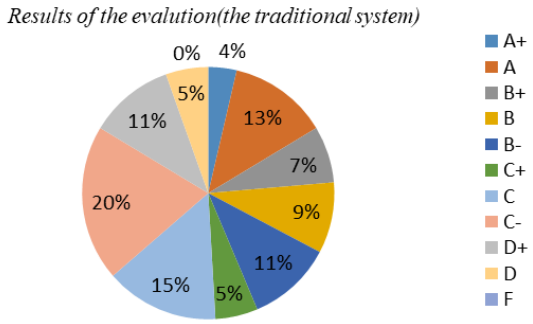

Figure 2. Evaluation Results (system control)

The comparative table of the evaluation results is presented in the form of table 2.

Table 2 - comparative table of evaluation results

Evaluation	*Traditional system*	*System control*
A+	*2*	*3*
A	*7*	*8*
B+	*4*	*4*
B	*5*	*6*
B-	*6*	*7*
C+	*3*	*4*
C	*8*	*4*
C-	*11*	*10*
D+	*6*	*7*
D	*3*	*2*
F	*0*	*0*

As we can see from the research results, the proposed evaluation system (system control) gives better results, which indicates that it is more effective.

Table 3 presents the results of studies for the system control of various Universities in different countries (Russia, Ukraine and Kazakhstan). Since the evaluation system is different, it was decided to compare the estimates of "Excellent", "Good", "Satisfactory", "Unsatisfactory".

Table 3. Comparative table of research results for different Universitiesvarious States on the subject of "electromagnetism»

Assessment	*Kazakhstan*	*Russia*	*Ukraine*
Excellent	*15*	*16*	*12*
Good	*45*	*44*	*50*
Satisfactory	*40*	*40*	*38*
Unsatisfactory	*0*	*0*	*0*

Table 3 indicates that, on the subject of "electromagnetism" as a result of research were obtained approximately the same results for different Universities in different countries.

Conclusion

Thus, the goals and objectives set for the modern education system can be achieved only through the use of new teaching methods and assessment systems. Educational reforms carried out in recent years have radically changed old stereotypes in teaching in General and in the assessment of knowledge in particular.

There is no doubt that the teaching is carried out regulation and modernization of the learning process on the basis of continuous ongoing monitoring, that is, obtaining information about the progress of students and the effectiveness of techniques and methods of their own activities. In order to correct the learning process, the teacher conducts diagnostics of knowledge and skills at different stages: lectures, practical, laboratory and additional classes, contributes to the transition of students to a higher level of learning. Research results shows that a comparison of the traditional system and system control of evaluation and teaching of students when considering the section of electromagnetism in Universities. The results indicate the best results of the material development in the evaluation and teaching using the method of system control.

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