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Technologies for the Development of Competencies in Physics in General Secondary Education using Multimedia Resources

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Abstract ***This article was written with the aim of to develop a technology for the development of physics competencies in general secondary education using multimedia resources. The following tasks are considered in the article as: studying the development of students' competence as an important pedagogical problem based on the study of pedagogical and scientific-methodical literature using multimedia resources; determination of the structure of basic and subject competencies necessary for the development of educational content and student competence, aimed at improving the teaching methodology; the inclusion of selected basic and subject competencies in the content of education and the definition of pedagogical and psychological conditions giving such an opportunity, the improvement of educational and multimedia technologies on the example of the subject of physics; improving models and methods for developing student competence based on general competency-based approaches in relation to basic and subject competencies in educational institutions; organization of lessons with the help of multimedia resources aimed at developing students' competence on the basis of a competency-based approach, and preparing recommendations for their implementation in the educational process.***

Keywords**: physics, multimedia resources, special tasks, physics training, competence, case studies.***

I. INTRODUCTION

In the process of global globalization, competent personnel occupy an important place in the development of subjects and the scientific and technical sphere. Internationally, programs such as the International Adult Competency Assessment Program (PIAAC) and the International Student Assessment Program (RISA) are widely used to assess the competence of students and increase student knowledge. Harmonization of professional mastery with personality traits, the progressive growth of such requirements as rapid adaptation to various changes are the reason for the consistent active implementation of a competent approach in the educational processes.

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In leading scientific centers and higher educational institutions, such research is carried out as studying the implementation of the principles of a competency-based approach to the content of standards of vocational education, general subjects, their impact on changes in the links of the pedagogical system, the concept of independent achievement of educational results, interpretation of the competency-based approach, and competencies related to social and one specific area of activity. The reforms taking place in the education system of our country, the need for competent personnel have necessitated the formation of the competence of education in the process of teaching each subject, in particular, teaching the subject of physics. In the concept of development of the public education system of the Republic of Uzbekistan until 2030, such tasks are defined as "... a quality update of the content of the continuing education system, improvement of teaching methods, pay attention to in-depth study of the subject of physics, develop criteria for assessing pedagogical activity based on competencies provided by state educational standards. " And this justifies the need to determine, by the example of a subject of physics, improving teaching methods, developing the content of education and increasing the competence of students, the necessary supporting and relating to the subject of physics competencies, on the basis of the general competency-based approaches that are relevant to the subject of physics.

II. METHODOLOGY

Fundamental and practical studies on the competency-based approach to education, on issues of competence and competence of students are carried out in leading scientific centers of the world and educational institutions, in particular at the University of Nevada (USA), University of Bayreuth (Germany), University of Kent (Great Britain) , University of Uppsala (Sweden), Nord University, Buda, (Norway), National University of Singapore (Singapore), Ufa State University (Russia), Belarusian State University (Belarus), Hokkaido University (Japan), National University of Uzbekistan, and also at Samarkand State University (Uzbekistan) On a global scale, studies are being conducted on the competency-based approach to teaching physics, the organization of modern training sessions with interactive software tools, as well as their effectiveness, including the following scientific results: the interactive teaching technologies for competency-based education have been developed (Leiden University);

interactive software tools based on the competency-based approach to the development of the scientific worldview of students (Polish Society for Human Evolution Studies) have been developed; developed a modular education system based on the integration and differentiation of the priorities of the educational, methodological and research processes (Center for Cellular and Molecular Biology); a methodology has been developed for using the international PISA (Program for International Student Assessment) programs for the development of natural and scientific literacy (Russian Institute for Educational Development Strategies).

Research is being conducted in the world on a number of priority areas for training future competent specialists, including: improving methodological conditions for developing the worldview of students using electronic software; the formation of a system of competencies for the development of logical and scientific thinking, the formation of a system of natural and scientific competencies of students to work with virtual laboratories, the increasing role of pedagogical innovative educational cluster and the improvement of methodological support for students in research.

III. LITERATURE SURVEY

If at first the concepts of "competence" and "competence" determined the need for communication between representatives of different nationalities, then today they also directly cover the education system, its content and practical significance. Certain requirements of these concepts, reliance on the education system and the approach to formation issues regarding the subject and interdisciplinary competencies in Europe began a little earlier.

In the studies of scientists of the Commonwealth of Independent States (CIS) V.P. Simonov [15, 16], A.I.Subetto [17], A.V. Khutorsky [3] and other concepts of development and formation of personality competence are interpreted differently . A rapid change in the labor market is determined by the attention of employers not only to the employee's knowledge, skills and qualifications, but also to personal qualities. In this regard, in the pedagogical and psychological direction in Russia, an example is the research of I. Ya. Lerner [10], VV Kraevsky [7], VV Davydov [2].

In developed foreign countries, the authors of S. Shaw, B. Oskarsson, A. Shelton, V. I. Baidenko, A. M. Novikov and others [6] considered mainly the problem of expression and formation of the structure of basic competencies in foreign theory and practice [6] in vocational education. They considered basic competencies, firstly, as a wide range of specializations of an individual's activities; secondly, as a "tunnel" relationship of knowledge and skills in any professional and work activity, i.e. if the first opinion took into account personality traits, then the second opinion emphasized the priority of skills. In the works of I.A. Zimnaya [22], A.A. Verbitsky [20] and E.V. Pryamikov [14], competence is considered as a paradigm of education, it is emphasized that in the education system the role of the teacher is directed to the object, and in the process organization can be a solution to problems with a focus on the subject, as well as the need for a radical change in the relationship between the learner and the learner. Most of the research carried out was aimed at the requirements of educational institutions of the humanitarian direction and was not considered as a direction of exact sciences.

Work on the development of an independent and creative approach, logical thinking, educational technologies, computer literacy, professional competence and experimental skills, considered to be components of the competency-based approach in educational institutions of the country, was studied by B. Mirzakhmedov [12], K. Nazriddinov, N. Azizkhodzhaeva [1], S. Otajonov [13], M. Kurbonov [9]. Reflections on professional and practical competence, competence, educational technologies aimed at developing students' competencies, as well as on monitoring their formation, were reflected in the works of J. Tolipova, U. Inoyatov [4], B. Khojaev [4], M. Vakhobov [19], O. Kuysinov [8], and D.M. Mamatkulov [11].

IV. THEORY AND DISCUSSION

The purpose of the study is to improve the content of physics in general secondary education and the development of students' competence on the basis of basic and subject competencies.

Research Objectives:

- study of the development of students' competence as an important pedagogical problem based on the study of pedagogical and scientific-methodical literature using multimedia resources;
- determination of the structure of basic and subject competencies necessary for the development of educational content and student competence, aimed at improving the teaching methodology;
- the inclusion of selected basic and subject competencies in the content of education and the definition of pedagogical and psychological conditions giving such an opportunity, the improvement of educational technologies on the example of the subject of physics;
- improving models and methods for developing student competence based on general competency-based approaches in relation to basic and subject competencies in educational institutions;
- organization of lessons aimed at developing students' competence on the basis of a competency-based approach, and preparation of recommendations for their implementation in the educational process.

Test assignments aimed at diagnosing students' competence consist in the development and experimental testing of questionnaire questions.

The subject of the study is the methodology for developing students' competence on the basis of improving and teaching the content of the subject of physics in institutions on the basis of the competency-based approach.

Research Methods. In the research process, methods of pedagogical observation, critical comparative analysis, test tasks, classification, questionnaire questions, interviews with teachers, school leaders and parents, mathematical and statistical analysis, as well as a method of summarizing the results were used.The scientific novelty of the study is as follows:

- the competence structure of students in secondary schools in physics is being clarified based on the inclusion of elements for the classification of physical processes (observation of phenomena, their understanding and explanation), state of experiments (conducting, measuring physical quantities and making conclusions), practice (physical knowledge and ability to use devices in practice);
- the structure of the formation of general competencies of students in physics is developed on the basis of the stages of motivation, cognitive, active and effective assessment by disclosing the content of the features of competencies (need, correct goal setting, interest, motivation, physical concepts, forecasting, analytical skills and interpretation) and indicators (formation of competencies, ability to independently use competencies, competence, self-esteem);
- the possibilities of determining the level of competence of students in physics are expanded based on the inclusion of the functions of pedagogical and psychological diagnostics (assessment of the initial and subsequent levels, monitoring methods, correction);
- the design processes for the forms of lessons aimed at the student's personality, in accordance with a passive, active, interactive approach, have been improved on the basis of giving priority to the requirements (modernity, principles of pedagogical techniques, creating a learning situation) presented to lessons in the formation of general competencies in the subject;
- educational technologies that enhance and accelerate educational activities are improved on the basis of the development of teaching materials aimed at strengthening logical thinking and increasing student motivation.

The methodological foundations of the development of students' competencies are competency-based, system-active and personality-oriented approaches. At the root of a personally oriented approach lies the idea of forming its capabilities for personal development, independent and informed decision-making. At the stages of the development of subject competencies of students, in particular at the motivational stage, the issue of awakening students' interest in the subject is important. Based on this approach, in 2017, in cooperation with the Multimedia Center for the Development of General Education Programs under the Ministry of Public Education of the Republic of Uzbekistan, we prepared an electronic informational educational resource in physics for students of 6th grades of secondary schools. In order for the topic "Center of Mass of Bodies and its Definition" to be understood by students and easily remembered, a 2-3-minute animated film was shown using the example of a cart (Fig. 2). In the initial situation, an unloaded (empty) cart easily moves through a block of stone. Now load the hay in a cart and repeat the experiment. A cart with hay overturns on its side when moving through the same block of stone. Why did it happen so?

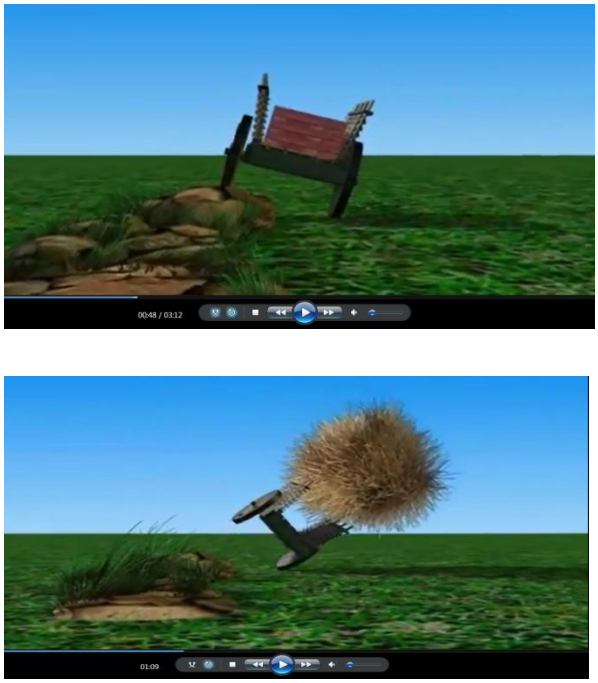


Fig. 1. Plots about the center of mass of bodies and its definition.

At the same time, students are explained in detail that the empty and loaded carts do not maintain equilibrium, the center of mass of a loaded cart is relatively higher than that of an empty cart, therefore the higher the center of mass is, the more unstable and prone to tipping over. Using a computer, you can simply and clearly demonstrate that for an unloaded cart, the line of influence of gravity passing through the center of mass of the cart is between its wheels, i.e. in the framework of its supporting surface, and in a cart loaded with hay, the projection of gravity is outside the supporting surface, so the loaded cart can easily tip over. Such an approach involves the formation of students' competence "Ability to use the physical knowledge and tools", the possibility of introducing the theoretical foundations of physics in everyday life and professional fields, mastering the skills of logical thinking and independent decision-making. The result expected from the educational process also depends on the student's diagnosis factor. To ensure a full pedagogical diagnosis (didactic, psychological, pedagogical, socio-pedagogical, managerial), all participants in the educational process (parents, teachers in certain subjects and leading employees) should be involved, the learning environment (school, home, etc.) should be studied and diagnosed) throughout the school year. When determining and assessing the level of students' physical competence, normative tests were used, which are used to identify general abilities of students in a school subject, as well as constant results, compared with constant standards.

Thus, the possibilities of determining the formation of basic competencies of students by diagnostic methods have been studied. For example, to check how competent the students demonstrated by answering questions given to them to determine their competence to work with information (I know various sources of information; I can find the necessary information from various sources of information and use it; I can make written conclusion from materials taken from various sources, etc.).

Based on this data, justify your answers on information competency:

Fig. 2. An example of an assessment of competence in working with information.

By means of this, it is possible to evaluate in what sources students are looking for information about the sun, gas and electric lamp, their common aspects and differences, physical properties, as well as their place in the everyday life of a person, their significance, involvement in their study of people, universal human values, and through the collection of such information, it is possible to assess the basic competencies of students (low, medium or high level).

Another method for diagnosing students' basic competencies is testing to determine mental development, which belongs to the category of psychological tests. To observe the dynamics of the formation of knowledge and skills that are part of the basic competencies, students are recommended to fill out a self-diagnosis sheet several times a year (for example, at the end of each quarter).

In the same way that students' knowledge, skills and qualifications are mainly formed during classes, competencies are also formed precisely in the process of lessons. In this regard, the requirements for technology for organizing classes on the basis of traditional and non-traditional teaching methods are important. Based on the didactic goals of the traditional lesson, it consists of introducing students to the topic, studying and consolidating a new topic, testing and correcting knowledge in which the teacher exercises central control. In this case, the lesson has three goals: it is divided into educational, educational and developing parts.

When organizing lessons on the basis of the competency-based approach, it is first of all necessary to strengthen students' motivation to study the world around them, search for the necessary information, and prepare for their use in real life. In this vein, the activities of teachers and students will change. Such lessons meet such didactic requirements as planning, organization, implementation and control, correction and analysis. In accordance with the objectives of the lesson, students are required to realize their incompetence in this topic and the need to study these disciplines. To do this, lessons can be organized by creating problem situations in the format of opposing facts, paradoxes, inconsistencies of scientific theory with life cases (informational — what will we learn, what will we teach? Operating room — how will we study? Motivational - what is it for? And communicative - with by whom and where will we study?). For example, to heat water from temperature t1 to temperature t2 requires heat in the amount of Q = cm (t2-t1). This is a scientific fact.

Is the amount of heat used to heat water from 10oC to 20oC equal to the amount of heat used to heat water from 80oC to 90oC? According to the formula, in both cases the discrepancies in the comparative heat volume c, water mass m and temperatures are the same (t2-t1) = 10oC. Therefore, from a theoretical point of view, the same amount of heat should be consumed, but in practice, the amount of heat used to heat water from 80oC to 90oC exceeds the amount of heat used to heat water from 10oC to 20oC.

The basis of the modern lesson is the principle of systemic activity. After identifying its purpose, it is necessary to provide for methods and technologies, means of achieving results, subjects' activities and assessment methods, as well as competencies that need to be developed among students. The teacher, along with inspiring students, must covertly manage the learning process. It is appropriate to recall the principle of William Ward: “A middle-level teacher expounds. A good teacher clarifies. Famous teacher shows. The great teacher is encouraging”, which provides for the observance of these provisions, and the educational process should be aimed at the formation of appropriate competencies of students. For example, after completing the topic “Liquid Pressure”, students completing the following tasks will help them understand the essence of the issue and the possibility of using physics knowledge in everyday life, as well as awaken motivation in them.

Task 1. Excessive pressure at which a person can breathe safely, usually does not exceed 0.3 atm. Based on this, determine the maximum depth at which a person who breathes through the tube can swim.

Task 2. When swimming, the human body is at a different water level. Why? How should a person who does not know how to swim or not able to swim fully, when getting into the water? What is the loss of reason?

Through the use of such questions in the lessons, the development of students' physical competence is achieved, as well as their universal and basic competencies for working with information are formed. The methodology for increasing student activity during lessons through the development of their critical thinking is also considered an important educational tool. Only after students begin to deal with a specific problem do they have critical thinking. In this regard, the most important issue, which is the starting point of the educational process relating to any situation or phenomenon, is considered to be a question that indicates what problem this situation may cause. Only when looking for his own way out of a difficult situation when solving a specific problem does the student really think.

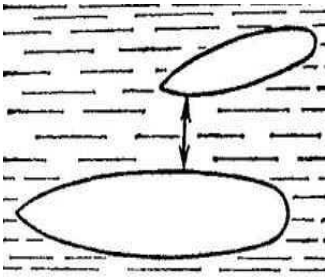
And the logical, critical thinking of students is the basis and component of their independent thinking. That is why the organization of the process of systematic training of students creates opportunities for the development of their communicative competence. At the same time, the main task of teaching students critical thinking in a modern democratic society requires every citizen to have active civic competence and the ability to solve the problems he faces.

Educational technologies have a number of opportunities for developing student competency.

Regardless of the type of lesson, the problem should be aimed at the creative thinking of students, their activation, the formation of relevant competencies. Technologies based on activating students are also different: 1) games; 2) problem education; 3) design; 4) trainings or interactive educational technologies are selected based on the objectives of the lessons and the content of education. For example, in the process of problem education, a certain educational problem is posed under the guidance of a teacher, and students are given the task to solve it. At the same time, social activity, mutual communicativeness of students, their mathematical literacy in search of a solution to the problem, competence in using the achievements of science and technology are formed.

A scientific problem in problem lessons in the direction of the subject of physics: new rules, laws, educational problems requiring proof or the use of certain knowledge in a new situation as a solution to a practical problem, creating designs, discovering inventions and finding solutions to such issues. For example, when setting out the theme “Forces acting on a body moving in a liquid or gas. The Bernoulli equation” can pose the following problem:

a) in the fall of 1992 a huge steamboat “Olympic” was sailing along the sea, and the ship “Gauk” was moving at a higher speed hundreds of meters from it at a high speed. Suddenly, the Gauk ship, under the influence of an unknown force, turned its nose towards the big ship, completely lost control and with great force hit the side of the Olympic steamer. For this, the captain of the Olympic liner was found guilty. But who is really guilty of this situation? How was everything really? Why did the small ship cease to obey the helm?



b) when the fluid moves from the wide part of the pipe to the narrow part, its speed increases, that is, in the narrow part of the pipe it receives acceleration.

What reason causes this acceleration?

Similarly, in practical exercises to consolidate this topic (reflection), the manufacture of a sprayer from a pen, an empty tube and a matchbox can help; manufacturing a pump from empty plastic containers (eggplant); production of paper airplane and layout of the wings of the aircraft; a twisted hit on a ball for table tennis, a soccer ball, and other similar tasks that serve to form students' research skills.

The physical solution to the problems noted above can be demonstrated by blowing between two parallel pieces of paper and showing how they approach each other. This should be explained by the fact that the pressure between the pieces of paper is lower than the pressure from the outside, the same can explain the lifting force of the wings of the aircraft. Such methods will help to incorporate physics into the consciousness of students in the format of an easily digestible subject, as well as form them as a competent person.

The interconnection of theory and practice in teaching a subject is the main task of didactics, aimed at studying the purpose of teaching the subject “Physics” in the system of continuing education, the fundamental foundations of this discipline, studying information about the structure and principles of work of technical objects described in the textbook, mastering practical skills, as well as the use of acquired knowledge in solving problems encountered in the daily life of students. Practical skills (problem solving, creative tasks, experimental tasks for the construction of objects) are important in the formation of students' competencies. The solution of typical questions in the development of practical skills of students, for example, obtaining objects with desired properties, experimental tasks in the classroom, in particular tasks related to quality, also play a large role in the development of students' competence. Speaking of a typical question, we understand the goal that has been set many times before a person in certain life situations. For example, obtaining objects that have the desired properties: 1) come up with a device for opening the entrance doors without applying special effort (for children) and so that the doors then slowly close; 2) offer a device that would inform you in a pleasant voice that there are newspapers or letters in the mailbox.

The effectiveness of the use of tasks focused on competence in the formation of basic and subject competencies is assessed through the strong impact of the subject of physics on technology and production. As noted in the first chapter, the State educational standard, based on the competency-based approach to the subject discipline “Physics”, provides for the formation of competencies in the observation, understanding and explanation of physical processes and phenomena; conducting experiments, measuring physical quantities and making conclusions; the practical use of physical knowledge and tools. One of the effective methods for the formation of such competencies is the conduct of educational experiments in physics, which perform a number of didactic functions, such as arousing interest in the subject "Physics", activating students' attention, teaching them how to work independently and helping to build physics competencies.

For example, the following tasks are used: a) to determine the rate of exit of a stream of water from a tap using a cylindrical container, a stopwatch and a caliper; b) how to determine the air pressure inside a soccer ball using a ruler and sensitive weights?

c) is it possible to determine the initial speed of a bullet fired from a toy pistol using only tape measure? g) you need to determine the weight of a body. At your fingertips you have only a tripod, spring, ruler and one weight with a known weight. Is it possible to complete the task with their help? In the process of performing such experimental tasks, students form competencies for observation, analysis, generalization and conclusion.

When using tasks focused on competence, it is necessary to take into account the student’s age, his psychophysiological characteristics, and also what aspects of competencies must be formed.

At what stage in the development of the topic, students need to be given assignments. Tasks aimed at the formation of competence, teach working with documents, reflecting real life, assumption, the pursuit of knowledge, the collection of information and prediction in essence. Similar tasks by their level can be divided into several groups:

- recovery level (use of basic knowledge in standard situations), the level of networking (integration of materials on various topics, interpretation of the information provided through graphs and tables);
- level of discussion (generalization, solution of non-standard problems, substantiation of conclusions). In existing textbooks, assignments of this type are rare. In accordance with this, it is necessary to take into account that the teacher himself must draw up assignments aimed at developing competence and use them before the student re-displays his knowledge in their implementation.

Such tasks form the competence of students in speaking to the audience and observing speech standards, regulations, pondering the questions posed to him after the speech and choosing the most appropriate answers. At the same time, they enter into a group dialogue, present their ideas to others and discuss the opinions of others in the group.

This in turn forms their communicative competencies. When students master the subject, develop their competence, the development of their logical thinking is important. For example, why is it impossible to melt a nail on a candle flame? Most people answer this question in this way: the flame from the candle does not have enough temperature to melt the nail. But at the same time, the temperature of the candle flame reaches 16000C, while the melting temperature of iron is about 15000C. Such tasks can be used for generalization, control, as homework and, most importantly, to enhance student motivation. There are many external factors affecting the students' attitude to the world around them, their thinking, worldview, finding their place in society and, on the whole, shaping as an individual, therefore, the competency-based approach is considered as a solution to the global problem of the effective use of the available information base.

V. EXPERIMENTAL RESULTS

The study reflects on the goals and organization of the pedagogical experiment, diagnosing the degree of competence of students. We are talking about the features of the lessons in the lesson, as well as the development of competence, the compilation of materials to determine the readiness of students to learn disciplines and the results of tests, to determine the degree of formation of basic competencies of students, the results of the diagnosis of the preliminary state of the created conditions for the formation of primary, school and extracurricular competencies , as well as the results of the process of forming competencies. For the experiments, school No. 235 of the Yunusabad district of the city of Tashkent, school No. 5 of the Pskent district of the Tashkent region and school No. 34 of the Kushrabat district of the Samarkand region were selected. To simultaneously monitor secondary specialized vocational educational institutions, which are considered the next stage of education after graduation, pilot testing was carried out at the academic lyceum at the Tashkent Chemical-Technological Institute, as well as at the 2nd Republican Medical College. In experimental trials involved 816 students. It turned out that, in addition to lessons on the formation and development of competence, they are influenced by other factors (home, on the street, with friends). In this sense, 86 teachers, 12 senior employees, 472 parents participated in the polls.

Based on the results of the diagnosis of didactic, psychological, pedagogical, socio-pedagogical and managerial tools, conclusions were drawn and diagrams were made based on them.

Since no reform is possible without teachers, in the course of a survey among them they studied the methods they used in the lesson, the amount of time allocated for completing assignments at school, pedagogical technologies, the availability of necessary equipment in educational laboratories, as well as suggestions made to improve the efficiency of experiments. It should be noted the opinions of teachers in answering the questionnaire and suggestions regarding reducing the load in addition to class hours. (Full information on the analysis of the results is given in the appendix to the dissertation).

Issued tasks to determine mental development (ZDUR) to determine the development of students' competencies consist of 6 subtests, which include from 15 to 25 tasks. They contain questions aimed at clarifying the general awareness of students, logical generalization and identification of the rules for creating a digital series, finding a synonym for a word, a certain logical relationship between words, grouping by signs, finding commonality, logical periodicity (regularities) between words.

To more accurately assess the level of students' competence, an attempt was made and the opportunity was created to maximize the answer options, i.e. 7 options: -3, -2, -1, 0, 1, 2, 3.

To study the dynamics of the formation and development of basic and general competencies in physics in students in the tests conducted at the beginning, middle and end of the school year, out of 10 prepared test questions in two versions, 7 answers were selective and 3

written responses. In the course of the control tests were used to determine the knowledge, qualifications and competencies of students.

At the end of the year, for the purpose of complex diagnostics, a dictation in physics was conducted.

In the statistical analysis of the results of pedagogical experience, the χ^2-statistical method was used. The hypothesis data χ^2 were tested on the basis of the formula T of the statistical criterion. When the degree of significance is - α = 0.05, then the degree of freedom is ν = 2-1 = 1, χ^2 is taken from the table, the value equal to Tcr = 3.841, in our study C = 2.

$$T = \frac{1}{n_1 n_2}\{\frac{(n_1 O_{21} - n_2 O_{11})^2}{O_{11} + O_{21}} + \frac{(n_1 O_{22} - n_2 O_{12})^2}{O_{12} + O_{22}}\}$$

Based on the calculation results, in the 2015/16 academic year due to the fact that

T = 0.17 <T_{cr} = 3.841 the null hypothesis was accepted.

This means that the level of knowledge during the trial work carried out in the selected groups before the pilot experiment was practically the same. The analysis showed that the level of formation of experimental skills among students over the period of pilot experiments increased from 36.2% to 63.8%. The analysis of the results of the control work in the experimental and control groups is given in table I.

Table I. The results obtained on the basis of control work

№	Educate. institution	Experimental group	Passed	Didn't pass	Control group	Passed	Didn't pass	χ^2	Result
		n_1	Q_{11}	Q_{12}	n_2	Q_{21}	Q_{22}		
1	**School number 235**	112	36	76	111	37	74	0,04	H0
			76	36		60	51	4,464	H1
2	**School number 5**	120	42	78	118	40	78	0,03	H0
			83	37		66	52	4,451	H1
3	**School number 34**	65	23	42	61	21	40	0,01	H0
			48	17		34	27	4,541	H1
4	**RTK number 2**	60	23	37	60	24	36	0,03	H0
			43	17		32	28	4,302	H1
5	**TKTIand a / l**	55	25	30	54	24	30	0,01	H0
			42	13		31	23	4,427	H1
Total:		412	149	263	404	146	258	0,000062	H0
			292	120		223	181	21,53	H1

Based on the calculation results, T = 4.334> Tcr = 3.841, therefore, the null hypothesis is rejected, and hypothesis H1 is accepted. In other words, the level of mastering the requirements of the experimental group is higher compared to the level of the control group, which indicates the effectiveness of the study. Thus, using the mathematical-statistical method it was confirmed that the training methodology recommended by us is more effective than the traditionally conducted training methodology. Studies have confirmed the correctness of the promoted scientific hypothesis on the development of student competencies.

VI. RECOMMENDATION AND CONCLUSION

As a result of the study on the topic "Improving the content of education on the basis of basic and subject competencies and developing the competencies of students", the following conclusions are made.

1. Considering the place occupied by the Republic of Uzbekistan today in the world community, scientific and technological progress and the level of its development in the country, the impact of market conditions on the everyday lifestyle of citizens, the basis for improving the CRP based on a competency-based approach and training programs served as 6 basic competencies : a) communicative; b) for working with information; c) self-development as a person; d) socially active citizenship; e) general cultural; e) mathematical literacy, scientific and technical awareness, as well as user competencies and 3 competencies in physics: a) observation of physical processes and phenomena, their understanding and explanation; b) conducting experiments, measuring physical quantities and making conclusions; c) physical knowledge and determination of competencies in the ability to use devices.

2. It was revealed that the basing of the model of students 'competence development on: a) the awakening of students' motivation for the subject; b) creating a program aimed at developing competence; c) the use of methodological tools; d) based on the principles of creating pedagogical and psychological conditions is the methodological basis for the development of students' competence.

3. The study revealed that it is effective in terms of determining the competence of students to use the diagnostic method, which consists of such components as didactic; pedagogical and psychological; pedagogical-social and management method.

4. The formation of educational competencies based on such methods as comparing the results with educational goals; diagnostics; feedback; consistency and constancy; Efficiency and openness of requirements allows developing students' competence, increasing the effectiveness of education and obtaining objective results.

5. It is justified that linking the theory of development of student competence with practice through the implementation of educational tasks and experimental assignments; The use of new pedagogical technologies serves to form general competencies in physics in the professional and life activities of students.

6. It is justified that when organizing a lesson, the lesson's goal is open and consistent with the goals of students,

compliance with the principle of increasing learning motivation in the lesson and the creation of a learning situation, the exact definition of tasks assigned to students (in particular, drawing up a schedule or diagram corresponding to the text read, creating an algorithm to fulfill a specific rule or task, the ability to use the studied measuring instrument) are important didactic requirements for the development of students' competence.

7. It was revealed that the use of educational technologies aimed at the personality and the enhancement of students' activity, as well as didactic improvement of educational material, are a necessary pedagogical factor in the formation of basic and subject competencies of students in the learning process.

8. It has been demonstrated that the pedagogical conditions in the educational process, the cooperation of teachers of the educational institution and parents are one of the basic principles for the formation of basic and general subject competencies of students.

9. Based on the results of the study, it was confirmed that didactic materials prepared with a focus on the development of logical thinking of students serve to increase the dynamics of the formation of educational competencies.

10. As shown by the study of the dynamics of the formation of basic and general subject competencies, the growth as a result of the chosen methodology and training approaches amounted to 17%.

This confirmed the correctness of the goal set in the dissertation, the correspondence of the goal of the proposed model, the high effectiveness of the methods and techniques used in it, the effectiveness of the methods of diagnosing competencies formed in students. At the end of the study, on the basis of the scientific findings, the following opinions and suggestions were made:

- introduction of technologies in the education system to ensure the development of basic competencies (communicativeness; work with information; self-development of a person; socially active citizenship; general cultural; mathematical literacy, awareness of scientific and technological innovations and their use);

- posting on the Internet sites of scientific and methodological foundations, sources and exemplary organization of lessons based on a competency-based approach;

- the inclusion in the curriculum of general secondary education subject on the formation and development of logical thinking of students;

- revision, within the framework of competency requirements, of topics identified in the programs on disciplines in the curricula of schools and academic lyceums, as well as the introduction of tasks aimed at competence in the repeated publication of textbooks for secondary schools (academic lyceums).

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