

## **The organization of independent learning activities of students on the basis of a competent approach is a guarantee of high efficiency**

**Termiz Institute of Engineering and  
Technology  
п.ф.д.доц Ў Султонова**

**Abstract.** In the article, the problems of organizing students' independent educational activities based on the competence approach and achieving high efficiency, and their solutions, as well as the development of problems related to all chapters of physics, are analyzed using the simplest methods.

**Keywords.** Competence, independent educational activity, university component, pedagogical, innovative, laboratory.

**The relevance of the topic.** Increasing the quality of teaching physics in educational institutions, introducing modern teaching methods into the educational process, selecting talented students, selecting competitive talented students for the labor market, and training competitive specialists for the labor market are the urgent tasks of today..

**Progress of the topic.** Important strategic indicators of today's globalization conditions are determined by the spiritual development of the country, and to a certain extent, the quality of education. Therefore, it is important to have subjects of the educational process that increase the quality and efficiency of education in educational institutions. Every educational institution in one way or another is dealing with issues of improving the quality and efficiency of education. However, the question arises: do they always achieve the expected result? In order to find the answer to this question, it is possible to summarize the following points about what is being done and what conditions are created for students to get quality general secondary education today:

- that students' component league is sufficiently developed;
- lessons are organized on the basis of modern pedagogical and information technologies
- teacher's skills in implementing pedagogical innovations;;
- adequacy of innovative pedagogical activities;
- rational and effective use of computer equipment and laboratory equipment;
- such as teacher-student cooperation.

The sufficiency of the factors listed above can be a solution to the problems of increasing the effectiveness of education.[3-11]

The effectiveness of the educational process is determined by the teacher's interest in activating the independent activity of students. It is the main task of educating the qualities of ambition, inquisitiveness, resourcefulness in students, organizing and forming independent educational activities. If he performs homework and other tasks in an exemplary manner, independently studies the textbook and other additional literature, and participates in science clubs, such an educational process is actively organized. If the teacher explains the topics in a clear and simple way during the lesson and extracurricular activities, uses demonstration in its place and uses technical tools, new innovative and non-traditional methods in education, taking into account the individual characteristics of students, basic competencies organize the educational process based on the principle of individual and differentiated education. if he can, the learning outcomes will be effective. It is appropriate to organize students' independent educational activities in physics classes in the following directions.[5-14]

- 1) independent study of the text on the subject in the lesson;
- 2) independent performance of subject-related exercises;
- 3) solving experimental and computational problems;
- 4) solving test tasks independently;
- 5) conducting experiments and observations;
- 6) work with tables, pictures, graphs, electrical circuits;
- 7) work with visual aids and other educational tools;

- 8) study of materials related to the subject with the help of a computer;
- 9) performing physical puzzles, riddles and various individual assignments and tasks;
- 10) putting the learned knowledge into practice.[15]

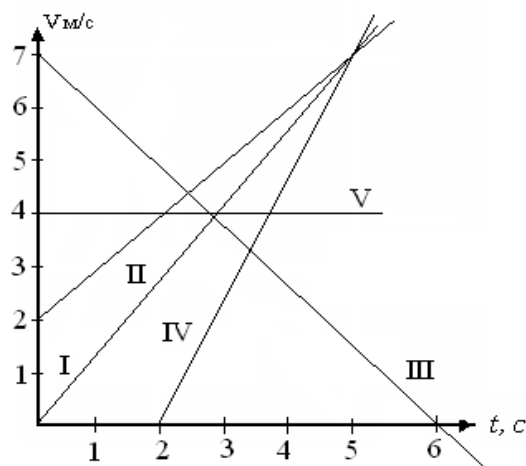
Regardless of the type, independent work is carried out using specific questions and assignments. Assignments range from simple to complex, and each assignment has a specific didactic goal. Separate types of independent work are closely related to each other, and under certain conditions they can be combined. For example, performing physical experiments can be done frontally. In this case, students' activities will have a copy character. Experiments are conducted in order to strengthen the learned material. It is known that it is important to increase the cognitive activity of students in organizing independent work in class. Only when students understand the problem and are interested in the work to be done, the new knowledge is well understood. When setting the teacher's goals and tasks, it is necessary to take into account the desire of students to learn independently, to express themselves, and to acquire knowledge.[3-4]

The teacher considers various aspects of the methodology, taking into account the importance of generating interest in knowledge from the beginning of the lesson. The most important of them are related to 3 situations: firstly, to focus students' attention on the goals and tasks of the lesson; secondly, to arouse interest in the content of the repeated and newly studied material; thirdly, to provide students with access to a form of work that is interesting to them.

Active perception of new material occurs in classes where issues related to the problematic tasks of forming students' physical thinking are discussed. In this pedagogic situation, an atmosphere of research is created, from which students begin to more actively solve the problems set before them. From the problems below, we present problems related to mechanics and electricity that attract thinking

As follows,

Fig. 1



Using the given graph, describe how the objects moved and write the velocity formula for each motion. Students independently look at the graph and analyze the movement.

Analyze each view of the graph separately.

The movements in the graph are analyzed by students as follows

1-Pic

1. a) If the speed increases over time, the motion is accelerated.
- b) Decelerating if the speed decreases with time.
- s) If the speed remains constant, it is uniform motion.
2. Acceleration is determined for variable motion.[14]
3. The velocity formula is written from the acceleration formula for uniform variable motion.

$$\text{will be } \mathcal{G} = \mathcal{G}_0 + a \cdot t$$

4. Constant quantities are determined from the graph:  $a = \frac{\Delta g}{\Delta t} = \frac{g_2 - g_1}{t_2 - t_1}$  is found from the speed axis and by

calculation, and the value is put into the general formula.  $g_0$

How did the teacher analyze the graphs based on the students' theoretical knowledge in order to draw conclusions based on the students' answers,

analysis of graphs based on their independent thinking is considered.

I is a straight accelerating motion with zero initial speed on the graph.

Fig. 1.

II is a uniformly accelerated motion with an initial speed of 2 m/s.

III - uniform decelerating motion with an initial speed of 7m/s.

IV is a special case of uniformly accelerated motion with zero initial velocity.

V is a uniform motion with a speed of  $y = 4$  m/s.

According to the above conclusions, putting the values of the accelerations into the speed formula, the equations are written:

$$\text{I } g_0 = 0; a = \frac{7M/c}{5c} = 1,4M/c^2; g = 1,4t$$

$$\text{II } g_0 = 2M/c; a = \frac{7M/c - 2M/c}{5c} = 1M/c^2; g = 2 + t$$

$$\text{III } g_0 = 7M/c; a = \frac{0M/c - 7M/c}{6c} = 1,2M/c^2; g = -7 + 1,2t$$

$$\text{IV } g_0 = 0; a = \frac{7M/c}{5c - 2c} = 2,33M/c^2; v = 2,33(t_2 - 2)$$

VV;  $=0$  plane motion.  $g_0 = 3M/c$  It can be considered as a special case of a plane variable motion with zero acceleration.

will be analyzed. Based on

considered to be a complete

By solving problems

- strengthens theoretical

- the ability of independent

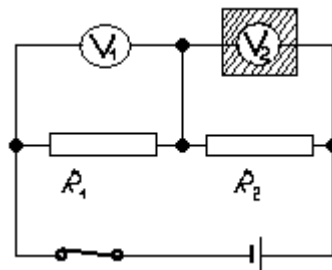
- studies the connections

- achieves conscious

- the ability to make a graph

appear;

- learns to write down given



these points, graphic  $g = g_0 + 0 \cdot t = g_0$  is problem.

independently, students:

knowledge;

creative thinking is formed and developed;

between physical quantities;

assimilation of the laws of physics;

according to the condition of the problem will

physical quantities according to graphs.

**Experimental problems.** When solving experimental problems, experiments should be carried out in accordance with all the conditions of the school demonstration experiment. In this case, special attention should be paid to the good visibility of tools and events. It is necessary to lead the process of the experiment by the teacher himself. We give examples of demonstrative experimental problems.

1. A lever that can be rotated around the fixed support is provided. We attach objects of equal mass, but different volumes, to the two ends of the lever. The lever is in equilibrium. If objects are immersed in water, it is determined that they are affected by the force of repulsion.

The magnitude of this force is proportional to the volume of the body and the density of the liquid. That is why a body with a smaller volume in the water pulls more on the tip of the lever.[6-7]

This answer is checked in an experiment with the participation of students.

The problem can be solved without experimentation, but there is more to lose. 2. The device shown in the picture is assembled. R1 and R2 are demonstrative resistance magazines. Determine the voltmeter reading with the scale closed.

Based on specially prepared tasks and instructions, the students themselves perform the experimental problems independently, the experiment is conducted and the result is obtained.

Demonstration resistors R1 and R2, voltmeter, switch, current source box and connecting wires are provided. Using these devices: a) assemble the electrical circuit according to the given scheme. Sequence the resistances

connect; b) after making the electric circuit, close the second voltmeter through the cell, determine the electric circuit and the resistance of the second rheostat, open the cell and compare it with its reading. Under the supervision of the teacher, students build an electrical circuit according to the electrical circuit. The values of the voltmeter V1 and the resistances R1 and R2 are recorded by connecting the switch. When the electric circuit is connected in series, the voltage drops are proportional to the magnitudes of the resistances, so it can be written as follows.

Since the rheostats are connected in series, the currents are equal, that is, taking into account that  $I_1=I_2$ . [1-2]

$I_1=I_2$  эканлиги назарга олган холда

$$\frac{U_1}{R_1} = \frac{U_2}{R_2} \text{ бундан } U_1 \cdot R_2 = U_2 \cdot R_1$$

$$U_2 = \frac{U_1 \cdot R_2}{R_1} \text{ бўлади}$$

The value of  $U_2$  is determined. Based on the experiment, the value of  $U_2$  is obtained, students take the box above the second voltmeter, and students determine whether their solutions are correct or incorrect.

Independent work skills and competencies are formed and developed in students as a result of students independently conducting experiments and observations in solving experimental problems. Repetition of the learned material can also be the basis for developing and strengthening interest in knowledge and draw attention to the most important issues of the studied material.

In order to arouse students' interest in physics, problem and exercise games, work, modeling and other didactic games are used. During the game, the activity of each student is shown, a competition appears between some students or teams. Since only students who know the studied material can participate in the game, they see the game not only as a game, but as a serious and interesting activity. The issues of using didactic games in teaching physics are covered to some extent in methodological literature. Here are some examples of didactic games

In the process of studying physics, we will give examples of didactic games for students in class and group activities. In order to achieve a high score in these didactic games, it is advisable to use textbooks and additional literature[15]

**Physics Vocabulary Game:** The teacher writes one letter on the board, and the students independently write in their notebooks the physics term, physical quantity, physical instruments, units of measure, etc. that begin with that letter.

He then said which student had written the phrase. The teacher goes around and checks out, and whoever writes a lot, the student wins. Then the words of the student were written on the board and the words that were not in the student's back were written on the blackboard and all the students were able to copy the words that they could not find on the blackboard. For example, T speed, sound, nature, brake, vibration, temperature, thermodynamics, Thomson, Tesla, thermonuclear, accelerator, tacoma, torque, transistor, transuran, turbulent, smoke, wave, smooth, smooth, smooth

A. Accelerometer, amorphous, atom, Avogadro, acoustics, alpha, antimodda, atmosphere, astrophysics, aluminum, adiabatic, abadi, asosli, angstrom, aneroid, arometer, ammeter, absolute elongation, anisotropic

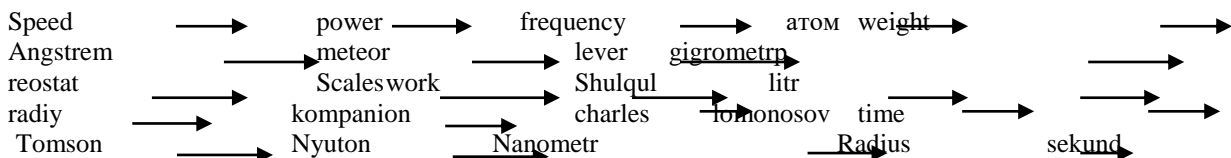
**According to the physical formulas, the damino continues as follows:**

$$v = \frac{s}{t} \rightarrow t = \frac{s}{v} \rightarrow v = v_0 + at \rightarrow t = \frac{v - v_0}{a} \rightarrow a = \frac{v^2 - v_0^2}{2s} \rightarrow s = v_0t + \frac{at^2}{2} \rightarrow t = \frac{A}{N} \rightarrow N = \frac{A}{t}$$

$$t = \frac{A}{IU} \rightarrow U = IR \rightarrow R = \rho \frac{l}{s} \rightarrow S = \frac{F}{P} \rightarrow P = nkT \rightarrow T = \frac{2E_k}{3K} \rightarrow k = \frac{R}{N_A} \rightarrow N_A = \frac{N}{V} \rightarrow v = \frac{m}{\mu} \rightarrow \mu = m_b N_A \rightarrow$$

$$\rightarrow N_A = \frac{NRT}{PV} \rightarrow T = \frac{P}{nK} \rightarrow k = \frac{2E_k}{3T} \rightarrow T = \frac{P}{nK}; n = \frac{N}{V} \rightarrow V = \frac{m}{\rho} \rightarrow \rho = \frac{m}{V} \rightarrow V = Sh$$

**A domino game made up of physical terms.**



will be continued in order. In the domino game consisting of physical words, the teacher says the first word and writes it on the board, from the last letter it is continued with physical words[9-14]

**"Physicist Linguistics"**

Linguistics deals with the laws of language and the charms of speech. The language of physics is very rich, and appropriate use of its possibilities can greatly improve the level of students' knowledge. Puzzles related to various physical quantities, laws, and units teach students to be eloquent, resourceful, and present. This event, first of all, encourages them to work independently, gain additional knowledge, and use the written and spoken language opportunities of physics.

If you find the correct answers to the following questions and place their initials in the blank boxes provided, one of the words of wisdom will come out and it will remind the students for a long time that physics is one of the powerful natural sciences. We have provided examples of linguistic didactic games in class and extracurricular activities, where it is required to find both the meaning and the answer to the riddle.

**Assignment 1: If you find the correct answers to the following questions and place them in the empty boxes with their capital letters, one of the wise words will come out and it will remind students for a long time that physics is one of the most powerful natural sciences.**

1	2	3	4	5	6	7	8	9	10
Ф	И	3	И	К	А	Ф	А	Н	И

11	12		13	14	15	16	17	18	19
М	У	Ъ	Ж	И	3	А	Л	А	Р

20	21	22	23	24	25	26
М	А	Й	Д	О	Н	И

1. Bodies composed of different substances are called .....
2. A body can move in such a way that a straight line connecting two arbitrary points of it remains parallel to itself even as the body moves..... is called action.
3. The mass of a substance per unit volume is called .....
4. Invariance of the speed of a body after the impact of another body on one body has stopped is called .....
5. The effect of one body on another body is called .....
6. Accelerometer.....
7. The expression consisting of the quantitative relationship between the quantities characterizing events is called .....
8. A body immersed in a liquid compresses a liquid of the same weight as its volume and is acted upon by a ..... force of this magnitude
9. Power Unit.....
10. The amount of energy given to the body as a result of heat exchange is called .....
11. The physical quantity that characterizes the inertia of bodies .....
12. The .....passing through the center of the lens is called the optical .....
13. The father of Russian aviation .....

14. The chaotic motion of the molecules that make up the body and the sum of the interaction energies of the molecules is called .....
15. kg/m<sup>3</sup> is the unit of which physical quantity?
16. Density measuring instrument.....
17. Volume measurement unit .....
18. Thrust acting on a body immersed in a liquid or gas output power .....
19. A body that can rotate around a fixed support .....
20. One of the optical instruments .....
21. A body that is both liquid and solid in terms of properties .....
22. The quantity equal to the length of the trajectory .....
23. Changes in the shape and size of an object under the influence of force It is called .....
24. The speed of the trajectory at a certain time and at a certain point ..... called speed.
25. A unit of force that can give an acceleration of 1 m/s<sup>2</sup> to a body with a mass of 1 kg .....
26. Formed when one body slides on the surface of another body and the force opposite to the motion is called .....

Answer:

1. Physical body. 2. Progressive action. 3. Density. 4. Inertia. 5. Strength. 6. Accelerometer. 7. Physical law. 8. Archimedean force. 9. Newton. 10. Amount of heat. 11. Mass. 12. Arrow. 13. Zhukovsky. 14. Internal energy. 15. Density. 16. Hydrometer. 17. Liter. 18. Archimedean force. 19. Richag. 20. Microscope. 21. Amorphous. 22. Road. 23. Deformation. 24. Instantaneous speed. 25 Newtons. 26. The force of friction. [11-14-15]

Conclusion So, didactic game activities used in class and in circles have the following advantages:

- cognitive activity of students increases;
- will be able to solve the most urgent problems;
- during the training, it leads to mutual support and friendly discussion among students;
- students independently use textbooks and additional literature during preparation;
- students prepare for game training with great interest, as a result of which the efficiency of acquiring new knowledge increases independently;
- will be important in testing students' knowledge and talent, in self-assessment, and in choosing a profession.

Usually, teachers prefer to convey a large amount of information to students, to present new material in planned lessons. But practice shows that mastering new material by listening to the teacher's explanation is more ineffective than learning it independently under the teacher's guidance. At the same time, there are problematic limits for independent work. If most of the content of new materials is covered on the basis of previously acquired knowledge and skills, then it is possible to organize independent learning with the help of tasks, which is the basis of which high efficiency in the field of education is achieved.

#### Used literature

1. Султонова Ў.Н. “Устройство для контроля физико-химических параметров питьевой воды”. “Техника ва технологик фанлар соҳаларининг инновацион масалалари” мавзусидаги халқаро илмий-техник анжумани.-.: 2020 йил 22 сентябрь. -С. 393-395 Б.
2. Султонова Ў.Н. Оромиддинов С. “Талабаларни мустақил ўқув фаолиятини ташкил этишда семинар машғулоти. //УФА шахридаги Халқаро “Высшая школа” -.:2018 й, 24.сон 35-38.Б
3. Султонова У.Н., О.Алимназаров “Анализ изменения кинетической энергии механической системе”. // МЦНС “Наука и просвещение”-.: 2019, 66-69.Б
4. Султонова Ў.Н., Султонов С.Н. Автоматизация эксперимента в лабораторном комплексе по механике. //Высшая школа.-.: 2018, 24 сон. 32-33.Б

5. Султонова Ў.Н. Аманов Б. “Физикани ўқитиш технологиялари ва лойиҳалаштириш”. “Техника ва технологик фанлар соҳаларининг инновацион масала-лари” мавзусидаги халқаро илмий-техник анжумани. -:2020 йил 22 сентябрь. - 410-412. Б
6. Султонова Ў.Н. Соқиева Б. Formation of basis competences for studentsbusolvingproblems in physics. Page-.:107-114 Vol 7 no 11.2019.
7. Султонова Ў.Н. Тўраев Б.Э. Султонов С.Н. “Физика фанидан муаммоли масалалар ечишда компетенциявий ёндашув” выпуск 6 (50) F.A Mamadaliev, Egyptian triangle (books 1, 2,3) T/ “Renessans press”-.: 2018 й, 144-149.Б
8. Султонова Ў.Н., Раҳимов Н.Р., Турдиев Б.Э., Аманов Б.Ш. “Техника ва технологик фанлар соҳаларининг инновацион масалалари мавзусидаги халқаро илмий-техник анжуман материаллари” 22 сентябрь -: 2020 й, 393-395.Б
9. Б.Э.Тўраев, Султонова Ў.Н. Физикадан савол ва масалалар тўплами дарслик.-Т.:2021. -365 бет.
10. Султонова Ў.Н. Кадирова Н.Т. Султонов С.Н. Жиянова С.И. Паянова С.Қ. “Technology to improve the methods of teaching physics in hicher education based on a competency approach (on the example of training technical engineers)” European Journal of Molekular&Clinikal Medicine ISSN 2515-8260 Volume 7 issue -:2020 й, 365-374.б
- 11.
12. Султонова Ў.Н. “Устройство для контроля физико-химических параметров питьевой воды”. “Техника ва технологик фанлар соҳаларининг инновацион масалалари” мавзусидаги халқаро илмий-техник анжумани.-.: 2020 йил 22 сентябрь. -С. 393-395 Б.
13. Султонова Ў.Н. Соқиева Б. Formation of basis competences for studentsbusolvingproblems in physics. Page-.:107-114 Vol 7 no 11.2019.
14. Б.Э.Тўраев, Султонова Ў.Н. Физикадан савол ва масалалар тўплами дарслик.-Т.:2021. -365 бет.
15. Султонова Ў.Н. Аманов Б. “Физикани ўқитиш технологиялари ва лойиҳалаштириш”. “Техника ва технологик фанлар соҳаларининг инновацион масала-лари” мавзусидаги халқаро илмий-техник анжумани. -:2020 йил 22 сентябрь. - 410-412. Б
- 16.
17. Султонова Ў.Н. Оромиддинов С. “Талабаларни мустақил ўқув фаолиятини ташкил этишда семинар машғулоти. //УФА шахридаги Халқаро “Высшая школа” -:2018 й, 24.сон 35-38.Б
18. Султонова У.Н., О.Алимназаров “Анализ изменения кинетической энергии механической системе”. // МЦНС “Наука и просвещение”-.: 2019, 66-69.Б
19. Султонова Ў.Н., Султонов С.Н. Автоматизация эксперимента в лабораторном комплексе по механике. //Высшая школа.-.: 2018, 24 сон. 32-33.Б
20. Султонова Ў.Н. Кадирова Н.Т. Султонов С.Н. Жиянова С.И. Паянова С.Қ. “Technology to improve the methods of teaching physics in hicher education based on a competency approach (on the example of training technical engineers)” European Journal of Molekular&Clinikal Medicine ISSN 2515-8260 Volume 7 issue -:2020 й, 365-374.б
21. Султонова Ў.Н. Тўраев Б.Э. Султонов С.Н. “Физика фанидан муаммоли масалалар ечишда компетенциявий ёндашув” выпуск 6 (50) F.A Mamadaliev, Egyptian triangle (books 1, 2,3) T/ “Renessans press”-.: 2018 й, 144-149.Б
22. Султонова Ў.Н., Раҳимов Н.Р., Турдиев Б.Э., Аманов Б.Ш. “Техника ва технологик фанлар соҳаларининг инновацион масалалари мавзусидаги халқаро илмий-техник анжуман материаллари” 22 сентябрь -: 2020 й, 393-395.Б