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Methods of teaching students in higher technical schools

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ABSTRACT: In this paper proposes a new method of teaching students. Given the procedure for implementing the method on the educational process and explained the essence of the method. The article describes the advantages of the "electronic swimming Method" and the results of experiments among students.

KEYWORDS: Lesson, training, method, electron, solid, electric current, voltage, resistance, represent

I. INTRODUCTION

The main task for each country is to improve the quality of teaching lessons for students in both primary and higher education institutions. The technical and economic development of a country depends primarily on the number of highly erudite and qualified specialists of this state. The pedagogical activity of a specialist in this field is very comprehensively [1-4]. It should masterfully coverage the interests of youngers, regardless of their abilities, accustom to a certain specialty, psychologically analyze the student's mental state and almost always be ready to give correct and positive advice in case of problems and questions [5]. The student can be focused and interested in studying the subject only under normal conditions and conditions with the intriguing methods of the teacher. Now a time, there are many works based on the results of scientific and pedagogical research and recommendations for realizing this goal. However, there are a number of problems whose solution is an important task [3-7].

II. RELATED WORKS AND FORMULATION OF THE PROBLEM

As you know, the quality of knowledge of students of technical universities and institutes, compared with educational institutions graduating teachers, teachers and specialists in the humanities, is significantly different. Usually philological knowledge is relatively easily learned by students [8-9]. Of course, the reason for this is the accessibility of the content of the topics, the lack of bulky and complex mathematical formulas, as well as diagrams, graphic materials.

Today, a lot of work is being done on the use of innovative pedagogical technologies in the training of quality personnel. In particular, in the works of V.A. Slastenin [10-12] basically analyzes the theoretical foundations and methods of practical application of traditional pedagogical technologies, in the works of A.P. Panfilova [13-16], M.V.Klarina [17-20], a broad picture of innovative teaching practices and technologies in world pedagogy is presented: pedagogical taxonomies, specification of educational goals, "inverted class", a model of full mastery, action learning, procedural training, invitations to discoveries, "serious games" , synchronous and asynchronous discussions, synectics, CDIO, etc. And in the works of S.A. Perekalsky [21-22], contemporary problems of preparing a future teacher for innovative activity are analyzed. Representatives of modern pedagogy are actively using elements of computer-based learning games [23-25], the virtual world [26] and artificial intelligence.

No matter how hard the scientist-educators try to present at a high level specific high-performance teaching methods in technical higher educational institutions (HEI) and natural sciences, they have not yet been crowned with success. An obstacle to this is incompetence [27, pp. 48] in the field of those specialties for which the student is studying. Therefore, in our opinion, a person who has many years of experience will be able to recommend one way or another teaching method, which allows to improve the degree of the mastered subject or the subject of the lesson [28, pp. 112]. The most difficult among technical specialties are the issues of teaching electric power disciplines [29]. Because here it is necessary to form in the student's thinking the most correct ideas about those physical processes that occur in the volume of a solid, liquid, gaseous medium, and of course in plasma. Only after this is it possible to speak

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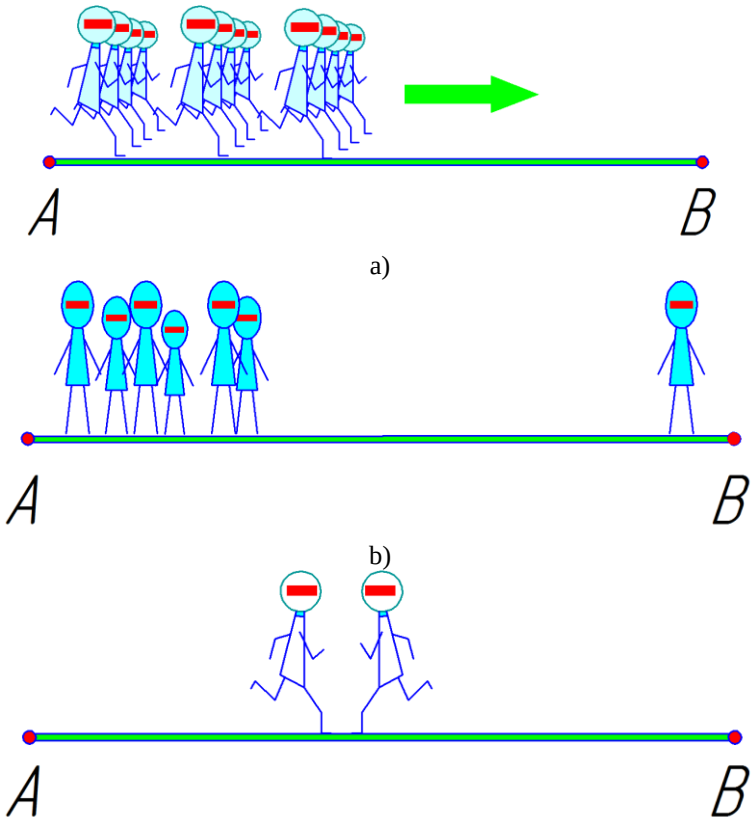
of a satisfactory knowledge of the student. Based on this, the main objective of this research work is to develop a methodology for teaching subjects related to physical processes.

III. METHODS OF TEACHING ELECTRIC POWER DISCIPLINES

Electricity is associated primarily with the movement of electrons located around a positively charged atomic nucleus particle. If there are no effects, the electron will be at its specific energy level, and will not contribute to the formation of an electric current. An electric current is a one-way motion of an electron stream. The latter occurs when an external electric field is applied, the surface of the conductive material is illuminated or a stream of electrons is formed, which is called electromotive force (EMF). EMF is observed in an open circuit. However, this does not mean its absence in closed electrical circuits. When studying the laws of electricity, magnetism and other physical phenomena, it is very important for a student to have understanding skills. And for this, was developed a teaching methodology, which the student in parallel with the electron must mentally be in the volume of the studied object. This method has been called the **"Electronic Swimming Method (ESM)"**.

The essence of the MEP is as follows. The teacher of the subject dividing the group into students of "electrons", "resistances" and even the "potential difference" between the two points a and b of the electric circuit [Fig. 1], explains their tasks, movement, under what circumstances can overcome the rival "resistance", why the movement of "electrons" leaves the state of ordering when the circuit breaks. This formulation of the problem contributes to the mental "swim with the electron". Overcoming the path of electric current, they will understand the law of Ohm, Kirchhoff. And here, based on the student's weight and size characteristics, it is easy to explain the processes of elastic and inelastic collisions of electrons, a change in the direction of electron motion, the reasons for the change, and energy loss. Students - "resistance" should be placed between the rows of "electrons" that are carriers of electric current and explain the need to prevent them from moving the "electron" from one place to another. Moreover, each overcoming of obstacles should be explained by an excess of energy, or by force. That is, the one who has more energies will win. If the conditional "electron" cannot overcome the "resistance", this means that the "electron" has less energy, as a result of which it could not overcome the "resistance", it lost the energy that it possessed. This may explain the process of loss in conductive materials.



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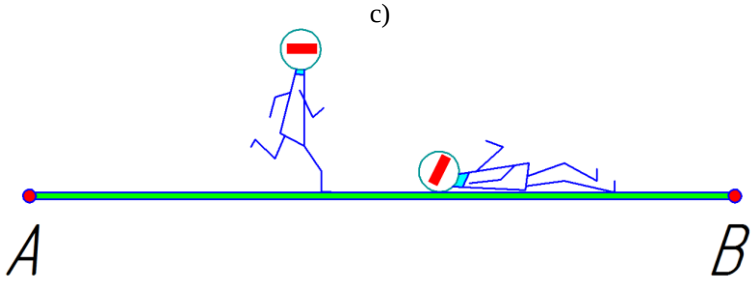
c)



d)

Fig 1. The movement of electrons

a) one-sided ordered movement of electrons - to the understanding of electric current; b) potential difference; c) opposite movement of electrons; e) electron collision

Figure 1 shows an example to explain the process of electric current stream. The same number of students - “electrons” are directed to one side of the conductor and have the same number of people both in a row and along the length of the conductor (Fig. 1a).

This example can explain the concept of electric current density. To do this, you need to count the number of students in a row. Since the row can visually replace the cross section of the conductor. In explaining this lesson, the teacher must masterfully regulate the movement of each student. The student’s unplanned movement can be likened to some process taking place inside a solid body or some medium.

Fig.1b shows an example to explain the potential difference. Moreover, in this case, the teacher must explain the concept of "potential". This can be likened to the strength of each student and to some kind of energy reserve, working hands, etc. For example, at point a, five students are concentrated, and at point b there is only one student. If, for simplicity of understanding, we assume that the strengths of each student are equal to each other, then the difference in forces (and, consequently, the potential difference) is equal to 1: 5. A similar case takes place in a conducting medium. And, here, among other things, you can still explain the formation of EMF. From the point of accumulation of many students (meaning, electrons!), They move to a more free place or space. In this case, the object with the highest energy comes into motion first.

In Fig.1c an example of an explanation between electronic collisions is given. It can be seen that the weakest student (or, electron) does not withstand the opposition of a stronger student. It either collides with the strongest object and falls and loses all its energy, or slows down (having lost some of its energy in a collision with an oppositely moving object, or changes direction if the collision is lateral.

Thus, in this case, the student has the opportunity to imagine the physical phenomena occurring inside a solid body or some kind of environment.

IV. EXPERIMENT

An experimental study of the influence of this developed method for students of electric power specialties on the quality of education was conducted among first-year students of the Faculty of Energy of the Fergana Polytechnic Institute in the discipline "Physics". The main topic of the lesson was “Electricity. Ohm's law for closed and open circuits".

According to the methodology of the lesson, students were divided into large and small groups. Their purpose was explained (i.e., that they are electrons!) And placed at pre-designated audience locations. The experiment was carried out according to the above scheme.

According to the results of the study, you can easily notice, firstly, the elated mood of students, secondly, their 100% interest and, thirdly, the appearance of the desire of each of them to participate in this experiment. At the end of the lesson, was obtained a positive result on the learning of the subject by about 55% more compared to the lesson in which it is conducted in the traditional way. In addition, the emergence of initiatives among the participants in the experiment was observed. They began to make proposals on the concepts of electrical circuit, load and electrical power. The concept of “directed electron motion” was instilled empirically with the built-in sequentially walking electron students between the rows of student desks. Moreover, the rows between the desks were used as separate lines of the electric network.

The second experiment was also carried out to explain the physical phenomenon - the attraction of particles from opposite signs. Instead of positively charged charges, female students were involved in the experiment. The

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difference in her and his knowledge was taken as the force of attraction. Since practically all pairs did not have the same level of knowledge, the highest knowledge of one person of one of the pairs was taken as the main force of attraction. And, given the fact that everyone wants to get deep knowledge, the connection between the attraction of one person to another and the intriguing knowledge of another person was explained. Here, the human factors of the individuals involved were adopted as proactive proposals. Students have tenderness, attractiveness, good dressing style, a pleasant voice, and guys have strength, courage, rationality and tolerance. These qualities explained the physical nature of the electron, the positive charge-holes, their energy, attraction, collapse, etc.

The result showed the possibility of the appearance of skills among students for various examples. They could even find explanations for those studied physical processes that can be explained by human properties and have a clear idea of electrical parameters, phenomena and processes.

V. CONCLUSION

In conclusion, we can conclude that the use of pedagogical technologies with new methods leads to improved learning. The recommended method has a gaming character. It attracts students, or even high school students of any level of knowledge. In addition, it facilitates the development of special disciplines in the energy field. This article discusses just two experiments. It is possible to offer even more productive teaching methods that make it possible to understand and easily master topics containing mathematical formulas, graphs, and circuit diagrams. A concrete conclusion can be made: that understanding technical disciplines is tantamount to learning a foreign language. Until the essence of the studied subject is presented as a student in the brain system and the symbols of electrical and physical parameters are learned, it is simply impossible to “speak the language of technology”. Therefore, first of all, it is necessary to strive to create an imaginary space in the brain. Further, by gradually thinking, the movement of the components of the body under study or the development of actions, it is possible to firmly lay knowledge on the teacher.

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