The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: January 31, 2021 | **Pages:** 104-117
Doi: https://doi.org/10.37547/tajas/Volume03Issue01-16

IMPACT FACTOR
2021: 5. 634

OCLC - 1121105553

The Methodology Of Teaching Physics Electromagnetism Lectures

Fayzieva Zarifa Hikmatovna
Master's Degree From Bukhara State University, Uzbekistan

Copyright: Original content from this work may be used under the terms of the creative commons attributes 4.0 licence.

ABSTRACT

In this article, we are talking about private teaching methods characteristic of teaching electrical engineering disciplines, electromagnetism and their application, in subordination to the goal of developmental education. Here are presented particular questions of the methodology for teaching sections of the course of general electrical engineering, features of the practical implementation of the technology of organizing and conducting laboratory-practical classes in electrical disciplines are considered.

The importance of the systematic and purposeful activity of the teacher in conducting educational and methodological work, stimulating and motivating students to master subject knowledge is shown, attention is paid to the problem of forming the professional thinking of students in the learning process. independent work in the process of studying electrical engineering disciplines.

The article is intended for teachers working in the field of physics, as well as for students of the specialty "physics".

KEYWORDS

Electromagnetism, magnetic interaction, electric charge, Coulomb's law, Ampere force, induction.

INTRODUCTION

Everyone knows that studying the course of electromagnetism in schools for children, in a higher school for students is associated with certain difficulties, since the sections of

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: January 31, 2021 | **Pages:** 104-117
Doi: https://doi.org/10.37547/tajas/Volume03Issue01-16

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

mechanics and molecular physics can be more or less clearly presented before our eyes. It is a little more difficult to master the questions and experiments of magnetic phenomena in secondary school at once, the study of these phenomena is associated with certain difficulties of a logical nature.

In principle, the magnetic interaction is explained on the basis of experience, where the mutual attraction and repulsion of parallel conductors with current is considered.

Before studying the study of the magnetic interaction of moving electric charges, students were faced only with the course of electrostatics, where they studied the interaction force of only stationary charges. Here we immediately encounter moving charges, where we are dealing with a magnetic field.

To check specifically the applicability of Coulomb's law to propelling charges, an experimental test of experience is required. For example, in an experiment with two parallel electron beams, it is difficult to separate the effects of electric and magnetic interactions of electric charges.

In fact, the force of interaction of driving charges differs from the force of interaction of point charges, which is described by Coulomb's law.

The main property of the magnetic field is it always acts on the driving electric charges. This property is first of all to be learned by students: electrostatics studies the properties and characteristics of stationary charges, electrodynamics - the properties and characteristics of moving charges.

The Lorentz force acts on a charged body in a magnetic field, and the Ampere force acts on a conductor with a current in a magnetic field. The directions of these forces are determined by the rules of the gimbal. In a word, the electric field and the magnetic field cannot be considered separately, this is an electromagnetic field. People encounter the electromagnetic field and its characteristics every day, in life, at home, at work, etc.

The course of electromagnetism is naturally one of the main branches of physics, specifically with the phenomena of electromagnetic induction, with electric current, with a transformer, with electrical measuring instruments and other phenomena, people in life, in everyday life, meet every day in everyday life. The history of the emergence of the phenomenon of electromagnetic induction has been known to many for a long time.

In 1831, the English scientist M. Faraday, director of the laboratory of the Royal Institute, in the article "On the induction of electric currents" described an experiment that became the discovery of the phenomenon of electromagnetic induction: "A copper wire 203 feet long was wound on a wide wooden coil, and between its turns was wound a wire of the same length, insulated from the first cotton thread. One of these coils was connected to a galvanometer and the other to a strong battery. When the circuit was closed, a sudden but extremely weak action was observed on the galvanometer, and the same action was noticed when the current was cut off. " Then Faraday received an electric current using only a magnet, pushing it into the spiral, and with a sharp removal of the magnet, the arrow deflected in the opposite direction. With

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: January 31, 2021 | **Pages:** 104-117
Doi: https://doi.org/10.37547/tajas/Volume03Issue01-16

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

electromagnetic induction, a so-called induction current occurs.

In 1833, the Russian scientist E.Kh. Lenz formulated a rule for determining the direction of the induction current: "If a metal conductor moves near the magnet, then a current is excited in it in such a direction that if this conductor were stationary, then the current could cause its movement in the opposite direction."

In the small town of Albany in the United States of America, Joseph Henry taught physics and mathematics at the Academy. In his spare time, he was fond of making electromagnets and achieved success: one of the magnets could hold a platform weighing a ton. Like Faraday, Henry pondered the problem of obtaining an electric current using a magnet.

Henry set up an experiment that is included in all physics textbooks. He made two coils, large and small, so that one could slide freely into the other. Then I connected a small coil to an electric battery, and a large one to a galvanometer, and, pushing the first into the second, noticed the deflection of the arrow.

Henry was able to publish his results only in 1832, that is, after Faraday.

After getting acquainted with the magnetic field, its strength characteristics, units of measurement, solving problems for the Lorentz force, the Ampere force, they begin to study other large sections of electromagnetism. These are such sections as "Electromagnetic induction", "Electromagnetic vibrations", "Electromagnetic waves", "Electromagnetic field", etc., the study of which requires good theoretical training and scientific experiment.

In a word, the electromagnetic field represents a special kind of matter, this became obvious after many experimenters made their famous experiments (Faraday's experiment, Ampere's experiment, Oersted's experiment, etc.).

One of the main achievements of natural sciences in the 19th century is significant progress in the understanding of electrical, magnetic and optical phenomena. At the beginning of the century they were considered separately, at the end of the century they began to be considered in a single complex. The transformation of electricity into magnetism, and then magnetism into electricity, meant in fact the unification of electricity and magnetism; a unified theory of electrical and magnetic phenomena was created - the theory of the electromagnetic field, which was to change the mechanical picture. The process of integrating physical knowledge was not limited to the unification of electricity and magnetism within the framework of the theory of the electromagnetic field, the electromagnetic nature of light was established, which actually meant that the theory of optical phenomena was the basis of the nature of electromagnetism.

Research in the field of electromagnetism led to a number of serious technical inventions. These were the following inventions: the electric telegraph, the B.S. Jacobi, various electric generators, self-excited generators, electric lights, incandescent lamps, the invention of Radio, generators and DC motors, etc. When studying the course of electromagnetism, carrying out some experiments in physics is very difficult, therefore it is advisable to carry out these experiments on computer models.

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: January 31, 2021 | **Pages:** 104-117
Doi: https://doi.org/10.37547/tajas/Volume03Issue01-16

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

Here, of course, one cannot think that all experiments, laboratories need to be translated into computer models, these are experiments that are practically very difficult to carry out. For example, in atomic physics, nuclear physics, there are experiments, the demonstration of which is associated with the radiation of the body, they harm the human body, it is precisely such experiments that undoubtedly need to be carried out on a computer basis. These are experiments related to radioactivity associated with the radiation of the body, finding many parameters of radioactive radiation, also others in experiments in nuclear physics, in atomic physics, physics of elementary particles, etc.

However, it should be remembered that all experiments, demonstrations should not be automatically copied to a computer base.

However, the main distinctive feature, the core of the course of electromagnetism, are numerous experiments, interactive physical models - unique and original developments, computer animations. The proposed models for the study of the laws of physics on a computer basis make it possible to change the conditions of physical experiments within a wide range (values of mass, speed, acceleration, spring stiffness, temperature; parameters that specify the nature of the ongoing processes, the value of current strength, voltage, power, particle charge, etc.).

Such interactivity opens up enormous cognitive opportunities for students, making them not only observers, but also active participants in the experiments being conducted.

It should be noted that real conditions of physical experiments are recreated in computer models; this greatly contributes to the development of a sense of the real scale of physical phenomena and processes in students.

The study of the laws of physics on a computer basis is focused mainly on the individual independent work of the student. But it can also be widely used in the classroom at school, for example, carrying out a specific experiment in nuclear physics, atomic physics, electromagnetism and other branches of physics. models, tasks, tests.

Working with "live" models of physical phenomena, followed by discussion and theoretical assessments, arouses increased interest among students and creates an atmosphere of collective creativity in the classroom.

At the senior level in the classes of the humanitarian profile, computer courses can be used simply as a demonstration laboratory to illustrate the qualitative aspect of physical processes and phenomena.

In the classes of the main profile, computer courses can be used to repeat the material covered, to control the knowledge of students, to illustrate the quantitative aspect of the studied physical phenomena (at the teacher's choice), etc.

Carrying out various experiments in physics on a computer basis is naturally necessary at the current level of development of computer literacy among students, although they cannot completely replace a specific real experiment in physics in laboratory conditions.

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: January 31, 2021 | **Pages:** 104-117
Doi: https://doi.org/10.37547/tajas/Volume03Issue01-16

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

The study of the laws of physics on a computer basis almost completely covers the curriculum for classes with an advanced study of physics. The course includes a number of topics that are not studied in the classes of the main profile and are not sufficiently detailed in standard textbooks. In addition, there are many advanced problems and tests in the course aimed at students with a deep interest in physics.

To increase the interest of schoolchildren, it is advisable to publish various necessary methodological materials on a given topic, conduct consultations on various topics of physics, exchange experience in conducting experiments, experience in using educational computer programs at school.

Currently, many schools in various subjects have special educational computer services for this. Experienced qualified teachers and scientists should conduct individual electronic consultations.

On the computer program "Open Physics" there are developed special courses on information security in networks, on the main demonstrations of the physics course, the basics of computer science and the Internet for certain categories of specialists, and others.

The study of the laws of physics on a computer basis assumes to combine in it everything that a student, applicant, teacher needs to study physics both in the classroom at school and during independent studies at home. The study of physics by traditional methods of course cannot be denied in any way, carrying out various experiments in many areas of physics is necessary in schools, since at the same time students are interested in this subject, a specific topic in different areas of physics.

It should be noted here that it is necessary to take a comprehensive approach to the problem of studying the subject, firstly, traditional methods need to be improved, and secondly, students need to be interested in studying the laws of physics on a computer basis, to consider various experiments under the Open Physics program, which is available for each student on the Internet.

The integration of the course on the Internet also makes it possible to organize various creative projects for both teachers and schoolchildren. The study of the laws of physics on a computer basis may well become the basis for interschool projects, for preparing schoolchildren for many scientific projects and conferences aimed at involving high school students in active research activities, modeling physical phenomena.

The problems of improving university and secondary specialized education, improving the quality of professional training of specialists are among the important tasks in the development of society.

The objective process of modern economic and social development of the country puts forward new criteria for the quality of education: modern approaches to assessing the organization of labor and the use of energy resources require from young specialists the prospects and breadth of their professional education.

The Electrical engineering as an independent academic subject at universities appeared only at the end of the 19th century. The laying of the foundations of electrical engineering and the

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: January 31, 2021 | **Pages:** 104-117
Doi: https://doi.org/10.37547/tajas/Volume03Issue01-16

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

formation of its scientific foundations, in the late 18th and early 19th centuries, were the beginning of the study of electrical phenomena for educational purposes.

Before the final formation of electrical engineering, the questions of the practical application of electrical and magnetic phenomena were studied in the academic discipline - physics.

In physics textbooks, sufficient electrical and magnetic phenomena were presented. In particular, Dvigubsky outlined the concepts of the actions of electric current, described the experiments of V.V. Petrova; PIStrakhov, as a researcher dealing with the electrical conductivity of water and soil (earth), in his textbook gave interesting material on the section of electricity.

Physics rooms created at higher educational institutions were of great importance in teaching electricity and magnetism.

The scientific and pedagogical activity of V.V. Petrov has the greatest influence in the formation of electrical engineering knowledge. The creation of an excellent physics study provided his lectures with a variety of experiments on electricity and magnetism.

The pioneering nature of his research, especially for the formation and expansion of the practical application of electricity, attracted the interests of many. V.V. Petrov's students - E.I. Gruzinov, S.V. Bolshoi, I.H. Hamel made a great contribution to the future electrical engineering as a science and as an academic discipline. THEM. Hamel, while still a second year student, developed a simple and reliable electrostatic machine, and later became an academician of the St. Petersburg Academy.

Of great interest is also the work of Vlasov in the field of electricity, one and three students and followers of Professor Petrov.

Starting from 20-30s. 19th century scientists from different countries began to work intensively on the problems of the practical application of electrical and magnetic phenomena, i.e. over the development of electrical engineering issues. Naturally, this trend is reflected in the teaching of the fundamentals of science.

When carrying out educational work, it is very important to have a generally accepted method of electrical measurements. The creation of units of electrical quantities, the development of electrical measuring instruments, the adoption of a unified terminology and symbols - these issues were not yet fully resolved until the middle of the 19th century. For example, each scientist used his own terminology, there was still no clear understanding between the quantities describing electrical laws. Without solving these issues, it was still impossible to create effective manuals for educational and methodological work and teach the subject at an appropriate level. Therefore, in the middle of the 19th century. well-known physicists dealt with these problems. The most effective and fruitful work in the electrical part of this direction was academicians E.Kh. Lenz, B.S. Jacobi.

As you know, these scientists, who have many inventions in electrical engineering and fruitfully engaged in pedagogical activities, made a significant contribution to the

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: January 31, 2021 | **Pages:** 104-117
Doi: https://doi.org/10.37547/tajas/Volume03Issue01-16

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

formation of electrical engineering as an academic discipline.

After the first qualitative and quantitative research in the 20s of the 19th century, the physical foundations of the theory of electric currents began to form, which served as the foundation for the creation of textbooks. A. Amper, G. Ohm, G. Kirchhoff made a great contribution in this direction.

The famous American electrical engineer Ch.P. Steilitz published a fundamental course entitled "Theoretical Foundations of Electrical Engineering", which considered a comprehensive method for calculating AC circuits. The English physicist Oliver Heaviside proposed an operational calculus for solving problems based on the Laplace transform.

With the expansion of the theoretical foundations of electrical engineering, the appearance of books and manuals for the study of electrical, magnetic phenomena as applied to practice, the training of scientific and engineering personnel of electrical engineers began more purposefully.

So gradually by the beginning of the 20th century. the main trends have developed that have determined important achievements in the domestic methodology of teaching electrical engineering disciplines. These achievements include:

inclusion of electrical engineering as a mandatory section of the physics course in the programs of gymnasiums and real schools;

introduction of independent observation and laboratory work into teaching as an important means of combating formalism in knowledge and practical training of students in the learning process; the creation of textbooks that meet the requirements of science, industry and the pedagogical conditions of the work of gymnasiums and real schools.

Learning outcomes depend both on the correct definition of the goals and content of education, and on the ways to achieve goals, in other words, methods.

The educational process is a two-way process, combining the teaching activity of the teacher and the educational activity of the student. Therefore, the teaching method is a system of purposeful actions of the teacher, organizing the cognitive and practical activities of the student, ensuring the assimilation of the content of education and thus the achievement of learning goals.

The history of didactics and private methods has shown that teaching methods depend on the goals of teaching and the content of education.

The teaching method is a social category, since it depends on the social order of society to an educational institution. As you know, the educational goals of the younger generation changed and supplemented in accordance with the prevailing social goals and the outlook of society. So, in the early stages of the school's formation (in the era of feudalism), the only task facing the students was the assimilation of predominantly scholastic knowledge. Obviously, the methods used by the teacher were mainly limited to storytelling; the students needed to perceive the information and reproduce it. Later (during the development of the bourgeois system) there was a demand to teach the application of knowledge in practice. Under these conditions,

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: January 31, 2021 | **Pages:** 104-117
Doi: https://doi.org/10.37547/tajas/Volume03Issue01-16

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

the teacher had to organize not only the assimilation and reproduction of knowledge, but also their practical application. At the present stage, the goals of education have radically changed. Along with the formation of knowledge, skills and abilities of students, i.e. By solving educational problems, an educational institution faces a set of tasks related to the development and upbringing of the younger generation. The tasks of developing students' thinking, their cognitive activity and independence, the formation of a modern world outlook are priorities today. Accordingly, the system of methods used in the learning process has changed, among which a special place belongs to the methods that organize the cognitive activity of students at various levels. So, the lecture, as a traditional method of teaching for a university, began to be built in a problematic way, an interest in non-traditional, creative tasks appeared, elements of an independent, research experiment, etc., began to be introduced into laboratory work.

Further, the applied system of teaching methods depends on the content of education. Any change in the content of education - the nomenclature of educational knowledge, their structure - also affects the selection of teaching methods. Thus, the principle of generalization has significantly influenced the methodology of teaching electrical engineering in general, and teaching methods in particular: the role of the deductive method of presenting new material has increased; the share of teaching methods that initiate independent work of students and increase their cognitive activity has increased; teaching methods such as heuristic, research, etc. have become more significant.

By observing the learning process, you can see a huge variety of activities of the teacher and students. The teacher explains new material - this is a method of explanation or a method of storytelling; students solve problems - this is a method for solving problems; doing laboratory work - a laboratory teaching method; the lecturer uses a demonstration experiment in the process of explanation - a demonstration method, etc. Moreover, one and the same teacher can explain the same material in different groups using different methods: in one - the method of storytelling, in the other - the method of conversation, and in the third - the method of research frontal work, etc. At the same time, the same teaching method can be organized in completely different ways depending on the expected level of students' cognitive activity and their independence. For example, laboratory work can be carried out according to the instructions, which indicate all the stages of work, and students will only reproduce the actions named by the teacher, or you can organize an independent study. This will be a research method or a method of independent work.

In pedagogy, in addition to the concept of a method, there is a concept of a methodological technique. A methodical technique is a detail of a method, a particular concept in relation to a method.

It should be noted that the separation of the concepts of method and methodological reception is relative. One and the same type of activity in some cases can act as a teaching method, in others - as a technique. If the teacher explains the principle of operation of the device (for example, an ammeter) and this is the didactic task of the lesson, then he uses the demonstration method, and the teacher's

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: January 31, 2021 | **Pages:** 104-117
Doi: https://doi.org/10.37547/tajas/Volume03Issue01-16

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

story accompanying the demonstration is only a methodological technique. If the demonstration accompanies the teacher's explanation, then it can be considered as a technique, while the teacher's explanation will be the method. The method of controlling the knowledge and skills of students may include such techniques as problem solving, polling (individual or frontal), conversation, etc. To orientate in the variety of methods and methodological techniques, their systematization is necessary.

In didactics and private methods, there are various classifications of teaching methods, depending on what essential feature is the basis of the classification. The most accepted, at present, in didactics is the classification of methods according to the nature of cognitive activity, which is organized by the teacher and students are carried out in the educational process, proposed by I.Ya. Lerner. At the same time, there are five teaching methods:

1) Explanatory and illustrative;

2) Reproductive;

3) Problem statement;

4) Heuristic;

5) Research.

The approach to the division of methods can be justified in another way. The methods are determined depending on the methods of assimilation of the types of educational content. To assimilate knowledge, it is necessary to organize a conscious perception of information; to assimilate methods of activity, an organized reproduction of actions is needed, etc.

The listed methods, which are usually called general didactic teaching methods, can be divided into two groups:

I) reproductive (1st and 2nd methods), in which the student assimilates knowledge and reproduces already known methods of activity; 2) productive (4th and 5th), when a student obtains subjectively new knowledge as a result of independent or partially with the help of a teacher of creative activity. Problematic presentation (3rd method) is intermediate, since it equally presupposes both the assimilation of ready-made information and the elements of creative activity.

It should be borne in mind that the distinction of methods does not mean that in the real learning process these methods are separated from each other; on the contrary, teaching methods are implemented in combination with each other. Even the division of methods into productive and reproductive is very relative. In fact, any act of creative activity is impossible without reproductive activity. Solving any problem, the student mentally reproduces the knowledge already known to him. At the same time, the act of reproduction can also contain elements of creativity, if the teacher offers the student to change the purpose or logic of presentation.

CONCLUSION

For many years, didactics and private methodologies have used the classification of teaching methods according to the source of knowledge. The student can receive information from various sources - from the teacher's story, from a book, during direct observation or practical activity. Based on this approach, the entire set of teaching methods

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: January 31, 2021 | **Pages:** 104-117
Doi: https://doi.org/10.37547/tajas/Volume03Issue01-16

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

can be divided into three groups: verbal, visual, and practical.

Verbal methods are called methods in which the main source of knowledge is the word. A story, an explanation, a conversation, a lecture are verbal methods with the help of which the teacher conveys educational information. Verbal methods include the work of students with a book (textbook, educational and popular science literature, reference book, etc.).

The group of visual teaching methods includes methods in which the main source of student knowledge is observation. Pupils, observing, comprehend the results of observations, experimental facts, analyze them, draw conclusions and receive new knowledge as a result. The group of visual methods includes, first of all, a demonstration experiment and an illustrative method (use of pictures, drawings, tables, mechanical models, transparencies, films, television, video films, etc.).

Practical teaching methods are problem solving (a method that plays a special role in teaching electrical engineering) and experimental work of students (laboratory and frontal experiments, electrical engineering workshop, home experiments). In the process of using these methods, students develop skills in applying knowledge in the process of solving problems and experimental skills, such as the ability to make measurements, determine the division price and instrument readings, read and assemble electrical circuits, etc. The results of such work become the main source of knowledge and skills of students.

Proceeding from a holistic approach to educational and pedagogical activity (i.e. any activity as integral components includes organization, stimulation and control), Yu.K. Babansky suggests considering three groups of teaching methods:

1) Methods of organizing educational and cognitive activities;

2) Methods of stimulating learning activities;

3) Methods of monitoring activities.

The first group of methods includes both verbal methods (story, conversation, lecture, etc.), and visual (demonstration method, illustrative, etc.) and practical (laboratory work, problem solving, etc.). The group of stimulation methods, in addition to verbal, visual and practical teaching methods, also includes methods specific to this group, such as: a method of cognitive play, a method of discussion, a method of encouragement, etc. The group of control methods includes a variety of methods of oral and written control - individual and frontal survey, tests, work with didactic material, abstracts and much more.

If we take the methodology of science as the basis for the classification of teaching methods, then all teaching methods can be divided into empirical and theoretical. Empirical teaching methods are characterized by such techniques as observation, experiment, hypothesis, abstraction from insignificant aspects of a phenomenon or process, analysis and comparison of the data obtained, induction, generalization and systematization of experimental facts. Theoretical teaching methods are characterized by idealization, modeling, conducting a thought experiment, theoretical analysis, hypothesis, analogy, deduction, etc. In other words, for such a classification, logical

The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: January 31, 2021 | **Pages:** 104-117
Doi: https://doi.org/10.37547/tajas/Volume03Issue01-16

IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

techniques become integral elements of teaching methods.

The considered classifications of teaching methods are presented in Table 1.

Basis for classification	Method groups
The nature of cognitive activity	explanatory-illustrative reproductive problem statement heuristic
Source of knowledge	Verbal Visual Practical
A holistic approach to educational and pedagogical activities	organization of educational and cognitive activity stimulation of educational and cognitive activity control of educational and cognitive activity
Science methodology	the oretical empirical

There are other classifications of teaching methods in the pedagogical and methodological literature. The stages of the educational process, levels of assimilation of material and cognitive activity of students, logical ways of transferring knowledge, etc. can be taken as the basis for classifications. Many classifications are a combination of already known systems of methods. All this speaks of the versatility of each method, the variety of methodological techniques used in it. However, it is the general didactic system of methods that is the model of the norms of activity in learning. At the private didactic and methodological levels, there can be many methods, and the number of methodological techniques is practically unlimited.

At the level of individual academic subjects, systems of techniques can be constructed that provide instruction in the subject. For example, the set of techniques of V.F. Shatalov can be considered as a subsystem (as part of a methodological system), i.e. a stable combination of techniques for teaching physics (mathematics and a number of other school subjects). All these combinations of techniques always fit into the general didactic system of methods and can be assessed from the point of view of didactic completeness and compliance with the main goals of teaching.

REFERENCES

1. Abekova Zh.A., Oralbaev AB, Tazhibaeva A., Abdubaeva F. METHODS OF STUDYING THE COURSE OF ELECTROMAGNETISM ON A COMPUTER BASED IN THE HIGHER SCHOOL PROGRAM // International Journal of Experimental Education. - 2016. - No. 3-2. - S. 149-152;

2. URL: http://expeducation.ru/ru/article/view?id=9688 (date of access: 27.01.2021).
3. Arkhangelsky S.I. Introduction to the theory of higher education. - M .: Higher. shk., 1974.
4. Babansky Yu.K. Optimization of the educational process (methodological foundations). - M .: Education, 1982.- 192 p.
5. Batyshev S.Ya. Production requirements for the development of educational and production documentation // Pedagogy. -1999. - No. 3.-C. 15-19.
6. Bespalko V.P. Textbook theory: Didactic aspect. - M .: Pedagogika, 1998 .-- 160 p.
7. Bobyko N.N., Shepetov A.S. From the experience of organizing an electrical engineering office // Polytechnic education. -1988. - No. 2.- S. 71-76.
8. Bytev A.A. Technique of teaching technical disciplines. - Minsk: Higher. shk., 1975. - 271 p.
9. Veselovsky ON, Shneiberg Ya.A. Energy technology and its development: Textbook. allowance. - M .: Higher. shk., 1976 .-- 304 p.
10. Vinogradov M.I. Physiology of labor processes. - M., 1966.
11. Ilyina T.A. Pedagogy: Course of lectures. - M .: Education, 1984. -495 s.
12. Kaloshina I.P. Problems of the formation of technical thinking.- M .: Publishing house of Moscow State University, 1974.-184 p.
13. Kaplyansky A.E. Methods of teaching the theoretical foundations of electrical engineering. - M .: Higher. shk., 1975.-143 p.
14. Kirchhoff G.R. Selected Works / Otv. ed. L.S. Polak. - M .: Nauka, 1988 .-- 428p.
15. Kudryavtsev T.V. Psychology of technical thinking (The process and methods of solving technical problems). - M: Pedagogy, 1975 .-- 304 p.
16. Kudryavtsev T.V., Yakimanskaya N.S. Development of students' technical thinking - M .: Higher. shk., 1964.
17. Lenz E.H. Selected Works. - M .: Publishing house of the USSR Academy of Sciences, 1950.
18. Lerner I. Ya. Didactic system of teaching methods. - M .: Knowledge,
1. 1976.- 64s.
19. Lutsenko A.I. Methodical development of electrical engineering lessons. - Minsk: Higher. shk., 1977 .-- 80 p.
20. Makhmutov M.I. Organization of problem learning at school. - M .: Pedagogika, 1977 .-- 80 p.
21. Makhmutov M.I. Problematic learning. - M., 1975.
22. Melnichuk A.S. Methods for teaching electrical equipment and automation of agricultural units and installations. - M .: Higher. shk., 1977 .-- 255 p.
23. Guidelines for laboratory work in electrical engineering and electronics / Ed. A.V. Netushila. - M: Publishing house of MITHT, 1983.
24. Moroz L.I. On the content and structure of teaching methods of general technical disciplines // Wed-special education. -1967. -No. 8.-C. 15-20.
25. Moskalev L.A. Demonstration and laboratory work in electrical engineering. - M .: Proftekhizdat, 1961 .- - 71 p.

26. Nine A.Ya. Formation and development of technical thinking. - M .: Higher. shk., 1983 .-- 72 p.

27. Netushil A.The. On a systematic approach to teaching electrical engineering disciplines // Electricity. - 1986. - No. 5. - P.43-47.

28. . Umarov S.X., Guseinov.G.D., Matiev A.K., Malsagov A.M., Abdullaev.E.G. Effect of Pressure on Electrical Conductivity of TlInSe2 Single Crystals. Phys.Stat.Sol.1985. (a). v.90. P. 703-707.

29. Umarov S.X., Guseinov G.D., I.Nuritdinov, Rustamov V.D. Studies of EMF in TlInSe2 Crystals with the Simultaneous Action of Solan Radiation and Sound Waves. Applid Solav Energy. 2000. v. 36. № 1. P. 82-86.

30. Umarov S.X., Nuritdinov I. Rustamov V.D.Effect of admixtures of groups II and V on the photolectric properties of TlInSe2 single crystals. Journal of Advanced Materials 2004, 10(1), P. 51-54.

31. S.X.Umarov, N. Z. Gasanov, F. K. Hallokov Spectrum and refraction absorption of TlIn1-xFexS2 solid solutions. ЕВРАЗИЙСКИЙ СОЮЗ УЧЕНЫХ (ЕСУ). № 4 (49). 2018. Ч 3. С. 27 - 32 . Global impact factor (0.388).

32. Умаров С.Х., Гасанов Н. З., Нуритдинов И., Халлоков Ф. К.Особенности дифференциальных спектров отражения монокристаллов TlInS2. ЕВРАЗИЙСКИЙ СОЮЗ УЧЕНЫХ (ЕСУ). № 4 (49). 2018.Ч 3. С. 60 – 63. Global impact factor (0.388).

33. S.X.Umarov, F. K. Hallokov. Piezophotoresistive qualities of p-TlInSe2 monocrystals. ЕВРАЗИЙСКИЙ СОЮЗ УЧЕНЫХ (ЕСУ). № 6 (51). 2018. Ч 1. С. 38 - 42 . Global impact factor (0.388).

34. S.X.Umarov, I. Nuritdinov, Zh. Zh. Ashurov. F. K. Khallokov Resistivity and Tensoresistive Characteristics of TlInSe2 - CuInSe2 Solid Solutions. Technical Physics, 2019,Vol.64, №2, pp. 183 – 186.

35. Атоева М.Ф. Периодичность обучения физике. Аспирант и соискатель.
a. Москва, 2010. – №6. – С. 41-43.

36. M.F. Atoyeva. Interdisciplinary relations in physics course at specialized secondary education. The Way of Science. – Volgograd, 2016. – №9 (31). – P.22-24.

37. M.F. Atoyeva. The significance of periodicity at teaching physics. The Way of Science. – Volgograd, 2016. – № 10 (32). – P.62-64.

38. Атоева М.Ф. Эффективность обучения электродинамике на основе технологии периодичности. The Way of Science. – Volgograd, 2016. – № 10 (32). – P.65-66.

39. M.F. Atoyeva. Use of Periodicity in Teaching Physics. Eastern European Scientific Journal. – Düsseldorf-Germany, 2017. № 4. –P. 35-39.

40. M.F. Atoyeva. Didactic foundations of inter-media relations in the training of university students. International Scientific Journal. Theoretical & Applied Science. p-ISSN: 2308-4944 (print) e-ISSN: 2409-0085 (online). Year: 2020 Issue: 06 Volume: 86, P. 124.

41. M.F. Atoyeva, R. Safarova. Pedagogical integration as a means of forming professionally important qualities

among students of a medical university. Academicia. ISSN: 2249-7137 Vol. 10, Issue 8, August 2020. Impact Factor: SJIF 2020 = 7.13 ACADEMICIA: An International Multidisciplinary Research Journal https://saarj.comэ.

42. M.F. Atoyeva. Pedagogical Tests As An Element Of Types Of Pedagogical Technologies. The American Journal of Applied Sciences, 2(09), (TAJAS) SJIF-5.276 DOI-10.37547/tajas Volume 2 Issue 9, 19.09.2020. ISSN 2689-09. 92 The USA Journals, USA www.usajournalshub.com/index.php/tajas 164-169. Имп.5.2.

43. Farkhodovna, A. M. (2020). The problems of preparing students for the use of school physical experiment in the context of specialized education at secondary schools. European Journal of Research and Reflection in Educational Sciences, 8 (9), 164-167.

44. Saidov S.O., Fayzieva Kh. A., Yuldosheva N. B. Atoyeva M.F. The Elements Of Organization Of The Educational Process On The Basis Of New Pedagogical Technologies. The American Journal of Applied Sciences, 2(09), (TAJAS) SJIF-5.276 DOI-10.37547/tajas Volume 2 Issue 9, 19.09.2020. ISSN 2689-09.92 The USA Journals, USA www.usajournalshub.com/index.php/tajas 164- 169. Имп.5.2.

45. Atoeva Mehriniso Farhodovna, Arabov Jasur Olimboevich, Kobilov Bakhtiyor Badriddinovich. (2020). Innovative Pedogogical Technologies For Training The Course Of Physics. The American Journal of Interdisciplinary Innovations and Research, 2(12), 82-91.