



APPLICATION OF THE INTERACTIVE "STEP-BY-STEP" METHOD IN TEACHING THE SUBJECT OF NUCLEAR TECHNOLOGIES

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Abstract

The article provides comprehensive information on the use and benefits of nuclear technologies in the national economy, modern medicine and industry. Today, as a result of the rapid development of science and technology, attention and demands on education and educators are increasing day by day. Based on these requirements, the use of interactive methods in the educational process in order to achieve the effectiveness of quality education is a guarantee of achieving the expected results, and the article presents the advantages of this interactive method "Step by step".

Keywords: Nuclear technologies, interactive, Step by step, pedagogical, reactors, atom, information, student, trend, well-being, future, quality, neutron, integration, energy.

Introduction

It is not for nothing that attention to science has reached a peak during the current technological development. As we know, modern life cannot be imagined without the development of science and education. In the leading countries of the world, the development of education is defined as the first task. Therefore, the reforms being implemented to fundamentally change the education system of our country, to integrate it with international standards, to train highly qualified specialists in line with the demands of the labour market, are noteworthy, and the future development of the country is inextricably linked with its achievements in this field [1].

According to the views established in the East about the human mind, there are two types of mind, that is, natural and professional. Natural intelligence is an innate gift to man. Professional intelligence is acquired through study, learning and experience.



The honourable and arduous task of forming a professional mind is entrusted to the pedagogues. In every social system, there are concepts such as education, spirituality and enlightenment, which ensure the spiritual growth of a person, and they require the study of changes in the field of pedagogy in connection with the development of society. Forming the educational process in the educational system has been carried out by teachers-pedagogues both before and now. The use of innovative pedagogical technologies and modern technical means of teaching in educational institutions has a significant impact on the quality of personnel.

- Acquaintance with the news;
- Arousing interest in the news;
- Deciding on the introduction of innovation;
- Evaluation and approval (testing) of the novelty;
- Gaining knowledge about new technology;
- Search for additional information about the news;
- Deciding to apply or deny the innovation;
- The active, purposeful application of innovation to education;

Pedagogical technology is a set of pedagogical-psychological methods and techniques aimed at solving the problems of student education, upbringing, and personality development and implemented based on a certain sequence. It is news in the technical support of the educational process, and student thinking, in society.

It is an innovative project that develops and renews depending on socio-economic relations, state policy in the field of education, the information space of society ("Internet"), the possibilities of using it, the spiritual world of educators and learners, and the level of material support [2].

Literature Review

Among the foreign and domestic scientists who contributed to the development of modern pedagogy and science and technology, we mention the following eminent persons: A.I.Sherbakova, N.V.Kuzmina, A.K.Markova, F.N.Gonobolin, Yu.K.Babansky, M.Makhmutov, K.D.Ushinsky, M.M.Lisina. Friedman and others.



Among Uzbek scientists, Bozorov Erkin Haydarovich, Oynisa Musurmonova, Doctor of Pedagogical Sciences, Professor Norboy Ortikov, Doctor of Pedagogical Sciences, Professor, Abdukadirov Abdukahhor Abduvakilevich, N.N. Azizkhodjaeva, J. Yoldoshev, A.R. Khodjabaev, U.N. Nishonaliev, N. Sayidahmedov and other scientists contributions are immeasurable.

Methodology

To increase the effectiveness of quality education in the educational process, the "Step-by-step" method of interactive methods is discussed and its main structural factors and parts are described. Approaches to assessing the quality of education of the "step-by-step" method were studied.

Results and Discussion

To increase the effectiveness of quality education, quality control of education is an integral part of the management system. At the moment, it is difficult to improve the effectiveness of teaching, to achieve full mastery of the knowledge, skills and qualifications set by the state education standards, to ensure that they get independent education and that it is difficult for gifted and talented people to master some subjects individual approach to students, development of the best qualities of students, paying serious attention to the organization of classes by determining the interests, needs, abilities, intellectual characteristics and personal qualities of young people are urgent tasks. It is worth noting that today certain works are being carried out to update and improve the content of education, to increase the effectiveness of teaching and the professional skills of teachers, and to popularize best practices.

It got a legal basis through the national training program. New educational technologies and interactive methods are being developed and regularly modernized in all subjects. Early identification and development of gifted children's abilities, support of talented, ambitious, creative pedagogues, popularization of their best practices, ensuring the organization of the educational process in educational institutions at the level of modern requirements, improving the pedagogical skills of teachers means the rise and establishment of a powerful state.



Also, quality education is an important factor in the development of human capital. Therefore, every state, and every nation that thinks about its future, gives priority to the education of the young generation at the level of world standards, to bring the younger generation to adulthood mentally mature and physically fit. Therefore, in order to build a powerful state, it is necessary to pay more attention to education. It is necessary to popularize the use of various interactive methods in the educational process.

Currently, there are many types of interactive methods, one of which is the "Step-by-step" method. In the "step-by-step" method, training students are individually and in small groups on a topic that has been passed or should be passed, thinking and remembering, recalling and collecting the acquired knowledge. Teaches to summarize thoughts and express them in writing, and drawing.

This method is written and presented in a group with learners individually or in groups. The purpose of this method is to train students to think freely, independently and logically, to work as a team, to research, to gather ideas and form a theoretical and practical understanding from them, to be able to influence the team with their opinion and to approve it, as well as to understand the basic concepts of the topic. Teaching to apply the acquired knowledge in interpretation.

This method can be widely used in lectures, seminars, and practical and laboratory classes. For this purpose, the following tools are used during training: prepare A-3, and A-4 format papers (corresponding to the number of assigned sub-tasks) and use hand-outs with the names of the tasks on the left side, felt-tip pens, etc. Application technology: The teacher is divided into small groups of 3-5 people, depending on the number of students. Students are introduced to the purpose of the training and the order of its conduct [3-5].

Sheets with the name of the task on the left side of the paper are distributed to each group. The teacher introduces the group members to the tasks written in the handout and, based on these tasks, assigns the team members to write down common thoughts on the blank space on the paper using a felt-tip pen as a task, and sets a schedule. The members of the small group together express their thoughts on the task indicated in the handout in the form of a written picture or drawing [4-6].

In it, the group members will have to provide as much information as possible. After the distribution materials are filled, one of the group members will make a presentation. In this process, the material prepared by the groups must be hung on a pinboard (pinboard) in the auditorium or on the classroom board in a logical sequence and presented by a representative of the small group. The teacher and students of the group listen to the presentation and discuss the task based on questions and answers, evaluate the materials prepared by the groups and complete the exercise [3,7].

In conclusion, it should be noted that by applying the step-by-step method in the course of the lesson, it is necessary to form interpersonal skills in students; develop written and oral speech; activate students during the lesson; teaches students to increase motivation (interest) and apply theoretical knowledge in practice. We expressed the topic of nuclear technologies using the "Step-by-step" method as follows (Fig. 1):

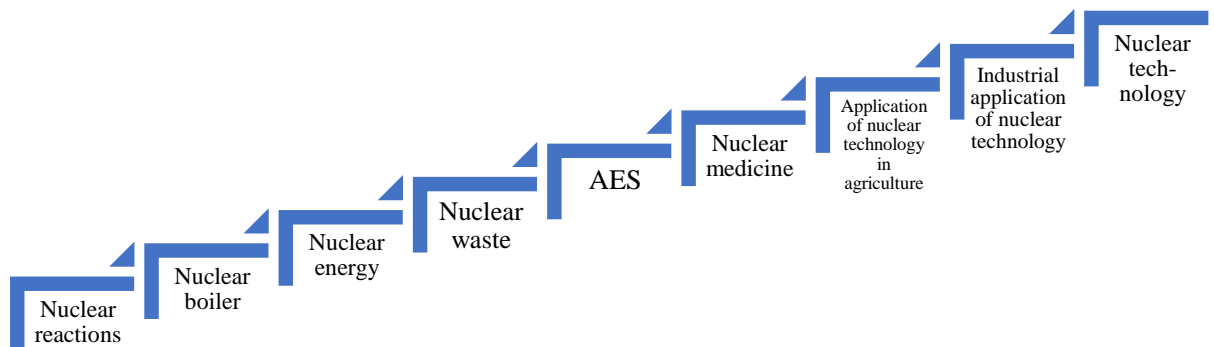


Figure 1. Representation of the topic of nuclear technologies through the "Step by step" method

Since the middle of the 20th century, nuclear technologies have increasingly contributed to important areas of human life. And it's not just nuclear power. Non-energy applications of nuclear technologies are becoming more and more widespread, their implementation rate is higher than in the energy sector. Doctors and technicians working in the field of nuclear medicine perform billions of procedures a year around the world.



The volume of food products processed by ionizing radiation reaches a billion tons per year and continues to grow. Nuclear technologies are increasingly used in crop production and pest control, water resources management, mineral exploration, public safety, and many other areas.

Nuclear waste. During the operation of nuclear power plants, waste of different levels of radioactivity is generated. Depending on the level of radioactivity and the final goal, different strategies for working with them are used.

Nuclear fission. Nuclear fission is the splitting of an atomic nucleus into two or smaller nuclei and the release of energy. For example, the nucleus of the uranium-235 atom, when a neutron enters it, splits into a barium nucleus and a krypton nucleus and two or three more neutrons. These extra neutrons collide with other nearby uranium-235 nuclei, which also fission, producing additional neutrons with a multiplying effect, resulting in a chain reaction within a second.

Nuclear boiler. As soon as humanity, in the form of its advanced scientists, realized a little about what a self-sustaining chain reaction is, it figured out how to apply it to practical problems. First of all, to the production of an atomic bomb. However, let's also be fair to nuclear power generation, where the fission reaction occurs in a controlled manner rather than in an avalanche, resulting in a certain amount of heat. This heat heats the water and turns it into steam, which turns the turbines of the electric generators. Energy enters the power grid. This is a very simplified, bare skeleton of how a nuclear power plant works. But there is no point in going into the details of the design of various reactors here. Mainly, on September 3, 1948, in Oak Ridge, Tennessee, USA, he experimentally powered a light bulb from a nuclear reactor for the first time. And on June 27, 1954, the world's first nuclear power plant connected to the public grid was put into commercial use in Obninsk, Kaluga region, USSR. So it took us more than half a century to get to know and think about what a peaceful atom is.

The first thing to say is that a peaceful atom is generally better than a military atom, and for other reasons.

AES. A nuclear chain reaction is localized and controlled using appropriate equipment in a nuclear power plant reactor, often using fuel based on uranium-235, the fission of which produces heat.



This heat is used to heat the reactor coolant, usually water, to produce steam. The steam is then sent to the turbines, which causes them to rotate and activate the electric generator, which allows the production of electricity without carbon dioxide emissions.

Nuclear medicine. Officially, the name "nuclear medicine" refers to the branch of clinical medicine concerned with the use of radionuclide pharmaceuticals (RPs) in diagnosis and treatment. Also, remote radiation therapy methods are often called nuclear medicine. However, the range of medical approaches and methods using the phenomena and processes of nuclear physics is much wider.

Nuclear technologies in agriculture. Pest control. Gamma radiation is used to sterilize large populations of insects. This method has successfully controlled populations of the American tropical fruit fly (*Cochliomyia hominivorax*), the Mediterranean fruit fly (*Ceratitis capitata*), the Mexican fruit fly (*Anastrepha ludens*) and the tsetse fly (*Glossina*). Radiation processing of food is carried out using both g-irradiation and electron beams. Radiation treatment slows the germination of potatoes and onions during storage, extends the shelf life of meat and fish in the frozen state, disinfects grains and fruits, and sterilizes meat and meat products for storage. frozen state etc. Devices for radiation processing of food products are widely used: vegetables, fruits, meat and fish products, etc. Through chemical and biological studies, tests of the nutritional properties of irradiated products have shown that radiation treatment does not have any harmful effects on products. . Radiation treatment increases the strength of plastic film used to package fruit and other products. Sealed, processed foods can be stored at room temperature for long periods, just like canned goods. Application of nuclear technology in the industry. Registration and quantitative measurement of transmitted scattered or secondary radiation allow for the determination of the physical properties, geometric dimensions and other parameters of the environment. For example, iron thickness up to 10 cm can be measured using ^{137}Cs or ^{60}Co g sources. ^{90}Sr , ^{85}Kr , etc. b-sources are used to measure thicknesses in the order of a fraction of a millimetre. Measuring the intensity of radiation passing through a material and comparing the intensity with a calibration function of thickness or density.



Allows you to determine the thickness or density of the material. Level meters for liquids, metal solutions, and bulk solids often use ^{137}Cs and ^{60}Co emitters. Radioactive radiation is also used in flow meters for gases, liquids, and solids. In production lines, radioactive radiation is used for the automatic accounting of scrap products.

As a result of using the "Step-by-step" method of studying the subject of nuclear technologies, students' mastery results are highly effective. Below are the advantages of this method:

Formation of interpersonal skills in students;

To develop students' written and oral speech;

To activate students during the lesson;

To increase motivation (interest) in students;

It teaches students to apply theoretical knowledge in practice.

Conclusion

One of the interactive methods is the memorization by students of all the topics of the nuclear technologies subject or department, carried out using the "Step-by-step" method, and independently giving their comments on the concepts given by the teacher on the subject being taught. , thereby creating an opportunity to check and evaluate their knowledge and the teacher is directed to evaluate all students in a short time. Further develops students' interests, needs, abilities, intellectual characteristics and personal qualities, as well as the level of mastery of the subject taught in all types of educational activities (at the beginning of the lesson or at the end of the lesson, or when any section of the educational subject is completed). Intended for assessment, repetition, reinforcement or intermediate and final control, as well as for checking the student's (or student's) knowledge before starting a new topic. This method can be organized individually, in a small group or in a team during the training process or in a part of the training. As a result of using interactive methods during training, we achieve high-quality educational efficiency. Because it is a fact that does not require proof that science, education and upbringing are the forces that make the country powerful and the nation great. Today, the reforms carried out in our country are aimed at further expanding the coverage of young people with higher



education, educating them to be knowledgeable and competent and training experts in line with world development.

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