EXCELLENCIA
INTERNATIONAL MULTI-DISCIPLINARY JOURNAL OF EDUCATION
Volume 02, Issue 06, 2024 ISSN (E): 2994-9521

Professional-Technological Variable Methodology in the Process of Training Future Teachers Based On the Cluster Approach

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Abstract:

This article examines the significance of the educational cluster as a scientific and pedagogical problem. In the currently organized educational process, students must: acquire theoretical knowledge, practical skills and qualifications; independent and creative thinking, freely expressed his opinions in writing and orally.

Keywords: Education, teacher education cluster, researchers, goal, objectives, development, scientific and practical significance, science and production, innovative, cluster.

The world's leading scientific centers and scientists conduct fundamental and practical scientific research to create a scientific and theoretical basis for the implementation of the cluster approach and develop mechanisms for its implementation. Clarification of the pedagogical foundations for the development of professional technological diversity in the educational process through the integration of student-oriented and diverse educational opportunities, the development of pedagogical mechanisms for increasing professional training, and improving the didactic system for the formation of professional skills based on the cluster approach is becoming increasingly relevant. At the same time, this creates the need to develop pedagogical conditions for the systematic organization of the educational process based on variable technologies among students in the conditions of an innovative pedagogical cluster system.

The scientific and theoretical foundations of the innovative cluster of teacher education in our country, its description as a new innovative structure associated with continuity, coherence and consistency, as well as the mechanisms for its implementation were presented by teachers G.I.Mukhamedov, Sh.Mardonov, U.N.Khodzhamkulov, R.Eshchanov, J.E.Usarov, A.Rakhimov, Sh.I.Botirova covered the research.

A cluster approach to vocational education studying the theoretical foundations of the formation and development of educational clusters by scientists of the Commonwealth of Independent States (CIS) B.Pugacheva, A.V.Leontiev, activity theory and pedagogical design by V.V.Davydov, V.P.Bespalko, Ledneva, A .A. Slastenin, the concept of lifelong education was studied by such researchers as B.S.Gershunsky, Features of teaching chemistry V.I.Zagvyazinsky, O.S.Gabrielyan, M.S.Pak, G.K.Selevko, E.E.Minchenkov, G.M.Chernobelskaya, T.A.Shiraeva, V.S.Zaysev, O.I.Gulay, V.A.Kuzurman, I.V.Zadorozhny's research.

The essence of economic education in the works of L.K. Anderson, B. Weber, D. Carnegie, J. Ron among foreign scientists; The meaning, psychological aspects and priority ideas of economic socialization of the individual in the studies of R. Douglas Thompson, N. Nevitt, F. Michael O. Soppell; In the studies of E. Floury, N. Hill, C. Kim, R. Robert S. Ziegler, attention is focused on the study of existing problems of the cluster system and ways to solve them. E. Rogers, F. G. Mann, B. C. Saunders and others on creating aspects of introducing modern approaches into the educational process, P. G. Meyer, D. A. Jacobson, P. Eggan, D. Kauchak in the field of improving teaching chemistry. A.T.Jarachev, M. Sullivan, M. Stajanovska, B. Velevska, D.T. Thomas, I. Devetak, S.A. Glaser is an example.

In the currently organized educational process, students must: acquire theoretical knowledge, practical skills and qualifications; acquire independent and creative thinking skills, the ability to freely express one's opinion in writing and orally; solve various problem situations that arise in the educational process, critically evaluate them, strive to constantly improve their knowledge and skills, learn new things; have the qualities of a creative, independent approach to educational and work activities; tasks are set related to increasing the effectiveness of training, for example, the ability to use computers and information communications, as well as telecommunications.

For this reason, in order to achieve efficiency through variable implementation of training, teaching chemistry, modeling chemical processes, conducting various reactions and laboratory work were carried out safely and variablely using the electronic computer program "Vertual-Chemistry-Laboratory".

This program was used in teaching chemistry with the aim of in-depth teaching of chemical knowledge and the formation of a wide range of practical skills. Through the program, using free-form containers, various.

You can observe a chemical reaction by mixing reagents. During a chemical reaction, the ability to see the color of the reacting substances, the proportions of substances, and the formulas of chemical reactions in a special window allows you to use the program as a powerful pedagogical tool. The program opens a table of chemical elements and uses it to determine the location and period of existence of metals. During the lesson, based on the capabilities of the program, you can solve problems related to acids, write reaction equations, and move from one unit of measurement to another. The ability of the program to animatedly show the mechanism of chemical reactions in the form of particles expands the imagination of students.

One of the virtual laboratory programs that can be used in chemistry lessons, the Vertual-Chemistry-Lab program was used as an option for practical classes in teaching chemistry.

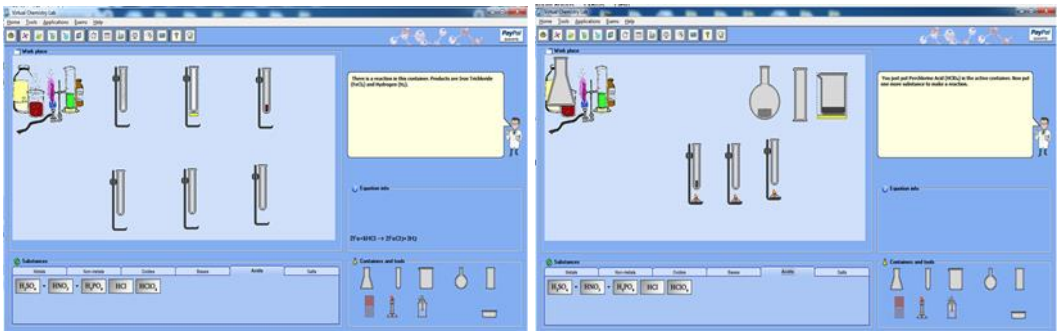

Figure 1. Variable execution of laboratory work in the program

In the program, on the recommendation of the electronic laboratory assistant, containers and reagents for laboratory classes are placed on the working window. In the sequence given in the conditions of laboratory training, laboratory work is performed by a programmer of an electronic chemical laboratory assistant and is carried out under the supervision of a teacher. By pressing the appropriate buttons, the required reagents are placed in the chemical containers and the reactive reagents are added.

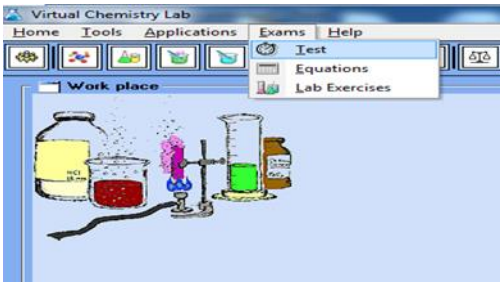

Figure 2. Variable performance of laboratory work in the program.

The program also provides reaction equations that allow students to self-correct their errors.

The program has the ability to show the mechanism of chemical reactions in the form of particles, so that students can see the results of their work, try one practical work in several different ways under the guidance of a teacher.

At the end of laboratory classes, there is an opportunity to take a test using the program in order to test the acquired knowledge and organize the assessment process.

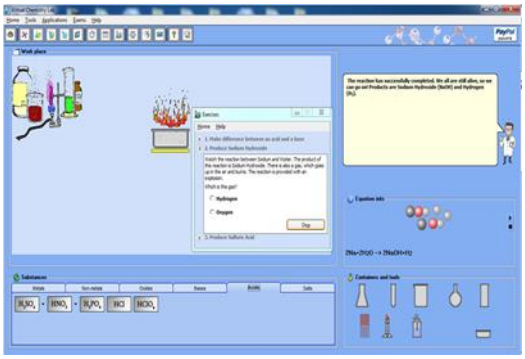

Figure 3. Animated display of the results of chemical reactions in the program

For example, in the “Organic Chemistry” program: the degree of oxidation, hybridization and structural formulas of atoms in organic and inorganic substances; structural theories of organic compounds; homologous series of organic substances, extraction, physicochemical properties and use; know the properties of cyclic compounds; synthesis of new substances based on chemical reactions from organic substances and their significance; heterocyclic types of compounds and their

properties; the biological significance of organic substances found in living organisms and their changes as a result of various processes; organic substances with polymeric properties; organic fibers found in nature; methods for the synthesis of synthetic and high-molecular compounds; In the course of experimental studies, it was found that through the use of the resources of this program and test tasks, the effectiveness of student learning in acquiring knowledge such as the importance of organic substances in industrial development has increased. The content of the lesson and the visual aids used require certain teaching methods. The teacher must have a good knowledge of the types of teaching methods, their methods and how to apply them. Taking this into account, we have used the following interactive teaching methods to enhance learning effectiveness.

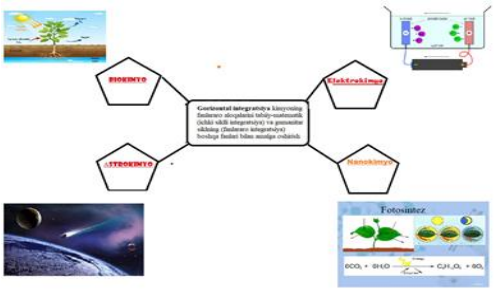

Figure 4. Development of the diversity of chemistry based on a cluster approach in interdisciplinary relationships

The use of a group of demonstration methods in teaching “organic chemistry” is of great importance. The use of demonstration methods in the learning process makes it possible to emotionally perceive objects and phenomena based on the content of organic chemistry, compare them, identify features, generalization, synthesis and conclusion. During the learning process, demonstration methods were used in harmony with oral, practical, logical, and problem-based methods. For example, a teacher gives oral assignments to students to master educational material based on visual aids. In the process of completing tasks, demonstrativeness is combined with practical techniques and is embodied in problematic techniques for solving problem situations that arise in the lesson.

In the “Organic Chemistry” lesson, the teacher’s problematic research methods were used to find the content of the students’ creative experience. During the lesson, problem situations, created consistently and purposefully, helped students actively master the educational material, applying previously acquired knowledge and skills in new situations.

This group of methods prepares the ground for the intellectual development of students, the development of creative and independent thinking skills, the analysis of problem situations and the search for the best way to solve them, the correct goal setting, and requires the chemistry teacher to create problem situations. related to the topic by creating problem questions and difficult test (multiple choice) questions. The analytical method was used to study the processes of “organic chemistry”. This method is used to understand information about chemical processes, identify similarities and differences between the processes under study, separate the studied processes into components and determine the relationships between them.

The method of highlighting the main idea, which is part of the logical method of developing students' independent work skills, is the selection and sorting of the main idea in the educational material, dividing information into logically complete parts, separating the main idea and secondary ideas, keywords and was used to separate concepts and obtain conclusions about the main idea. The processes of organic chemistry, especially in the study of organic substances, were studied by analyzing the structure of organic substances and comparing their changes. In this process, the students’ activities were aimed at identifying the main characteristics of comparative objects, comparison, as well as formalizing the results of comparing similarities and differences with

conventional characteristics. To summarize the data on the development of students' thinking abilities, the generalization method was used. Using this method, identify typical evidence in the students' educational material being studied; comparison, preliminary conclusions, visualization of the dynamics of the development of the phenomenon, and generalization results were marked with chemical symbols. The use of the method of motivation and justification of learning recommended by Academician Yu. Babansky in teaching chemistry gave good results. By using this method in the teaching process, this was achieved by encouraging students who had mastered chemical science well to be able to learn new learning material well.

The methods used above develop students' interest in knowledge, mental activity, the need to acquire new knowledge, a culture of communication, self-control and management, and assessment skills.

Case No. 1

Situation: Organic substances have been known to mankind since ancient times. Since ancient times they knew how to extract sugar and oil from plants, as well as how to make soap by boiling oils. Although organic chemistry did not emerge as a science in India and Egypt, people developed the art of painting using organic dyes.

Case's assignment.

1. What are the unique properties of organic compounds?

Case solution 1.

The following are specific characteristics of organic compounds:

1. The presence of carbon in organic compounds and its ability to form a long carbon chain as a result of its connection with other elements and other carbon atoms through covalent bonds;

2. Since organic compounds contain carbon and hydrogen, when they burn, carbon dioxide and water are formed:

$CN4 + 2O2 \rightarrow CO2 + 2N2O$

3. The temperature of liquefaction and decomposition is much lower than that of inorganic compounds;

4. Organic substances are unstable compared to inorganic ones and are easily changed by temperature;

5. Unlike most inorganic compounds, organic compounds do not dissociate and are not electrolytes;

6. Organic reactions proceed more slowly than reactions between inorganic substances. Because an organic compound is linked by covalent bonds;

7. The phenomenon of isomerism occurs in organic compounds.

Experiments have shown that the first impulse to start innovative activities is caused by external factors, such as unsatisfactory results of teaching activities, failures and difficulties in work, and inability to meet new requirements. Usually the main motivation is a feeling of dissatisfaction due to lack of interest among students. But this feeling does not always initiate the teacher's innovative activities. Among several reasons for this, one can cite as an example that the teacher is lost in front of the problem that has arisen. It is known from practice that teachers rely on quick and easily accessible sources, such as communication with colleagues, methodological recommendations and articles in the press. Also, open trainings, mastery trainings, scientific and practical seminars, and variety programs are useful for teachers.

Variable programs can be divided into three types: update, addition and improvement.

The first stage requires replacing previously mastered methods with new ones.

At the second stage, new methods are added to them while preserving the previous methods.

At the third stage, skill increases through the use of different methods of activity.

In recent years, two trends have emerged in modern educational practice:

1. The direction of improving traditional forms, methods and means of teaching; 2. Direction of accelerated technologization of the educational process.

After all, the introduction of new technologies instead of traditional methods makes it possible to increase the efficiency of learning in the educational process.

To be used in the educational process, variable technology must meet the following requirements:

1. To be in demand in the educational process;

2. Comply with the "Teacher-Student" system;

3. Be universal in relation to the methodological system.

For the organization of individual elements of the educational process, their preliminary design is important when introducing pedagogical technologies.

The presence of another factor in the successful solution of these problems, namely the awareness of the essence of variable technologies by workers in the continuous education system, teacher educators and their ability to effectively use them in the educational process, as well as in organizing the educational process, it is important to decide on a creative approach.

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