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IMPROVING COMPETENCY-BASED NATURAL SCIENCE EDUCATION THROUGH THE INTEGRATION OF ARTIFICIAL INTELLIGENCE

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ABSTRACT

This article discusses improving the teaching of natural sciences in general education based on a competency-based approach through the use of artificial intelligence tools, scientifically and theoretically substantiating the teaching of natural sciences to students based on a competency-based approach, achieving conscious assimilation of educational material through the application of acquired theoretical knowledge, practical skills, abilities, and competencies in new situations, the integration and continuity of knowledge from various academic disciplines in studying the relationship between humans and nature and related problems, the teaching process based on innovative educational technologies, as well as ensuring the quality and effectiveness of teaching based on a competency-based approach in education by developing artificial intelligence in education, taking into account students' age-specific characteristics, the unity of theory and practice, and the dependence on the teacher's pedagogical mastery.

Keywords: Competence, class, integration, nature, knowledge, skills, abilities, didactics, pedagogy, content, improvement, substantiation, school, student, teacher, subject, innovation, lesson, form, method, tool, artificial intelligence, environment, human and nature problem, development, phenomenon, process, continuity, technology, theory, practice, creation, formation, interrelation, mechanism.

INTRODUCTION

At the global level, the development of natural sciences is increasingly raising the demand for competitive personnel that meet modern trends in knowledge acquisition based on a fundamentally new didactic paradigm ensuring sustainable development. This, in turn, highlights the need to enhance the competence of general education school teachers, which is one of the most important elements of the education quality assurance system, to improve it continuously and consistently, as well as to implement and monitor mechanisms that allow improving education quality and determining achieved results, and to teach natural sciences based on artificial intelligence tools as one of the urgent tasks.

In the field of education, improving the quality of priority directions for the development of general education, determining priority directions for the continuous reform of science in the future, training highly qualified personnel with innovative knowledge and independent thinking, modernizing scientific infrastructure and elevating it to a new level are becoming increasingly necessary. In particular, the task has been defined to ensure their professional development based on general qualification requirements for the content, quality, and level of application of artificial intelligence tools aimed at developing the methodological system of teaching natural knowledge based on a competency-based approach in the educational process.

Accordingly, in the system of continuous education, concepts such as competence and competency are encountered. The Latin term competentia refers to a set of issues and is considered as possessing knowledge, skills, abilities, and capacities acquired by individuals in a specific field. A person who possesses competence in a particular field is considered an individual who has knowledge and abilities in that field, can think reasonably, and can actively influence it. Teaching based on a competency-based approach in the educational process is considered a set of general principles that make it possible to analyze the content and results of achieving educational goals.

ANALYSIS AND RESULTS

The selection of curriculum topics based on the latest achievements of science and the enrichment of the content of academic subjects with new ideas is one of the important requirements of competency-based education. The educational elements within the content of each studied subject, which have educational and developmental significance, enable students to understand reality and socio-political processes. According to the principle of concentrism, the content of education consists of components that form the education system. In the content of each subject, main structural components with important scientific and educational significance, as well as secondary didactic projects, are distinguished. Within the framework of the concentrism principle, the volume of academic workload is limited.

Competence is the ability to apply existing knowledge, skills, and abilities in daily activities. Competency, in turn, is the capacity that exists or may arise for carrying out a particular activity.

A competency-based approach enables students to acquire solid and functional knowledge, effective skills, and expanded reasoning, as well as aims to form a positive emotional and value-based attitude toward education and professional activity.

Teaching biological knowledge based on artificial intelligence within the framework of a competency-based approach in general education ensures the development of strong and deep knowledge about activity, ecology, and evolution. It also represents a special biological education that helps develop students' creativity and achieve goals.

In addition, a competency-based approach in teaching biology contributes to the development of senior students' cognitive interest, intellectual abilities, and creative potential through experimentation, problem-solving, and modeling of biological processes. It enables students to independently search for and analyze biological information, describe modern discoveries in biology, and acquire knowledge about maintaining their health and rational use of natural resources.

Based on these approaches, teaching natural sciences in general education on the basis of innovative educational technologies requires a deep understanding of biological knowledge and professional preparedness. It also enables the acquisition of the ability to apply biological knowledge in real-life situations through self-education and the development of experimental and analytical skills. Ultimately, this approach prepares students for future professional activity.

While B.A. Begalov studied the issues of econometric modeling of trends in improving information and communication technologies, U.Sh. Begimqulov researched the scientific-

theoretical foundations of introducing innovative information technologies into pedagogical education, in particular, the organization of pedagogical education in the environment of modern information technologies, the problems and prospects of using information technologies in pedagogical education, and the methodological foundations for organizing a unified information and communication environment in educational institutions, and developed electronic educational-methodical complexes for higher education institutions and the requirements for their creation.

M.X. Lutfullayev dealt with the problems of improving the efficiency of the education system based on multimedia electronic textbooks, while Q.T. Olimov revealed the theoretical and methodological foundations for creating a new generation of educational literature in specialized subjects. R.F. Safarova improved the teaching of education theory in general education schools by linking it with practice.

Also, N.I. Taylaqov considered the introduction of innovative information technologies into the education system as a factor for improving the quality of education, developed scientific-pedagogical foundations for creating a new generation of informatics textbooks for the continuous education system, as well as didactic requirements for creating electronic textbooks, and analyzed Internet portals intended for distance learning.

J.D. Ashurov described the impact of artificial intelligence technologies on pedagogical processes, including the possibilities of objectively assessing students' acquired knowledge, their mastery, and the results of improving educational materials both theoretically and practically.

One of the necessary and priority directions for general education is the renewal of the content of education, which has led to the need to modernize and improve lessons based on innovative experiences and ideas, and to conduct them through artificial intelligence tools based on innovative technologies. Because the lesson is the main core of providing education and upbringing. If education and upbringing provided in subjects are delivered to students based on the laws of life, the dialectics of nature, and the demands of the time, then each teacher will fulfill his or her duty conscientiously.

Artificial intelligence is an innovative technology or system that has emerged under the influence of human intellectual activity, that is, it imitates capabilities such as learning, logical thinking, drawing conclusions, solving problems, and making decisions. It is also a set of computer systems and programs that serve to improve human intellectual activity.

One of the advantages of artificial intelligence technologies is that they create opportunities for independent learning, creative thinking, and the formation of skills and abilities, ensuring a comprehensive and deep assimilation of educational materials and scientific information. Also, this type of innovative technology is more effective than other types due to the integration of scientific information, richness in visual materials, the use of various animations, and the consideration of interactivity features.

Also, in artificial intelligence tools, texts are presented in an attractive and impactful form, main concepts and definitions are written clearly and precisely, and at the same time, they provide full coverage through multimedia and animation tools in monitoring users' knowledge. Its main distinctive feature lies in the ability to control acquired knowledge interactively,

simplify student services, increase efficiency, and play an important role in increasing scientific research and innovation in rankings.

At this point, the use of artificial intelligence tools in developing students' competency-based knowledge in schools is ensured based on the following psychological-pedagogical conditions:

taking into account students' individual characteristics, their cognitive and professional interests based on artificial intelligence tools;

enriching methodological tools with teaching methods, forms, and means that stimulate independent learning activity;

focusing on a scientifically grounded approach to studying biology as the main means of forming subject competencies;

creating an educational environment based on artificial intelligence;

ensuring conditions for successful learning;

effective use of artificial intelligence tools in the rapid development of natural sciences.

It is also difficult to imagine modern lessons without the use of project-based learning. Project activities help to identify students' awareness of their potential, abilities, and personal resources. Through project work, students strive to view their knowledge from a new perspective. They encounter new, non-standard problems that require creativity, strong will, and a high level of self-awareness. The result of such activities is reflected in changes in students' personal qualities.

Today, knowledge and skills alone are not sufficient for success. Rather, self-confidence, the ability to make decisions, teamwork skills, focus on clear goals, the ability to identify problems, and to search for solutions independently or collaboratively are very important. In this process, students must learn to take responsibility for the outcomes of their actions [8].

In addition, they develop a sense of responsibility for the rational use of natural resources and for the ecological well-being of the local community, their country, and the world. They also demonstrate readiness to participate in solving environmental problems and to contribute to improving the ecological condition of society [2; 103-b].

Teaching natural sciences based on a competency-based approach ensures the formation of key and subject-specific competencies necessary for students to successfully acquire knowledge and apply it in life. This approach is aimed at developing analytical thinking, creativity, and independent learning. In this context, students, using critical thinking strategies, become active participants in the learning process rather than passive recipients of knowledge.

Creating a developmental educational environment, applying effective innovative technologies, and taking into account students' individual characteristics help to form a comprehensively developed individual capable of solving problems from a biological perspective. Thus, a competency-based approach specific to biological knowledge not only increases students' scientific literacy but also fosters their sense of responsibility for sustainable development and environmental protection [7; 53-b.].

Competence is a requirement for the educational preparation of specialists necessary for effective activity in a particular field. It is a socially predetermined requirement established by the state and is applied to the educational (professional) preparation necessary for a student to acquire specific knowledge [8; 25-b].

In general education, it is the ability of students to practically apply the knowledge, skills, and abilities acquired in natural sciences based on a competency-based approach in their personal, professional, and social activities. Education based on a competency-based approach forms independence, active citizenship, initiative, the ability to rationally use media resources and information and communication technologies in one's activities, conscious career choice, healthy competition, and general cultural skills in students. In addition, during the process of mastering each academic subject, subject-specific competencies are also formed in students based on the nature and content of that subject [6; 47-b.].

CONCLUSION

Also, the competency-based approach, the formation of comprehensive competence in human activity, is considered a fundamental condition of social life. This requirement is directly related to the activities of teachers. Today, the main direction of updating world education is to improve teaching based on artificial intelligence in the educational process, to be able to view life and professional activity as a holistic system, to act systematically within it, and to form experience in solving new problems and tasks [5; 72-b].

In 2006, the European Parliament and the Council recommended 8 key competencies for lifelong learning. These include:

communication in the mother tongue;
communication in foreign languages;
mathematical competence and basic competencies in science and technology;
digital competence;
learning to learn;
social and civic competence;
sense of initiative and entrepreneurship;
cultural awareness and expression [1; 29-b].

Based on European experience, the introduction of a competency-based approach in the education system of Uzbekistan, the selection of educational competencies to be formed, and their integration into the education system can improve the effectiveness of the education system in our country. In addition, taking on additional educational activities is considered important [5; 73-b.].

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