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## POSSIBILITIES OF USING DIGITAL EDUCATIONAL TECHNOLOGIES IN TEACHING ANALYTICAL CHEMISTRY

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### ABSTRACT

*The article examines the teaching of analytical chemistry in higher educational institutions using digital educational technologies as a pedagogical problem. The possibilities of digital educational technologies in teaching analytical chemistry in the formation of the professional competence of a chemist are highlighted.*

**KEYWORDS:** *Analytical Chemistry, Student, Digital Educational Technologies, Specialist, Chemist, Competence, Professional Competence.*

### INTRODUCTION

In the world, special attention is paid to improving the field of chemical education, introducing modern pedagogical and digital technologies in the educational process, developing methodological foundations for teaching natural sciences in accordance with modern trends in their development. The program, developed by one of the international organizations CSR Asia, recognizes the improvement of the quality of education until 2030 based on information and communication technologies (ICT) [1], which provides for the support and effective organization of student learning. The dynamic development in the field of ICT will fundamentally change the way staff communicate at the local and international levels, and their relationship in the future.

All over the world, science and technology have become the backbone of global development. Both actors continue to improve the quality of life as new inventions emerge from science and technology. Despite the fact that "Analytical Chemistry" (ACh) plays an important role in the world of science, technology and natural sciences, university students, as well as teachers, always experience difficulties in mastering. Strengthening the material and technical base, equipping educational and scientific laboratories with modern equipment, developing a technology for performing chemical experiments based on virtual laboratories and the effective use of modern digital technologies in the educational process are of practical importance.

The accession of Uzbekistan to the Bologna Agreement is due to the modern problems of higher education, including chemistry, as a result of which it became necessary to adopt a competence-based approach as one of the strategies of vocational education. In the educational system of Uzbekistan, a great achievement was the implementation of the lifelong education model, which reflects the important provision of the Bologna Declaration - the obligation of learning and training throughout life [2, 52, etc.].

Along with the professional orientation of chemical education, the strengthening of its humanization and fundamentalization is due to the introduction of chemical disciplines that provide a unified perception of the content of the entire chemist training system. Studies of the importance of chemical disciplines in the training of specialists of various profiles were carried out by many authors [3, 4, 5, 6, 7, etc.].

Analytical chemistry is one of the most important applied branches of chemical science. Its practical orientation makes it one of the main components of the professional training of students.

Analytical chemistry is the science of the principles and methods for determining the chemical composition of substances or their mixtures. In other words, analytical chemistry deals with the development of the theoretical foundations of the method of analysis of the chemical composition of a substance and the practical implementation of these methods.

Improving the teaching of chemistry in universities has been explored by many researchers.

V.Kh.Usmanova's work analyzes the role of physical chemistry and colloidal chemistry in the training of food industry engineers [8]. The importance of fundamental chemical disciplines in the training of metallurgical engineers was investigated in the works of N.M. Vostrikova and N.P. Bezrukova [9]. The role and functions of the discipline "General chemistry" in the preparation of students of a medical university is revealed in the works of T.N. Litvinova [6, 7]. The analysis of the importance of the discipline "Analytical chemistry" in a pedagogical university in the preparation of a teacher of chemistry was carried out in the research of N.P. Bezrukova [4]. Improvement of teaching methods of organic chemistry in the integration of information-communication and pedagogical technologies was studied by IE Shernazarova [10].

For the formation of the scientific worldview of future specialists, the development of their systemic thinking, which is manifested, in particular, in the skills of transferring knowledge, in the formation of an understanding of the predictive functions of theoretical knowledge, in the development of logical, reflective and critical thinking, the ability to self-development, chemical disciplines have enormous potential. Chemical disciplines make a significant contribution to the formation of general cultural (GC), general professional (OPC) and professional (PC) competencies in students, which are important for understanding the integration processes inherent in modern science. Chemical disciplines also have a high potential for the implementation of an educational role (patriotism, pride in the achievements of domestic science), understanding the importance of chemical literacy of members of society. Chemistry is an interesting area for scientific research and creative research in the field of synthesis of new chemicals [4]. For the training of future chemists, chemical disciplines constitute the necessary foundation, both for theoretical and professional training in general.

The competence model of a specialist chemist implies the inclusion of the following characteristics:

- Intellectual competence, which is understood as generalization, flexibility and efficiency in the analysis of situations, which ensures the possibility of making effective decisions in the professional field of activity;
- Intellectual initiative - a personal property that is a readiness for self-development;
- Self-organization, self-regulation, meaning the ability to freely manage their own intellectual activity [11].

The course of analytical chemistry, integrative in its essence, plays a significant role in the formation of the professional competencies of the future chemist, serves as the basis for the subsequent study of the disciplines of the professional cycle, which is impossible without the formed chemical competencies and chemical competence in general.

To ensure professional activity, in accordance with the requirements of regulatory documents and the demands of the time, modern approaches to the training of graduates are needed, which make it possible to form chemical competencies in the study of ACh as an aspect of the readiness of students of the Faculty of Natural Sciences for subsequent educational and professional activities in a modern, multifaceted understanding of this concept.

The idea of our work is to scientifically substantiate the modernization of the ACh course systematically and modularly reflecting its main sections and highlighted components, aspects, functions in the training system of a chemist, especially in the developmental and educational plan of a competent specialist. It is important to reveal the course of ACh as a general cultural, general professional and professional value, to increase the level of consistency and functionality of the content of ACh, the formation of chemical and analytical skills, providing a more intensive development of the student's personality. To implement the ideas and directions of renewal of chemical-analytical education, we have chosen the following methods: integrative-modular, activity-based, competence-based approaches, personality-oriented technologies; mechanisms - purposeful, interdependent and interconnected interaction of teachers and students.

The basis for the development of the proposed ACh training digital educational concept was:

1) the results of the analysis of trends and promising directions in the development of chemical and pedagogical education, due to the approval of new priorities in national education as a whole, namely:

- Changing the nature of problems and tasks solved in society;
- A change in the ideology of education, which is expressed in its focus on the formation of a new system of values and the realization of the student's creative potential;
- Strengthening of integration processes in education, which is manifested in the desire of the domestic education system to integrate into the international educational space; in the development of distance learning; in the integration of modern pedagogical and digital educational technologies.

**LITERATURE**

1. The Role of ICT in Realizing Education for All by 2030 Achieving Sustainable Development Goal 4. – p. 1–46. <http://www.csr-asia.com/download/ICT4SDG4-Final-Version.pdf>.
2. Baydenko, V.I. The Bologna Process: Structural Reform of Higher Education in Europe / V.I. Baidenko. - M., 1999. -- P. 4.
3. Balachevskaya, O. V. Preparation for professional activity of students of the Faculty of Pharmacy in the process of studying the course of physical and colloidal chemistry on the basis of an integrative-modular approach: dis. ... Cand. ped. Sciences: 13.00.08, 13.00.02 / Balachevskaya Olga Vladimirovna. - Krasnodar, 2007. - 225 p.
4. Bezrukova, N. P. Theory and practice of modernization of teaching analytical chemistry in a pedagogical university: dis. ... Dr. ped. Sciences: 13.00.02 / Bezrukova Natalya Petrovna. - M., 2006. -- 336 p.
5. Foreign, N.A. Modern approaches to teaching chemistry / N.A. Foreign, R.G. Ivanova // Chemistry at school. - 2010. –No. 1. - P. 10-15.
6. Litvinova, T.N. Theory and practice of integrative-modular teaching of general chemistry to medical students: dis. ... Dr. ped. Sciences: 13.00.02 / Litvinova Tatyana Nikolaevna. - SPb, 2002. -- 483 p.
7. Litvinova, T.N. On the use of modern approaches and teaching technologies in the process of studying analytical chemistry / T.N. Litvinova, A.T. Tkhakushinova, Zh. I. Shorova // Problems and prospects for the development of chemical education: materials of the All-Russian scientific. Conf., 29 Sept.-3 Oct. 2003 - Chelyabinsk: Publishing house of ChGPU, 2003. - S. 93-97.
8. Usmanova, V. X The development of chemical competencies of students in the process of professional training of food industry engineers 173: author. dis. ... Cand. ped. Sciences: 13.00.08 / Usmanova Venera Khabibovna. - Kazan, 2007. - 23 p.
9. Vostrikova, N.M. Computer simulators in the organization of independent work of students in the study of chemical disciplines / N.M. Vostrikova, N.P. Bezrukova // Chemical technology. - 2009. - No. 10. - P. 635-639.
10. Shernazarov I.E. Improvement of teaching methods of organic chemistry in the integration of information and communication and educational technologies. Autores diss. d.p.n.f. (PhD), Tashkent - 2020. –52 p.
11. Raitsev, A. V. Development of students' professional competence in the educational system of a modern university: dis. ... Dr. ped. Sciences: 13.00.08 / Raitsev Anatoly Vasilievich. - St. Petersburg, 2004. -- 309 p.