WEB OF SYNERGY:
International Interdisciplinary Research Journal
Volume 2 Issue 3, Year 2023 ISSN: 2835-3013
https://univerpubl.com/index.php/synergy

Some Aspects of Problems in Teaching Chemistry and Philosophy in Higher Education

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Article Information

Received: January 26, 2022
Accepted: February 27, 2023
Published: March 28, 2023

Keywords: *Education, chemistry, philosophy, pedagogical problem, innovative processes.*

ABSTRACT

The article, based on its own experience, analyzes some of the problematic aspects of teaching chemistry and philosophy in non-core universities related to modern trends in education. The place of subjects in a number of studied disciplines is shown. The level of preparation of students in chemistry and philosophy was assessed based on the results of the survey, and the monitoring of the reasons that affect academic performance in subjects was carried out, which made it possible to develop teaching methods and methods, to take corrective actions. Various factors for the qualitative study of these disciplines are considered. The role of innovative pedagogical technologies, which will significantly improve the quality of modern education, is emphasized.

Introduction

For its development, modern society is trying to develop the appropriate knowledge and organize a stable system for transferring this knowledge to new generations in order to further replenish and improve them. Therefore, the relevance of studying the problems of education is a necessary component of any social system of education.

The globalization and innovation processes taking place all over the world and covering the technical, technological, organizational, economic and institutional subsystems of the Uzbek society determine the need to comprehend the new role of higher education in modern society and search for new management methods that are adequate to the challenges of the time. Intensive civilizational changes, such as the informatization of society, the spread of communication technologies, the growth of the openness of education in the world, determine the relative obsolescence of the classical paradigm of education, the need to replace it with the concept of continuous education and self-education, stimulating the efforts of the individual to dynamically adapt to the changing requirements imposed by society on the quality of social and professional activities.

The system of higher education, currently recognized as the most important and in need of

constant compliance with all the requirements of a changing world, and therefore simply obliged to respond to any transformation of society. Modernization changes in the institutional structure of the education system, in the strategy of the educational and educational process are a necessary component of the overall process of reforms that are currently taking place in Uzbekistan. The old institutions of education, by the nature of their functioning, in many respects have ceased to be adequate to the new institutional environment of a market society. The prospects for Uzbekistan's entry into the global information space in the current conditions make it necessary to take a fresh look at the current state of the education system from the standpoint of variability, non-linear dynamics of its development. The authors of numerous works published over the past decade on the problems of education almost unanimously argue that the goal of higher education should be to produce an active, creative and independent thinker. Chemists and philosophers agree with this point of view. This approach is also reflected in official documents.

Reforming the system in Uzbekistan is streamlined on the basis of a number of legislative documents. [11,12]. These laws form the basis of the current education system. The Concept for the Development of the Higher Education System of the Republic of Uzbekistan until 2030 [11] was approved [11]. It identifies priority areas for reforming the higher education system - raising to a qualitatively new level of training highly qualified personnel with modern knowledge and high spiritual and moral qualities, independent thinking, modernization of higher education , strategic tasks for the development of the social sphere and sectors of the economy based on advanced educational technologies.

Since it is the system of higher professional education that provides personnel for new directions in the development of science and technology, the question arises of its adaptation to new conditions, given by the level of development of modern society and its territorial subsystems.

Methodology

The problem of studying the sphere of education is not something fundamentally new either for the world academic community or for domestic scientists. The first problems of education were considered back in antiquity in the philosophical works of Aristotle[1], Plato[9,10], subsequently developed by J.-J. Rousseau, G. Hegel, I. Kant, W. Humboldt, etc. 2. The issues of analysis of the current state and consideration of the prospects for the development of higher education have found a versatile reflection in the works of Uzbek and foreign experts. The special foreign scientific literature contains the results of numerous theoretical and applied developments devoted to various aspects of this problem, which were investigated in their works by G.Becker, D.Bell, M.Blaug), C.T.Clotfelter, P.H.Coombs, K.Griffin, I.Fisher, T.McKinley, G.Psakhoropoulos (G.Psacharopoulos), T.W.Shultz, L.Thurow, E.Toffler, M.Woodhall and others.

The main signs of innovativeness of development, variants of their manifestation, as well as (directly or indirectly) the corresponding requirements for the education system are considered in a number of foreign publications (E. and X. Toffler, 1996; Castells, 2000; Giddens, 1999; Aghion, Boustany, Hoxbyz , Vandenbusschex, 2005; Acemoglu, Aghion, Zilibotti, 2002; Howitt, 2000). Similar topics have been actively discussed in recent years in domestic publications.

Meanwhile, the problems of the feasibility of various innovative educational projects are not trivial. Firstly, the social behavior of various groups is quite inertial, is formed and changes both under the influence of various incentives, and is largely culturally conditioned, that is, they are determined by culturally conditioned or norms that form over quite long periods of time. Secondly, the actual constitution of the education system is the resultant of the interests of many social factors, is formed as a result of complex socio-political processes of their interaction, making, in particular, significant adjustments to the declared projects of its reforms.

In our article, an activity approach was used, which made it possible to explore and design the educational process based on the patterns of organization of human activity.

Attention is paid to the anthropological approach, which involves the correlation of any knowledge about educational phenomena and processes with knowledge about human nature and allows you to design the educational process based on the orientation to the laws of human development as such.

The use of the axiological approach made it possible to determine the set of priority values in education and self-development of the individual, which made it possible to explore and design the educational process based on the patterns of development of the human value world.

Discussions and results

Chemistry, as a fundamental science, makes a significant contribution to the understanding of the modern picture of the world, is an integral part of human culture [2]. The study of chemistry allows one to form dialectical ideas about the chemical form of the movement of matter, to reveal the material foundations of the surrounding world, to give the knowledge necessary to understand the essence of the global problems of our time: environmental, raw materials, energy, food; develop intellectual, organizational, evaluative, communicative, and various practical skills. Mary M. Kirchhoff suggests studying chemistry to solve the problem of the crisis of creativity (a decrease in creativity against the background of an increase in intelligence): “Chemistry is a great way to teach creativity. Chemists are molecular designers who apply their skills and knowledge to develop new products and processes” [4 p. 1].

Knowledge of the basic chemical laws, knowledge of the technique of chemical calculations, understanding of the possibilities provided by chemistry, significantly speed up obtaining the desired result in various fields of engineering and scientific activity. The peculiarity of the discipline "Chemistry" for students of non-chemical areas of training is that in a small course it is necessary to master information from almost all branches of chemistry. Chemistry lays the theoretical foundations for a diverse and complex picture of chemical phenomena. The actual material is learned by students in the performance of laboratory work, in the process of observing chemical reactions and substances. It needs to be memorized. Complex and multifaceted theoretical material students need to carefully study and fully understand.

The discipline "Chemistry" in higher educational institutions is studied by students in the first year of study, and teachers have to decide how to combine the level of preparedness of first-year students and the information content of the course with a given number of hours of classroom lessons and independent work of students according to the curriculum. One of the most serious problems of teaching chemistry in universities at the present stage is the contradiction between the new targets and the traditional practice of teaching chemistry.

It is generally accepted in technical universities to focus on teaching, on the implementation of the “nutrition model”, in which the teacher is the main one, and the quality of learning activity depends on how well the teacher “teaches”, the student perceives information and reproduces it in the exam. With an emphasis on learning, the student is at the center, learning occurs through the interaction of the teacher and the student, and the teacher seeks to form the student's skills of independent learning [8].

Observing first-year students, we are faced with the following problems. This is a low level of basic knowledge, a lack of awareness of the close connection between chemistry and physics and mathematics, and as a result, a low interest in chemistry among most students, often an inability to formulate their thoughts, and about 40% of problems with the practical side of science - chemical calculations. Due to the large gaps in school knowledge, the teaching of chemistry at the institute starts from scratch, with a departure from the requirements of state educational standards, which do not provide for the study of elementary concepts and laws in universities. A

feature of the study of chemistry in technical universities is the fact that this process has a curtailed character. A large theoretical and factual material must be studied in a short time and with a minimum number of classes. The lack of understanding among applicants of the role of chemical knowledge in explaining the physical and chemical properties of materials, their behavior under operating conditions, the development of new technologies and materials creates an insurmountable psychological barrier when studying a higher school chemistry course. In addition, the recent trend is clearly declaring itself - students are not taught elementary skills of educational activity from school, they do not know how to learn. There is a problem of consolidating the acquired knowledge, because. knowledge that is not supported by skills and abilities is quickly lost. The basis of successful study at the university is not only school knowledge, but also the ability to work. In modern conditions, in the educational environment of a technical university, there are three stable trends: a tendency to reduce the knowledge of the school course of chemistry of applicants, a tendency to a sharp decrease in the asset of skills and abilities of educational activities, a tendency to a steady decline in motivation to study chemistry.

Assessing the level of students' preparation in chemistry based on the results of the questionnaire, as well as monitoring the reasons that affect academic performance in the subject, allow us to develop teaching methods and methods, and take corrective actions. The technology of teaching chemistry is based on the principle of adapting the level of information offered on the subject to the corresponding level of the audience according to the survey data. Teaching chemistry at the institute is aimed not so much at presenting the science of chemistry itself, but, as a necessity, at the axiological refraction of chemical knowledge through the prism of the consciousness of future engineers. To captivate the student, overcoming the skepticism towards chemistry that is typical for students of non-chemical specialties of technical universities, to involve him in the learning process, to interest him, to make the subject of study understandable and, as a result, to teach - this is the basis of the axiological task of finding ways and methods of presenting educational material on the subject. For this reason, the selection of lecture material, material in textbooks is based on the value, importance and significance of knowledge in chemistry for the future activity of an engineer, and the level and style of presentation contributes to the axiological motivation for studying chemistry. Therefore, in a number of cases, when arranging some sections of chemistry, a choice is made in favor of an axiologically accessible understanding of the material being presented.

It is obvious that an extensive approach to the goals, objectives and content of chemical education, which still forms the basis of practical teaching of chemistry, no longer corresponds to the current state of chemical science or the modern needs of economic activity. Moreover, the practical implementation of this approach is becoming more and more difficult due to the insoluble contradiction between the rapid increase in the volume of chemical knowledge and the impossibility of increasing the teaching load of students in the same proportion. Quantitative changes, most clearly expressed in the multiple increase over the past decades of the “material” of chemistry offered for study in the established practice of higher chemical education, have reached that critical level, after which a qualitative leap is inevitable. Therefore, the solution to this problem is possible only as a result of the adoption of a fundamentally new approach to the goals and content of chemical education. Hence it follows that an important and urgent task is a comprehensive analysis of the problem and the development of specific ways and methods for its effective solution, focused on the rejection of the extensive classical approach to the content of chemistry as an academic discipline.

Let's formulate the real requirements for the content of the student's training. They can be divided into two blocks:

Substantial requirements that make training specifically chemical: chemical worldview (as part of the general natural science), knowledge of the chemical language, sufficient erudition in the field of chemical phenomena, a solid understanding of the principles of scientific methodology,

familiarity with general chemical and general scientific concepts and models, with the content and possibilities of the main theoretical and experimental methods of classical and modern chemistry;

Functional requirements that allow the student to successfully pass the adaptation, which determine his "susceptibility": developed mental abilities, skills of logical, reflective and critical thinking, the ability and conscious desire for self-education, the ability to work with literature and databases, practical knowledge of the methods and techniques of experimental work, understanding of their role in society.

The requirements formulated above also determine the main content of university chemical training - a relatively compact core of chemical knowledge necessary and sufficient to implement the above requirements. This does not mean a simple reduction in the amount of information. On the contrary, all available information should be compacted through cardinal logical processing, systematization and generalization. As a result of such folding, the very “compact core” will be obtained, which will contain not just information, but “knowledge”. In our opinion, it is this approach that will make it possible to bring the content of chemical education in line with the modern level of chemical science. The depth of study of this core can (and should) vary significantly, depending on the specialty of the student. Thus, one of the most important and urgent tasks is the development of such a variant of content and structure that would effectively and within the specified timeframe develop the substantial and functional qualities of the student, necessary and sufficient for his adaptation and transformation into a full-fledged specialist in the chosen field of practical activity.

It is advisable to reorient the content of chemical education from the study of the "material" to the effective and complete mastering of the chemical language by students, its "vocabulary and syntax", as well as ways of linking it with chemical practice.

The approach based on the study of the chemical language as the essence of fundamental chemical training has a number of important advantages over the traditional focus on studying the mass of factual material of modern scientific disciplines.

The contradiction between the goals of higher chemical education and the practice of their implementation is observed not only in the field of chemistry, but is characteristic of philosophy.

Like other socio-humanitarian disciplines, philosophy has changed its status in the system of Uzbek education and has been relegated to the background as fundamental knowledge, opposing vocational training. This position is justified by the increase in the level of qualification of the future graduate as a specialist in a particular field of knowledge, his ability to master a narrowly focused specialization.

The issue of teaching philosophy has been widely discussed in scientific publications for many years [5,13].

In the process, practice shows that students are more interested in general philosophical problems than in studying the concepts of specific philosophers and philosophical schools. Therefore, the teacher should not copy a textbook during lectures that students can master on their own. Students do not expect a dry theory about this or that philosopher, but an analysis of the most important philosophical problems related either directly to personal experiences or to their professional field.

Philosophical and pedagogical discourse must be built in such a way as to promote the student's reflection, his ability to carry out, within the framework of the discussion, the transition from everyday to philosophical reasoning, to the ability to think in a “different plane”. It is necessary to build the educational process in such a way that the problematic presentation of the material motivates students to search for its solution, during which, in turn, new questions of a debatable

nature would appear. The task of a philosophy teacher can be defined as follows: “It is only necessary to open this mysterious door called “philosophy” for students, and how interesting it will be to enter it, how much an integral part of life philosophy will turn out to be in the future, in a certain sense depends on the teacher” .

Philosophy is dialogic in its spirit, and the role of the teacher of philosophy should not be preachy. Rather, the teaching of philosophy is a kind of intellectual "shamanism", when the teacher must convey through the channels of rational and emotional connection the effort of thought, the movement of his spirit towards the philosophical problem. With the help of fine manual settings, an intellectual impulse is transmitted from the teacher to the student. That is why the course of philosophy in universities cannot be built every time according to the same scheme. The lecturer needs to be offered some kind of exclusive, if not in the content of the material being taught, then at least in its stylistic expression, in the very presentation of knowledge. And do not forget that philosophy plays one of the most important and irreplaceable roles in shaping a person’s personal qualities.

Difficulties also exist in the methodology of teaching philosophy. The competence-based approach in education suggests that a professional should be able to make choices in non-standard situations. Today it is believed that such skills and practical skills are acquired not so much as a result of the use of traditional methods by teachers, but as a result of the inclusion of various innovative methods in the learning process. It is assumed that the process of obtaining education can and should be easier, more entertaining and more accessible. Therefore, seminars on philosophy should contain an analysis of cases, specific situations based on one or another philosophical tradition; games in which students could take on a certain role, plunging into the created context. On the one hand, such an approach to teaching helps the student learn to analyze philosophical problems, to understand the essence of the most basic philosophical issues. In such game situations, students learn to reflect, acquire the skills of a value attitude towards nature, other people and themselves.

One of the important tasks in the teaching process is not just to transmit knowledge and traditions, but to prepare a person for life in an unpredictable, changeable world; to form the competencies of a professional capable of choice, quick search for information, and reflection. In such a situation, the role of the personality of the teacher, his ideas about the goals, content and methods of teaching philosophy is great.

In the teaching of any discipline, it is more important not what to teach, but how to do it.

You can speak with students both in a language they understand and incomprehensible to them, you can make a conversation with them both clear and intelligible, and slurred and confusing.

There are various ways to make the educational material of the philosophy course simple and intelligible, lively and interesting. This is an appeal to the life experience of students, to the knowledge they received at school from different sciences, to examples from fiction, cinema and television films; this is an appeal to the historical past of the people and examples from modern social life or everyday everyday situations, as well as parables, paradoxes, aphorisms and much more. Philosophy itself, as it were, pushes us to make its study an easy and exciting activity.

Conclusions

Summing up, I would like to note that the difficulties and problems voiced are not new and have been repeatedly discussed by the scientific community. However, their analysis was carried out by us on the basis of our own teaching experience related to modern trends in education. The ideas and conclusions expressed in the article, based on subjective assessments and facts of personal professional biography, should not be taken as ready-made recipes and guidelines for action.

In our opinion, the main problem is that the education system does not keep up with the dynamically changing world, since it remains an appendage to other areas of society, adapts to their interests and serves their private, momentary needs. In this situation, there is an urgent need to revise the basic imperatives of educational activity, to determine its most important priorities. This is a requirement of the modern era of global instability, in which the actions of one person can lead to planetary consequences [7].

An analysis of the situation convinced me of the need to change methodological approaches, to change emphasis and priorities.

The basis of the fundamentalization of chemical education in a technical university is its system and structure, which is not focused on narrowly professional pragmatic knowledge, but theoretically and methodologically important, assimilated in the form of invariants of the main content systems, which remain for a long time and actively function in educational and scientific knowledge. It is such knowledge that contributes to a holistic perception of the scientific picture of nature, the development of intelligence, creative self-realization and adaptation to rapidly changing conditions of life and professional activity.

The applied technology of teaching chemistry greatly increases the motivation in studying the discipline, positively influencing the growth of academic performance in the subject, and allows you to achieve the main goal - to teach students how to study and provide a sufficient level of knowledge that guarantees further education in other disciplines at a technical university.

As for philosophy, the adaptation of the mass teaching of this science to modern conditions can be achieved by focusing on problematic issues, during which the goal of teaching is not to study abstract theoretical constructions, but to acquire the ability to use philosophical practices of thinking to solve existential, social and professional problems. which are recognized as relevant by the students themselves. But the main element is the student, who, in the end, learns to use the tools of philosophy to construct his own personal position, which implies both rooted in modernity and connection with the most significant products of the philosophical tradition. Thus, the problem of education is not only and not so much a problem of a teacher and a student, but a problem of a sociocultural nature. The edge of this problem is determined by the search for harmonious cooperation between the teacher and the student, supported by the relevant value imperatives of the socio-economic, spiritual, cultural development of our country. This task can be realized only if the educational process is dominated not by the traditional system of education, but by a system using various innovative pedagogical technologies. The use of such technologies can significantly improve the quality of modern education.

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