

Realization of Pedagogical Conditions for the Formation of General Scientific Competence of the Future Bachelors of Machine Engineering Specialties

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Abstract

The article reveals the expediency of applying pedagogical conditions for the formation of general scientific competence of the future bachelors of machine engineering specialties. It is indicated that their implementation will positively influence not only the professional qualities of future bachelors, but also the formation of world outlook positions, moral beliefs, and the nature of thinking. It indicates the promotion of the development of spirituality and a common culture, the ability of interpersonal communication.

Keywords: future bachelors of machine engineering specialties, the results of education, natural-science training.

Introduction. Formation of professional competence of the future bachelors of machine engineering specialties is the most important factor of improving the quality of pedagogical activity in the university and the preparation of a competitive specialist. The content of the modern education system is aimed at ensuring the formation of multifunctional knowledge, skills and professionally important components of professional competence. Mastering new information technologies, the ability to adapt to the accelerated pace of scientific and technological progress and any production, will lead to the achievement of the desired result. Developed and proposed early pedagogical conditions [3, p. 49-56], in our opinion, will positively influence not only the professional qualities of future bachelors, but also the formation of ideological positions, moral beliefs, the nature of thinking, promote the development of spirituality and a common culture, and the ability to interpersonal communication.

Formulation of the problem. In the conditions of the higher education system transition to two-level training of specialists, a new education paradigm is realized. The training of future specialists in the technical field in the aspect of forming professional competence and providing readiness for professional activity acquires new significance. All these processes are focused on the implementation of the requirements of the Bologna process, the

standards of a new generation, changes in the content of engineering education, mastering professionally oriented qualities of engineer training [2, p. 153]. Specialists in the field of engineering pedagogy, teachers of fundamental, technical and socio-humanitarian disciplines strive to clarify the optimal conditions for training specialists in technical specialties and ensuring their high competitiveness. In our country, there are certain factors that can positively influence the problem of raising the level and role of the component of natural-science training in engineering education.

Statement of the main material. The future bachelors of machine engineering specialties are now oriented to receive professional training characterized by a high degree of scientific, technical and industrial importance. Ability to use knowledge in professional work; master the methods of cognition, self-improvement allow to freely navigate in the information space. A young specialist after graduating from a higher education institution needs constant self-improvement in order to manage production and technological processes in the future [1, p. 363].

According to the training program of specialists in machine engineering specialties, it is necessary to study the disciplines of professional, natural-science and professionally-oriented training. Chemistry as an academic discipline of natural-science training provides the teacher with ample opportunities for selecting system-forming factors. At the same time, a student can form the content of the course and choose the nature of the material presentation, in which the system maximizes the level of heuristic abilities of students, provides a deep understanding of the systemic integrity of the main provisions of the course. The vision of the unity of opportunities for the practical use of the acquired knowledge in future professional activity and developed skills is an important characteristic of the professional competence of a modern engineer.

The interaction of a chemistry teacher with teachers of professional educational disciplines is not only useful, but also multifaceted. On the one hand, it enriches the knowledge of a chemistry teacher with the features of applying this knowledge in the field of machine engineering. This makes his/her lectures, practical and laboratory studies more interesting and informative for students in terms of their future specialty. On the other hand, this interaction makes it possible for teachers of other disciplines to attract with students to motivate them to study chemistry. At the lectures the teacher explains the possible use of various ma-

materials and technologies used in machine engineering, drawing attention to the fact that these properties are studied in more detail in the course of inorganic chemistry.

An additional condition for the future specialist of machine engineering profile to study chemistry is the understanding that the knowledge of chemistry creates certain competitive advantages compared to those future colleagues who do not understand the importance of these disciplines for successful professional activity and for their own creative self-realization. Thus, the personality of the teacher is already in itself a powerful factor that encourages students to study the academic discipline that he/she teaches.

It is well known that even a bad system is better than the absence of system. The orientation of the educational process on a deep understanding of the essence of the material being studied is directly related to the systemic nature of the presentation. It ensures the inclusion and activation of associative thinking of students in the course of their educational activities. Applying the basic didactic idea of Sukhomlinsky V.A. "Teaching without coercion" removes a sense of fear among students in class, strengthens their confidence in their abilities and capabilities. It makes them relaxed and free, which makes it possible to realize their abilities, laid down from childhood. As a result, there is a real opportunity to develop and maximize the creative potential of each student; the desire for further, wider learning of the teaching material from childhood. Understanding also contributes to the development of logical thinking, disciplines it, and raises its culture and productivity. "In order not to turn a child into a storehouse of knowledge, a storehouse of truths, rules and formulas, one must teach him to think. The very nature of children's consciousness and children's memory requires that a baby sees the bright surrounding world with its laws and it should not be closed for a moment "[5, p. 258].

The innovative orientation of the training of specialists provides for the orientation of the teaching and upbringing process on acquaintance of students with innovative high technologies, as well as with unresolved problems and directions for finding possible alternatives to their solution. At the same time, students are encouraged to seek innovative solutions, and appropriate skills are formed. But even more important is that they are gradually developing a general innovative direction of thinking and showing its strategic character.

The general democratization of public life, the broad opportunities for access to information gradually change the role of the teacher. At the same time, teacher's purely edu-

cational functions of explaining the material to students, the answers to their questions to a certain extent, reinforce teacher's educational impact. This is not manifested in instructive conversations, but in culture and behavior, in the manner that teacher holds, in attitude towards students and in the nature of communication with them. All this contributes not only to the students' successful mastering of educational material, but also to their personal development and socialization.

Given the significant potential hazards of many chemicals and technologies, the future bachelor of machine engineering specialties should be well aware of the potential for their adverse impact on people and the environment and provide reliable protection against it. This is how a student understands one of the main tasks of the modern engineer - the need to maintain a stable balance in the system "man - society - nature - technology". At the same time, understanding of personal responsibility for the life and health of both current and future generations is strengthened.

In the process of providing the basic level of chemical preparation of students, the quality of students' studies in other disciplines was constantly monitored after studying the course of general chemistry, the experience of other teachers was analyzed, and the students were questioned. The information obtained thus confirmed our assumptions, allowed us to clarify certain provisions and improve the methods, techniques and pedagogical technologies used in the teaching of general and inorganic chemistry for students.

Therefore, those personal qualities that they can develop as a result of the creation and observance of the examined pedagogical conditions have a serious positive impact on all further educational and cognitive activities and students' behavior, on their attitude to learning and knowledge. Thus, they lay the foundations of professional and social competence; an understanding is formed of the need for a good quality education as the most important factor of their competitiveness in an extremely complex modern labor market and labor as one of the prerequisites of life success.

The proposed pedagogical conditions simultaneously perform an important educational function. Indeed, students get the opportunity to form their own teamwork skills, master the basics of business communication. The discipline of thinking and its culture help them to realize their creative personal potential more fully. We consider it extremely important to note that in the long-term socio-economic crisis that Ukraine is experiencing, it is

important for the student to get a good fundamental education, since after graduating from the university, he may not find a job in his specialty. In addition, today the worldwide trend of social and professional mobility of people, especially those with higher education, is becoming increasingly clear.

"Professional managerial skills are vital for the engineer, because they allow you to systematically analyze a problem situation, determine the ways and means of its optimal solution. Decision making is an important function of managers at all levels. Effective decisions and actions aimed at their implementation are possible only on condition of adequate awareness of the essence of a concrete situation" [4, p. 14]. Therefore, it is important to teach students the culture of business communication and the principles of teamwork, since it will be necessary for them in almost any sphere of modern life.

In addition to the above results of changing students' attitudes toward chemistry and its study, it is important to note the changes in the level and quality of their knowledge. There is a reason to assert that these changes were also the result of the observance of the pedagogical conditions formulated in accordance with the pedagogical theory and verified in the practice of education. When enrolling in machine engineering specialties of higher educational institutions in Ukraine, the assessment of the school's knowledge of applicants in chemistry is not taken into account. Therefore, before the course is studied, the input control of the determination of residual knowledge of inorganic chemistry is carried out.

We assessed its results with three levels of knowledge: high - above 85 points out of 100, average - from 65 to 84 points and low - below 64 points. According to the results of the entrance control, 6% of students showed a high level of knowledge of the school chemistry course, an average level of 18% and a low level of 76%. After studying the university course of general chemistry in the performance of the given pedagogical conditions and, naturally, as a result of their application, the results have changed significantly. A high level of knowledge showed 36% of students, middle - 52% and low - only 12% of students. For comparison, we present the results of the progress of students of other non-chemical specialties who studied chemistry in the traditional system. These results were kindly provided to us by other teachers. On a sample of 312 people, only 27 people (9%) had a high level of knowledge, an average of 75 people (24%) and a low level of 210 people (67%). The results of the research showed a positive dynamics in the formation of the level and quality of students' knowledge

after studying the course of general chemistry, which proves the effectiveness of the revealed pedagogical conditions and methods of their implementation in the educational process of the university.

Conclusions. Based on the fundamental principles and principles of pedagogy and reliably tested experimentally on a large sample of students, this study allows us to draw the following conclusions.

1. The future bachelor of machine engineering specialties should have a high fundamental component, which will provide an opportunity to develop and successfully use innovative high technologies based on new physical effects and nanomaterials. In addition, knowledge of fundamental disciplines will contribute to students' successful professional mobility.

2. Insufficient level of knowledge in the chemistry during school preparation of students, causes not enough interest of future specialists to study the subject in the first year of education, and consequently leads to a lack of understanding and the importance of obtaining knowledge. Ensuring the necessary level of their general scientific competence requires the creation and consistent implementation of appropriate pedagogical conditions.

3. Realization of the proposed pedagogical conditions, will allow forming the basic professional competence of future bachelors of machine engineering specialties in the process of natural-science preparation, clear ideological positions of moral principles and beliefs, development of general and professional culture, apply the results of education to European standards.

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