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INTELLECTUAL PREPARATION APPROACHES TO MASTERING SPECIALIZED SUBJECTS IN THE DIGITAL EDUCATION PROCESS

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ANNOTATSIYA

Institutda yaxshi ta'lim olishning asosiy sharti sifatida qaraladigan ta'limga intellektual tayyorgarlik kontseptsiyasi belgilangan. 60710800 -“Metrologiya va standartlashtirish” yo'nalishi bo'yicha bakalavriat talabalarining shakllangan kompetensiyalari tahlil qilindi. Ushbu tahlil asosiy metrologik va standart talablarni bilish ko’rsatkichlari hamda, muammolarni hal qilish va eksperimental professional tadqiqotlarda ishtirok etish darajalari aniqlangan. Talabalarning umumiy kasbiy va maxsus kasbiy kompetensiyalarini rivojlantirishda "Metrologiya, standartlashtirish va sertifikatlashtirish" maxsus kursining dars jarayonidagi muhim ahamiyati ochib berilgan.

Kalit so’zlar: motivatsion tayyorgarlik, intellektual tayyorgarlik, tashkiliy va kommunikativ tayyorgarlik, idrok, e'tibor, xotira, fikrlash, tasavvur.

Аннотация

В институте определено понятие интеллектуальной подготовки к образованию, которое считается главным условием хорошего образования. 60710800 - Проанализированы развитые компетенции студентов бакалавриата по направлению «Метрология и стандартизация». В результате анализа были определены показатели знания основных метрологических и нормативных требований, а также уровень решения задач и участия в экспериментальных профессиональных исследованиях. Выявлено важное значение спецкурса «Метрология, стандартизация и сертификация» в развитии общепрофессиональных и специальных профессиональных компетенций студентов в процессе обучения.

Ключевые слова: мотивационная подготовка, интеллектуальная подготовка, организационно-коммуникативная подготовка, восприятие, внимание, память, мышление, воображение.

Annotation

The concept of intellectual preparation for education, which is considered the main condition for a good education at the institute, has been established. The formed competencies of undergraduate students in the direction of 60710800 - “Metrology and Standardization” were analyzed. This analysis revealed indicators of knowledge of the main metrological and standard requirements, as well as the level of problem solving and participation in experimental professional research. The important role of the special course “Metrology, Standardization and Certification” in the teaching process in the development of general professional and special professional competencies of students was revealed.

Keywords: motivational preparation, intellectual preparation, organizational and communicative preparation, perception, attention, memory, thinking, imagination.

INTRODUCTION

Readiness to study at the institute is an integral education that determines the success of students in their academic activities, in which several components are distinguished:

motivational preparation, intellectual preparation, organizational and communicative preparation [1].

The main condition for educational success is intellectual preparation, since the ability to master

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knowledge at the highest level of education, in addition to the formation of general educational skills and abilities, also implies the presence of a certain level of development of mental abilities. Mental abilities, on the one hand, are the result of learning, and on the other hand, are a necessary condition for learning. They characterize the achieved level of development of the main cognitive functions (perception, attention, memory, thinking and imagination), the ability to identify important connections, relationships between objects, their forms of development and activity, the ability to apply abstract theoretical knowledge to solve specific practical problems.

The formation of intellectual readiness for studying at a higher educational institution should be carried out in general education. The effectiveness of this process is ensured by a number of conditions in the educational process. The main ones are the activation of educational and cognitive activity, taking into account the individual characteristics of students, and the purposeful formation of readiness for obtaining specific empirical and theoretical knowledge. The analysis of readiness for studying in engineering specialties is presented in the scientific research works of Matias Diaza and other foreign scientists [2].

Diagnostics of mental development can be one of the tools for assessing intellectual readiness for study at the institute. Our psychologists consider it the result of mastery[3]. A meta-analysis of students' cognitive abilities by several indicators is presented in the article by Nils Machts.

As noted by Johanna Kayse, Fabian T.C. Schmidt, Jens Moller, mental development includes such components as intelligence, talent, creativity [4]. Mental development is manifested in the level of basic knowledge in academic subjects, the ability to use them to perform various actions and solve problems. In contrast to the statistical norm, which is determined on the basis of the analysis of empirical indicators, the socio-psychological norm is established, the fulfillment of all test tasks is 100%. This allows students to be divided by the level of success according to the objective criterion of proximity to the socio-psychological norm, to identify the features of mental development, to determine the current trends in its development, to predict success, including in vocational education [6]. Test tasks designed to assess intellectual development include tasks for spatial thinking based on metrology and standardization, construction of measuring instruments, metrology basics of measuring devices and elements. The subtests “Analogy”, “Classification”, “Generalization” reveal the ability to perform logical actions and operations with the studied concepts, to move from abstract knowledge to its application in specific situations [7].

Training of specialists in vocational education institutions, carried out in accordance with the state educational standard of higher education, involves the student's acquisition of a number of competencies. Competencies are divided into three: universal, covering general professional and special professional competencies. Developed competencies provide a well-developed personality and a professional in a particular field [8]. General professional and special professional competencies develop professionally important abilities and qualities. General professional competencies are mandatory for all areas and specialties specified in the state educational standard of higher education. Special professional competencies are the same for areas specified in the main educational program. There are also professional competencies that are developed independently by the educational institution, based on the needs of the professional field, labor market, socio-economic indicators, etc. General professional competencies and three special professional competencies are formed in the training of undergraduate students in the specialty 60710800 - "Metrology and Standardization".

Engineering education involves preparing students to solve technical and technological problems, which requires mastering a system of technical concepts, the corresponding images and ideas. This

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determines the professional structure, and technical thinking is seen as a unity of three components, the current level of development of the ability to work with concepts and images is an important component of readiness to master the subjects of the professional curriculum and, as a result, the development of the professional skills of an engineer. In the process of online education, an objective assessment of general readiness for learning, its motivational, organizational, communicative and intellectual components becomes very relevant, since the set of usual tools that a teacher can use to organize and stimulate students' educational activities is sharply limited and has changed radically. At the same time, there are new opportunities for objective assessment, rapid control, individualization of training.

Increasing the effectiveness of professional training of engineers, taking into account the specific features of distance learning. In particular, the authors have developed a system of test tasks in a digital educational program designed to develop general professional and specific professional competencies.

The special course "Metrology, Standardization and Certification" helps to develop students' general professional competencies. Special attention should be paid to the development of typical problems of professional activity based on the laws of specialized disciplines and metrology, as well as logical thinking. In addition, having mastered the material, first-year students should develop the ability to apply modern technologies in professional activity, justify their use. The special course "Metrology, Standardization and Certification" is studied at the very beginning of training and becomes the basis for its further development.

Therefore, it not only expands professional knowledge, but also lays the foundation for skills for more complex disciplines. This course develops elementary skills for conducting further experimental research in professional activities.

The study included three stages. In the first stage, students completed a test on the content of the first section of the special course "Metrology, Standardization and Certification" (at the end of the 6th semester). At the beginning of the second section of the course, students independently completed a test created using cloud technology as a training to develop the ability to perform mental operations. The test results were presented in the form of the number of correct answers of students for individual subtests and the percentage of correct answers for the number of tasks.

To identify areas for improving the effectiveness of online education and implement an individual approach, students were divided into small groups according to their level of mental development and socio-psychological closeness, all based on standard requirements, and five small groups were identified for each.

Analysis of the structure of abilities showed that the results of the first two subtests, which are diagnostic of the mastery of scientific and cultural concepts, are almost the same in all four subgroups and differ significantly for the worse only in the subgroup of unsuccessful students. Excellent students performed the generalization of concepts and verbal tests best; spatial thinking indicators were somewhat unsatisfactory. Students with good mastery could not perform mental operations on similarity, while their results in all other subtests showed that they were very close to the socio-psychological norm, and they outperformed excellent students in subtests on spatial imagination. In the subgroup of average students, tasks requiring verbal-logical and spatial thinking were performed at approximately the same average level. Students with satisfactory and unsatisfactory mastery are characterized by insufficient work on themselves, low ability to work with images, and a very low level of development of the ability to generalize.

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Conclusion: The relationship between the level of students' knowledge of scientific concepts, the development of their mental abilities and the ability to perform mental actions was shown. The use of mental development tests allows us to obtain a general assessment of the intellectual readiness of students to master the content of professional disciplines, creates a basis for the implementation of professional success and indicates directions for individualizing training. Identifying subgroups of students who differ in the level of readiness for study at the institute can be the basis for a differentiated approach to selecting content. It seems appropriate to organize additional classes for third-year students on the development and formation of general and professional intellectual abilities. Another direction of scientific and methodological work should be the improvement of methods for assessing intellectual readiness, in which it is important to combine the content of test tasks and the requirements for technical thinking and engineering knowledge. The test for assessing intellectual readiness should consist mainly of concepts related to the content of the main professional disciplines.

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