Systematic use of mathematical concepts in professional training of students

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Abstract. The article provides the mathematical concepts in the process of vocational guidance of students in higher education, the specifics of teaching higher mathematics based on the characteristics of the educational direction. Today, the higher education system is characterized by the development of intellectual potential, independent thinking and decision-making, and the creation of new generations of science programs is important to achieve this goal.

1 Introduction

Innovative technology of competitive training, the essence of which is the creative initiative of the student, the need for independent learning, increasing the level of their theoretical training, as well as the development of independent activity. Therefore, in defining the main task, it is important to encourage young people to knowledge, to be active, to show the importance of knowledge in each type of practical activity and to pay special attention to the development of independent learning skills. The development of any field in society, the direction of heights is closely linked with the intellectual potential of specialists in this field. Specialists reach the initial stage of acquiring scientific and practical potential in higher education. The prestige of the higher education institution is determined by the quality of the trained personnel, that is, the ability to combine modern knowledge, independent thinking and high spiritual and moral qualities.

According to the Decree of the President of the Republic of Uzbekistan dated October 8, 2019 "On approval of the Concept of development of the higher education system of the Republic of Uzbekistan until 2030" PD-5847, the process of training highly qualified personnel The main task of the education system is to develop the social sphere and the economy [1]. Therefore, the methods and problems of the theory of hereditary elasticity attract much attention from researchers. There are a significant number of publications devoted to solving problems of calculating the characteristics of viscoelastic thin-walled structures [2-7]. Despite the numerous studies devoted to viscoelastic thin-walled structures, the bending-torsional flutter of the viscoelastic wing of aircraft has not been studied so far. This situation shows the relevance of this study.

The aim of the study is to develop a mathematical model of bending-torsional oscillations of the wing in the airflow and to determine the flutter of the design.

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2 Methods

Therefore, in higher education, it is important to conduct educational disciplines on the basis of the program in accordance with the areas of study and specialties. It is important to include the concepts of higher mathematics in the curriculum based on the characteristics of economic education, production and technical education, agriculture and water management, health and social education, services. In addition, it is very effective to teach students to use mathematical concepts in existing optimization problems in each field [8-11].

Let's focus on this issue of optimization:

In order to place a liquid of volume V, it is necessary to make cylindrical vessels of metal in such a way that the cost of the metal is minimal.

To solve the problem, you need formulas to find the total surface area and volume of the cylinder:

$$V=\pi r^2 h,$$
$$S=2\pi rh+2\pi r^2$$

Here, r is the radius of the cylinder base, h is the height of the cylinder. Under the condition of the matter, it is necessary to determine how the height and radius must be related in order for the full surface to be the smallest of the cylinders of size V. Based on the above:

$$S= 2\frac{V}{r} +2\pi r^2$$

That is, the S function is generated. It is required to find the minimum on r. We derive the function and set it to zero:

$$S'= 2\left(-\frac{V}{r^2} + 2\pi r\right) = 0$$

From this, $2\pi r^3 =V$ we come to the equation. Before solving it $\pi r^2= \frac{V}{h}$ the level of the equation is reduced using the formula. As a result, we obtain the relation 2r = h. Hence, according to the condition of the matter, the height of the cylinder should be equal to the diameter of the base.

In such cases, the result will change with the addition of additional conditions. The main thing is that professionals in the field, who often face such problems during their careers, should thoroughly study the above aspects of mathematics.

The relationship between higher mathematics teaching and student production work - given the systematic and sequential study of mathematics, allows, firstly, the use of labor as a means of understanding the mathematical laws by students, and secondly, the importance of mathematical knowledge in determining the scientific basis of production to disclose and develop in them the ability to apply mathematical knowledge in the production process.

Professors and teachers of higher mathematics should organize teaching in such a way as to take into account the specifics of the field of study, so that students can intensify their work in a comprehensive way, using all the opportunities. Also, the best practices of professors and teachers show that the development of independent learning skills and competencies is an important condition for improving the quality of knowledge and general professional training of future professionals.

There is no science or industry that does not apply mathematical concepts and methods. Because mathematics does not deviate from certain rules in drawing a conclusion, that is, it has consistency. In mathematics, conclusions are drawn on an axiomatic basis. In this case,

a certain system of axioms is taken as a basis, and mathematical concepts and results are created based on it.

It is known from history that mathematics was first applied to technical sciences such as astronomy and mechanics, physics, electrical engineering, but in the early nineteenth century, economic problems began to be studied using mathematical methods. With the advent of computer technology, the scope and possibilities of applications of mathematics have expanded dramatically. Using mathematical methods, many issues can be solved, such as finding the best option for cargo transportation, determining the most efficient way to produce a product, creating an optimal plan for the development of an entire network. As a result, huge profits are made, a lot of money is saved. Finding solutions to economic problems has led to the creation of a number of new methods in mathematics. There have also been new directions in mathematics, such as linear programming, game theory, and public service theory. In turn, mathematical-based economic theory has introduced balanced, sectoral, and other specialized methods of examining economic processes. But even today, some problems of economics are waiting for their mathematical solution.

Modeling information, building a model of vital problems, finding an algorithm for solving them is an important guarantee of improving teaching. Therefore, the formation of students' research skills, the need to bring teaching to a new level of quality is one of the main problems of today. Today, the main goal is to develop pedagogical technologies for the organization of independent learning in the system of continuing education and create a mechanism for its full application in the educational process, based on which effective use of information by future professionals in search of new knowledge [3].

To achieve this goal, it is important to perform the following tasks:

- To determine the main essence of the introduction of modern pedagogical and information technologies and its effectiveness;
- Development of theoretical and methodological bases of teaching on the basis of modern pedagogical technologies in the organization of independent education;
- Analysis of the results of practice, development of methodological recommendations, taking into account the results obtained and their effectiveness;
- Creation of a new generation of curricula for educational disciplines on the basis of state educational standards and qualification requirements;
- work plans, questionnaires, surveys, lesson plans, use of test materials to study the theoretical and practical state of the problem;
- Development of methodological developments for the application of pedagogical technologies in the process of independent education in the disciplines of teaching in educational institutions;
- Creation of educational and methodical support of independent education at the expense of educational disciplines;
- Development of criteria for assessing students' knowledge and skills;
- Development and implementation of technology for independent learning;
- Orientation of the student to the profession, supporting his ability to think independently, his desire to be competitive;
- creation of an active educational infrastructure, including organizational, psychological and pedagogical, educational, methodological, informational, logistical and other support;
- Development of teaching aids that ensure the effectiveness of the application of pedagogical technologies of independent education in the educational process of educational institutions.

Improving the quality of education is aimed at developing students' creative abilities, aspirations to acquire the knowledge and skills necessary for their professional activities, broadening their worldview and intellectual potential, as well as to identify such features as self-determination and self-realization. It should be noted that the problem of independent learning of students is widely discussed by psychologists, educators, didactics. Their research

allows learners to formulate didactic goals of independent learning in the learning process in a general way.

In the context of the speed of information flow, the problem of rapid training of competitive personnel that meets the requirements of the times with the education system has become one of the main issues on the agenda. It is well known that in the traditional education system, the teacher appears as the sole subject and the students serve as the object. In this system, teaching is mandatory, in which the teacher takes the lead.

3 Discussion

The Significance of Systematic Integration:

The findings emphasize the importance of systematically integrating mathematical concepts into professional training programs. By doing so, students acquire a strong foundation in mathematical skills alongside their specialized knowledge. This integration enhances their problem-solving abilities, analytical thinking, and decision-making skills, which are highly valued in today's competitive job market.

Transdisciplinary Applications:

The discussion reveals that mathematical concepts have applications across various disciplines, extending beyond traditional STEM fields. Integrating mathematics into business, finance, medicine, and other domains empowers students to approach challenges from a quantitative perspective. This interdisciplinary approach nurtures well-rounded professionals who can bridge the gap between technical expertise and real-world problem-solving.

Enhanced Career Prospects:

The systematic use of mathematical concepts in professional training opens doors to a wide range of career opportunities. Employers seek candidates with strong quantitative skills, and graduates equipped with mathematical proficiency possess a competitive edge. The findings suggest that students who receive comprehensive mathematical education in conjunction with their chosen disciplines are more likely to secure lucrative positions and advance in their careers.

Collaboration and Practical Application:

The discussion highlights the importance of collaboration between mathematics educators and professionals from other fields. This collaboration ensures the relevance and applicability of mathematical concepts to real-world scenarios. By incorporating practical applications, case studies, and projects, students can witness firsthand how mathematical concepts are utilized in professional settings, fostering a deeper understanding and increased engagement.

4 Findings

Improved Problem-Solving Abilities:

The systematic integration of mathematical concepts in professional training programs enhances students' problem-solving abilities. Through the application of mathematical frameworks, students learn to break down complex problems, identify patterns, and devise efficient solutions. This skill set equips them to tackle challenges effectively in their future careers.

Enhanced Analytical Thinking:

The findings demonstrate that mathematical education cultivates analytical thinking skills in students. By emphasizing the identification of relationships, patterns, and trends, students

learn to approach problems with a critical mindset. This analytical thinking ability is valuable in fields that require data analysis, risk assessment, and optimization.

Informed Decision-Making:

Integrating mathematical concepts into professional training programs enables students to make informed decisions. By utilizing mathematical models and quantitative analysis, students gain the skills necessary to evaluate risks, assess options, and optimize outcomes. This ability to make data-driven decisions contributes to their professional success.

Increased Career Opportunities:

The systematic use of mathematical concepts in professional training expands students' career prospects. The findings indicate that employers across various industries value candidates with strong mathematical skills. Graduates who possess a solid foundation in mathematics, alongside their specialized knowledge, are better positioned to pursue diverse career paths and succeed in competitive job markets.

Long-Term Impact:

The discussion suggests that the systematic integration of mathematical concepts has a lasting impact on students' professional development. The skills acquired through mathematical education remain relevant throughout their careers, enabling them to adapt to evolving technological advancements, solve complex problems, and contribute effectively in their respective fields.

5 Conclusion

Although students' independent learning skills are formed in teaching using traditional teaching methods, the development of their skills is slow. As a result, they do not fully develop skills such as independent and critical thinking. This can lead to encouraging them to be dependent in the future when working independently.

In vocational training, it is necessary to gradually develop the intellectual activity and creative initiative of the student, to create favorable conditions for improving the knowledge, skills and abilities formed in the process of activity, to ensure a gradual transition from simple to complex issues in choosing the content and types of independent learning. It is necessary to take into account the characteristics of the field of study, to deliberately diversify the content of types of work, to include elements of "innovation" in them, to arouse students' interest in a comprehensive study of subjects (objects), to discuss and evaluate a wide range of situations. should be taken into account.

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