PROBLEMS OF PERFECTION OF SYSTEM OF MASTERING OF ENGINEERING DISCIPLINES ON THE BASIS OF COMPETENCE APPROACH (AS A SAMPLE OF "MATERIAL RESISTANCE" SUBJECT)

NabievAbdimital
Professor of Tashkent Chemical-Technological Institute, Candidate of Technical Sciences

ABSTRACT

The following article deals with modern requirements of competitive engineering and technical personnel in the framework of a competency-based approach to the theory and practice of education in the modern information economy in the world. It also explains the forms and content of the competency-based approach (module), which is supposed to be acquired in the course “Material Resistance”.

Keywords: Competency, ccompetence-based approach, basic competencies, educational technology, innovation, didactics, design, durability, fixity, stability.

INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

In recent decades, competence-based diversification has become increasingly important in the theory and practice of education. The conceptual aspect of postgraduate study is that competence focuses on the ability of students to demonstrate their personal qualities in solving critical engineering problems or issues during their early years of independent work, such as direct pedagogical or masters participation or early life.

The meaning of the word "Competence" commonly used in vocational education is that the future specialist (employee) can independently demonstrate his or her personality in the practical work of solving problems in life, based on his life experience, values and inclinations should be understood as a set of abilities.

Now, let’s analyze existing pedagogical problems and competence requirements of students for the development of science in the field of teaching and learning processes in engineer training as a sample of "Materials Resistance" and "Mechanical Engineering" subjects based on the competent approaches.

Naturally, as science, technology is being developed rapidly; the need for competitive engineering personnel is increasing. While the scope of engineering requires a scientific and creative approach, it plays an important role in finding urgent solutions in key areas, such as the creation of new modern engineering structures (buildings, residence, machines) and the efficient use of existing ones, improving technology and the scientific organization of labour, which means that the word “engineer” in Latin means (ingenium) creativity and ability.

“Materials resistance” subject is studied almost as a prior subject of all technical disciplines in higher education institutions in the field of construction, transport and training of highly competitive engineers in the areas of mechanical engineering, aircraft construction, automotive, metallurgy, chemistry and technology.

All designs and parts (core, roller, and frame, arch) including steel, iron, copper, wood, stone, brick, glass, plastic, and alloys, are resistant to external loads and temperatures and are naturally safe. It is necessary and sufficient to meet the constructive requirements known as durability, refinement and priority. Usually, the ability of external loads and temperature structures to maintain the original elastic equilibrium at a time when there is not enough strength, resistance to deformation or displacements to withstand or break down without breaking.[1]

On the basis of these constructive requirements, the competence of the teaching staff of "Material Resistance", which is a general engineering discipline that combines designing and computational methods, is aimed at perfect solution of vital scientific and pedagogical tasks and problems. In particular, their competence is:

(a) Determination of the internal force, voltage, deformation and displacement that occur in specific, especially dangerous parts of the structural components;

(b) Determining the necessary, reliable and usable dimensions to meet constructive and economic requirements;

c) Finding of the greatest forces (loads) to ensure safe and reliable operation of the components on the basis of the given dimensions, as well as education and training.

Competence of students is also important in the achievement of such priorities in the educational process. In particular, it should be noted that in the process of mastering all engineering disciplines in accordance with the requirements of the current state educational standards (DTS) it is planned to develop and gradually develop relevant knowledge and skills, as well as experience of independent activities and their personal qualities and responsibilities. As a rule, such views are the competences in education and are directly related to the quality and effectiveness.

Indeed, assimilated and faith-based knowledge, skills, qualifications, and acquired competencies are both permanent and guaranteed results of education in engineering fields. To be more precise, a set of abilities that allow the design, computation and design of structural components should be rigid, sophisticated, and prioritized from the ability or competence to master the “Material resistance” subject in engineering practice.

It is desirable to classify the forms and contents of the competence-based approach (module) on the four interrelated areas.

1. Students' competence to implement the tools of action including several interrelated components:

- Competence of using basic knowledge - the ability of the student to apply general knowledge in the disciplines studied and mastered before this subject (especially mathematics, physics of solids, theoretical mechanics, material science, etc.);

[1] Nabiev A. “Materiallar qarshiligi” // Textbook. Second edition. “Yangi asr avlodi”–T.: 2008. 380 p.
Nabiev A. “Materiallar qarshiligi” (theories and tasks) // textbook. Third edition. “Navro’z” pree, –T.: 2019. 412 p.;
Горбунов В.Ф. Изучай сопротивление материалов самостоятельно//Учебное пособие. –Иркутск: Изд-во ИрГТУ, 2008. –162 с., ил.

- Competence of using methodical and logistical support - ability of the student to use existing textbooks, manuals, methodical development, Internet materials, teaching and laboratory and practice equipment;

- Communicative competence - automated computation of parameters of verbal and written language in the state or relevant foreign languages, as well as computer, in particular, one of the automated designing systems for parts or components - AutoCAD (Compass). It is the ability of using communication technologies to communicate with software;

- Socio-information competence - the ability of the student to master information and communication technologies, to collect, summarize and analyze the necessary educational materials through the Internet, as well as to critically analyze social information through the Internet;

- The competence of the media (technical practice device) is the main competence of the century, such as finding relevant books and magazines in Information and Resource Center, receiving news from the Internet, television and radio stations, posting messages on the Internet portal and carrying out activities;

- Problem solving competence - solving problems related to designing and computing processes (such as problem or example, plotting, experimental determination of mechanical sizes) by the student on the strength, precision and priority of engineering structures, after the analysis of results. Demonstrate and sufficiently present the ability to interpret and synthesize.

2. The basic vocational competence in student activity consists mainly of:

- Competence to demonstrate knowledge. It is the student's ability to demonstrate knowledge while learning the subject within existing state educational standards (DTS), curricula and plans;

- Cognitive competence - the student's interest and aspirations for the continuous development of his / her educational level, the need for personal capacity building, the desire to solve vital issues and problems in the field of independent learning, and the ability to systematically acquire new knowledge and practical skills;

- Competence of module or sectional analysis - in this way a student can understand basic projecting-calculating formulas and technological aspects of the process along with logical reasoning, as well as learn the secrets of static equation formation and necessary parameters;

- Competence of using theoretical and experimental methods based on the research method and subject of the student, here the student will be able to effectively use equations of formulas and static equations and the parameters or diagrams identified in the experiment to solve practical problems, formation and development of acquisition skills;

- Informational competence - the ability of the student to collect, systematize, summarize and analyze theoretical and practical information from the various sources (educational and methodological support and the Internet);

-Competence of quality and efficiency evaluation of results - student's theoretical (correct, optimal, prompt use of mathematical apparatus in the development of basic design and calculation formulas on the case of tension and deformation of the structural parts), practical (for example, problem solving, plotting and project work), and experience (not testing materials or components in teaching and laboratory equipment) identifying with the main mechanical parameters, taking up a mechanism to evaluate the quality and effectiveness of the results of the aptitude to be provided.

3. Now that we have the basic skills that are part of the “Competence Formation Competence” that are directly relevant to student activity:

- Professional skills - design and read sketches, schematic, empirical and experimental diagrams independently within engineering requirements, construct diagrams of internal forces and voltages, based on the design, calculation and calculation of durability, specificity, and

priority conditions, ability to perform and protect the drawing, analyze the economic performance of the production;

- Didactic Skills - publications (handout material, technological map, slides, posters, paintings, charts, tables, etc.) and tools for defining internal forces and voltages in the form of tangible and complex deformations, independently expressing specific learning objectives and application of information technology (diaprojector, graph projector, film projector, video recorder, computer, electronic board, etc.);

- Constructive and technological skills - development of design and computational drawings of the design and components based on the basic constraints on "Material Resistance" subject, measuring devices, test machines or mechanisms in laboratory conditions, with strict adherence to routing tests. Also, it is the ability of experimental determination of the basic mechanical properties of materials by means of equipment such as technical and technological equipment, as well as the stability of the structural parts; the development of a mechanism to calculate the inventive design work, as well as the ability to apply scientific-research works;

- Special skills - ability to master material resistance and other necessary disciplines on the basis of the Network Education Program appropriate to these activities when there is a need for further professional or related occupations within any particular industry.

It is important to note that each student must also have the ability to work with individuals or within a team within the “Competence Formation Competence”, in the essence of the problem.

4. Also, the main components that are relevant to the students activities such as “Practical knowledge”, “Practical knowledge”, “Inventive, constructive and research tendency”, “Striving for achievement of goals”, “Quality and efficiency responsibility” in the “System practical scientific competence” which is directly related to student activity "," Collecting and implementing new innovative ideas" are taken into consideration.

Now, along with mastering the "Resistance to Materials" step by step we outline the most important general requirements for students' knowledge, skills and competencies:

- Knowledge Requirements are definition of minimum requirements within the requirements of (DTS), curriculum and syllabus, defining the content of a subject, the subject of the research, history of development, disclosure of the essence of continuity in theoretical, practical and experimental aspects of science; the purpose and objectives, the essence of the using method, the understanding of the processes of co-ordination, the methods used in the design-calculation of the structural components, the durability, the refinement, the priority, differentiating the essence and content of the program, the programmatic and didactic possibilities of science, the information and pedagogical technologies that are used in the educational process, and others;

- Requirements of skills and qualifications are the followings: analyzing and implementing teaching, methodological and logistical support based on the requirements of the curriculum, the ability to use didactic principles, the use of forms, methods and tools directly related to science, with the help of a teacher. In the early stages of design-computing the durability, clarity, priority in the learning environment is a computational model is formed that corresponds to the actual appearance and operation of the design or components. Schematic representation of supports, compilation of static equations representing necessary and sufficient equilibrium conditions, calculation and validation of base reactions, construction of internal stresses using manual or Mathcad software, and detection of hazard cross section, voltage-deformation conditions are also can be included there. The ability to generate and apply appropriate formulas while analyzing mechanical and technological processes is consistent with a static, geometric and physical approach to the problem; ability to synthesize the results correctly, to solve the problems of computational formulas and examples of their application, to apply design-computing methods and techniques in combination with modern pedagogical

technology, interactive methods and innovative methods, Internet materials, the use of teaching and laboratory equipment, the use of methods to control and evaluate the acquired knowledge are important for qualification;

- Competence Requirements - based on practical experience, skills and knowledge in addressing engineering problems directly related to a profession, through targeted actions such as:

- To solve constructive problems in the form of static, geometric and physical approaches to the problem of research methods, and to solve the problem-solving problems, including the determination of the force and deformation parameters required in the synthesis process;

- Experiments on equipment such as measuring apparatus, test machines or mechanisms, directly technical and technological equipment, and experimental design of the elasticity, plasticity and energy properties of materials, deformation and displacement and stresses of shafts, beams and frames, and Analytical summarization and synthesis of computed results;

- Statistical, geometric and physical approach to the problem in the design of bars (shafts, beams, bars) and calculations of durability and dampness, including the results of the "Brainstorming", "Networks" method, "Cluster", "Case Study" "Boomerang", "Scales" and "FSMU". Also, using Mathcad software within the framework of computerized learning technology, systematic acquisition of control mechanisms based on normal and impact voltages and voltages, identifying reactions on supports, constructing internal stresses and voltages and thus finding dangerous cross sections;

- Analytical study of Internet materials in the context of independent education and their rational use in education, active participation in inventive-design and research areas;

- To demonstrate the professional qualities and abilities of the universal, as well as master the mechanism of objective, prompt and fair evaluation of the quality and effectiveness of theoretical, practical and experimental results.

The conclusion summarizes the following problems

As with many other technical publications, most of the existing literature (textbooks, manuals and methodological developments) in the field of "Resistance to Materials" is not fully, systematically, and not clearly related to student activities.

Also, some educators, who do not have sufficient pedagogical skills and capacity in higher education institutions underestimating the importance of a professional competence approach in education. As a result, there is still a shortage of competitive results in the field of competitive human resources.

Given that core competencies are an important quality of competence-based training, special attention should be paid to the systematic organization and maintenance of education based on the competence-based approach.

This is because the development of basic skills and competencies is achieved through the use of such a well-grounded and proven competence-based approach, such as the introduction of individualized learning. It is clear that the core competencies are the responsibility of the individual student, the future specialist (staff), for the effective performance of their specific professional activities, reliability, independence, flexibility, creativity, efficiency, the use of innovative ideas as a number of professionally important qualities such as decision making - have a positive impact on their abilities and real educational experience.

REFERENCES

1. Organizing training courses for teachers on "Competence approach in education";

2. Continuous strengthening of the use of new pedagogical technologies within the competence-based approach to education;

3. Taking into account the requirements of the competence-based approach to the creation of a new generation of educational literature;

4. It is advisable to clearly define competences in the curriculum and follow them closely in the learning process.