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PEDAGOGICAL CONDITIONS FOR IMPROVING STUDENT'S COMPETENCY IN THEORETICAL MECHANICS

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Annotation: The article is aimed at identifying the pedagogical conditions for improving student's competency in theoretical mechanics. It discusses the goals and objectives of the theoretical mechanics course, the role and importance of this subject in training engineering specialists, the organizational, methodological, psychological-pedagogical factors that ensure effective learning of theoretical mechanics, as well as methods for developing theoretical-mechanics-related competency through the use of digital technologies.

Keywords: Theoretical mechanics, knowledge, skill, competency, digital technology, digital educational technology, pedagogical condition, organizational-pedagogical, psychological-pedagogical, didactic condition, web platform, calculation and graphic work**.**

Introduction: In modern era, the development of digital technologies and their widespread application in all spheres necessitate the identification of pedagogical conditions for teaching the discipline "Theoretical Mechanics," which is one of the fundamental subjects taught in technical universities, as well as the development and improvement of students' competency in theoretical mechanics through the use of digital educational technologies. Since one of the goals and objectives of modern education is the transition from students who have merely acquired deep knowledge to students with a high level of competency, this has become a societal requirement [1]. The purpose of teaching the discipline "Theoretical Mechanics" to undergraduate students is to ensure their ability to independently solve various problems and assimilate innovations that arise in the process of future scientific and technological progress. In addition, studying the discipline "Theoretical Mechanics" should contribute to broadening the worldview of future bachelors, developing their thinking, and forming the ability to apply theoretical knowledge to solving practical problems related to their specialty.

Main part: In this article, pedagogical and psychological literature, various scientific studies, and articles dedicated to the pedagogical conditions for developing students' competency in theoretical mechanics were studied and analyzed, and conclusions were drawn based on them. Research on these topics has been conducted by scholars such as Z.T. Rakhimov, A. Parmonov, Y.N. Gryadunova, T.N. Gubina, N.L. Krilova, and B.Kh. Khodjaev [1–6].

Pedagogical conditions for developing students' competency in theoretical mechanics are understood as organizational, methodological, and psychological-pedagogical factors that contribute to the formation of their theoretical knowledge in the subject, practical skills, and the ability to solve problems related to theoretical mechanics. For the effective organization of this process, the main pedagogical conditions can include organizational-pedagogical, psychological-pedagogical, and didactic conditions.

Organizational and pedagogical conditions include ensuring the educational process based on relevant normative documents, namely state educational standards (SES), the curriculum, and the study program, using didactic, technological, and informational resources, educational and methodological materials, digital resources, and electronic publications. In addition, an important condition for increasing the effectiveness of the educational process is equipping classrooms for

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students with modern computer devices, Wi-Fi networks, interactive whiteboards, and other digital tools [8].

Didactic conditions for developing subject-specific competency include improving curricula, modernizing programs, that is, developing a model study program for the discipline "Theoretical Mechanics" based on open educational resources from leading foreign universities, providing educational and methodological support focused on student-oriented learning content, using interactive teaching methods, and improving the system for assessing students' knowledge in the subject. This also includes updating the content of state educational standards, curricula, and textbooks in educational institutions of the Republic of Uzbekistan, effective use of electronic educational resources, and improving the education and training system based on digital technologies. Ensuring an effective educational process in the disciplines "Mechanics" and "Theoretical Mechanics" is a necessary didactic condition [9].

Pedagogical conditions are aimed at increasing students' and teachers' interest in the subject and improving teaching methodology using digital technologies. Universities can develop subject competency by applying the teaching methodology of theoretical mechanics in the fields of mechanics and engineering, mechanical engineering technology, and mining, using professional tasks, non-standard tests, creative assignments, and independent learning (for example, the Plepping approach, etc.).

Psychological and pedagogical conditions for improving the education system are also important factors aimed at increasing learning efficiency. These conditions include the development of independent learning, organizing student activities, students' success in creative assignments, visualization of a student-centered and individualized learning process, prioritizing students' independent work, forming goals and values, developing a self-improvement mechanism, creating a system for managing independent activities, and providing psychological and pedagogical support to students in stressful situations. To achieve this, it is necessary to effectively organize students' independent work. Updating methodological manuals for performing calculation-graphic tasks in the discipline "Theoretical Mechanics" and monitoring the completion of assignments is important for developing subject competency. Each student, while completing a particular task, forms the necessary knowledge to study the subject. At this stage, students acquire scientific knowledge, learn to work with literature, and independently find the necessary information. The presentation of educational material, as the main form of teaching, should be scientific, systematic, clear, conscious, and active, ensuring solid knowledge acquisition and taking into account students' personal characteristics. At the same time, a high level of competency of the teacher in students' developmental psychology and their mental state is important. As is well known, the educational process in technical fields is associated with intellectual development, and students must master scientific and technical knowledge, as well as relevant skills, abilities, and competency [11].

Thus, the pedagogical conditions for developing students' competency in theoretical mechanics have been considered. To develop students' competency, it is important to design study assignments for lectures, practical, and laboratory classes using a creative approach aimed at forming knowledge, skills, abilities, and competency. Preparing assignments that promote the development of creative thinking in students helps future engineers develop creative thinking and understand the essence of problems. A large volume of textual information is difficult for students to assimilate, so in modern conditions, presenting textual information in a graphical

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form is required. Converting educational information into a graphical format, presenting data as models, diagrams, tables, charts, clusters, and mathematical, physical, and geometric forms is advisable. Such a presentation of information is effectively perceived by students.

When working with interactive methods, students can systematically and comprehensively assimilate educational information. For example, when explaining different types of force systems to students, a cluster diagram of forces can be used (Fig. 1). It is also possible to present the conditions of equilibrium of a body under the action of various forces in the form of a table (Fig. 2) [1].

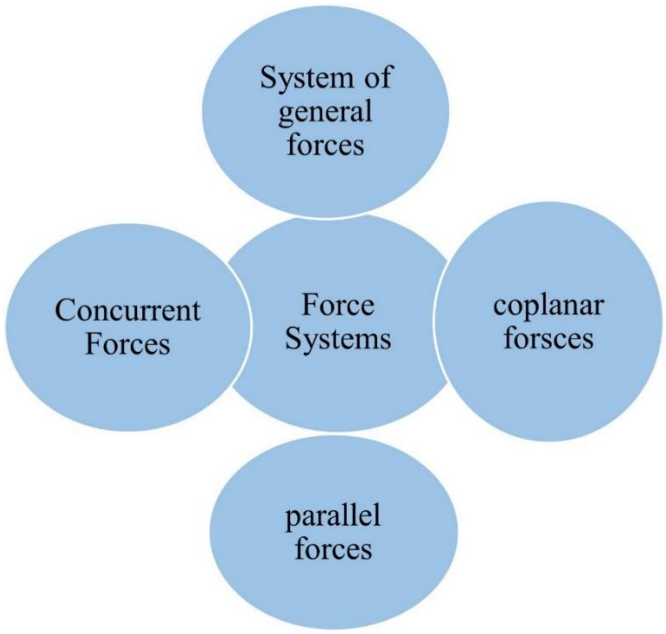
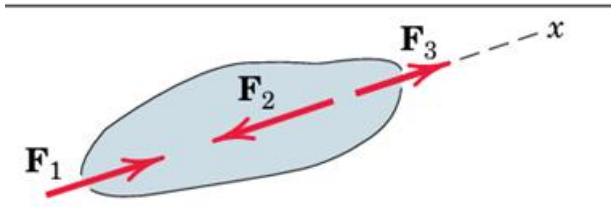


Fig. 1. Cluster representation of the names depending on the arrangement of the lines of action of forces in a system of forces.

CATEGORIES OF EQUILIBRIUM IN TWO DIMENSIONS		
Force System	Free-Body Diagram	Independent Equations
Collinear		$F_x = 0$

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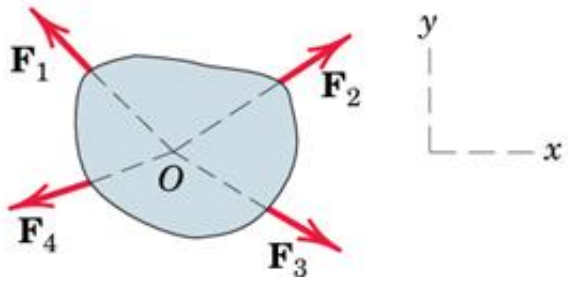
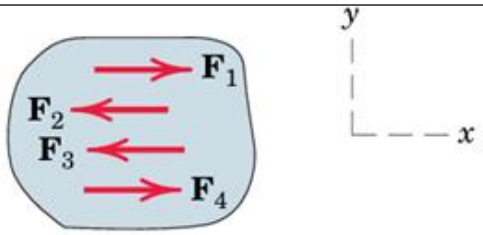
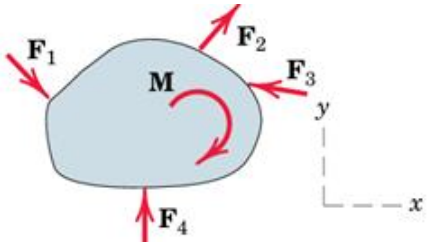
Concurrent at a point		$F_{kx} = 0,$ $F_{ky} = 0$
Parallel		$F_{kx} = 0,$ $m_z(\overline{F}_k) = 0.$
General		$F_{kx} = 0,$ $F_{ky} = 0,$ $m_z(\overline{F}_k) = 0.$

Figure 2. Table of equilibrium conditions of a body under the action of various forces in a plane.

Conclusion. Based on the study and analysis of pedagogical literature and scientific research, the necessary pedagogical conditions were examined, and taking into account the specified requirements, the pedagogical conditions for developing students' competency in theoretical mechanics were identified.

- In accordance with the State Educational Standards for organizing education in the educational institutions of the Republic of Uzbekistan, update the curriculum and the content of textbooks for the subject "Theoretical Mechanics."
- Improve the teaching methodology of theoretical mechanics for the fields of Mechanical and Engineering Sciences, Mechanical Engineering Technology, and Mining through the use of digital educational technologies.
- Create a distance learning platform for the subject of theoretical mechanics.
- Ensure an effective learning process when explaining lecture, practical, and laboratory-experimental sessions in theoretical mechanics to students by applying modern educational technologies.
- Use electronic educational resources effectively and purposefully in the educational process.

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- To develop competency in theoretical mechanics, explain theoretical material during lessons by linking it to real-life events and phenomena.
- In the subject "Theoretical Mechanics," identify profession-oriented problems, solve them, analyze results, and draw conclusions.
- Updating methodological guides for completing independent assignments in the subject **"**Theoretical Mechanics" and monitoring the completion of these assignments are important aspects in developing competency in this discipline.

References

1. Muslimov N.A., Usmonboeva M.H., Sayfurov D.M., To'raev A.B. Pedagogik kompetentlik va kreativlik asoslari – Toshkent, 2015. –120 bet.
2. Xodjayev. Umumiy pedagogika nazariyasi va amaliyoti. Darslik. - T.: «Sano-standart» nashriyoti, 2017-yil, 416 bet.

3. Рахимов З.Т. Ўқув-билиш компетентлиги касб таълимининг таянч компетенцияси сифатида // Таълим ва инновацион тадқиқотлар (2021 йил №6) ISSN 2181-1709 (P)DOI:
4. Parmonov A. Organizational and pedagogical conditions for the formation of information and technical competency of students on the example of theoretical mechanics. // Current research journal of pedagogics. – 2023.- №4(5). – p.28-32.
5. ГРЯДУНОВА Е.Н. [и другие]. Методы компетентностного подхода в техническом образовании. Ученые записки Орловского государственного университета. Scientific notes of Orel State University. Vol. 1 – no. 86. 2020.
6. ГубинаТ.Н. Педагогические условия формирования информационно-технологических компетенций будущего учителя математики и информатики. // Автореферат разослан «24» ноября 2009 г.
https://doi.org/10.53885/edinres.2021.39.16.083.
7. Крылова Н.Л. Формирование профессиональных компетенций техника-механика в партнерстве с предприятиями нефтегазовой отрасли.// Автореферат диссертации на соискание ученой степени кандидата педагогических наук. - Казань 2013.
8. O'.J. Yo'ldoshev O. [va boshq.]. Umumiy pedagogika. –T.: «Fan va texnologiya», 2017, 376 bet.

9. Musurmonova O. [va boshq.]. Umumiy pedagogika. Qism I: darslik / - Toshkent: Yoshlar nashriyot uyi, 2020. - 376 b.
10. Рахимов О.Д., Турғунов О.М., Мустафаев Қ.О., Рўзиев Ҳ.Ж. Замонавий таълим технологиялари /Тошкент, "Фан ва технология нашриёти", 2013й., 200 б.
11. Atayeva N, Salayeva M, Hasanov S. // Umimiy pedagogika (Pedagogika nazariyasi va amaliyoti asoslari). O 'quv qo 'llanma. II –"Fan va texnologiya". 2015, 800 b.