

AN EFFECTIVE WAY TO ASSESS STUDENT KNOWLEDGE

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Abstract

The use of modern methods in the evaluation of theoretical mechanics in higher educational institutions is an important task. The proposed method for fair determination of students' knowledge level and increasing their activity in classes using the method of interactive confused logical chain. By using the method for one subject, section and whole part of theoretical mechanics, it is shown that it is possible to evaluate the level of students' knowledge fairly, transparently and quickly.

Keywords: theoretical mechanics, statics, kinematics, dynamics, force, equation, center of gravity, axis of symmetry, plane of symmetry, motion, speed, acceleration, rotational motion.

Introduction

Nowadays, great changes are being made in the field of education all over the world. In particular, the number of students of higher educational institutions and the number of educational fields is constantly expanding and increasing. Our opinion is evidenced by the addition of 5 more state and non-state higher educational institutions to the existing 3 higher educational institutions in Namangan region alone. Therefore, the increase in the number of students makes it necessary to provide them with quality education and to use methods of fair, quick and transparent assessment of the level of knowledge. Therefore, the issue of using the recently widely used confused logical chain method in science training is urgent.

Pedagogical scientists have conducted many studies on effective teaching of students based on advanced pedagogical technologies. Organization of classes using Venn diagrams in lectures and practical sessions is presented in works [1,4,5,6,18]. Practical solutions are given in the work [3] on increasing visibility in classes by organizing the lesson process based on the cluster method. Researches [2,9,12,15,16] have been conducted on methods of increasing student activity. Studies on the assessment of the level of knowledge of young people using the method of confused logical chain are given in works [7,8,11,13,17, 20].

The method of "confused logic chain" has become one of the most effective methods for determining the level of students' knowledge of theoretical mechanics. This method is distinguished by ease of use within one subject of science, in the process of conducting intermediate evaluation, and in the stage of conducting final evaluation. When using this method, the student is able to combine concepts related to the studied topic such as formulas, phrases, definitions, theorems related to the science of theoretical mechanics with information on several studied topics, and to match the correct ones from among them. should be able to. In this case, the set of facts related to the topic is presented to the attention of students in a case where the chronological order of cause and effect is confused (broken). Students should be able to correctly place the task in order.

Let's see the application of the method in the teaching process of the topic "Center of gravity of a solid body" of the statics department of theoretical mechanics. Information about quantities and formulas on the subject is provided by the method of confused logical chain. The teacher distributes a copy of the table corresponding to the number of students in the audience to the students of the group. After studying the given table in detail, students write down the answer number for each question listed on the left and the corresponding number on the right. Then the teacher collects the answers from all the students, checks them and announces the results. Below is a table corresponding to the above topic.

Determine compatibility:

| | | | |
|---|---|---|--|
| 1 | Show the formula for determining the center of gravity? | 1 | $x_c = \frac{\sum l_k \cdot x_k}{\sum l_k}, \quad y_c = \frac{\sum l_k \cdot y_k}{\sum l_k}, \quad z_c = \frac{\sum l_k \cdot z_k}{\sum l_k}$ |
| 2 | Show the formula for determining the center of gravity of a line? | 2 | $\vec{r}_c = \frac{\sum \vec{F}_k \cdot \vec{r}_k}{\sum \vec{F}_k}$ |
| 3 | Tell me the methods of determining the center of gravity? | 3 | If a solid body has a point, axis or plane of symmetry, its center of gravity necessarily lies on this point, axis or plane of symmetry. |
| 4 | Where is the triangle's center of gravity? | 4 | At the point of intersection of the medians of the triangle |
| 5 | What is the essence of the symmetry method? | 5 | <ol style="list-style-type: none"> 1. Symmetry. 2. Fragmentation. 3. Filling (negative surfaces). 4. Integration. 5. Experience (attraction). |

Correct answers (2,1,5,4,3).

We will now use the method of entangled logic chain for a branch of theoretical mechanics - the branch of statics. The results of this score can be used to test students' knowledge in a non-traditional way to determine the level of mastery of the studied unit by the student and to determine midterm assessment scores. In this case, the number of questions will be more compared to the assessment of one subject. Because the higher the number of questions, the higher the level of objectivity. At the beginning of the academic year, professors of the department create a bank of questions, which are regularly filled and improved. Below is the table covering all the topics of Statics of Theoretical Mechanics:

Determine compatibility:

| | | | |
|---|---|---|---|
| 1 | Show the formula for calculating the moment of force about a point? | 1 | $F_{ish} = f \cdot N$ |
| 2 | Write the conditions of analytic equilibrium of a system of space meeting forces? | 2 | $\sum F_{kx} = 0, \quad \sum F_{ky} = 0,$ $\sum m_o(\vec{F}_k) = 0$ |

| | | | |
|----|--|----|--|
| 3 | State the fundamental theorem of statics? | 3 | If a body is in equilibrium under the action of three forces lying in the same plane, which are not parallel to each other, the lines of action of these forces intersect at one point, and the force triangle formed by the forces is closed. |
| 4 | What is the direction of the reaction force of the moving hinge support? | 4 | If the force is perpendicular to the axis |
| 5 | Write the equilibrium conditions of a system of forces located arbitrarily in a plane? | 5 | $\sum F_{kx} = 0, \quad \sum F_{ky} = 0,$ $\sum F_{kz} = 0$ |
| 6 | State the three power theorem? | 6 | When arbitrary forces in space are brought to a center, they exchange with a principal vector equal to the geometric sum of the given forces and the principal moment equal to the geometric sum of the added pair moments |
| 7 | What is the direction of the torque? | 7 | $\vec{R} = \vec{F}_1 + \vec{F}_2$, $R = F_1 + F_2$ |
| 8 | What is the equal effector of two parallel forces directed in the same direction? | 8 | Perpendicular to the plane of the pair, viewed from the end of this vector, the pairs rotate counterclockwise |
| 9 | When is the projection of the force on the axis equal to zero? | 9 | It is perpendicular to the plane on which the base stands |
| 10 | What formula is used to find the amount of frictional force in sliding? | 10 | $m_0(\vec{F}) = h \cdot F$ |

Correct answers (10,5,6,9,2,3,8,7,4,1).

As a result of using the studied method to determine the level of knowledge acquired by students in the entire field of theoretical mechanics, it is possible to quickly, transparently and fairly evaluate their level of knowledge. In this case, the teacher selects materials from the question bank from the departments of statics, kinematics and dynamics of science. Below is a table covering all sections of science. It is natural that the number of questions offered to students increases with the increase in the weight of the material. However, after a certain number of questions (40-50) using the method of confused logical chain causes a number of inconveniences. Therefore, it is necessary to use this method without increasing the number of questions to 25 when conducting the final assessment.

Determine compatibility:

| | | | |
|---|---|---|--|
| 1 | State the axiom of detachment? | 1 | The force acting on a material point is equal to the product of its mass times its acceleration, and the acceleration is in the direction of the force |
| 2 | Write the analytical equilibrium equation of a system of spatially parallel forces? | 2 | $m\ddot{x}_c = \sum R_x^e, \quad m\ddot{y}_c = \sum R_y^e, \quad m\ddot{z}_c = \sum R_z^e$ |
| 3 | What do you mean by farm account? | 3 | If the work done by the reaction forces in any possible displacement is zero |

| | | | |
|----|---|----|---|
| 4 | Tell me the name and direction of the reaction force of rope, rope, chain? | 4 | Along the trajectory of the point |
| 5 | When is the moment of force about the axis equal to zero? | 5 | If the translational motion is forward motion and the relative velocity and translational angular velocity vectors are parallel |
| 6 | What formula is used to find the acceleration and normal acceleration of a material point? | 6 | $\vec{a}_B = \vec{a}_A + \vec{a}_{AB}$ |
| 7 | What is the direction of linear velocity in circular motion? | 7 | The tension depends on the strength and the point of suspension |
| 8 | Write the law of uniform circular motion? | 8 | $x = c_1 \cos kt + c_2 \sin kt$ |
| 9 | What formula is used to find the acceleration of an arbitrary point of a body moving parallel to the plane? | 9 | $a_\tau = \frac{dv}{dt}, \quad a_n = \frac{v^2}{\rho}$ |
| 10 | When is the Coriolis acceleration equal to zero? | 10 | If the arrow and the force lie in the same plane |
| 11 | State the basic law of dynamics? | 11 | To consider a body in any bond as free, the bond must be replaced by the bond reaction force |
| 12 | Write the law of free oscillating motion? | 12 | $\varphi = \varphi_0 + \omega \cdot t$ |
| 13 | Write the analytical formula of the theorem about the movement of the center of mass of the system? | 13 | $\sum F_{kz} = 0, \quad \sum m_x (\vec{F}_k) = 0$ $\sum m_y (\vec{F}_k) = 0$ |
| 14 | Show the formula for finding the work done by gravity? | 14 | $A(\vec{G}) = \pm mgh$ |
| 15 | What connections are called ideal connections? | 15 | Find the truss support reaction forces and find the tension in all the struts |
| | | | |

Correct answers (11,13,15,7,10,9,4,12,6,5,1,8,2,14,3).

So, as a result of using the method of the confused logical chain, students have the ability to organize the topics they have studied in science, to divide them into components, to compare them with other parts of the topic, to understand information about the newly studied topic. skills are formed. Regular use of this method in lectures gives students the opportunity to systematically study scientific materials, organize, divide and differentiate what they have learned. As a result of the above facts, the level of knowledge of students will increase significantly.

The activity of students in the lessons also increases. The ability of the teacher to objectively determine the level of knowledge of students in a quick way, to successfully conduct intermediate and final evaluations increases.

When planning to evaluate students' knowledge using the method of confused logical chain, it is necessary to pay attention to the following:

- it is necessary to expand the bank of questions related to science by topic.
- a bank of questions should be created separately for each subject, chapter and part of the science.
- it is necessary to create a bank of logical, easy-to-solve examples and problems related to the topics.
- in order to determine the level of mastery of the subject of science, it is necessary to compile the options of tables consisting of 5-10 questions at least equal to the number of students in the group.
- the professor-teacher offers the option of tables consisting of 10-20 questions to students for mid-term assessment.
 - it is recommended to prepare tables of 15-25 questions for the final control assessment.
 - Samples of the question bank and example-problem bank and the order of execution should be regularly published on the website of the department.
- the bank of questions and the bank of example problems should be updated every academic year.

In short, the method of the confused logical chain is one of the modern and convenient methods for determining the level of students' knowledge. This method is distinguished from other assessment methods by the fact that it is especially effective in checking students' knowledge on one topic of science, on one chapter of science, and during midterm control.

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