Methodology For Using Non-Standard Tasks In The Development Of Thinking Of Future Engineers

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ABSTRACT

In this article, the use of non-standard tasks based on an integrative approach in the training of future engineers allows for the development of thinking and logical thinking, the development of knowledge, skills, abilities, and competencies of future engineers, creative thinking, the ability to understand, explain, and develop the rapidly developing technologies of today and the present in a dynamic environment by the European model is one of the pressing issues of today. The improvement of the methodology for applying non-standard tasks based on an integrative approach to practice and a theoretical approach to the relationship between pedagogical education and training of future engineers is envisaged.

Keywords: logical thinking, the concept of a non-standard task, the emergence of an integrative approach, interpretation of answers, analysis and conclusion on the answers to be found, as well as the formation of professional training.

Our research purpose is to train future engineers development of a methodology for developing an integrative approach based on non-standard tasks and to practice current to grow importance to education full thinking skills develop pedagogy technology current to do with science and of the technique the most last achievements based on activity indicating technologies to create, to come into being coming problems non-standard ideas with positive solution through working release fertility increase, population marriage of style improvement provide can creative experts preparation of opportunity to the body on arrival manifestation to be with explained.

Imagination is a special form of the human psyche, which is in a state between perception, thinking, and memory, and is different from other mental processes [18]. Non-standard problems solution to do wonderfully is a tool above counting passed qualities increase for. Indeed, such problems solution to for many time spent, students activity reasonable organization to be, certain the idea done increase with related difficulties in advance know. Solution the idea in search to the surface coming obstacles overcome transition, perseverance, perseverance, willpower decision demand does. Therefore, non-standard assignments to develop help give purposefulness, expressed to something responsibility within a relationship to be advantages. Non-standard assignments to perform in the process every how from methods use assignments every always also to success take It doesn't come. The problem solution until it is ripe remains. More amazing “ Suddenly concept this character, with undoubtedly, far continue from reaching evidence gives

unconscious work ... This work possible, or no unless at least, from before and then only when it arrives fertile will be from it then conscious labour period comes " [14. 61-b].

In the scientific article "Methodology of increasing students' interest in physics through Olympiad problems" by VGRakhmatullayeva, Olympiad problems are the most attractive set of problems in elementary physics. Olympiad problems teach students to think deeply, work on themselves, improve their talents and skills, have a rich imagination, be a determined person, and make decisions. As is known, Olympiad problems encourage students to reason logically and justify their conclusions. In the process of solving problems, students repeat theoretical knowledge and acquire the skills to apply it practically. The difference between Olympiad problems and simple general physics problems is that they cover several physical processes and physical laws at once. That is, if a student can solve a simple problem with knowledge of a given topic, this will not be enough to solve an Olympiad problem, and he will also need to be aware of other physical laws. It is also necessary to fully imagine the process given in the problem and reflect it in a drawing, and this occurs based on deep logical thinking. In addition, in solving Olympiad problems, it is necessary to have a sufficient level of mathematical knowledge, in particular, in addition to simple arithmetic calculations, full knowledge of the derivative, differential, integral topics and, of course, geometry. When preparing students for science Olympiads, the teacher should first pay attention to the student's level of knowledge in physics and mathematics and their ability to think logically. It is stated that if a gifted student is selected and taught methods for solving problems from simple to complex in an age-appropriate manner, his knowledge level will increase and he will certainly be able to achieve high results in the science Olympiad [15]. Sh.R. Khurramov's collection of higher mathematics problems, and control tasks, part 3, describes the technical and technological bachelor's degree programs of higher educational institutions in a way that fully meets the state educational standards and the curriculum of the subject. This textbook is intended for students of bachelor's degree programs and includes materials on special sections of the subject, such as probability theory and mathematical statistics, theory of functions with complex variables, operational calculus and equations of mathematical physics [16]. VABolotov and VVSerikov in their work define competence as "a way of being educated, knowledgeable, skilled, a set of concepts that allow one to express one's identity [17]. Stanford University professor Robert McKim invites students to the Imagination Room (Imaginarium) to develop their imagination [19, pp. 56–62].

As M. Djorayev noted, the principle of consistency of teaching is one of the basic principles of philosophy, which is manifested in physics in the form of the principle of compatibility. His methodological basis dialectic inconnu denial to grow law organization does. Physics in science to consistent according to, every how new theory from himself previous old theory main the results in itself embodied to be need. Private without, every always new from the theory they come output necessary. Including relativity theory from the results $\vartheta << c$ condition when done, classic mechanics results come output need. So similar, real gases for the offer made all situations from the equations, to the ideal gas Mendeleev - Clapeyron equation, that is: $PV = \nu RT$ - come output necessary, otherwise without real gas for the offer made situation equation wrong become It turns out. Didactic from a point of view, consistency principle, study material of teaching different stages according to correct distribution and they between connections and them step by step development shows. This separately highlights It is necessary that in teaching consistency, in science from consistency reverse of communication existence with difference does [5, 27-b].

(60721500 – Geodesy and Geoinformatics, 60710400 – Energy Engineering, 60712500 – Transport Engineering) are relevant.

For example, mathematician knowledge repetition for: Think of a number, multiply it by 4, add 6 to the result, divide the sum by 4, and subtract the number you thought of. What number is the result?

1) 8 4=32 ; 2) 32 + 8= 40 ; 3) 4 0 : 4=10 ; 4) 10 - 8=2. The number 2 is obtained. This solution can be written as the expression (8·4 + 8): 4 – 8, whose value is 2.

1) $2{,}17 + (3{,}2 - 0{,}17) = 2{,}17 - 0{,}17 + 3{,}2 = 2 + 3{,}2 = 5{,}2$

2) $\left(\frac{1}{2}+\frac{1}{3}\right)\cdot\left(\frac{1}{5}-\frac{1}{4}\right)=\left(\frac{3+2}{2\cdot 3}\right)\cdot\left(\frac{4-5}{4\cdot 5}\right)=\frac{5}{6}\cdot\left(\frac{-1}{20}\right)=-\frac{1}{24}$

2. Calculate : $2+\frac{81}{64}\cdot\left(7+\frac{1}{9}\right)$(express your answers in Table 1)

Solution : $2+\frac{81}{64}\cdot\left(7+\frac{1}{9}\right)=2+\frac{81}{64}\cdot\frac{(7\cdot 9+1)}{9}=2+\frac{81}{64}\cdot\frac{(63+1)}{9}=2+\frac{81}{64}\cdot\frac{64}{9}=2+9=11$

Table 1

No.	**Question :**	**Answers (+) (-)**
1	Is the example correctly solved?	
2	To solve movement Did you do it?	
3	To me interesting it's not.	
4	Very simple.	
5	Before I knew	

Scientific theories are created to explain and justify the results of experiments. All this leads to the study of objective laws existing in nature and, as a result, to the understanding and comprehension of the mathematical expression of physical laws related to them, which ensures the interaction of future engineers. In the training of future engineers, to increase their scientific and practical potential, 10 credits are allocated for higher mathematics per course, programs are taken from technical higher educational institutions, and syllabuses are formed in this process. For example :

Try to call it **an incident.** as a result , that is appointed conditions complex when done event to give possible was every how to the fact It is said . Events Latin first letter of the alphabet letters with For example , a coin throw - try , A- emblem side fall , B- digit side fall events .

If you try the results of events full group organization if and equal possible if, that is the only possible way, together not been and equal possible events if, then this to the results elementary results It is called. In this The test is called " Classic ". Try it. Being studied of the event event from elementary to the results try event to give convenience procreator results is called.

Probably classic to the definition according to *A* of the event to try, as a possibility *A* event to give convenience procreator results in number m 's try all elementary results number n to the ratio it is said and *P(A)* with is marked :

$$P(A)=\frac{m}{n}.$$

In this case, event A event to give convenience procreator results " Inclined events.

$$P^{*}(A)=\frac{m^{*}}{n^{*}}$$

Probably statistic to the definition according to test conditions of event A when it does not change relative frequency vibrating number A case-san probability is called. The above theory without this assignment recommendation we will.

Task 1: To the truck increase 25 out of 400 watermelons at the time rupture Watermelons rupture of the event relative Find the frequency (see Figure 1).

Figure 1.

A watermelon rupture event Let it be. The problem is on condition according to $n^* = 400,\ m^* = 25$

In that case

$$P^*(A) = \frac{m^*}{n^*} = \frac{25}{400} = 0.063.$$

Task 2: With mass M=9 kg stroller ϑ=2 m/s constant speed with moves. It's per head his/her from the dimensions much small mass m=1 kg body is placed. Body and stroller between friction coefficient 0.6 to equal if, body from the stroller falls not leaving for necessary was stroller Find the length of the trolley. (m) and land between friction Assume no . g=10 m/s ^{2}.(See Figure 2)

Solution: Initially stroller and the body impact provide strong If we write. Body for friction stroller in the direction of, carriage for and to the speed against directed Newton's second law we use.

Stroller for

$$MA = F_{ishq} = \mu N = \mu mg \to A = \mu g \frac{m}{M};$$

Body for :

$$ma = F_{ishq} = \mu N = \mu mg \to a = \mu g \frac{m}{m} = \mu g;$$

Stroller for speed equation $\vartheta = \vartheta_0 + At$: body for and $u = at$

Their speed is equal to one system as movement begins and the body stroller does not slip.

$\vartheta = u \to t = \frac{\vartheta_0}{A+a}$; Of time this value speed from the equations optional to one putting the following harvest we do :

$$\vartheta = u = \frac{a\vartheta_0}{A+a}$$

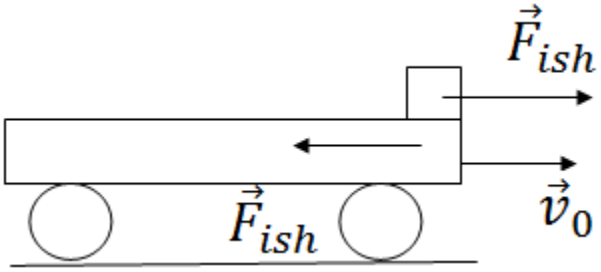

Figure 2.

The stroller migration body from moving difference does. Their difference stroller from the length big be can't. Otherwise without, a body stroller over fall goes.

$$S_1 - S_2 \le l;$$

Print passed distances for $S_1 = \frac{\vartheta^2{}_0 - \vartheta^2}{2A};\ S_2 = \frac{u^2}{2a}$ formulas and from expression (1) to the following as we will not be :

$$S_1 = \frac{(A+2a)\vartheta_0^2}{2(A+a)^2}; \qquad S_2 = \frac{a\vartheta_0^2}{2(A+a)^2}$$

These expressions into (2) let's say :

$$\frac{\vartheta_0^2}{2(A+a)} \le l\ l \ge \frac{\vartheta_0^2}{2\mu g\left(\frac{m}{M}+1\right)}$$ Or do as we will be ;

Calculation :

$$l \ge \frac{2^2}{2\cdot 0{,}6\cdot 10\left(\frac{1}{9}+1\right)} = \frac{4\cdot 9}{2\cdot 6\cdot 10} = 0{,}3m$$

In the article future engineers in preparation to them passable general education and general professional of sciences to be taught and from

them given of tasks attractiveness and to the topic related or close to being attention to take necessary. Future engineers are logical to think to increase creative thinking engineers world to the standard suitable in upbringing non-standard assignments based on future engineers knowledge, skill, ability and competencies to develop melting possible our view possible.

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