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Application Of Triz Technology in Teaching The Discipline Of Mechanics

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Abstract: The article is devoted to conducting classes using modern technologies to explain topics to students of technical specialities through the application of TRIZ technology. The article reveals the essence of this technology using examples of applications developed by the author.

Keywords: TRIZ technology teaching method, application, information communication, gearbox, gear step.

Introduction: At present, enterprises cannot operate without using the latest achievements of modern technologies. One of these is the technical sphere, which has become an inseparable part not only of individual life but also of all areas of society's life.

In this regard, specialists in the technical sphere are actively participating in advancing scientific and technological progress by developing ideas that ensure material production, scientific and technical knowledge, new technologies and equipment, as well as organizational and managerial, scientific-technical, and pedagogical development.

The problem of modern teaching technology concerns contemporary researchers and educators in the region. For example, in her work Polrvaya M. V. notes the impact of classical and interactive teaching methodology on knowledge, learning materials prepared by students, and also states that the latest "classical" teaching methodology does not correspond to the current generation of students [1]. In the scientific article by Goyeva V. V., the most widespread forms of conducting lessons today—active and interactive methods—are discussed. The authors conclude that it is necessary to introduce active and interactive methods. This makes it possible to solve the problem of monotony in the educational process and also increases learning effectiveness in general [2].

One of the teaching methods based on modern teaching technology is TRIZ (Theory of Inventive Problem Solving).

TRIZ is a teaching method and a set of techniques designed to solve various problems and improve systems. Its main difference is the active involvement of a creative approach. In fact, today TRIZ functions as the only systematic theory for teaching creativity.

In TRIZ-based teaching, methods such as brainstorming, synectics (comparing and finding similarities in objects and phenomena), morphological analysis (identifying all possible solutions), the focal objects method (establishing associative links with various objects), and others are used. In this process, the professor-teacher can formulate the goal set before the learners as an ideal final result and determine which resources can be used to solve it. The teacher demonstrates which of the solution methods is the most optimal. In analyzing the result, the learners are considered the main participants.

What is considered important in TRIZ technology? The main tools of TRIZ are technical and physical contradictions, the ideal final result. Starting

approximately from the 1990s, TRIZ methods have been applied not only in technology but also in other areas of human activity. In particular: business, information systems, art, and others.

Main Part

When modern information technologies are widely used in the training process, the following opportunities arise:

- making it easier for the professor-teacher to deliver learning materials to learners;
- repeated demonstration of the learning materials presented during the lesson;
- a high level of learners' mastery;
- conducting practical and laboratory classes using only applications related to this topic;
- mass use of the recommended learning materials, that is, the availability of the possibility to use them in one or several classrooms and groups through network technologies;
- operative modification of the educational materials database;
- creating the possibility to switch to lecture materials during practical and laboratory classes;
- the possibility of serving as one of the main tools for distance learning.

The idea of conducting lessons using modern information and communication tools has been presented above. Below, we list the main tools used in this method:

a) Software is a set of instructions written in a programming language that performs specific tasks on a computer;

b) An application is a program designed to perform specific tasks or functions and installed on a mobile device or a computer;

c) A presentation is an information or promotional tool that makes it possible to deliver the necessary information about an object to the recipient in a convenient form. In other words, a presentation is a structured and visual way of explaining information so that it is easy for the audience to understand and remember.

d) A presentation (public demonstration) is a public display of new, newly emerging, or previously created equipment. A presentation (as a method of delivering information) is an information or promotional tool that enables the necessary information about the presentation object to be delivered to the recipient in a convenient form. Educational presentations are a convenient and effective way of presenting information using computer programs (for example, Microsoft PowerPoint, Apple Keynote) and web services (Prezi, Google Slides, and others).

In this article, the use of TRIZ technology in teaching higher education students technical disciplines through software (applications) is considered. As an example, when conducting a lesson on the topic "Technical Mechanics," specifically the section "Machine Parts → Gearbox," the use of applications dedicated only to this topic is described.

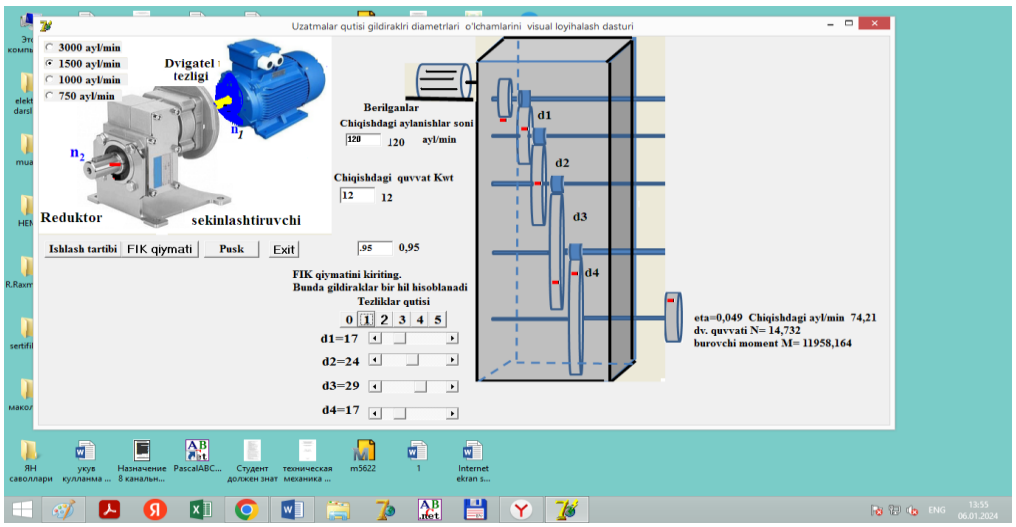
It is well known that in such a lesson the main task is to explain the number of gear ratios, the input and output angular velocities on the shafts, as well as the input and output power. Screenshots (1a, b) of the working interface of the application created by the author for this topic are presented. As can be seen from the figure, applying TRIZ technology in practice during the lesson makes the learning process more understandable. In this case, the professor-teacher may propose problem situations with sufficiently clear solution options. For example:

a) When the rotation speed of the electric motor that drives the device is reduced, by how much does the number of gear ratios decrease, and which parameter determines its main indicator? (Because there are many possible answers, it is important to find the optimal ones among them.)

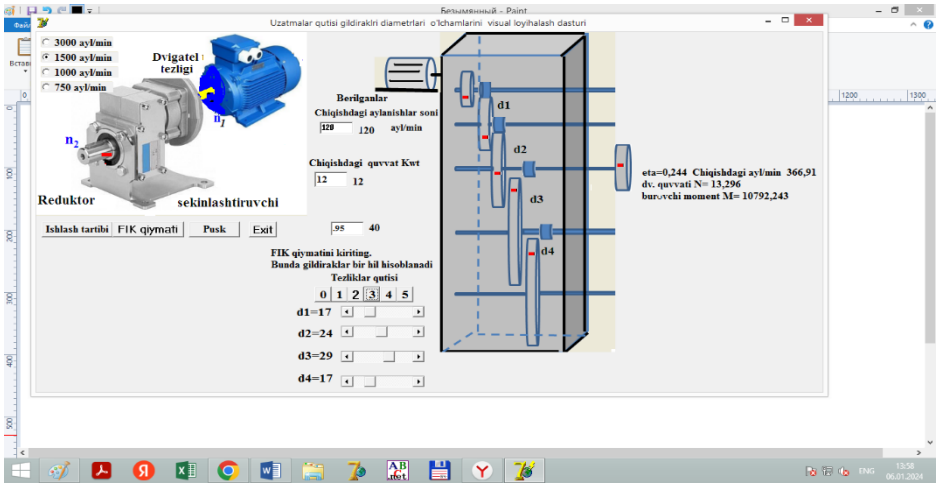
b) If the output power and rotation speed are known, what is the method for optimally selecting the power of the electric motor to be chosen and the optimal shaft rotational speed?

c) When selecting the diameters of the gears in the gearbox, what is the most cost-effective option that meets the main requirements: hand-made manufacturing or production according to GOST standards?

d) What reconsiderations does increasing the number of gear stages lead to, and so on.



a) Reducing the rotational speed in a multi-stage reducer (gearbox)



a) The significance of the number of stages when reducing rotational speed in a multi-stage reducer.

Figure 1. Screenshot of the application interface designed to explain the operating modes of multi-stage reducers.

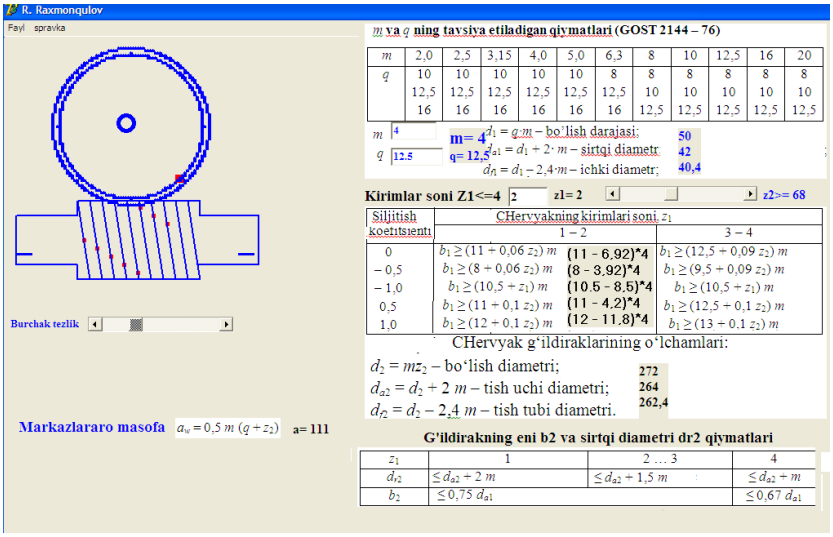


Figure 2. Screenshot of the program interface developed by the author to explain the topic of worm gear drives.

Let us provide one more example. A screenshot of the software developed for the topic of worm gear drives within the “Machine Parts” course is presented in Figure 2. It is known that visual teaching aids for this topic may be available at a higher education institution. However, in such cases it is usually possible only to count the teeth of the worm and the gear wheel displayed, or simply to observe them visually, without being able to examine other operating conditions. If a topic-specific application (a downloadable program) is used to conduct the lesson, many questions can be generated during the session and it becomes possible to find solutions to them.

Here we do not dwell on what the parameters shown in the screenshot represent, because this is not our main objective. Using the screenshot, the professor-teacher may raise questions such as the following:

a) What changes if the number of worm threads (starts) is increased?

b) What changes if the worm’s angular speed is altered?

c) Which parameters change when the geometric dimensions of the worm wheel are modified?

d) And so on.

It should be emphasized separately that the programs mentioned above are downloadable, and they do not depend on the operating system.

At present, types of electronic programs include:

- a translator (compiler);
- an interpreter.

Programs of the interpreter type run only if the corresponding interpretive package is available, whereas a translator (compiler) differs in that it can be launched directly.

Conclusion

We consider it expedient that, when conducting classes—especially lecture sessions—for students studying in technical fields, small and topic-specific downloadable applications should be developed for each lesson in order to reduce the lecturer’s time costs and to make the lecture more understandable. This does not require much time, and modifying the structure of the software you have created is not very easy. For this purpose, programming languages such as Pascal, C++, and Delphi can be mentioned. Not every professor-teacher may know programming in these languages. In such cases, there are grounds to believe that these tasks can be performed with the help of students studying in higher education.

In addition, during lectures, using interpreters requires extra time to load them, start working with them, and, most importantly, obtain results when creating problem situations. For these reasons, we concluded that using only compilers (translator-based solutions) is a requirement of the modern era.

References

1. Полевая М.В. Современный преподаватель: взгляд на студентов и методики преподавания в вузе / М.В. Полевая // Гуманитарные науки. Вестник Финансового университета. – 2015. – № 3 (19). – С. 83-90.
2. Альтшуллер Г.С. Найти идею. Введение в теорию решения изобретательских задач. - Новосибирск: Наука, 1986.
3. R. Raxmonqulov., L.E Yakubov., A.A Yusupov. Uzatmalar qutisi g‘ildirak-larining diametralini visual loyihalash dasturi. O‘zbekiston Respublikasi ning electron hisoblash mashinalari uchu ndavlat reyestrida 13.12.2023 y. ro‘yxatdan o‘tkazilgan. DGU – №31072.
4. M.T.Mansurov. G.A.Toshtemirova. Use the TRIZ method to teach mechanical engineering ISSN 2277-3630 (online), Published by International journal of Social Sciences & Interdisciplinary Research., under Volume: 11 Issue: 03 in March-2022 https://www.gejournal.net/index.php/IJSSIR. Pp.40-44.
5. Toshtemirov K.Q., Toshtemirova G.A. Oliy ta’limdagi pedagoglarning kriativligini oshirishda IMYEN texnologiyasining ahamiyati. ISSN 2181-3779 Научный журнал строительство и образование. https://jurnal.qurilishtalim.uz/ Maxsus son.
6. Raxmonkulov R., Toshtemirov K.Q., Toshtemirova G.A. Dars o‘tishda muammoli vaziyatlarni hosil qilishni ba’zi usullari. Namangan davlat universiteti ilmiy axborotnomasi. 2023 6-son.
7. Toshtemirov K.Q., Toshtemirova G.A The content, structural framework, and development stages of

the imyen technology. “Transforming challenges into opportunities: strategies for innovation and growth” Conference Online:- https://nextscientists.com/index.php/science-conf/issue/view/24