Methodology Of Training Engineers For Professional Activity On The Basis Of Module-Competent Approach

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Abstract

This article describes the theoretical foundations of modular teaching, one of the most promising systems of teaching, teaching technology, its components, objectives of modular teaching, the specifics of the application of modular teaching technology in technical sciences and the content of organizing lessons using modular teaching technology. Also, the results of lesson development and experimental work on teaching the subject "Machine Details" using modular teaching technology are presented.

Key words: Modular training, modular-competent approach, modular technology, competence, problem-module, analysis, extensions, result, comparison, skill, technology, functional system, variability.

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Introduction

Radical reforms in the field of education in the Republic of Uzbekistan ultimately provide for the training of competitive personnel with world-class knowledge and skills. The system of knowledge and skills experienced by developed countries is reflected in the State educational standards, curricula and programs developed for the implementation of these tasks. In this system, professional skills also play an important role with their importance and scope..

Although modular teaching has been used in teaching subjects for many years, it has been rarely applied to technical subjects. The module explores the fundamental concepts of science by including a particular phenomenon or law, or section, or a particular major topic or group of interrelated concepts. Modular learning, on the other hand, is one of the most promising systems of learning because it is best adapted to the assimilation system of the human brain. The basis of modular training is based on the modular organization of human brain tissue. With this in mind, the use of modular teaching technology in teaching the subject "Machine Details" makes it more convenient for students studying the subject [1].

The formation of a modern market economy requires a sharp development of all sectors and directions of the economy, based on competition between enterprises. Because a market economy cannot be imagined without competition. Competition between enterprises, in turn, leads to the acceleration of science, technology and engineering, ie scientific and technological development.

Literature review

The modular system of education was first officially mentioned in 1972, in the UNESCO World Concept in Tokyo. Modular teaching technology is based on the general theory of functional systems, neurophysiology of thinking, pedagogical psychology.

O. Tolipov commented on the advantages of modular technology: “One of the advantages of modular technology is the regulation of educational content, which requires careful and diligent selection of available information that will allow students to successfully perform their activities within the state educational standards. ”[5].

From Uzbek scientists R.A Khadjaboev, J.A Hamidov, Yu.S. Ashurova, I.B.Askarov. J.R

Turmatov's books and dissertations clearly state the content and objectives of modular teaching technology [12, 10, 4, 3, 2, 6].

According to pedagogical scholars, modular teaching is one of the most promising systems of teaching because it is best suited to the system of developing students' cognitive abilities and creative abilities. Modular training provides an opportunity to comprehensively address modern issues of vocational education. To do this, it is necessary to solve the problem of developing modular learning technology in an optimized and simple form.

Modular education as a type of pedagogical technology is becoming more widespread in the educational process. The original meaning of the word module is "model" (French model - sample, Latin - modulus - measurement), which means a conditional image (exhibition, scheme, etc.), i.e an object or a system of objects. In a general sense, module technology can also be understood as one of the visual aids in teaching.

The term “modular training” is related to the international concept module, which means a node consisting of closely interconnected elements that can function. In this sense, it is understood as the main means of modular learning, as a complete information block.

Modular education is one of the most promising systems of learning because it is best adapted to the assimilation system of the human brain. The basis of modular training is based on the modular organization of human brain tissue. It will consist of the following (Figure 1).

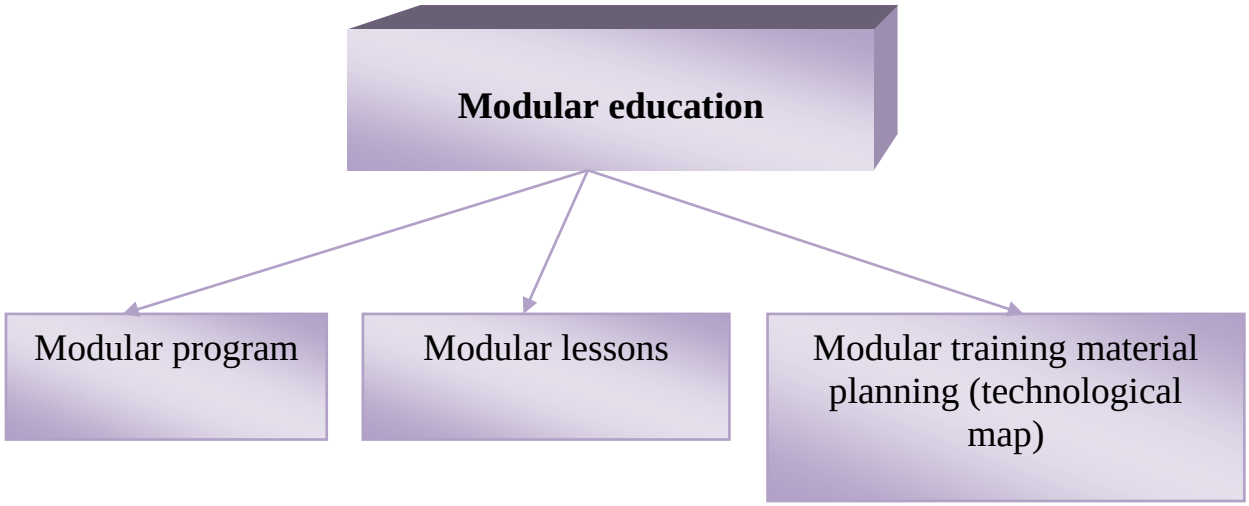


Figure 1. Modular training structure.

Human brain tissue is made up of about 15 billion neurons (nerve cells) or conditioned modules. Tissue cells share numerous collisions with each other. The number of collisions between one cell and its tumor with another cell and its tumor reaches 6,000.

Hence, the number of collisions (contacts) in the brain tissue is an astronomical number (15000000000x6000). In this context, the module is seen as a cell of the learning process.

This cell is composed of different elements that simultaneously have a specific integrity and structure to the information community.

According to research in these fields, the human brain, which consists of a modular tissue, is best able to receive information in quantum form (i.e., in the form of specific portions).

Research Methodology

Today, the quality of professional and pedagogical training can be formed by the

professional and pedagogical competence of the future specialist, which can be achieved through the introduction of modern innovative educational technologies in the educational process. One such technology is modular learning technology. A modular competent approach to education in the professional-pedagogical process allows the design and implementation of a set of basic, professional, professional and special competencies that need to be formed and developed in the educational process [2].

By combining the theoretical, practical and social aspects of education in the process of professional and pedagogical training, a number of new opportunities are created in the educational process, additional didactic conditions are created for the implementation of modular-competent approach education, namely:

- Systematization and interdisciplinary integration of knowledge is ensured;
- It allows the content of education to expand dynamically;
- There will be opportunities for specialists to develop action plans in accordance with production technologies;
- Introduced to functional duties and responsibilities;
- Actions and ways of carrying out the work to be performed are indicated;
- The job and personal interests of future professionals are taken into account.

In higher education, the learning process based on a modular-competent approach is organized in such a way that the purpose of education is the sum of the professional competencies of the student, and the means to achieve it is the modular construction of the content and structure of vocational education [7].

A module is an independent unit of a training program aimed at forming a specific professional competence or group of competencies. In other words, a module is a complete unit of a curriculum that forms one or more competencies and ends with the control of the knowledge and skills of the learners. Hence, a modular training program is aimed at acquiring certain competencies and consists of a set of modules arranged in a certain sequence.

All components of the learning process will be present when students study the modules. For each module will be distributed classroom workload, independent work of students, course work, current, intermediate and final controls, as well as internships, student research work, writing chapters of graduate work, etc. In this way, a training program consisting of a set of modules that are formally recognized to give a certain level is formed.

An educational module is an autonomous unit for defining learning goals and content, which includes recommendations for their mastery and control, and provides for the formation of one or more competencies or part of a complex competence.

The flexibility and variability of the modular education system is especially relevant in the current era, as there are constant changes in the quality and quantity of jobs in a market economy. The essence of the modular system of vocational training is that students master the modules of one educational unit after another. In this case, the learner can work independently with the program provided. The student sets a clear goal, methodological guidelines for achieving information technology and didactic goals. The formation of professional competencies in students is ensured as a result of the use of all methods and tools of education in the teaching of general professional disciplines on the basis of a modular-competent approach [9, 11].

The introduction of modular systems of education in the implementation and effective use of educational opportunities based on a modular-competent approach will give good results, resulting in the successful formation of professional and pedagogical competencies of future technology teachers and training of modern competitive specialists in accordance with customer goals.

The concepts that explain the essence of modular learning technology include:

- modular program;
- complex didactic purpose;
- integrated didactic purpose;
- special didactic purpose;
- educational element;
- access control;
- current control;
- generalized (output) control.;

The essence of modular education is that the student achieves the specific goals of learning activities independently (or with the help of some teacher) when working with the module [3].

To achieve these goals, modular training technology needs to be integrated into a specific system. To do this, you need to create a modular

program. In turn, the modular program will consist of training modules, and the training modules will consist of learning elements (EE) (Figure 2). An educational element is an organizational-content unit that serves to convey a specific technical concept or process to students. Each learning element concludes with control questions.

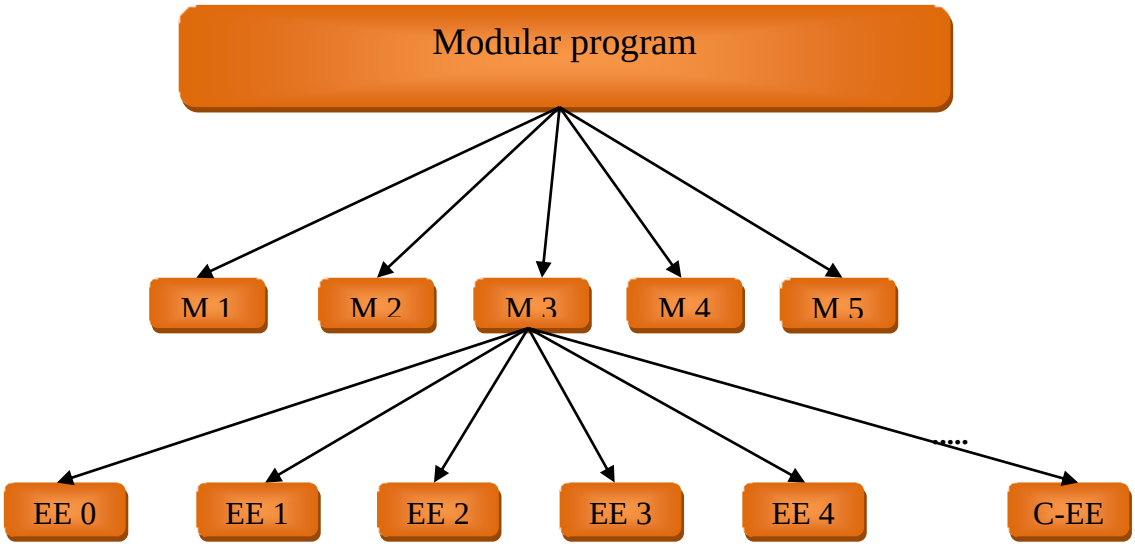


Figure 2. A system of goals in a modular program.

The following general rules should be followed in modular training:

- the ability to describe the content of the training material and methodical material;
- the following 3 items are added to the number of learning elements: the current control (performed at EE 0), the main purpose of the module (performed at EE 1), the final control (performed at c-EE).

The result is a system of goals with which the full content of the curriculum can be integrated.

As an example, “Belt extensions. The division of the training module "Fundamentals of their calculation" into learning elements can be described as follows (Figure 3):

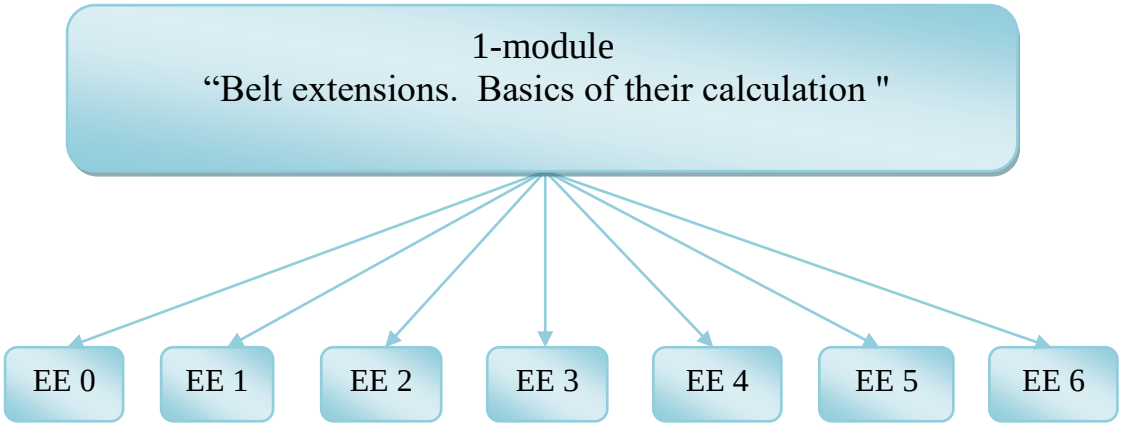


Figure 3. Distribution of educational elements of module 1

(EE 0– initial control);
EE 1 – “Belt extensions. The purpose of the module "Fundamentals of their calculation";
EE 2 – Types of belt extensions,;
EE 3 – Strip extension geometry;
EE 4 – Kinematics of belt drives;

EE 5 – Forces and voltages in belt networks;
EE 6 – Final control.

Effective implementation of these goals of modular learning can occur only when it is built on the basis of conceptual ideas, pedagogical and psychological theories. The purpose of the module action plan, information bank; includes methodological guidance for achieving the set didactic goals. For this reason, the module is considered in the educational literature as a means of modular teaching.

Another feature and advantage of modular teaching of machine parts science is that it saves a lot of time, that is, to give students more knowledge in less time. In modular learning, students have an independent understanding of the modalities of activity based on the learning modules, which allows them to take an individual approach according to the pace of learning. In this way, by incorporating more problem-solving tasks into technical training modules, it is possible to create problem-based, modular-collaborative technologies based on students working in groups with learning modules. If a teacher uses some teaching technology in his / her lessons, the use of modular teaching does not interfere with his / her work, but rather serves to intensify the student's activity [8].

If a student is having difficulty mastering the learning modules from our subject, then the teacher will guide him or her through various instructions and portioned assistance. Usually after the transition to modular teaching, students have a bit of a hard time until they get used to this technology. After completing 1-2 modules, they develop certain skills in the modular system, and a certain part of their activities are automated. For this reason, we recommend that you first use modular teaching for a specific part of the group, and after gaining enough experience, move on to modular teaching of science in the whole group.

View of the training module

Table 1

No	**Educational elements**	**Description For students(content, form, methods)**
0	Access control	Tests on the previous module
1	Objectives and tasks of the module	Knowledge and skills
2	Educational elements	Explanations on the study material
…	…	…
c	Control (self-control and final control on the module)	Test materials and answers to questions

The use of the algorithm presented in the design and implementation of modular learning of machine details will help the teacher to take full advantage of this technology and ensure the quality of the created modular programs and training modules.

It is advisable to study the curriculum in modules to provide theoretical knowledge on the subject "Machine Details". Table 2 below shows the modular structure.

Table 2

Modular program-based structure of educational science

Number		**Hours**

of the module	Name of the module	In the program		Offered	
		Theoretical	Practical	Theoretical	Practical
Module 1	Basic parameters of transmissions, efficiency, transmission rate, brief information about drives.	4	2	2	2
Module 2	Gear extensions General information. Brief information on the geometry and kinematics of gears.	4	2	4	2
Module 3	Calculation of straight gear cylindrical transmissions for strength.	4	4	4	4
Module 4	Cone gear transmissions. Inclined and circular gear conical extensions.	4	2	4	4
Module 5	Planetary transmissions and features in their calculation.	4	2	4	4
Module 6	Worm extensions. Their geometric parameters and methods of their preparation.	4	2	4	4
Module 7	Calculation of the strength of worm gears.	4	4	2	2
Module 8	Friction transmissions and variators. General information.	4	4	2	2
Module 8	Belt extensions. The basics of their calculation	4	4	2	2
	Total	36	26	28	26

When creating machine parts modular programs and training modules, the teacher will have to do certain things:

1. Determine the position of the module in the modular program.
2. Separate the topics included in the module and name the module.
3. Defining the integrative didactic purpose of the module and the final learning outcomes.
4. Selection of necessary technical training materials.
5. Selection of methods and forms of teaching and control on the basis of the module.
6. Selection of teaching methods.
7. Create a module structure.
8. Divide the teaching material of the subject into separate completed study elements.
9. Reproduce the module text in the desired copy.

Each of the form changes introduced on the basis of the module attracts the attention of the teacher and the student, the learning material concentrates their thoughts on a certain point of view. There is a connection, a connection, between curiosity, reading and learning material.

Therefore, it is expedient to organize the theoretical knowledge of the subject "Machine Details" on the basis of modular training based on the following stages of training (Figure 2).

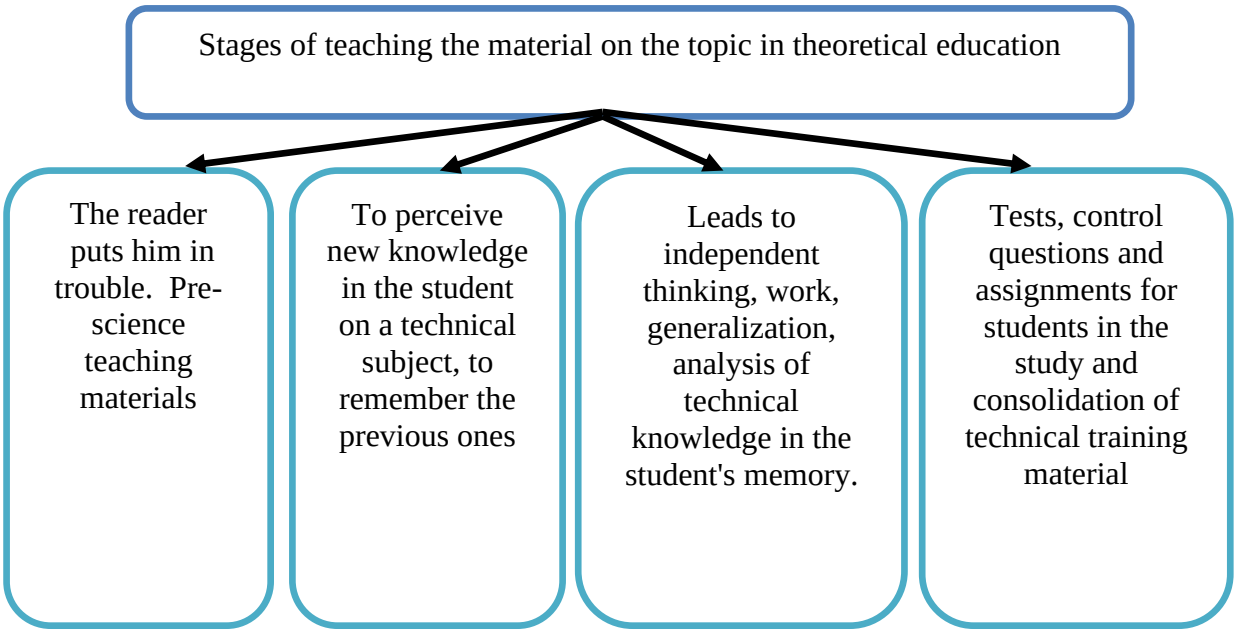


Figure 2. Stages of teaching the material on the topic in theoretical education

Based on the above training steps in the transfer of theoretical knowledge using a modular program, we will consider the example of the section "EXTENSIONS" in our block diagram. This section is part of the "Machine Details" block. This chapter is designed for the 5th semester of the 3rd year of higher education and includes 4 hours of theoretical training.

The integrative didactic purpose of this training module is to introduce students to the areas of use of transmissions, their differences, advantages and disadvantages, creating a basic understanding and knowledge of transmissions.

Each training module consists of an initial control. We recommend 10 or 15 simple tests on extensions and their calculation. This will prepare the students for the module, which will be necessary to determine the level of formation of their initial knowledge of the engine.

In the second stage of the module, the role of this training module in the modular program, its relation to the previous training module, and its main purpose are briefly described. It is advisable to write down what textbooks and manuals are needed to complete the module and to write a brief description of the module.

The topic of the last two hours of the theoretical part of the work chapter in the science working program is "Forming a general understanding of the types of tapes used in these extensions, the materials used and the field of application of these tapes." On this basis, we move on to the creation of learning elements by combining the interconnected parts of the topic, taking into account the size of the relevant learning material. On this basis, based on the topic of the lesson for the first 2 hours, we divide it into 2 learning elements:

1. Creating a general understanding of belt extensions.
2. Get acquainted (gain, obtain) with present-day techniques that came from Tape Transmissions.

In this case, the teacher on the 1st learning element briefly monitors the knowledge of students and recalls the knowledge they have. In the second learning element, the teacher explains the need to diagnose depending on which engine performance. At the end of the lesson, students' mastery is assessed using control questions or tests.

Development of a modular lesson on the subject "Machine Details".

Module 9: Belt extensions. The basics of their calculation.

Field of study: Ground transport systems and their operation

I. Purpose

To update students' knowledge and skills about belt transmissions, their field of application and calculation.

II.The function of the training module

1.Repetition of general concepts about extensions.
2.To study of the structure of belt drives.
3.To get acquainted with the types of belts used in belt extensions.
4.Familiarity with the field of application of belt drives.
5.To study of the calculation of belt transmissions.
6.Maintenance of belt drives.

III. Student learning outcomes By the end of the course, the student will have the following skills and abilities:

1. Can tell the structure of belt drives.
2. Knows where the types of tape used in belt extensions are used.
3. Can perform belt drive calculation.
4. Can distinguish the advantages of belt transmissions from other transmissions.
5. Can service belt transmissions.

IV. General information given to students by the teacher in the training module Theoretical information on this topic is provided.

Conducting the training process.

1. Sharing theoretical knowledge with students, this process is carried out in the form of lectures and discussions to help students master their knowledge, as well as using the scheme of tape transmissions and the stand.
2. Students are explained the structure of belt transmissions.
3. Students will be shown parts of the belt drive.
4. The advantages of belt drive are shown.
5. Students are taught the types and materials of tape.
6. Students should learn to replace the tape on the belt extensions independently.

V.Assessment of theoretical knowledge and practical skills

Knowledge assessment means covering and measuring the result achieved, as well as comparing it with the scale of the result. Assessment of students' knowledge and skills is important in modular teaching.

In the teaching of technical sciences on the basis of modular methods, the assessment of students' knowledge and skills should be conducted regularly, focused on learning objectives, based on legal, pedagogical and psychological principles and assessment standards.

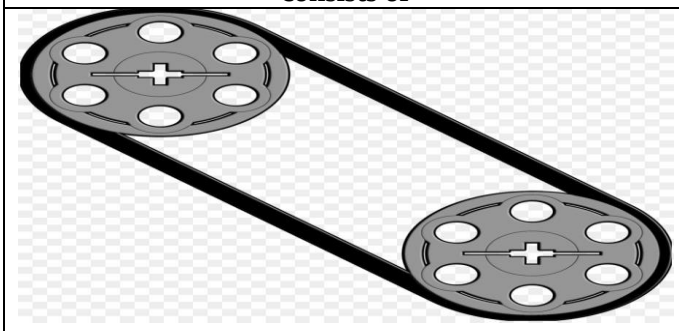
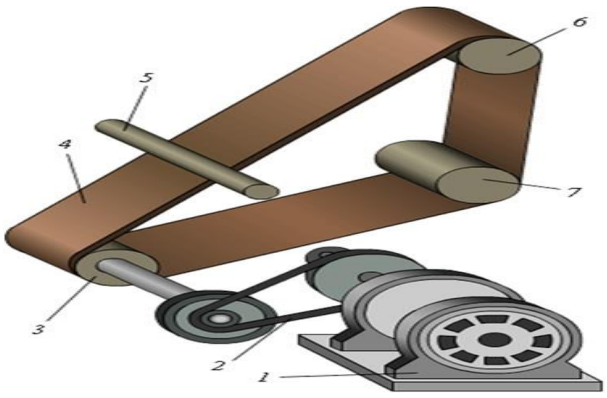
Assessment of students' theoretical and practical knowledge should be carried out in different ways in modular teaching. When evaluated in the same way, the desired result cannot be obtained. Therefore, the teacher should be prepared in advance to assess students 'knowledge. For this purpose, in addition to oral questions and answers, control questions, schematic assignments, test assignments are created.

Control questions

1.Please tell, whats the story of them big puppies .....
2.Do you know the areas of use of belt drives?
3.What materials are used in the pulleys used in belt transmissions?
4.Do you know the types of tape?
5.What are the advantages of belt extensions?
6.What is the difference between belt transmissions and friction transmissions?
7. Do you know the disadvantages and advantages of gear transmissions?
8.What are the working conditions of the tape types?

Homework

The schematic assignment is distributed to the students by the teacher.

Write down what the belt drive in the picture consists of	**Say which tape type is listed.**
	
Write the names of the numbered parts of the diagram shown in the figure.	**Explain how the type of tape in this picture differs from the others?**
	

Monitoring during modular learning, analyzing the results, and assessing behavior, knowledge, and skills is another opportunity for the student to understand himself or herself.

The following should be done to assess students' knowledge and skills:

1. Before assessing for each module, the student should be informed of the requirements and criteria.
2. Once a student's knowledge and skills have been assessed, his or her results should be communicated to the student as soon as possible.
3. If a student's results are unsatisfactory, his or her reasons should be discussed through conversation.
4. It should be borne in mind that the student's behavior can also lead to his unsatisfactory results.
5. Consult on measures to be taken to jointly improve unsatisfactory results.

The student should be given the right to view and comment on documents assessing knowledge and skills. Evaluating the results of assignments is a purposeful requirement. Tests are a means of testing knowledge, ability, skill, as well as character and attitude.

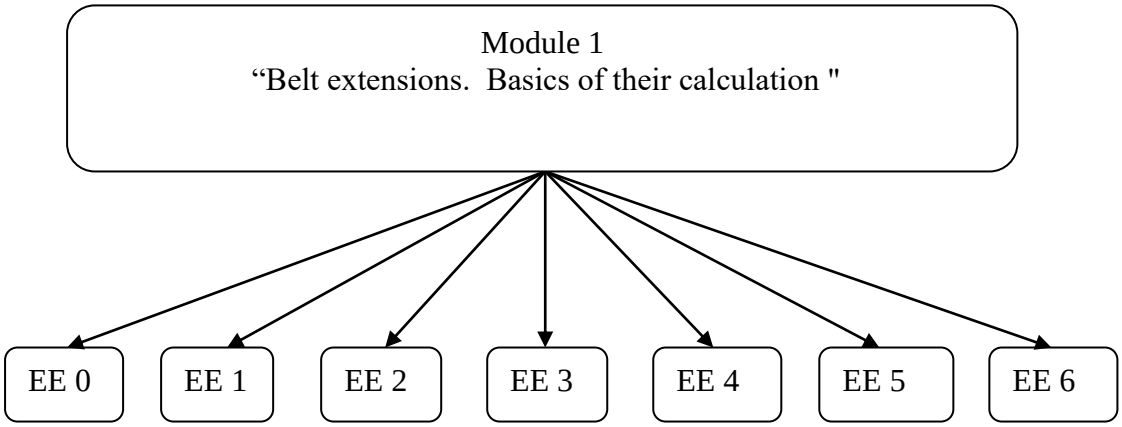
Tests can be structured in the following directions.

- tests to determine whether the module has achieved its learning objectives;
- aptitude tests to determine a student's intelligence and other abilities;
- tests to determine the professional competence of the student;
- focus on educational goals;
- regular conduct;
- based on real, pedagogical and psychological principles;

The assessment process highlights the strengths and weaknesses of both students and teachers, as well as shortcomings in the learning

process. The structure of the modular training program, teaching aids, the quality of organizational work can also be assessed. Regular evaluation of results leads to clear and fair conclusions. The generalization of these conclusions in the assessment helps to make the assessment more accurate. Regularly informing the student about his / her results has a positive effect on his / her aspiration to the goal and fulfillment of his / her desires.

"Belt extensions. Fundamentals of their calculation "training module.



(EE 0 - initial control);
EE 1 - "Belt extensions. The purpose of the module "Fundamentals of their calculation";
EE 2 - Types of belt extensions,;
EE 3 - Strip extension geometry;
EE 4 - Kinematics of belt drives;
EE 5 - Forces and voltages in belt networks;
EE 6- Final control.

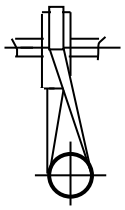
Educational element	Study material with the purpose and tasks given to students	Review for students
EE 0	**Objective of the EE 0 Learning Module:** Students' knowledge of belt transmissions is monitored. The structure and working principle of the belt extensions are briefly repeated.	***Dunaev, P.F., Lelikov, O.P. Design of units and machine parts. - M .: Academy, 2008.*** ***Ivanov, M. R, Finogenov, V. A. Machine parts. - 12th ed., Rev. - M.: Higher School, 2008***.
EE 1	**Objective of the EE 1 training module:** To consider the differences between the types of belt transmissions ***Problematic question:*** *Is it possible to adjust the number of transmissions on the belt drive?*	
EE 2	**Following the recommended learning elements, assignments, and guidelines in this training module, students should be able to:** Understand the general structure of belt drives: Determine what materials are used in belt drives and belts, and their durability under operating conditions.	
EE 3	**Geometry of belt extensions.** Belt extensions need to know how far the movement can be transmitted, how to determine the distance between the	

	pulleys, how to determine the length of the belt, and how to reduce the loads on the pulleys.	
EE 4	**Following the recommended learning elements, assignments, and guidelines in this training module, students should be able to:** Learning to determine the rotational speed of the shafts. Calculate the coefficient of friction between the belt and the pulley. Learning to determine the number of transmissions of a belt drive	
EE 5	Examine the causes of forces and voltages in belt networks and explore ways to reduce them.	
EE 6	**Final control**	Solve the tests suggested below

1) Belt transmissions are included in which type of transmission?
* Friction transmission
To transfer action based on attachment
To transfer the sliding motion
Slide motion transmission

2) Belt transmissions basically transmit motion on shafts of any power.
* 100 kW each
10 kW each
50 kW each
200 kW each

3) K_V - what is the coefficient?
* coefficient of speed in belt drive
the operating mode coefficient in the belt drive
the coverage angle coefficient in the belt drive
the coefficient of velocity in the gear transmission



4) K_N - what is the coefficient?
the coefficient of velocity in the belt drive
* the operating mode coefficient of the belt drive
the coverage angle coefficient in the belt drive
the coefficient of velocity in the gear transmission

5) What are the main parts of the belt drive
chain, belt, pulley
belt and pulley,
* two pulleys and a belt
two belts and a pulley

6) What is the number and speed of current belt transmissions?
* number of transmissions 15 and speed up to 25 m / s. the number of transmissions is 25 and the speed is up to 50 m / s. the number of transmissions is 5 and the speed is 15 m / s. The number of transmissions is 10 and the speed is up to 20 m / s

7) What is the unit of power?
* kVt
N / mm2
N
N (m

8) The following diagram shows which belt transmission scheme
* open extension
cross extension
half cross extension
stepped pulley transmission

Analysis and results

Experimental work on modular training was organized at Jizzakh Polytechnic Institute.

In order to organize modular training on the subject "Machine Details", we have developed modular training materials. The modular training material contains the purpose of the module, the knowledge and skills acquired at the end of the module, the type of assessment, theoretical materials, technological map of the topic, tests, assignments.

At the initial stage of the pilot work, the following work was planned and carried out:

- Control and experimental groups in the field of "Ground transport systems and their operation" were selected;
- A modular curriculum, teaching materials, handouts, textbooks, tests, questionnaires, modular teaching methods for the organization of teaching on the basis of modular methods on the subject "Machine Details" on experimental work were developed;
- Development and implementation of various recommendations, guidelines for the organization of training in the control and experimental groups involved in the experimental work to distinguish the modular teaching of the subject "Machine Details" and the peculiarities of traditional teaching;
- To study the attitude of students to the study of the module on the subject "Machine Details

Criteria such as independent data collection, planning, decision-making, implementation, verification and inference were used in the assessment of the knowledge formed as a result of the application of the modular teaching method.

Third-year students of the university were selected to conduct pedagogical experiments. They were divided into two experimental and control groups. In the experimental groups, lessons were organized on modular teaching technology. In the control groups, physics lessons were conducted in the traditional way.

Two professors and 45 students from groups in the field of "Ground transport systems and their operation" 303-17 and 304-17 participated in this experiment. The results of the experimental work are presented in Table 3 below.

We used a mathematical-statistical method to ensure the validity of the experimental results. In developing the results obtained in the experiments, it is necessary to compare the frequency of one series with the frequency of another series, to determine whether the difference in the experimental series with the theoretical frequencies is random or non-random. To do this, we use the famous English statistician K. We used the x^2 criterion or conformity criterion proposed by Pearson.

In this case, control and experimental groups are given, which determine the number of degrees of freedom based on the following formula.

$$x^2 = \sum_{i=1}^{k} \frac{\left(P_i^{emp} - P_i^{H_0}\right)^2}{P_i^{H_0}}$$

P_i^{emp} – mastery indicators (frequency) of students in the experimental group

$P_i^{H_0}$ – mastery indicators (frequency) in the control group;

k – the amount of characters.

We substantiated the reliability of the results obtained on the overall mastery index based on the coefficient x^2.

Performance indicators of control group students trained on the basis of experimental and traditional teaching methods based on modular teaching technology

Table 3

Groups	**Control group Number of students (n=22)**				**Experimental group Numbr of studens (n=23)**			
Marks	“2”	“3”	“4”	“5”	“2”	“3”	“4”	“5”

Number of students	n=4	n=9	n=7	n=2	n=2	n=9	n=9	n=3
Assimilation indicators%	18,18	40,09	31,81	9,09	8.69	39,13	39,13	13,04

$$x^2 = \sum_{i=1}^{k} \frac{\left(P_i^{emp} - P_i^{H_0}\right)^2}{P_i^{H_0}} = \frac{(8{,}69 - 18{,}18)^2}{18{,}18} + \frac{(39{,}13 - 40{,}09)^2}{40{,}09} + \frac{(39{,}13 - 31{,}81)^2}{31{,}81} + \frac{(13{,}04 - 9{,}09)^2}{9{,}09} =$$

$$= (4{,}95 + 0{,}02 + 1{,}65 + 1{,}7) = 8{,}3$$

$$\gamma = (k-1)(c-1) = (4-1)(2-1) = 3$$

$x^2_{emp} = 8{,}3;$ $x^2_{krit} = 7.81$

$x^2_{emp} > x^2_{krit}$ $\rho \le 0.05$

γ - degree of freedom;

k – studied characters (grades);

c – is the amount of comparative distribution (number of groups)

k is equal to 4, s is equal to 2; Accordingly $\gamma = (k-1)(c-1) = (4-1)$

When we processed the results using the mathematical-statistical method, it was found that the x^2_{krit} coefficient (7.81) x^2_{emp} is smaller than the coefficient (8.3). This indicates that the indicator lies in the confidence interval R <0.05 compared to the indicator x^2_{emp} in the special table. This leads to the statistical substantiation of our scientific hypothesis, which states that the results of our research "increases the quality and effectiveness of teaching when teaching using modular teaching methods."

Experiment - The differences between the mastery indicators of the test and control group students are represented in the following histogram (Figure 3).

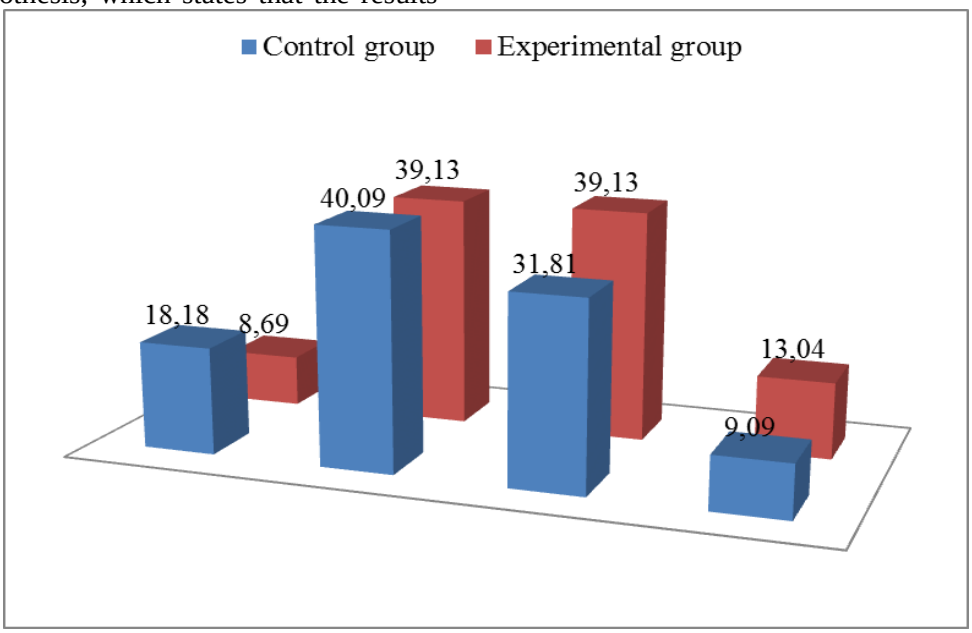


Figure 3. indicators of mastery of the experimental test group trained on the basis of the control group and modular training technology

As can be seen from Figure 3 above, the use of modular technologies in the teaching of technical subjects in higher education has led to the following results: the mastery rate in the experimental group at "excellent" is 21.74% (12.65% more than in the control group), "good" The mastery rate was 39.13% (7.32% more than the control group), the number of students who received a “satisfactory” grade was 39.13% (1.77% less than the control group),

"unsatisfactory". the number of students who received a grade was 8.69% (9.49% less than in the control group). So, these statistics are the basis for our conclusion that the modular teaching methodology, developed by us and tested in practice, is more effective than the traditional teaching methodology.

CONCLUSIONS

Today, the application of advanced pedagogical technologies in the educational process, the development of modern teaching materials is one of the important tasks of the national training program.

Based on the results of the research, the following conclusions were drawn:

- The study studied the problems of the subject "Machine Details" in higher education and developed an optimal module as a result of improving the curriculum;
- The scientific basis of the theoretical and methodological structure of modular learning technology has been developed, which provides for the improvement of the subject "Machine Details". The principles of technological mapping of science in modular teaching, creation of modular programs and training modules were developed and the system of goals was defined;
- Based on the theoretical and practical research, it was found that modular teaching can create sufficient conditions for independent study of educational material, accelerate teaching, activate on the basis of professional interest, fully realize the opportunities for independent study;

The results of experimental work on the use of modular training technologies in higher education on the subject "Machine Details" showed that the level of mastery in the experimental group with "excellent" grades was 13.04% (3.95% more than in the control group), "good" The rate of mastering was 39.13% (11.86% more than in the control group), the number of students who received a "satisfactory" grade was 39.13% (1.77% less than in the control group), "unsatisfactory" grade the number of students received was 8.69% (9.49% less than in the control group). Thus, the decrease in the number of "unsatisfactory" and "satisfactory" grades in the experimental groups compared to the control group, the increase in the number of "excellent" and "good" grades proved the increase in educational effectiveness.

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