THE ROLE OF INDEPENDENT EDUCATION IN PREPARING STUDENTS FOR SCIENTIFIC-RESEARCH ACTIVITIES BASED ON THE TEACHING OF GENERAL PROFESSIONAL SUBJECTS AND THE METHOD OF CONDUCTING IT

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Annotation: *In this article, the role of independent education in preparing students for scientific and research activities based on the teaching of general professional subjects and the methodology of its implementation are considered. Based on the nature of the subject, instructions for independent work have been developed.*

Keywords: *independent education, reflexive thinking, skills, knowledge, independent activity, technological map, skills, sketch.*

INTRODUCTION

Today, the process of training a qualified specialist cannot be imagined without independent education. Because it is in the process of doing independent work that students develop critical and creative thinking reflexes. Independent learning activity is important in mastering knowledge in any academic subject. Training in the classroom cannot fully provide students with high-level knowledge. In the implementation of this, independent educational activity serves as a supplemental developer.

Independent education is a form of education aimed at strengthening acquired knowledge, skills and abilities, additional information or independent study of material.

Independent activity serves to implement the formation of knowledge, skills and abilities defined in the type of educational lesson in a particular subject and should be mastered by the student. Based on the nature of the subject, assignments are developed for independent work types.

Independent work can be divided into three types:

1. Written independent assignments include the following: performing the tasks assigned for calculation, filling in summarizing and repeating tables, developing technological maps, drawing up reports on laboratory and practical work, organizing student activities based on various organizers, and others.

2. Graphical independent tasks can include the following: preparation of various projects, sketching of drawing works, description of sections and cross-

sections (delineation of certain details and nodes, etc.), drawing up schemes, graphs, charts, description of observation results and similar tasks. takes

3. The following tasks can be included in the independent assignments of a practical nature: students prepare items and products, repair equipment and equipment, process products, calculate, design new devices, make models and models, prepare samples during independent work based on the teacher's assignment. increase.

In order to perform independent work, students should be well armed with the required knowledge and thoroughly master the subject. If the student did not have enough understanding during the lecture, he will not have the opportunity to solve the assignment positively. Therefore, when organizing independent work, it is desirable to activate knowledge, remember, sort and come to a single conclusion.

Conducting independent work outside the auditorium using the project and case-study method will stimulate the development of creative skills in students.

In the process of organizing independent activities, the teacher uses more didactic materials.

Didactic materials include problematic, interesting questions, creative assignments, projects, games, and crosswords aimed at developing students' independent and creative work and thinking abilities. The following should be taken into account when developing didactic tasks and materials.

1. Focus on solving problems.
2. Directing research.
3. Focus on the analysis of different situations and situations.
4. Aiming for conducting experiments and exercises.
5. Direction to search and find news.

In the organization of independent works, it is necessary to ensure movement from "simple to complex" and "from general to specific", from "abstract to concrete".

After getting acquainted with the above system of requirements for organizing independent activities in the auditorium, the teacher introduces students to didactic games that can be conducted in the auditorium (organizers, interactive methods, independent tasks).

Students are divided into several groups and each group is assigned a separate task. Each group prepares a presentation on the task assigned to it. The students' activities are organized individually, and they are invited to complete the table of organizing independent activities outside the auditorium according to the given course.

In educational institutions, paying special attention to independent education of students develops students' ability to think independently and creatively. Independent education of students is their desire to expand and deepen their knowledge, improve existing skills and abilities, and acquire new ones.

The main goal of independent education is to develop personal and professional qualities of students, the ability to work on oneself. The main method of independent education focuses on individual work on literature. This method forms the ability to find the most necessary information in the flow of information, evaluate it, and use this information in one's professional activity.

The organization of students' independent work is carried out taking into account the characteristics of a particular subject, as well as the level of academic mastery and ability of each student.

Activities carried out on the organization of individual projects and graduation works are also included in the group of independent works carried out outside the auditorium.

The main independent task on the topic of gear transmission is the course project, in which the students are given the kinematic scheme of operation, operational, load and energy parameters of the working technological machines and mechanisms in their field of study.

It is necessary for the students to calculate all the elements of the drive according to the given task and to design the closed and open transmission and the drive in the form of cylindrical, conical, worm and other types of reducers.

Basically, the kinematic scheme and initial parameters of chain or belt conveyor movements are presented. Methods that can be used to solve the problem are given. The course project is mainly carried out at the expense of students' time allocated for independent work. But it requires a lot of hard work and skill from the students to complete this project in a timely manner. For this reason, it is necessary for the course project leader and consultant teachers to explain the issues that most of the students have difficulty with in the counseling classes, and give directions, instructions and recommendations so that the students can understand and use the literature correctly. In this case, it is possible to allow some parts of the course project assignments to be completed during class time, and other measures that help students complete the course project correctly and on time, including the calculation or drawing of a certain part of the project using computer programs or graphics programs. However, when using these programs and tools, the student is not allowed to copy or use the program as a template.

1. Assignment for design. The course project in the subject "Machine details" will be the first practical-constructive experience in the design of machines and mechanisms for students studying in the field of engineering work. In the course project assignment, students are also given individual assignments to design the procedures of working technological machines and mechanisms in their field of study. In the task, as a rule, the kinematic scheme of the operation, operational, load and energy parameters are given. This allows students to imagine and understand the task that is set before them when completing the project.

2. Kinematic calculation of the method. In this section, the kinematic parameters of the drive are calculated, including shaft torques, angular velocities, number of transmissions, number of revolutions, and power on the shafts. Management is designed based on the results of the calculations.

3. Calculation of open transmission. Depending on the operating conditions, transmissions that transmit the power coming from the energy source can be of open or closed form. Open gears are more commonly used belt and chain drives or open gear drives. Their kinematic parameters are calculated using the parameters given in the first section.

4. Project and inspection accounts of closed transmission. During the calculation of the closed transmission, based on the values of the forces, power and torques that can be transmitted by the transmission, the calculations of the stresses affecting the transmissions are performed, and the materials of the transmission details are selected according to the values of the stresses.

The choice of materials is based on the working conditions of the details, taking into account their mechanical properties. After the materials are selected, the geometric dimensions of the extension parts are calculated using the appropriate formulas. In this department, students will improve and strengthen their basic knowledge and develop new skills for future engineering activities.

5. Calculation of shafts. In this section, the methods of calculating drive shafts, their design calculations and design principles are studied. Creates their construction using approximate, approximate and relatively accurate methods of calculating shafts and axles. Students will acquire knowledge and skills in shaft design. Such calculations are performed by students based on their knowledge of such subjects as mathematics, physics, drawing, drawing geometry and engineering graphics, materials science and technology of construction materials, resistance of materials.

6. The first stage of placing the details of the reducer in the sketch. Based on the results of the calculations made in the above sections, the preliminary sketches

are drawn on a millimeter scale of A1 size, as far as possible, on a scale of 1:1, the position of the reducer housing and the shafts, gear wheels in relation to it. All sizes are selected in accordance with state standards.

7. Selection of bearings and determination of their service life. Bearings are standard items and are selected based on the stresses they will produce on the shafts and axles and their service life is checked using appropriate formulas. In this, students will gain knowledge and skills about which parameters to pay attention to when choosing a bearing.

8. Choosing a key and calculating the strength of the joint with a key. Keys are selected according to the standard, depending on the diameter of the shafts and axles. Permissible stresses depending on their material, geometric dimensions depending on the size of the place of installation are selected from the tables and strength is checked based on the appropriate formulas.

9. The second stage of placement of reducer details in the sketch. In this section, all the details of the reducer are placed on the sketch based on the relevant standards. Sizes, allowances and deposits are displayed.

10. Selection of couplings. The main quantity that characterizes couplings is the torque they can transmit. When choosing couplings, the diameters of the shafts and the maximum value of the torque transmitted by them are selected from the tables according to the standard. Which type of coupling to choose depends on their operating conditions. In doing so, students will have the skills they need for professional engineering innovation activities in coupling selection.

11. Lubrication system development and oil selection. The selection of the type of oil and the development of the lubrication system of parts are carried out based on the knowledge and skills acquired in the tribotechnical department of the science, in the selection of economically efficient and high-quality oils.

Independent work is carried out together with the educational process and in an integral connection. Expanding the range of independent knowledge and acquisition of additional theoretical and practical material is closely connected with the student's professional qualification and the ability to work independently in production.

–Based on the suggestions and recommendations discussed above, we conclude the following:

–pay attention to the fact that the chosen type of independent activity corresponds to the goals and tasks of the subject;

–choosing a topic in one's field;

–determining the time period allocated to the selected independent activity;

–justifying that the chosen independent activity is optimal in providing the result to be achieved;

–choosing the optimal method of organizing independent activity suitable for the topic;

–comment on what kind of skills and qualifications they want to form based on the chosen method;

–preparing a presentation on the results of the task;

–development of task assessment criteria and commenting on the result to be achieved.

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