The Role of Project Activities in the Technological Education of Schoolchildren in the Russian Federation

Khotuntsev Yu.L.
Moscow Pedagogical State University
Russia

Summary
The role of project activity and reproductive education in the technological education of schoolchildren from the 1st to the 11th grade is analyzed. The recommended stages of the implementation of creative projects by schoolchildren and the criteria for evaluating these projects, along with examples of projects by schoolchildren of 5-11 grades are presented. An important role of presenting the original projects at the All-Russian Olympiad for Schoolchildren in Technology is emphasized.

Keywords: Technological education, creative projects, stages of project implementation, criteria for project evaluation.

In 1993, a new subject area (subject) "Technology" was introduced into the Basic Curriculum of the General Education Institutions of the Russian Federation. Nowadays, "Technology" is taught from the first to the eighth grade in the majority of Russian 11-year schools, while in 9-11 grades it is the elective course. It is in the process of studying the subject area "Technology" that students should receive the initial knowledge and skills of analysis and creative solutions of emerging practical problems of transforming materials, energy and information, designing, manufacturing, evaluating processes and products, knowledge and skills in the field of both technology and fine and applied art. Trainees receive ideas about the world of science, technology and the technical sphere, the impact of technology on society and the environment, on the areas of human activity and social production, the range of professions and ways to assess their capabilities. The subject area "Technology", synthesizing scientific, technical, technological, entrepreneurial and humanitarian knowledge, reveals the ways of their application in various areas of human activity and contributes to the realization of the pragmatic orientation of general education. An important role in this subject area is played by the independent design and research activities of students, contributing to their creative development and the formation of universal educational actions.

The subject area "Technology" with material, methodical and personnel support is the main practice-oriented educational area in school, where the knowledge gained in natural and humanitarian disciplines together with interdisciplinary interaction of these disciplines and technology is realized, as well as skills of practical design and research work, absolutely necessary for workers of all modern professions. It is worldwide known that "Technology" is the third core
component of general school education along with humanitarian and science components, enabling them to apply practically and use creatively the knowledge of the basics of Science in design and manufacture of products. This ensures continuity of the transition of students from general to vocational education, continuous self-education and work. The main study time is devoted to students mastering technological knowledge and skills. About 75% of school time is spent on this reproductive education. Much attention is paid to manual and mechanical processing of wood and metal, as well as processing of fabrics and food products, together with robotics and 3D-prototyping.

An important part of the technological education of Russian schoolchildren is the project activity, i.e. work on creative projects [1,2]. Creative project implies independent creative work of a student or a group of students, performed under the teacher ' s guidance. Accordingly, individual and collective creative projects differ. About 25% of the study time is allocated to the implementation of projects. Students carry out projects corresponding to their age characteristics in primary school (grades 1-4) and every year from grades 5 to 11.

The project activity of schoolchildren includes the drawing up of a well-grounded plan of action, which is formed and refined throughout the project period, elements of marketing activities (study of supply and demand), design, technological planning, equipment adjustment, product manufacturing and implementation. The design task also includes an economic and environmental assessment of the work performed. The results of this project activity should gradually materialize, i.e. to be recorded in the form of a description and justification of the purpose of the activity, its economic, ecological and social feasibility, the production of sketches and drawings, technological maps, plans, equipment adjustment, etc. It is important that the results are real, i.e. the theoretical problem must culminate in its concrete solution. The totality of all working and refined materials, including the final product, constitutes the implemented project of the educational and production activities of students, according to which the level of their general labor preparation must be assessed.

The use of the project method in "Technology" makes it possible to realize the activity approach not just virtually, but in practice, to promote the use of knowledge and skills obtained in the study of various school disciplines at different stages of training and integrate them in the process of work on the project. This allows not only to implement the polytechnic principle of training in life, but also to use knowledge from social and cultural disciplines.

We distinguish three stages of realization of creative projects in Technology:

1. Research stage

At this stage, students define the problem, whose solution will require to design and make a certain product. They also formulate the theme of the project, which is a specific product. Then the prototype of the product is analyzed, the most interesting one selected, original ideas for the project product are designed, and, finally, a sketch of the product is created, with preliminary economic (availability of materials and equipment) and environmental assessments. The original idea is discussed with the teacher and students.

2. Design and technological stage

Now students draw up a work plan, with drafts and technological maps, materials, tools and equipment for manufacturing the product. As a result, the product is manufactured and tested, necessary changes are made.

3. The final stage

Students prepare an explanatory memorandum of the project, as well as graphic and video materials. Finally, the project is presented to the teachers and students, its evaluation, possibilities of use and advertising are considered.

To conclude, at the first stage of the project, the main creative component is the formulation of the original ideas, at the second stage, the formulation of the way of implementing the product, and at the third stage, the choice of the creative form to present the project and prepare its explanatory memorandum.

The following project evaluation criteria are often used:

Evaluation of the Explanatory Memorandum of the Project

1. General design.
2. Relevance. Defining the problem, formulating the topic, goals and objectives of the project.
3. Gathering information on the project topic.
4. Analysis of prototypes.
5. Analysis of possible ideas. Choosing the best ideas. Originality of the proposed ideas, novelty.
6. Choice of manufacturing technology products (process map).
7. Economic and environmental assessment of the future product and technology of its production.
8. Development of design documents, quality of graphic documentation.
9. Description of the manufacturing technology of the product.
10. Description of the final version of the article.
11. Economic and environmental assessment of the final product.

12. Advertising the product.

Product rating

1. Originality and complexity of the design.
2. Product quality.
3. Product conformity to the project.
4. Social and practical significance.
5. Aesthetic (designer) evaluation of the selected option.

Assessment of Project Presentation

1. Formulation of the problem and the theme of the project.
2. Analysis of prototypes and justification of the chosen idea.
3. Description of the manufacturing technology of the product.
4. Clarity of presentation.
5. General knowledge and erudition.
6. Time of presentation.
7. Self-evaluation.
8. Answers to the questions.

Presentation of creative projects is an important part of the All-Russian Olympiad for Schoolchildren in Technology, which has been held annually since 2000. This Olympiad has four stages: school, municipal, regional and final. Each stage includes testing students (checking their technological knowledge), performing a theoretical creative task designing the manufacturing process for a simple given product, doing practical work on material handling or assembling and programming robots and programming a 3D printer. The last part of each stage of the Olympiad is presentation of creative projects. Below are two examples of projects for the final stage of the All-Russian Olympiad for Schoolchildren in Technology in 2017.

Project "Creation of an electromechanical prosthesis of a human hand with a control system based on the reading of muscle impulses", Albert Tazhigulov, Saransk, Mordovia.

Project "Assembling, adjustment, calibration of the milling mini-machine with numerical program control", Azat Gubaidulov, Vyatskie Chelny, Kirov region.

Literature

1. Khotutsev Yu.L., Kozhina OA, etc. Projects in the school course "Technology". "School and production" .1994, №. 4, p.84-89.
2. Sasova IA Technology: The method of projects in the technological education of schoolchildren. Grades 5-9: Method. Benefi.M .: Ventana-Graf, 2010.