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# FACTORS OF DEVELOPING CREATIVE SKILLS IN STUDENTS

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**Abstract**:
The article discusses some of the new factors aimed at developing students' creativity skills in technology classes taught in general secondary schools.

**Keywords**: Creativity skills, stages of activity, complexity of objects (products), technical and technological requirements for the manufacture and use of objects (products), the degree of formation of students' creative abilities, interdisciplinary connections.

## Introduction

Developing students' creative skills will help them find quick solutions to some of their problems in their future life activities. Therefore, this issue is attracting the attention of most researchers. As a result of this, they created a number of theories and methodologies. As a result of a comparative study of these methodologies, we came to the conclusion that in our research it is necessary to further expand the stages of activities to involve students in creativity. As an example, in Figure 1, we compared the recommendations of P.Torrens and P.N.Andrianov regarding the stages of organizing students' creative activity with the recommendations developed by ourselves. (See Figure 1).

| E.P. Torrens' proposal: | **P.N.Andrianov's proposal:** | Author's **offer:** |
|---|---|---|
| 1. Understanding, comprehending the problem.<br>2. Searching for a solution to the problem.<br>3. Creating and expressing an idea aimed at finding a solution to the problem.<br>4. Adapting the idea.<br>5. Studying the result.<br>[8; p. 85] | 1. Perception and justification of the idea.<br>2. Technical development of the task.<br>3. Practical work on the task (object).<br>4. Testing the object in work and evaluating the result of the creative solution.<br>[1; p. 6] | 1. Expanding the stages of students' activity in the development of creativity skills.<br>2. Taking into account the level of complexity of products made by students.<br>3. To give students an understanding of the technical and technological requirements for the preparation of products.<br>4. To determine the level of formation of creative skills in students.<br>5. To strengthen the use of interdisciplinary connections in the development of students' creative skills. [3; p. 30] |

Figure 1. Comparative analysis of the stages of organizing activities to engage students in creativity.

Based on our own experience, we tried to supplement them and called them “Factors for the development of creative skills in students.” We will discuss them in detail in below.

Factor I. Expanding the stages of activity in developing students' creative skills in technology lessons. These stages include the following:

I.1. Theoretical preparatory stage. The following work is carried out in this: Since creativity is a complex process from a pedagogical and psychological point of view, students cannot quickly and easily enter this process. Therefore, it is necessary to prepare them for this process in advance. For this purpose, we used simple tasks, interesting questions, puzzle games, and methods such as creating and changing the shape of various objects using ready-made details.

I.2. Stage of creative research. It consists of the following:

- understanding the essence of the given task. Determining the purpose for which the item to be made will be used;
- imagining the appearance, shape, dimensions of the item to be made, what parts it will consist of and how they will be connected;
- finding a solution for making the item.

I.3. Stage of organizational work. These works include:

- drawing up a plan for the preparation of the item;
- selecting the material(s) for the preparation of the item, preparing the equipment and workplace to be used.

I.4. Stage of technological work. These works include:

- preparing the item according to the given conditions or your own solution;
- testing the prepared item, correcting its defects and finishing it;
- searching and finding ways to expand the service life of the prepared item, its ease of use, its application possibilities, increase its durability, and artistic processing.

Factor II. Taking into account the level of complexity of the items made by students. As is known, the curriculum for technology subjects provides for various practical exercises and the making of certain items in order for students to learn work methods and develop labor skills. As is known, at this time, in early adolescence, students of the same age have different understanding, thinking and work skills according to the characteristics of their mental and physical development. This should be taken into account, especially when performing practical work. Therefore, one of the important factors in developing and developing creative skills in students in practical classes on technology is the following 5 levels, depending on the structure of the items they make, the methods of assembling parts, the types and number of materials, tools and work methods used in their preparation:

II.1. The simplest objects with one detail. These include objects such as a pointer, a ruler, a ruler, a pendulum, a compass.

II.2. Simple composite objects with many details made of one or two different materials. These include objects and tools such as a shovel, box, a mat, a mop, a hammer, an ax handle, a nutrimeter, a circle.

II.3. Objects with many details, complex composite objects made of one or more different materials. Examples of these include objects such as picture frames, frames, doors, gates, chairs, chests, sandals.

II.4. Objects with simple mechanisms. Examples of these include hand-wheels, screw jacks, and rotary machines.

II.5. Moving objects and radio devices. This category includes models of cars, tractors, ships, airplanes, and rockets that are moved by mechanical or electrical devices and are controlled by radio; Various toys; robots; devices that transmit and receive radio signals, record and play back sound and images, and display them, and so on.

Dividing the items made by students into levels based on this simple to complex feature serves as the initial stage in developing creative skills in five different areas in accordance with the changes in their mental and physical development during early adolescence. Consequently, this situation greatly helps students to work independently and creatively to the best of their ability, without getting bored or tired. When implementing these activities, it should also be taken into account that since developing creative skills in students is a complex activity, it is not easy for students to engage in such creative activities. Therefore, it is necessary to start the activity by teaching students activities that prepare them for creativity and gradually complicate these activities.

Factor III. Giving students an understanding of the technical and technological requirements for making products. In technology lessons, it is also of great importance to give students an understanding of the technical and technological requirements for making products. In this regard, the use of design, that is, technical aesthetics or artistic design elements, also gives good results. Because a product made with taste, beautifully and elegantly pleases the student, strengthens his self-confidence. Therefore, the designer's goal is to create new types of beautiful, decorative, simple and easy-to-use products that meet the requirements of society. Therefore, the use of design, that is, artistic design elements in technology lessons greatly helps to increase the general labor skills of students, to cultivate a sense of beauty and elegance in them. It also serves to improve the appearance of the products being made, to increase the convenience of their use. In this regard, design is also inextricably linked with the science of ergonomics. Based on our observations, it can be noted that the manufactured products, tools and devices, depending on their specific structure, must meet technical, technological and design requirements such as constructability, economy, operability, usability and beauty. With this in mind, it is advisable to inform students about this in advance and explain these concepts in a context that suits them. In our work, we have explained these concepts as follows:

III.1. Constructivity means refers to the fact that the product has the simplest, most convenient structure possible, its stability, strength and reliability.

III.2. Economy refers to the process of making a product cheaper by spending less effort, material and time.

III.3. Workability refers to the mechanical properties of the materials used, which are suitable for making the products quickly and easily using simple working methods and operations.

III.4. Usability refers to the convenience of using the product, its advantages over other products, the ability to perform additional tasks, etc.

III.5. Beauty refers to the state in which the dimensions, natural and artificial colors of the products are proportional, and the appearance is beautiful and evokes a pleasant feeling in a person.

As can be seen from the above, workability is a working criterion that must be taken into account when choosing materials for the product, and the rest are taken into account during the design and manufacture of the product. Thus, we believe that the appropriate use of these ideas in technology lessons will undoubtedly help develop students' creative skills.

Factor IV. Determining the level of formation of creative skills in students. It is known that the final result of any creativity ends with the creation of something new, an invention, or at least finding elements of innovation. According to its content, this innovation can be objective (new for everyone), subjective (new only for oneself), private (for use only by oneself or in individual cases) and general or social (available to the whole society or to the majority). If the creativity of adults often ends with the discovery of innovations of an objective and social nature, then the results of such creativity in students often end with the creation of innovations of a subjective and private nature. It is worth noting that in some cases, the creative activity of students may also be associated with the creation of objective innovations. Accordingly, the state of formation of creative skills in children, that is, students, can be conditionally divided into three different levels:

IV.1. Level 1 - low level. In this case, the news found by students is mainly subjective. That is, in this case, students “discover” previously known news from others. As a result, this news is news only for this student. However, this process is not easy. Because in this process, the student also experiences strong psychological states - processes such as understanding the essence of the problem, understanding, imagining, searching for a solution to the problem, comparing certain solutions. Therefore, even though the result is known in advance, the very fact of arriving at this result serves as a basis for the student to move on to objective creativity in the future.

IV.2. Level 2 - medium level. In this case, the news found by students is both subjective and objective. That is, we can observe cases where students who have reached this level have mastered the methods of creating innovations to a certain extent and have gained some experience in the field of creating innovations. If students who have reached this level are given good attention in the future and their creative skills are further developed, they will be able to overcome some difficulties and reach the third, that is, the highest level.

IV.3. Level 3 - high level. In this case, the innovations found by students are mainly objective. However, it is not easy to reach this level. For this, first of all, the student must

have a desire and interest, and the teacher must be able to notice this in time and implement measures to further expand the student's creative skills.

Factor V. Strengthen the use of interdisciplinary connections in the development of creative skills in students. Because creative work cannot be developed with concepts and knowledge in one or two subjects. For this, it is necessary to master knowledge in several subjects. This can be done on the basis of interdisciplinary connections taught at school.

Below is a description of the system for developing creative skills in students in Technology lessons (see Figure 2).

| Stages and types of creative work (pedagogical process) | The process of creative work (psychological process) | Mechanism for implementing creative work (adapted technologies, interactive methods) | Didactic support for the implementation of creative work (methods, forms, exhibitions, schemes, drawings, etc.) |
|---|---|---|---|
| Stage 1. (preparatory) Preparing students for creative activities | Understanding, thinking, preparation for practical work | Find the missing words and make sentences, use simple questions, puzzles, pictures, etc., and make certain changes. | Using initial samples recommended by the teacher |
| Stage 2. Organizing students' creative work | Understanding, imagining, and implementing | Using technical issues, making objects according to a given task, being able to disassemble and reassemble objects | Working with technical documentation, using interdisciplinary connections, taking into account the level of complexity of objects |
| Stage 3. To form and develop creative skills in students | Development of understanding, imagination, practical work, imagination and intuition. Ability to independently see defects in details or objects, find ways to eliminate them | Using creative issues and adapted technologies appropriate to the types of lessons, make changes to previously prepared or newly presented items (expand the scope of service, increase durability, improve appearance, artistic processing, etc.). Make suggestions for eliminating the shortcomings of existing details or items | Working with technical documents; using interdisciplinary connections, historical information; analyzing available data; taking into account technical and technological requirements for the manufacture and use of objects. Being able to develop a scheme, shape of the proposed details or objects (this can also be a rationalization proposal or invention) |

Figure 2. System for developing students' creative skills in technology lessons.

We believe that the above mentioned recommendations will be useful in developing creative skills in students.

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