

RESEARCH WORK ON DESIGN PROJECT FOR ACTIVATING COGNITION IN STUDENTS

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Abstract: This paper examines the problems of cognitive activation of students in the course of research-based learning by design projects. The paper describes the stages in cognitive activation by means of developing a design for thematic exhibition of installations; the opportunities for acquiring a functional research skill as a universal way to cognize the surrounding world through a variety of activities; development of a personal standpoint based on the knowledge obtained by self-study. The convincing evidence is provided that the cognitive activities during research work on a design project are boosted if the project topic is relevant, much in demand, arouses high emotional interest, requires cognition for perceiving and processing information, and engagement in the creative activity.

Keywords: cognitive activity, cognitive abilities, activation, research-based learning, exhibition of installations, design project.

1 Introduction

The research-based learning is a highly appreciated form of learning and an effective tool for promoting a creative approach to the modern life. One of the most important goals pursued by educational institutions today is to raise a researcher knowledgeable in the modern research methods, capable to deal with problems in a creative way and to replenish the knowledge by self-study. This is especially important given the impact of globalization and digitalization on the research process (Strielkowski & Chigisheva, 2018).

The encyclopedic dictionary on philosophy defines a term "research" as "a process of generating new scientific knowledge and one of the forms of cognitive activity. The inherent characteristics of research are objectivity, replicability, evidence and accuracy" (Panov et al., 1983).

A distinctive feature of the research-based learning of students is its focus not on obtaining a scientifically objective result, by rather on developing functional research skills, or in other words a universal method to cognize the surrounding world, facilitate cognitive activity and promote a personal standpoint based on the knowledge and skills gained through self-study.

The work on a design concept of a thematic exhibition organized by the educational institution fosters the inclusion of students in research-based learning and project activities, which help not only to unleash the creative potential of every student, but also to boost their cognitive abilities.

The relevance of this research is heightened by acceleration of all processes occurring in the modern life and the growing information affluence, which requires from the system of education to create favourable conditions for boosting cognitive skills of students and developing their ability for full participation in society in the shortest possible time, in other words to search for the methods and tools to speed up perception and processing of information.

2 Literature Review

The cognitive activation of students is the topic which is dealt with by such scientists as Bogoyavlenskaya D.N. (1962), Shadrikov V.D. et al. (1990) and others. Shadrikov V.D., Anisimova N.P., Korneeva E.N. (1990) believe that the learning process drives cognition and expansion of knowledge. L.S. Vygotsky (2008) asserts that intellectual development is

more vigorous when something new is produced as a result of independent activity, i.e. creativity.

Bogoyavlenskaya D.B. (1962), Korobov E.T. (1990) view cognition through creative activity as a meaningful, goal-directed process aimed at studying and researching the possible ways for improving the activity.

Fialko A.I. (2015) clarifies that the process of cognition directed at studying different objects and phenomena yields an understanding of their interrelations, with concentration of attention on what is most important. G.I. Schukina (1979) notes that the cognitive activation of students requires creation of certain conditions that would give rise to the intrinsic motivation for inclusion in the process of cognition. According to Tolmacheva G.V. (2015), at the core of active cognition lies high interest in the undertaken task. Ksenzova G.Yu. (2000) asserts that a strong motivation for cognition in the research activity is its connection with practice.

Grimovskaya L.M. (2020) explores the development of cognitive abilities through project activities, including such "components as goal setting, work with information, processing of obtained data, presentation and application of results in practice" (p. 6). E.N. Perevoschikova (2020) notes that collective designing helps to solve complex problems: "allows us to combine efforts and learn how to distribute functions, communicate, and develop a team strategy to achieve a goal" (p. 3).

The authors Zimina E.K. and Lagunova M.V. (2012) define design approach as "an artistic and technical analysis, development, creation, and transformation of a material item as a complex object, broken down into components from the perspective of an item and from the perspective of a human, in order to meet the human needs to the fullest extent possible and achieve the aesthetic perfection of the world of things" (pp. 136-139).

3 Research Methodological Framework

The research purpose was: to explore the impact of research work on design project for an exhibition of installations on the cognitive activation of students.

The research objectives were as follows:

- Clarify the essence of a definition of cognitive activity and describe its key characteristics;
- Analyze cognitive activity of students at each stage of research work consisting in the development of exhibition design and its implementation;
- Carry out a questionnaire survey of students for assessing the impact of research work on the design project for an exhibition of installations on the cognitive activation of students.

This paper was based on the following research methods:

- Theoretical-methodological: analysis of psychological and pedagogical, methodological literature, systematization, consolidation, comparison;
- Empirical: observational (direct and indirect observation), diagnostic (questionnaire survey, assessment and study of the results of cognition in the course of research-based learning).

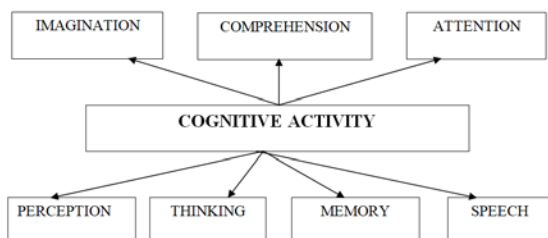
Experimental basis of research was the educational space in Nizhny Novgorod Art School, State Budgetary Educational Institution.

4 Results and Discussion

The mental components involved in cognitive activity catalyze such important processes in students as motivation for active learning, self-development, self-study.

The cognitive activity is enabled by mental processes. The structure of activity directed at cognition of the surrounding reality is shown in the chart below created by the authors of this paper (Figure 1).

Figure 1 Mental Processes in Cognitive Activity



Source: authors

The cognition process becomes much more successful if a student has interest in the undertaken task. The student's assertiveness in cognitive activity may be defined as a quality of personality directed at understanding a certain subject matter and finding ways for achieving the outcome pictured in imagination.

The cognitive activity helps a student to gain diverse knowledge, skills and abilities; expands the world outlook and develops moral qualities; unlocks cognitive capacity, distinctive qualities, assertiveness, cognitive interest, reveals hidden capabilities of a student; encourages search and creative activity.

For cognitive activation of student, the primary focus shall be on maintaining their stable interest, developing their intellectual abilities and mental determination. There are several important elements that control this plane of human's life, such as skills, abilities and habits (Klimov, 1986).

The cognitive activity is expressed in newly acquired skills and abilities and in many cases in abandoning unproductive habits.

Cognition is a complex procedure by means of which students progress from having no knowledge to obtaining knowledge, from spontaneous discoveries made through the lived experience and from information references to a system of active cognition powered by creativity.

Through cognitive processes that are incorporated in activity pursued by a human, various information is obtained contributing to better understanding of the surrounding world for its further transformation, the goals are set and the plans are built, the content of future activity is identified, its stages and necessary behavior are contemplated, the future results are analyzed (Ksenzova, 2000).

Cognitive activity of students is based on the level of their cognitive abilities which is predetermined not only by the innate qualities, but also depends on the education and upbringing received the the family and in the educational institution (Shadrikov et al., 1990).

A salient feature of cognitive activity is that the process may involve different amount of invested efforts, assertion and independence, the behavior may also vary: it may be imitative or creatively searching, which has an impact on the final result (Schukina, 1979).

Here, since all students differ in their level of cognitive abilities, a teacher should focus on the main stage of cognitive activity.

Continuous nature of the process of cognition was noted by such authors as Yurchenko T.V. and Lagunova M.V. (2011), who distinguished the following stages in this process: focusing

students' attention on the goal of cognition; selection of the methods for rendering impact on the end result; constant monitoring of the process and ensuring its integrity for achieving a desired result.

A teacher determined to spark the students' interest to the cognitive activity should be guided by certain objectives and motives.

The objectives are as follows: exploring something new and yet unknown, finding connections between the unknown and the known, developing new solutions, explanations, subjects, non-standard approaches, maintaining interest in finding solutions to practical and intellectual problems (Petrova et al., 2020).

The motives for cognitive activity include different states of mind inducing a person to obtain information about the surrounding world: an urge to explore the surrounding world and a desire to accommodate interests and appease curiosity of students.

The cognitive activity is implemented through exploration of the objects of cognition. Cognition is an intensive reflection and perception of reality in human consciousness, the course of events and the process of obtaining new knowledge. Research-based learning is driven by an intentionally inspired cognitive creative activity of students, which is characterized by initiative, purposefulness, assertiveness, motivation and consciousness. The expected outcome of such activity is the development of cognitive motives, research skills, individually meaningful knowledge and methods of work that are new for students.

Research activity may be seen as an indispensable requirement for the development of skills in watching, observing and exploring the surrounding world.

It is important to pay due regard for the age-specific psychophysical capabilities of students, only then the research work will be truly captivating, may last long without causing tiredness, which will have a positive catalyzing impact on cognitive activity, and will help students to develop their own point of view on the explored problem (Ksenzova, 2000).

Researching may be effective when it is on a voluntary basis only. The aspiration to study and analyze something appears when the subject under study is interesting and appealing to the student.

In the research work, major focus is on the following considerations:

1. Purpose and objectives of the students' research activity should correlate with exploration of the history of emergence and evolvement, specific features of the item under scrutiny; particular understandings about the item under scrutiny, etc.
2. The needs and motivations underlying the students' research work contain cognitive motives, as well as social motives. Such motives include fulfillment of personal duties, a desire to be responsible, to get approval for successful work, motivation to self-education.
3. The objects of the students' research work are artificial, social, fantastic objects, objects of inanimate and animate nature.
4. The mandatory subjects of the research work should be a student – a teacher, a group of students, several pairs of students, a whole group.
5. The means of the students' research work may include internal (acquired skills of research work and cognitive skills) and external (new material, various devices and tools) sources.
6. Results of the students' research work may include new skills and new knowledge, emergence of cognitive motivations.

The research work on the chosen topic should contain the following stages: formulating a topic, setting the purpose and

objectives, producing a plan and selecting definite ways of work, finding necessary information, carrying out various experiments and surveys, obtaining the results and analyzing own work.

A salient point in research activities is the connection with practice, with direct examination of the surrounding reality and application of the obtained theoretical knowledge in practice. The emphasis on the lived experience of students during their studies may become a strong motivation for cognition (Ksenzova, 2000).

When proposing a topic, it is important to make sure the proposed problem is relevant, to identify the most promising lines of research, and to accommodate the interests and propensities of students.

The research supervisor should make students aware of the requirements to the work, help them to determine the range of questions pertaining to the chosen topic, to draw up the action plan, render assistance in the selection of literary references and research methods.

Scientific studies concerned with design of educational space have their specificity, the main goal of such studies is to help students gain subjectively new knowledge in the field of design by performing tasks with the unknown result.

Studies in the field of design of educational space may proceed in two directions, depending on the pursued goal:

- the goal of the research has a specific practical orientation: creation of a design concept in the form of a design sketch (prototype model), accompanied by research and analysis of the project specifics, study of analogs, materials to be used, etc.,
- the purpose of the research may consist in systematization, identification of regularities, clarification of processes in culture, or a particular industry, that affect the design of educational space, on the appearance of new stylistic, shape and color solutions affecting the learning.

In research-based learning involving development of design it is important for not only the theoretical part, but also the practical part to be of the research nature, since exploration of the problem in between the educational space and human activity (the process of learning) constitutes a basis for the search of a conceptual idea (Sherbakova et al., 2020).

It should also be noted that student's research in the field of educational space design takes place in the environment shared with other participants of the educational process who are also interested in the result of his/her activities, which allows to conduct research, analyze and draw conclusions not only based on personal impressions and through personal interpretations, but also by involving other participants of the educational process showing interest to this subject, who may indirectly become participants of the research by mastering teamwork skills.

Different teamwork models may be applied within the same project to obtain better results of the research.

In the course of a pedagogical experiment to boost cognitive skills as a key driver of research-based learning, 14 students of Nizhny Novgorod Art School, State Budgetary Educational Institution, of the 1st and 2nd years of study were asked to develop a design project for an exhibition of their own creative works "Combinatorial Voluminous Structures". These works were created by students as part of the elective course "Environmental Design". Let us take a closer look at how the research and learning of students on this topic were organized.

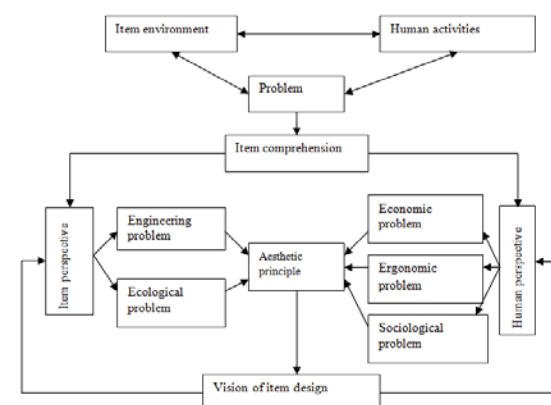
The research process in the field of design includes the following main stages: pre-design scientific research and creative development of the design concept.

In elaboration of a design solution, work at each stage should be carried out in accordance with the structure of the design approach (Zimina & Lagunova, 2012).

Structure of the design approach proposed by the authors of this paper (Figure 2) indicates the scope of knowledge in different areas that a student should have to create design for an exhibition of installations, in order to solve:

- Engineering problems;
- Environmental problems;
- Economic problems;
- Sociological problems;
- Ergonomic problems;
- Aesthetic problems.

Figure 2 Structure of a Design Approach to Item Transformation Activities



Source: authors

The students in their pursuance of the design vision as a solution to the stated problem learn methods of analytical and project activities, improve their researching skills, learn the principles of design approach to transformation of educational space in the search for a design solution.

Drawing on the age-specific psychophysical capabilities of students, it is important to make the research work rational and exciting, and then it may last long without causing tiredness, which will have a positive catalyzing impact on cognitive activity, and will help students to develop their own standpoint on the explored problem.

A salient point in the research activities is the connection with practice, with direct examination of the surrounding reality and application of the obtained theoretical knowledge in practice.

As part of work on the design project for an exhibition the cognitive activation was provided at the preliminary consultations, where the project goal, objectives, working hypothesis, general strategy of the pre-design research were defined, different sources of information were recommended on the history of exhibition activity, emergence of traditional and modern types of exhibitions.

The *intermediate consultations* served to support the students' motivation for active research-based learning. Students were offered to independently study the process of organizing thematic exhibitions of installations; to plan the stages of the design project for a thematic exhibition of installations, to formulate the conceptual idea of exhibition of installations through the heuristic search for a design solution, to consider structural aspects central to space organization, to consolidate the general vision of exhibition installations, to produce the prototype model of an exhibition space.

The *final consultation* was held to discuss the results of research, possible ways to present the results and material to be included in presentations.

In the course of the research work on the design project, the students themselves found out that designing is always the work with a special emotional mood, which most effectively affects such components of cognitive activity as perception, thinking, memory, attention, imagination and comprehension.

Design of combinatorial voluminous structures from modular elements for an exhibition of installations became the result of a search for new compositional solutions based on the study of modular structures in folk art, finding and revealing the harmonious coherence in elements by using the artistic design techniques, which has expanded the students' idea of the design capacity of folk art when developing design of the thematic exhibition.

The work resulted in the translation of emotionally felt idea of the exhibition of installations into reality and the proposed design for combinatorial structures from modular elements, which transfigured the space of educational institution into a coherent whole.

The design approach to a finding a design solution for the exhibition of installations confirmed that the students need knowledge in different areas, as it is required to solve various problems: engineering, environmental, economic, sociological, ergonomic and aesthetic.

Upon completion of the project, the students were offered a small questionnaire with the following questions:

1. What aroused your greatest interest during research work on the project?
2. How can you use the experience you have gained?
3. Which research stage did you enjoy the most?
4. Did you develop any new character traits while working on a design for exhibition?

The answers of students allowed us to verify that the students' research work inspired their great cognitive interest in such a field of environmental design as "exhibition activity", it was captivating for them to learn different types of exhibition equipment, traditional and modern ways of organizing exhibition space, etc. Students noted that they also learned to "state a problem", "carry out an analysis" of already created design objects, "analyze the obtained results" and this may be helpful for them in the future both in their studies and in professional activity. The most enjoyable for students was the discovery of new knowledge, as well as the creative process of organizing an exhibition itself. Students noted that they have gained self-confidence and validated that this profession was a right choice for them.

5 Conclusion

The conducted research revealed that the work on design of a thematic exhibition triggers cognitive development of students provided that: the exhibition topic is relevant and much in demand; arouses high emotional interest to the stated problem and the search for the conceptual idea, requires cognition in the course of information perception and processing as part of creative activity.

Design approach to the development of exhibition design indicates the scope of knowledge in different areas that a student should have to create design for an exhibition of installations in order to solve engineering, environmental, sociological, ergonomic, economic and aesthetic problems.

The search for a design solution embracing combinatorial structures from modular elements for exhibition had a direct impact not only on the development of artistic taste and visual thinking, but in general on cognitive activation of students in the course of work on the design of structures for an exhibition on a particular topic.

It has been determined that the work on the design for a thematic exhibition has an activating impact on the cognitive development

of students when they explore key specifics of exhibition and design activities.

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