PEDAGOGICAL CONDITIONS FOR ORGANIZING STEAM-BASED PROJECT ACTIVITIES IN PRESCHOOL EDUCATION

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Abstract: This article explores the pedagogical conditions for organizing project-based activities based on STEAM in preschool education. The STEAM approach is viewed as a crucial tool for fostering children's creativity, critical thinking, and problem-solving skills. The article provides a detailed analysis of methods for organizing STEAM-based project activities for preschool-aged children, pedagogical conditions, and the requirements for them. Additionally, the importance of parental involvement and the integration of innovative technologies are highlighted.

Keywords: preschool education, STEAM, project-based activities, pedagogical conditions, creativity, critical thinking, innovative technologies, parental involvement.

The current reforms in the education sector, especially in the preschool education system, create the need to implement innovative approaches. In particular, the STEAM (Science, Technology, Engineering, Arts, Mathematics) approach is becoming increasingly important in developing skills such as critical thinking, problem-solving, and collaboration in children.[1]

Today, strengthening children's interests, creativity, and practical knowledge through the effective organization of project activities in preschool

[1] **Islomova, N.A.** (2020). *Maktabgacha ta'limda innovatsion texnologiyalar*. Toshkent: O‘qituvchi.

educational organizations is an important issue. From this point of view, an in-depth study of the pedagogical conditions for organizing STEAM-based project activities for preschool children is one of the current scientific and practical tasks. STEAM education is an integrated approach to teaching science, technology, engineering, arts, and mathematics in an interconnected manner, unlike the traditional education system. This model is widely used in the United States and European countries, and is now being introduced into the educational process in many developing countries, including Uzbekistan.

The main goal of STEAM education is to develop children's life skills, including:

- **Critical thinking** – children look for multiple ways to solve different problems.
- **Creativity and inventiveness** – through project work, children express their ideas and fantasies.
- **Collaborative work** – by working in groups, children develop communication and idea-sharing skills**.**
- **Problem solving –** attempts to solve real-life problems in a practical way.
- **Conscious use of technology** – children are introduced to information technology from an early age.

The STEAM approach is especially important for preschool children, as it is during this period that children's thinking is formed, their interests grow, and they seek to actively interact with the environment. Through this approach, the learning process for children becomes natural and interesting, as they strive to learn for themselves, ask questions, and seek answers.

From this point of view, the STEAM model is one of the most important modern, integrated, and child-focused methods for achieving high efficiency in education.

Project activity is a research process of students (or preschool children) independently or in groups, aimed at solving a specific problem, with a clear

goal and result. In preschool education, this activity is organized more through games, practical tasks, experiments and observations.

- **The main features of project activities are:**
- **Existence of the problem:** Project work will be aimed at solving a specific problem.
- **Practical activity:** The child tries to solve the problem practically, not just theoretically.
- **Outcome-oriented:** There will be a clear product or conclusion at the end of the project (e.g., a model, a drawing, the result of an experiment).
- **Creative approach:** The child expresses his/her thoughts freely and participates with creative ideas.
- **Collaboration**: Children learn to work collaboratively with each other and with the educator.

The importance of project activities in preschool education is reflected in the following:

1.Forms practical knowledge. The child understands the topic he is studying through real-life examples and connects it to real events.

2. Increases interest. The process in which the child actively participates gives him more pleasure.

3. Develops creativity. During the project process, the child shows his fantasy, imagination and ideas.

4. Develops communication skills. Through group work, the child exchanges ideas with peers and learns to express his opinion.

5. Forms a sense of responsibility. The child learns to be responsible for completing the task assigned to him.

Methods for organizing STEAM-based projects for preschool children.

In order to effectively organize STEAM-based project activities in a preschool educational organization, it is necessary to take into account the psychology of the age group and individual characteristics. Since preschool

children are mainly inclined to search, learn through play and experience, the conditions created by the teacher should correspond to these needs.[2]

Below are important methods for organizing projects based on the STEAM approach:

- Cross-disciplinary integration
- Topics should cover multiple areas. For example, a project on the topic "What is Water?" might look like this:
- **Science (S):** Observations about the properties and states of water.
- **Technology (T):** Explanation of the water cycle process through videos.
- **Engineering (E):** Making a simple model of a water filtration device.
- **Art (A):** Drawing a picture about the water cycle.
- **Mathematics (M):** Measuring and comparing the volume of water.

2. Teaching through experiments and practical activities

In the STEAM approach, children are more influenced by real-life experiences. For example:

• In the topic "How does a plant grow?", children plant a seed and observe, measure, and photograph the changes every day.

• In the topic "How does ice form?", they conduct an experiment using a freezer.

3.Game-based projects

Since play is the main activity of children, STEAM projects should also be organized in a game-based manner. For example:

• As part of the project "Let's build a space rocket", children work in groups to build a rocket model from various materials, give it a name and "fly".

4. Combining group and individual work

[2] **Mirmuhamedov, O.** (2019). *STEAM ta'limini tashkil etish metodikasi*. Toshkent: Fan va Texnologiya.

In projects, children learn to work as a team, but each child must make their own contribution. This strengthens their sense of responsibility and increases their social activity.

5. Involve parents

Family support for STEAM projects can strengthen a child's knowledge. For example, in the project "How does electricity work at home?" parents can safely explain various electrical appliances to a child.

In general, organizing projects in the STEAM approach combines knowledge, skills and abilities in children, increases creativity and interest. Most importantly, the child actively participates in learning, acquiring knowledge not in a ready-made form, but on the basis of his own experience.

Pedagogical conditions and requirements for them

For the successful implementation of STEAM-based project activities in preschool education, it is necessary to create certain pedagogical conditions. These conditions directly depend on the capabilities of the participants in the pedagogical process - children, educators, parents, and the educational institution.[3]

Below are the main conditions in this regard and their description

1.Training qualified pedagogical personnel

The most important factor in implementing STEAM education is the teacher's knowledge of new methods and their effective use. The teacher must:

• be able to plan project activities,

• encourage creative thinking in children,

• be able to use technologies for didactic purposes,

• be able to organize independent activities of children.

2. Creating a suitable environment (learning environment)

[3] **Qodirov, Sh.** (2018). *Loyihaviy faoliyat va ta'lim jarayonida uning ahamiyati*. Pedagogika va Psixologiya jurnal.

STEAM activities require a diverse, safe and open environment. The following factors are taken into account:

• equipment needed for conducting experiments (simple laboratory equipment, water, soil, building materials),

• technological tools (tablets, projectors, small devices for robotics),

• materials needed for art (colors, plasticine, paper, paints),

• space and space where children can move freely.

3.Methodological support for STEAM projects

Teachers need to have methodological guides, recommendations and practical lesson plans. When planning projects:

• age-appropriate topics should be selected,

• a step-by-step plan should be developed,

• assessment criteria should be determined.

4. Partnership with parents

Educational effectiveness increases with partnership with parents. They can:

• participate in projects,

• support children,

• continue practical activities at home.

This, in turn, ensures the continuity of the educational process.

5. Introducing innovative technologies

Modern information technologies are an integral part of STEAM projects, developing digital literacy in children. For example:

• Showing the growth process of plants through AR (augmented reality),

• Learning science and mathematics through interactive programs,

• Recording experiments using electronic devices.[4]

In conclusion, project-based activities in the preschool education system transform children into independent thinkers, initiative-takers, and active

[4] **Miller, R.** (2017). *STEAM Education: A 21st Century Approach to Learning*. Educational Review, 69(4), 456-472.

participants. In particular, combining this activity with the STEAM approach makes the learning process of children more effective and innovative. At the same time, pedagogical conditions also depend on the material and technical base of the preschool educational institution, its territorial capabilities, and the openness of the leadership. The STEAM approach supports not only the quality of education, but also the personal growth of students.

Organizing STEAM-based project activities in preschool education is one of the important directions of modern education. Research results show that the STEAM approach effectively develops children's critical thinking, creativity, collaboration, and practical skills.

Through project activities, children become more active in the learning process, consolidate their knowledge, and strive to apply the acquired knowledge to real life. At the same time, the creation of pedagogical conditions - training qualified personnel, methodological support, introduction of modern technologies, and cooperation with parents - ensure the success of STEAM projects.

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