Development of the Level of Knowledge of Primary School Students on the Basis Of "Steam - Integrated Education"

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ABSTRACT

This article highlights the importance of increasing the level of knowledge of students through STEAM (science, technology, engineering, art and mathematics) education. STEAM, a complementary and integrated unit of disciplines, helps students develop critical thinking, business knowledge, creativity and innovation. Combining science, technology, engineering, art and math, this method encourages students to take action and find alternative solutions to important social problems

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In the Decree of the President of the Republic of Uzbekistan dated April 29, 2019 "On approval of the Concept for the development of the public education system of the Republic of Uzbekistan until 2030", special importance is attached to "STEAM" to the development of competencies and skills of scientific and critical thinking, independent search and analysis of information. emphasis, the introduction of general education programs and new state educational standards that meet the requirements of a modern innovative economy" is defined as a priority task. As a result, the pedagogical opportunities for preparing future primary school teachers based on the STEAM-Education approach with integrated educational content have expanded, as well as ensuring a successful transition to the next level of education. [1].

Combining Science, Technology, Engineering, Arts and Mathematics, STEAM Education (Science, Technology, Engineering, Arts and Mathematics) is a multifaceted learning model. In this model, students are expected to acquire, develop, and develop knowledge and skills, creative thinking, innovation, and problem-solving skills through additional activities to solve real-world problems.

STEAM education allows students to connect technical knowledge with art, express it creatively, analyze different points of view and find ways to come up with original solutions. This model encourages technical skills, positive and critical thinking skills, the creation of original innovations, helps to educate the modern workforce, familiarizes them with 21st century technologies and prepares them for the right use. [5] STEAM education can be implemented at any level of education, from elementary to tertiary, and in any institution such as schools, museums, community centers and online platforms. This education will help students take initiative, develop critical thinking and technology problem-solving skills, stimulate creativity, and prepare them well to become a mature workforce in the future. It also encourages the diversification of the learning environment between different disciplines, breaking the links of external disciplines and defining the interdependence of specific disciplines [3].

The benefits of a STEAM education include increased student engagement,

improved critical thinking and problem-solving skills, development of new ideas and logical thinking, and improved preparation for future careers. contains h. It encourages the development of a unique, diverse and inclusive vision and expands the additional research and thinking skills of students from different backgrounds and cultures. STEAM education prepares students for creativity and innovation through the study of computers and technology, design and construction, and the use of various materials and devices. STEAM education is manifested in the development of creative, innovative and successful skills through the integration of design, engineering, art, mathematics and technology based on the principles of practical as well as experiential learning. Picture 1.

The main features of STEAM education are as follows:

1. Science: In STEAM education, students learn to analyze scientific problems, create scientific products, and seek scientific solutions using scientific methods and research methods.

2. Art: STEAM education allows students to create new works of art and invent new works, associating them with the study of various art forms, as well as technical knowledge and skills. allows.

3. Technology: In STEAM education, students learn how to solve problems, use technical tools and programs, become familiar with computer programming and robotics, and explore innovative technologies through technical knowledge and technology.

4. Engineering: Through STEAM learning, students learn to navigate situations, model and prototype designs, develop engineering skills, and create innovative designs using engineering principles and design processes.

5. Mathematics: STEAM education encourages the application of mathematics, the use of mathematical models and algorithms, mathematical ideas and problem solving, the development of mathematical skills, and the integration of mathematical skills.

STEAM education develops students' abilities and skills such as creativity, problem solving, innovation, and community support. This model helps learners develop their core competencies as they prepare for the diverse and new challenges of today's challenging technological era, and helps them achieve high levels of collaboration, community participation, and productivity [4].

By studying STEAM education, the following characteristics are developed:

1. Creativity is encouraged by students. Through information and examples of design, art and innovation, students develop the ability to freely express themselves, create in their thoughts, find new solutions and look for new ideas in news creation.

2. Develops students' ability to find correct, clear and logical solutions in practical processes by solving problems. It enhances the ability to think critically, analyze and approach problems in the process.

3. The ability to create something new develops. Students find new solutions to problems, develop the ability to work innovatively in new analyzes and processes, and support creativity.

4. The ability to work in a team is formed. Students should be able to correctly assess the process of communication in a team, cooperation with organizations, development of leadership qualities. In addition, students gain experience in the process of working in a team, cooperation, how to properly sort advice and express their thoughts in front of the public.

5. The ability to accumulate technological skills is being formed. For students, technical skills and knowledge-related skills are taught through practical situations, which enhances the skill. Through computer programming, robotics, 3D printers, sensors, and other technical tools, students develop problem-solving and creativity skills by learning and using technical skills.

STEAM education is taught in various educational systems and workplaces around the world. The following groups are examples of STEAM students:

1. For schoolchildren - the development of creativity, the right approach to problems, innovation and the ability to predict the result

through the integration of scientific thinking, design, engineering, art, mathematics and technology. taught for.

2. Higher education institutions - higher education institutions in all specific disciplines and directions, studying STEAM education, stimulate students' interest in news and innovations, their analysis, creativity in the search for new solutions and innovations, and strive to create opportunities for the development of interpersonal communication skills.

3. Educators - Educators play a major role in teaching STEAM education. They engage students in developing their creative, innovative and successful skills by integrating scientific thinking, design, engineering, art, mathematics and technology through practice and experience based learning principles.

4. STEAM professionals such as designers, engineers, architects, science and technology professionals can innovate and acquire technical skills by applying STEAM principles to their work.

5. Associates - When studying STEAM education, organizations such as schools, universities, research centers, international organizations and private project centers collaborate to develop innovations, study STEAM principles, and create and apply the innovation processes they support.

The main goal of STEAM education is to enable students to develop creativity, problem solving, innovation and analytical skills through the integration of scientific thinking, design, engineering, art, mathematics and technology. [7] Through the principles of STEAM, students receive theoretical and practical learning experience. They strive to achieve the following goals:

1. Encouraging students' interest in the news and helping them organize their activities according to their areas of interest helps develop their creativity and innovation. Students develop their own ideas by expressing themselves freely, solving problems, finding new solutions, and generating new ideas.

2. Students should be given the opportunity to apply theoretical knowledge in practice. Students participate in hands-on activities related to thinking, design, engineering, art, and technology as they learn to manage their learning and skill and complete tasks successfully.

3. Organizes the processes of creating problem situations and ways for students to find solutions and find alternative solutions. Students learn to make innovative judgments through analysis, understanding problems, and creative solutions.

4. Supports the development of students' ability to work in a group, teamwork, thinking and interorganizational work. Working on team projects, students learn to collaborate with others, communicate and draw complex conclusions from the above.

5. Gives students the opportunity to acquire knowledge and skills related to technology and technical skills. Students develop their knowledge and skills by getting acquainted with new technologies, applying them and using them in their activities.

6. Encourages students to think and analyze scientifically. Students learn the processes of solving scientific problems, conducting research, analyzing results, and creating fact-based news stories based on those results.

7. Develops an interest in design and engineering and gives students the opportunity to explore their principles of design and engineering. Students develop skills related to the organization of design processes, the creation of samples, the implementation of design tasks and their application in practice.

8. This enhances the role and importance of art, aesthetics and design in the activities of students. Through creative activity, students will learn to consciously analyze their thoughts, create interesting perspectives, and understand and develop the emerging variety of art and design.

9. They learn to identify and evaluate the impact of mathematics and computing on practical processes. Students develop the ability to study mathematical principles, perform practical calculations, create models, use mathematical thinking, and combine the above.

STEAM education mainly includes the following tasks:

- Collaboration: STEAM education is integrated in the fields of science, technology, engineering and mathematics. This allows students to learn how to think scientifically, solve problems, create and innovate with the same tasks.

- Practice-Based Learning Methods: STEAM education uses practice-based learning methods. Students develop the ability to study specific educational outcomes, independent analytical learning, research, create new ideas and test them in practice.

- Acquaintance with technologies: STEAM-education - introduces students to new technologies, ensures their entry into the technological environment through their application and use in practical activities. This will help them to constantly update their knowledge and skills and increase their interest in integrated technologies.

- Integration of mental approach and experience: STEAM education - allows students to learn how to solve problems associated with theoretical information and experience. This develops their passion for solving practical problems by analyzing real problems, conducting experiments, generating new ideas and demonstrating them.

- Innovation and Creativity: STEAM education encourages students to be innovative and creative. It helps students develop new approaches, generate new ideas, find new ways to solve problems, and develop their creativity.

- Flexibility: STEAM education allows students to learn how to work in a group, complete their task, collaborate with other students, share their ideas through discussion with others, and actively participate in community life. This prepares them to learn how to work successfully in society and work with social relationships.

-Creating a problem and solving it: STEAM education - develops students' ability to analyze a problem, identify problems, solve them and evaluate results. Students will learn how to use the skills and methods they have learned to analyze problems and come up with creative solutions.

-Creativity and design: STEAM education - develops students' creativity and design aspects. It allows students to create new design patterns, learn the design process, develop aesthetic skills, and learn to work in various aspects of design and creativity.

Thus, STEAM education provides students with opportunities for interaction, hands-on learning methods, exposure to technology, integration of theory and experience, innovation and creativity, scientific thinking and analysis, flexibility and problem solving, and helps develop creativity and design skills.

Some problems and shortcomings may arise in the application of STEAM (science, technology, engineering, art and mathematics) in primary education. These problems may be related to the knowledge and skills that students acquire in the process of assimilation and learning. Here are some of his problems along with their solutions:

1. Integration of subjects. Integrating STEAM programs into the current school curriculum can be a daunting task. A powerful tool is needed, a program for organizing coordination between teachers and lesson plans. In this case, it is necessary to use integrated systems that help to understand all the learning theories and connect topics between lessons.

Solution: Collaborate with teachers and lesson plans and combine topics with integrated systems.

2. Inadequate Use of Materials: STEAM classes should provide opportunities for students to gain experience along with hands-on activities. This requires the provision of the necessary materials and tools. Many students may be deprived of the necessary materials, equipment and laboratory space.

Solution: It is necessary to create laboratories from convenient and inexpensive materials that teach 3D printers, robotic systems, electronics and other necessary tools.

3. Insufficient qualification of teachers. The problem of teaching STEAM subjects can

also be caused by teachers. In STEAM classrooms, teachers need significant experience to learn safe and effective processes. They must be willing to learn, master new technologies and concepts, create topics, and solve problems creatively.

Solution: Private training for teachers based on STEAM principles and their application in practice.

4. Difficulties in ensuring the quality and effectiveness of teaching: The practical processes of STEAM classes require students to conduct a number of practical exercises and research. Such activities require significant resources and time, so it may be difficult to provide them in practical terms and organize research.

Solution: Get financial support, such as providing resources and tools, and planning integrated programs.

5. Integration of teaching with other subjects: When STEAM lessons are integrated with other subjects, collaboration and integration between the teaching team must also be ready. This requires the integration of lessons, the choice of the best way to study the subject and the effective direction of the entire curriculum.

Solution. To have a successful teaching experience, it is necessary to integrate the teaching team and the curriculum.

In conclusion, based on problem-oriented educational technology, STEAM lessons are presented comprehensively in primary education, and, having learned to find solutions to problems with their help, students can work on themselves, expand their worldview. Primary school can help students develop their thinking and creativity.

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