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Problematic education, which is one of the foundations of the STEAM approach in education

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Abstract: this article is about the development of the educational system, the innovative processes carried out in our country and the general development trends of STEAM education, the work carried out in the system of higher education and primary education in their implementation. Emphasis on education in the world. On the basis of an innovative approach, the issues of improving the competitiveness of students, as well as increasing their social role in the process of ensuring the quality of education, are being researched as one of the relevant areas. From this point of view, on the basis of advanced foreign experiences, an important place is occupied by improving the organizational and pedagogical mechanisms of students' creative abilities based on national and world educational experience. According to the decree of the president of our country, the concept of development of the higher education system was approved until 2030.

1 INTRODUCTION

Global electronization, computerization, informatization, virtualization, intellectualization form a completely different worldview in people, which is characterized by a discrepancy between the world of objective reality and the virtual world. STEAM education serves as a kind of connection between the objectively existing and the virtual world. Knowledge of how to create a high-tech product is no longer enough.

The STEM approach is seen as a key solution to increase the efficiency and competitiveness of our country's education in the digital age. However, according to many teachers, now is the time to add Arts as the main component to the Stem approach-a component (art) that includes creative, artistic Sciences, design innovations. This expands the philosophical framework of the STEM approach, but both of these approaches will have the same main goal – to change the educational system in accordance with the requirements of the digital economy and actively develop the digital environment of society. In addition, it covers visual,

written and action Art, in addition to the content of the concept of "art". Therefore, integrating artistic opportunities into Stem education increases value in the study of Stem subjects, expanding the range of knowledge.

2 Materials and Methods

In the last few years, creative industries related to intellectual and creative activities have become increasingly important in the innovation economy: computer technology, virtual reality, design, fashion, advertising, animation, etc. Creative industries around the world are becoming the driving force behind economic growth, and the employment of young people in the creative sphere has already exceeded the employment in real life. These changes put new tasks in the educational system, that is, the need to integrate more into the program teaching creative and artistic disciplines. Currently, these fields of science are one of the most demanded. STEAM technology is an innovative teaching method that connects technical and Natural Sciences, Engineering, Mathematics, and the arts, and STEAM

education does not contradict STEM education, but enriches and expands it[5].

In the United States, where more than 30 million jobs were created within the creative spheres, this need led to a change in the concept of STEM: a fifth component was added to the synthesis of Science, Technology, Engineering and mathematics-art. The result was a new abbreviation-STEAM.

The transition from STEM to STEAM is moving forward as a positive mode of action to meet the needs of the economy of the 21st century. In many countries, STEAM education is a priority for the following reasons:

- Lack of IT programmers, engineers, specialists in the field of high-tech production;
- the need for new types of specialists related to technology and high-tech production at the junction with the Natural Sciences of bio and nanotechnology;
- the need to comprehensively prepare from various educational fields of Natural Sciences, Engineering and technology.

A large part of workflows already allow automation, and in the future, as analysts predicted, more and more professions will fall into the danger zone and disappear one after the other – artificial intelligence will take their place, and among the few skills that are not yet in the near future, artificial intelligence will succumb to pressure, empathy and emotional intelligence will remain.

"The fashion for Stem education is a thing of the past, as robots perform technical tasks better than humans. IT companies need more professionals with STEAM skills with a basic element added to scientific and technical knowledge. After Apple released its first iPad, its head, Steve Jobs, said: "We are sure that the technology itself is not enough in Apple. With only art and humanitarian knowledge, the technology circle gives results and delights our hearts." He was an excellent expert in IT technology, had creative thinking and saw things from a creative point of view. This is how leaders participated in the presentation of research, design and development images and developed a marketing strategy taking into account expectations, people's dreams and needs. Of course, their experience does not prove that it should become Steam[1].

In the near future, IT technology will be in dire need of STEAM technology professionals. Because robots begin to solve tasks better than humans. But the humanities (for example, psychology or art) are unlikely to be mastered by machines in the near future. The development of product design, its aesthetics and philosophy will help IT professionals create new competitive solutions in the near future, and therefore the humanities, which will teach students to understand the human essence and think creatively, will be very useful here.

The idea of using multifaceted development methods in education is not new. For example, sel (Social and Emotional Learning) has the concept of social and emotional education, which involves the development of social and emotional skills of children, which pays great attention to the upbringing of "people of the future". This concept makes it possible to obtain basic and changing knowledge in various disciplines through the implementation of interdisciplinary technologies, learn to form professional competencies and build relationships with other people, find compromise solutions and achieve educational goals.

Finnish education system. The introduction of STEAM technology made it possible to conduct classes in addition to individual subjects, since in the lesson they study phenomena, situations, practical examples in life. Thanks to the free atmosphere of the educational environment – open space, which is characteristic of the Finnish educational system, in accordance with which groups of students of different ages are taught, the lesson explores phenomena, situations, practical examples in life.

Attempts are made to integrate different disciplines in the study or development of the subject in a steam-oriented teaching method. STEAM technology mainly ensures the strengthening of the technical sciences with the humanities. Therefore, teaching will be a step towards logic. Legalizing such an association, connecting the creative side of the development of personality to the pure technical concept of stem. Thus, in addition to science, technology, engineering and mathematics, Art (Eng. "art") STEAM, Music (Eng. music) STEM, Reading (reading alongside art) STREAM. STEAM methodology is most common as a complete, successful and self-sufficient phenomenon[2].

If we analyze the educational activities of the Finnish school in the direction of education

"technology". There is no "technology" in the basic curriculum, and technological education means teaching technical labor and material processing. At the same time, the components of technological education are carried out through many school subjects on the basis of integration and interdisciplinary ties.

For example, the High School explores the special interdisciplinary theme "humanity and technology", which deals with the following issues:

- the development of technology in different periods of history and changes in the field of culture, in different areas of life;
- technology in everyday life, society and local industry;
- development of technological ideas, modeling, evaluation, product life cycle, etc.

With this approach in the study of the topic, students not only study the humanitarian, environmental, economic, chemical and other aspects of this problem through knowledge of Mathematics, Physics, Chemistry, History, etc., but also learn to observe the phenomenon in general from many positions.

The results obtained and their analysis

Thus, the student develops an understanding of phenomena, the complexity of relationships in the study of problems, develops the ability to see the problem in different ways, forms soft competencies. In addition, today the importance of these skills and abilities is growing. Consequently, in modern conditions, the educational process according to the method we are considering is a way to study the phenomena of life, to obtain deep, systematic knowledge in each of them

The main idea behind STEAM education is to introduce art opportunities into education so that students' imagination and creativity are activated, encouraging them to think in a unique way, and thus lead them to an individual educational trajectory and true innovation. The unity of scientific and technical and art directions in education is also explained from a physiological point of view. It is believed that the left side of the brain is responsible for logic: it helps to memorize facts and draw logical conclusions. The

right side of the brain is responsible for thinking through direct perception and provides creative thinking. The work of both hemispheres is important: if one of them does not work, it becomes atrophy, like any muscle of the body, is not required.

"Half-brain" education, that is, education that makes a significant contribution to the left or right subjects, is not good enough education. The work of both hemispheres of the brain must be equally active, synchronous, so it is wrong to choose between the technical and humanitarian Sciences, which must be harmoniously combined in the content of Education.

G. Galileo, A. Einstein et al. Morse wrote about the need to combine science and art. Albert Einstein, for example, was very fond of playing the violin. Galileo Galilei was a prominent literary critic of his time, Samuel Morse was a noted portrait painter. Examples of prominent figures in strong IT business can be given. Features on both sides of the brain, notably Steve Jobs – American entrepreneur, inventor and industrial designer, discovery of the IT technology era, one of the founders of Apple Corporation, and Marissa Mayer-Yahoo! widely recognized as the president and Chief Executive Officer of his company. They had creative thinking as excellent IT technology experts and saw things from a creative point of view. Leaders have been involved in how research, design and development images are presented and have developed marketing strategies that meet people's expectations, dreams and needs. Many scientists and prominent business figures have achieved their success with the help of creative thinking. Its stimulation was carried out with the help of practical training of disciplines related to the work of the right hemisphere of the brain.

In 2009, neurological studies were conducted by Johns Hopkins University. As a result, the data obtained showed that practicing art increases students' knowledge and skills. At the same time, there is a development of memory and attention, which has a positive effect on the educational process. In addition, not only academic, but also life skills levels increase. The difference between Stem and STEAM Technologies is how they fit scientific concepts. STEM specifically focuses on complex scientific, technological, engineering or mathematical skills to develop progress or create a new concept. In Steam curricula, according to research, students are strongly oriented and use social skills.

Consequently, within the framework of STEAM education, students form professional competencies based on the capabilities of interdisciplinary technologies in the educational process. At the same time, professional competencies, which include knowledge, practical skills, experience of activities, are complemented by a comprehensive understanding of problems, the ability to think (creative, critical, visual) and understanding of the basics of design[6].

One of the foundations of the Steam approach in education is problematic education, since the main focus in the implementation of STEAM education is a practical task or problem.

Problem education is a method of organizing student activities based on obtaining information by solving real theoretical and practical problems. Problem education technology is a learning system in which the teacher offers a problem situation in the lesson and students independently solve it.

The idea of problematic educational technology is not new, the greatest teachers of the past have always looked for ways to transform the learning process into an interesting process of cognition, the development of the mental forces and abilities of students Ya.A.Komensky, J.J.Russo, I.G.Pestalozzi, F.A.Distverg, K.D.Ushinsky et al. K.D.Ushinsky was particularly close to this idea. For example, he wrote: "We see mechanical combinations as the best way to reasonably translate for all ages, especially for children, the method used by Socrates and named after him Socrates. Socrates did not impose his thoughts on the audience, but knowing that the contradictions of a number of thoughts and facts lie next to each other in their heads illuminated by consciousness, this raised the question of the opposite rows to a bright circle of consciousness, thereby forcing them to clash or destroy each other or reconcile in a third opinion that connects and understands them".

In the 20th century, the ideas of problematic educational technology developed intensively and became widespread in educational practice. Concept of problematic education in foreign pedagogy J. Devi. - Hey? J. Dui replaced "book learning" with the principle of active learning, the basis of which is the student's own cognitive activity. An assistant teacher took the place of an active teacher, who does not impose neither content nor methods of work on students, but only helps to cope with difficulties

when the students themselves turn to for help. Instead of the stable curriculum common to all, indicative programs were introduced, the content of which was determined only by the teacher in the most general sense. The place of oral and written speech was taken by theoretical and practical training of students, in which independent research work was carried out. At school, according to Dewey, labor is the center of all academic work. By performing different types of Labor and obtaining the knowledge necessary for labor activity, children thus prepare for the upcoming life⁴. In 1894, J. Dewey established an experimental school in Chicago, where the curriculum was replaced by play and labor activities.

American psychologist J. Brunner draws on the ideas of composing educational material and the dominant role of intuitive thinking in the process of mastering new knowledge as the basis of heuristic thinking. Bruner focused on the structure of knowledge. It should contain all the necessary elements of the knowledge system and determine the direction of the student's development.

In the development of the theory of problem education, teachers from the United Kingdom, Poland, Bulgaria, Germany and other countries have achieved certain results. The emergence of problematic educational ideas in the Russian school dates back to the first quarter of the 20th century. During this period, the theory of problematic education J. It goes back to Devi.

The main features of problematic education were as follows: students faced a problem and they had to solve it through trial and error, that is, in miniature, they had to repeat the history of discovery and, on this basis, have the appropriate knowledge. Problem education based on such a methodological basis is an uncontrollable process, which in turn did not meet the principles of building our educational system. For this reason, problematic educational ideas were criticized during this period and were hardly used afterwards[6].

At the present stage, the main ideas of problem education based on the study of the psychology of thinking began to be developed in the 1950s. Well-known psychologists A. N. Leontiev and S. L. Under Rubinstein's leadership. The central idea of the study is that:

- 1) the process of thinking is carried out, first of all, as a problem-solving process;
- 2) the patterns of thinking and the laws of the process of mastering knowledge largely coincide.

The essence of the concept of "problem education" is fully revealed by Mahmutov: problem education is a didactic system based on the laws of creative assimilation of knowledge and methods of activity, which includes a specific combination of teaching and teaching methods and methods, characteristic of search characteristics.

There are three main types of problem education:

The first type (scientific creativity) is theoretical research, that is, the search and discovery of a new rule, law, theorem, etc. to students.

The second type (practical creativity) is the search for a practical solution, that is, the search for a way to apply certain knowledge in a new situation, design, invention. The basis of this type of problem education is the formation and solution of practical educational problems.

The third type (artistic creation) is an artistic representation of reality based on a creative imagination, which includes literary works, drawing, writing a musical work, playing, etc.

Each type meets one of the most important conditions of problematic education – the presence of a certain level of cognitive independence of the student[5].

There are the following basic methods of problem learning:

- 1) problematic presentation (the teacher puts the problem independently and solves it independently);
- 2) partial-search activity, joint education (the teacher puts the problem independently and the solution is achieved together with students);
- 3) independent research (the teacher poses a problem and the solution is carried out independently by students);

- students do not know ways to solve the problem, their previous knowledge is not enough to explain the new truth;

- students must apply previously acquired knowledge in new practical conditions;

- there is a clear contradiction between solving a theoretically possible problem and the practical impossibility of the chosen method.

Problem Education has a number of advantages over traditional because:

- teaches logical, scientific, dialectical, creative thinking;

- develops the skills of observation, generalization, research work;

- makes learning material more evidential, thus helping to transform knowledge into belief;

- in the independent solution of problems, knowledge and skills are better learned and strengthened than in traditional education.

Pay attention to the shortcomings of problem education:

- it takes a long time to solve the problem;

- weak management with cognitive activity of students

- the teacher is required the ability to think creatively, it is impossible to model a problem for any educational material.

Conclusion

The use of problem education is divided into "about life" of the system for assessing existing results. The exam in certain subjects is in no way combined with project activities, in addition, high school students refuse to do things that are not on the exam. They say directly: "yes, it is interesting, but we need a high score to enter the University." teachers use such approaches only as part of extracurricular activities or in elementary school, where children pay little attention to the exact results measured using Oge/use. Therefore, in modern

conditions, problematic education can be applied in primary and Primary School.

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