
# MAIN DIRECTIONS IN THE DEVELOPMENT OF STEAM EDUCATION ELEMENTS.

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**Key words:** – Science (science), Technology (technology), Engineering (engineering), Math (mathematics).

**Abstract:** STEM education is the basis of high-tech education. Therefore, many countries such as Australia, China, UK, Israel, Korea, Singapore and the USA are holding state STEM educational programs.

**Scientific and technological progress and main trends in changing the content, means and methods of teaching in modern school**

STEM education is a new term in our latitudes, decoding each letter of which we get:

– Science (science),
– Technology (technology),
– Engineering (engineering),
– Math (mathematics).

In total, we have approached an integrated interdisciplinary approach with training in design that combines science with technology, engineering and mathematics. As in life, all objects are united and interconnected into one whole - and in the understanding of this most harmonious integrity is strength.

The term STEM comes from the USA, introduced into the school curriculum for in order to intensively develop and strengthen the competencies of their own students in the scientific and technical direction, because the fact that everything is already Today everyone knows about technology.

Variations of the STEM direction, expanded and in-depth -STREM (added to the "R" complex – robotics/robotics) or STEAM (added "A" - art/art).

At the national level, STEM has been introduced into the school curriculum in States to train future high-tech gurus from an early age age. Therefore, they start with STEM / STEAM - learning from the very beginning classes.

In many countries, STEM education is a priority for the following reasons:

In the near future, the world and, of course, Russia will feel acute shortage of: programmers, engineers, specialists high-tech industries, etc.

In the distant future there will be professions that are difficult to imagine imagine, they will all be related to technology and high-tech production at the intersection with the natural sciences. Specialists in bio- and

nanotechnology will be in demand.

Professionals of the future require comprehensive training and knowledge from a wide variety of educational fields in the natural sciences, techniques and technologies.

STEM education is the basis of high-tech education. Therefore, many countries such as Australia, China, UK, Israel, Korea, Singapore and the USA are holding state STEM educational programs. In Russia they also understand this problem - they open Technical Education Support Centers, which partially solve the problem of attracting students to the field mechanical engineering and robotics. Thanks to partnerships with businesses, for example, STEM centers are opening with Intel, STI, CTP and technology parks, giving students the opportunity to get acquainted with science, participate in scientific research. And it's possible that one of these guys won't go to lawyers and fashion economists, but will choose the path of a scientist or inventor, or will become interested in programming.

Advantages of STEM technology

1. STEM - education becomes an expanded area funding: an increasing number of diverse non-profit organizations provide schools with grants for technological oriented projects.
2. However, STEM offers the widest range of opportunities. professional development (efficiency of use). Exactly therefore, a nationwide campaign to introduce STEM disciplinary technologies.
3. Providing students with access to technology. For today day when the world is saturated with computer networks, schoolchildren create digital content, share it and consume it on a scale that It didn't exist before. They run websites, make films on their phones and develop games themselves.
4. STEM means creating a learning environment that allows students to be more active. Whatever happens, students participate in their own learning. The bottom line is that students are better off remember what they have learned when they are involved in a process rather than being passive observers.
5. STEM requires students to have excellent ability to think critically, work both in a team and on one's own.

Disadvantages of STEM Technology

1. Weak communication skills, especially vocal ones. In STEM engineers pay most attention to formulas, equations, structures of materials in which the language is likely to be used dry book.
2. Since engineers are primarily focused on STEM, they may lose their creativity. Most inventions and

innovation arose at the beginning of thinking about non-existent and "enough" crazy" things.

3. Engineers well trained to work with operating rooms systems and technologies may encounter difficulties in solving common “everyday problems”.

4. Pronounced narrow specialization of teachers, and as a result Schoolchildren's knowledge will be fragmented. Are able to implement this referral only to teachers who have completed additional professional training and are ready to work in a unified system natural science educational disciplines and technologies.

Conditions for introducing STEM technology

1. It is necessary to build an extensive system of search, support and support for talented children.

2. It is necessary to create a creative environment to identify special gifted children in every secondary school. High school students should be provided the opportunity to study in correspondence, part-time and correspondence schools, which allows them, regardless of their place of residence, to master specialized training programs.

3. At the same time, it is necessary to develop a support system educated talented children. These are, first of all, educational institutions around the clock. Existing experience in the activities of physical and mathematical schools and boarding schools in a number of Russian universities should be common

4. Working with gifted children should be economical profitable. The per capita financing standard should be determined in according to the characteristics of schoolchildren, and not just educational institutions. The teacher, thanks to whom the student achieved high results should receive significant incentive payments.

5. It is necessary to introduce a system of moral and material incentives to support domestic training. And the most important thing is to attract young talented people to the teaching profession.

Modern educational systems in Russia are not named STEM, currently priority is given to science and engineering education. This means that, taking into account the experience of the United States and global trends development of education, it is inappropriate to postpone the solution of creative questions for later. In Russia, 155 STEM centers were opened in 2014 Moscow, Moscow region and Volga Federal District. In 2015 up to 7 new regions will join the program this year in accordance with plans of the project organizers.

The philosophy of STEM education is to make the worldview of our students holistically, helping to solve problems, arising in life, using theoretical knowledge from various sciences.

Robotics has become a new trend in the global system STEM education that allows us to develop skills programming and design, being an integrator of all four

STEM components.

Kazakhstan has also begun active development of STEM education. This confirmed by what is intended in the context of STEM within the framework of the State programs for the development of education and science for 2016–2019 with the transition to updated content of school education. To implement a new educational policies are planned to be included in STEM curricula elements aimed at the development of new technologies, scientific innovations and mathematical modeling.

Leaders of Kazakhstani education and all pedagogical communities paid attention to this technology because it is relevant the task is to provide conditions for the development of scientific and mathematical, engineering, design, artistic and creative knowledge and skills students. Including through the development of divergent thinking, research competencies, leadership qualities, work skills cooperation.

The introduction of STEM education implies:

1. Creation of a portal to provide a single space, coordination and development of the STEM - education project.
2. Development of their own STEM projects, taking into account specifics of the region, strengths and student population of the school.
3. Increasing student interest in engineering and technology specialties and motivation to continue education in the scientific and technical field, business environment.
4. Attracting the attention of schoolchildren to technical creativity, new technologies, research in interdisciplinary / related areas, with a particular focus on skills development and skills of a generation of young innovators (creativity, ability to see and problem solving, teamwork ability, communication skills).
5. Active participation of students in international conferences and seminars on STEM education.
6. Training of instructors, training of teachers according to the course "Entrepreneurship".
7. Training of schoolchildren in the course “Entrepreneurship Education” in the educational field in the subjects “Global Perspectives”, "Economy".
8. Development of innovative projects on ecology and sustainability development.
9. Public exhibitions of student achievements in the field of STEM - education through EXPO exhibition pavilions (modeled on leading world exhibitions).
10. Participation of schoolchildren in the implementation of social projects. This large-scale tasks, and they dictate the need for teachers mathematicians, computer scientists and Robotics teachers united and coordinated their work to improve metacognitive potential students, including for the purpose of increasing its effectiveness.

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