

ПСИХОЛОГИЧЕСКИЕ НАУКИ

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THE ROLE OF STEM EDUCATION IN THE FORMATION OF SKILLS OF THE 21ST CENTURY

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РОЛЬ СТЕПЕННОГО ОБРАЗОВАНИЯ В ФОРМИРОВАНИИ НАВЫКОВ XXI ВЕКА

Abstract. The post-industrial society we live in requires people to acquire more skills in addition to knowledge. The article discusses the STEM (Science, Technology, Engineering, Math) method of education, which is important for the development of industrial society in a globalizing world, and its application in secondary schools in Azerbaijan. Today, there is a great need to develop education so that every member of society can live in a better future. To achieve this, teachers need to work with new and well-equipped teaching methods. The article substantiates the importance of including STEAM-based lessons in the teaching process in the formation of 21st century skills. The article also offers suggestions for the training of pedagogues-technologists who play an important role in the implementation of STEAM-based lessons.

Аннотация. Постиндустриальное общество, в котором мы живем, требует от людей приобретать больше навыков в дополнение к знаниям. В статье рассматривается метод обучения STEM (наука, технология, инженерия, математика), который важен для развития индустриального общества в глобализирующемся мире, и его применение в средних школах в Азербайджане. Сегодня существует огромная необходимость в развитии образования, чтобы каждый член общества мог жить в лучшем будущем. Чтобы достичь этого, учителя должны работать с новыми и хорошо оснащенными методами обучения. В статье обосновывается важность включения основанных на STEAM уроков в учебный процесс при формировании навыков XXI века. В статье также предлагаются предложения по подготовке педагогов-технологов, играющих важную роль в реализации уроков на базе STEAM.

Keywords: *The 21st Century Skills, STEM Education, STEAM Based Classes, Engineering Skills, Mathematics*

Ключевые слова: *Навыки 21-го века, STEM Education, Классы на базе STEAM, Инженерные навыки, Математика*

Introduction. The «State Strategy for the Development of Education in the Republic of Azerbaijan» approved in our country in 2013 has created ample opportunities for the integration of our country's education system into the world education system. The goal of this strategy, which covers five strategic areas, is to create an education system in the country that has a leading position among the world's countries in terms of quality results and coverage, with infrastructure based on qualified educators and the latest technologies. Implementation of the strategy will ensure the emergence of a knowledge-based economy in the country, the formation of an information society and sustainable development of the country [2]. Today, a lot of work has been done to implement the strategic lines envisaged in the order. New projects have been developed to enable education to be integrated into life, educational experiences of developed countries have been studied, and innovative training models based on international experience have been developed and applied. The implementation of competency-based training programs and projects in accordance with the requirements of the time is being successfully continued.

The «Concept of General Education in the Republic of Azerbaijan (National Curriculum)» [1], adopted in our country in 2006, changed the approach to education. In the new educational programs, interdisciplinary communication was given special attention, and the application of new pedagogical technologies was required. Reforms in the field of education, the application of innovations have created a need for the training of technologists, engineers and teachers in the pedagogical field. In order to achieve the goals, with the support of experienced specialists in higher education institutions and training centers, the training of pedagogical and technological personnel capable of working with new tools and appropriate mechanisms has begun. Due to all this, the recent work in the field of education has led to the creation of competitive modern schools in accordance with the requirements of the labor market.

The post-industrial society we live in has required people to acquire more skills in addition to knowledge. Namely, the development of society will change on the basis of the skills of the twenty-first century. It is known that it is more difficult for everyone to acquire skills than to acquire knowledge. The acquisition of skills by the growing generation depends on the model

of education and teacher training. Education is a key system that gives everyone equal opportunities for a successful future. Education also plays an important role in making the younger generation useful to society. The problem of raising a competitive person who meets the requirements of the world of the future is an area that is given more attention in developed and developing countries. The teaching process has already begun to give preference to technology to increase the level of achievement of each student and provide a better foundation for their future careers. The competition between science and technology around the world has revealed the importance of engineering skills in humans. In terms of skills development in the 21st century, the quality of education has improved in the United States, Israel, the United Kingdom, Finland, Germany, Korea, and many other countries where an education model based on the interaction of science, technology, engineering, and mathematics has been applied.

The «STEAM Azerbaijan» project of the Ministry of Education of the Republic of Azerbaijan has been implemented in our country since the 2019-2020 academic year [6]. The STEAM education method involves the combined teaching of five core disciplines. Based on the idea of joint and integrated teaching of Science, Technology, Engineering, Art, Mathematics, STEAM education is realized through interdisciplinary integration and project-based learning in solving problems methodology of everyday life.

1. Today, there are many of our teachers who have achieved high quality indicators by moving from standard teaching models to non-standard teaching models. I can say with confidence that it is very important for us to share our knowledge and experience with other teachers around the world. This will not only help us develop professionally, but also pave the way for the successful continuation of our mission.

2. **Research methods.** To start STEM classes, you need to start with teacher training. For this purpose, 20 teachers teaching mathematics, physics, chemistry, biology and technology in SABAH groups were involved in a two-week training. The training was held at the STEAM Center of the Ministry of Education of the Republic of Azerbaijan. What knowledge and skills did the teachers gain from the training?

3. The interdisciplinary relationship that forms the basis of STEAM combines two or more subjects into one activity. Interdisciplinary communication is a teaching approach that consciously combines several subjects to explore a topic, issue, problem, or experience.

The training process is based on the teaching of Project-Based Learning, Microbit and 3D Cad Modeling modules. In the first module, teachers received detailed information about the role of STEAM in education, its features, STEAM teacher and student. It was found that STEAM seeks to solve real-life problems by organizing project-based learning as the basis of education. This educational methodology is the creation of project products, models, prototypes in various forms based on the ideas of students. In this

case, the search for different solutions to the problem, creativity, initiative, way of thinking, etc. kept in the spotlight.

Based on the 4C concept, STEAM education develops students' 4C skills - Creativity, Collaboration, Critical Thinking and Communication.

The following learning models are used in STEAM-based lessons:

- Problem-based learning - PBL;
- Project-based learning - PBL;
- Research-based learning - IBL;
- Design-based learning;
- Game-based learning;
- Analysis-based learning;
- Mobile-based learning;
- Tinkering - learning based on correction by making small changes.

4. The engineering design-based learning or engineering process at STEAM directs students to analyze, synthesize, and develop their thinking skills to solve problems they encounter in daily life. The engineering design process is a variety of steps taken to solve a problem, in which students are given the opportunity to design everything they have or have not been able to fix. If engineering is about creating something new, the design process is about making changes to existing things at the same time.

5. STEM classes also include tutoring skills. The inculcation of maker skills at school is very important in the practical application of theoretical knowledge. The development of mapping will improve many skills in students:

- Technical skills;
- Manual skills;
- Very good preparation for project-based training;
- Accuracy in measurement;
- Ability to easily apply the laws they learned in school to a broker.

STEAM-based lessons shape the following qualities in students:

- Collects information freely and purposefully.
- Conducts research and shares its results.
- Skills for future work are formed during school.
- Participates in scientific design processes to solve problems.
 - Uses Scientific Research and Engineering Design Processes to solve problems.
 - Apply their knowledge, mathematical knowledge and skills in solving real-life problems is.
 - Communicates effectively in written and oral form.
 - Able to evaluate the work and activities of himself and others.
 - Participates in various projects and competitions.

STEAM teacher uses integrated project-based teaching, effectively organizes teamwork, trains various professionals, community and community members, adapts flexibly, is confident, communicative, creative, critical thinking, continuous education, leader, innovator, mentor. Other modules in the training include «Microbit», «What can be done with microbit»

(Figure 1), (Figure 2), «Variables», «Conditional operator», «Periods and coordinates», «Radio and Microbit Car», «Escape room in education»

Theoretical knowledge was given and applied in practice.

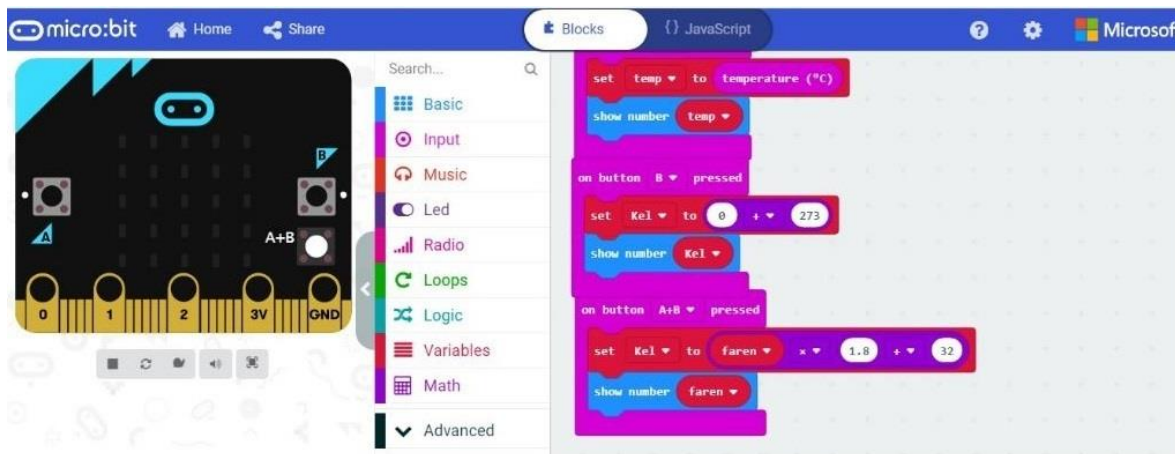


Figure 1. Demonstration of temperature change in microbite



Figure 2. Compass in microbit

Everyone needs to use a microbe, which is a carrier of information, in solving the problems they face in everyday life. The inculcation of microbial skills in students from primary school means the training of specialists who meet the requirements of the post-industrial society of our century.

Each case in STEAM should be evaluated. Diagnostic assessment is conducted at the beginning of the lesson to determine students' knowledge and skills. Formative assessment is used to track students' progress and setbacks towards the implementation of accepted standards. In this case, it is possible to eliminate the problems and direct them to the solution of the problem. Summative assessment is used to summarize the learning process, use standardized tools, and measure student achievement.

Research. From the 2019-2020 academic year, the Ministry of Education has launched the STEAM project in 42 general education institutions in Baku. The project is taught in schools starting from the 6th grade. Unlike the traditional approach to teaching science and technology, STEAM education shows

students the application of scientific and technical knowledge in everyday life through practical training. This approach teaches students engineering skills and instills them in real-life problem solving. STEAM subjects prepare students for life, regardless of their choice of profession [9]. Because of all of this, we hope that in the years to come, our students will be able to «Learn to Live!» They will achieve the highest results by meeting the requirements of the PISA (Program for International Student Assessment) program.

Hadaf Lyceum, which started operating in our country in the 2018-2019 academic year, is the first private lyceum providing STEM + A-based education. The goal of the lyceum is to educate the KNOWLEDGE Azerbaijanis of the XXI century by teaching lessons based on the integration of science and technology based on the principle of «learning by touch» [10].

In February, I observed 4th grade math classes at Hadaf Lyceum. One of the lessons I observed was The Measurement and Construction of Angles. Standards to be implemented: «4.2.1. Determines length, mass,

capacity, perimeter, area, angle with the help of appropriate units and tools. 4.2.5. Solves problems related to length, mass, capacity, perimeter, area, angle measurements». The purpose of the lesson is to «separate angles according to their types and determine their size. It measures angles accurately with the sun or with a protractor» [4]. Integration is the Azerbaijani language and technology. So the students:

- Talks about what they observe, hear and read (integration Azerbaijani);
- Manufactures different products (products) by combining details (integration is technology).

The teacher started the lesson by showing a video. Such a start aroused the interest of the students and created activity in them. The students shared their thoughts about the items in the classroom according to what they saw in the video.

The teacher then displays a picture of scales, meters, rulers, and protractors on the board and asks what they are used for. The children say the devices were used for measurement. They even answer the purpose for which each device is used, including measuring the degree of angles.

Teacher:

- How are angles constructed?
- Can we make an angle?
- How can we build?
- Can we do it?

He directed the students to think with questions such as, and noted that today's topic is «Measuring and

Constructing Angles». After a brief explanation of the topic, students showed examples of types of angles. They thought about the types of corners by opening the book, the window, the door of the room more or less. This means the formation of identification skills in students. The teacher notes that a sun and a protractor are used to measure and set the angles. It is convenient to use the sun to measure and set a right angle. A conveyor can be used to measure and set any angle up to 180° .

Students perform research first as a group and then individually. During the study, students were divided into three groups. Various items were presented to the groups. Students must identify objects with angles from the given objects, first estimate the angles, and then measure and compare them with the protractor and the sun. Evaluation criteria and time were announced to the groups. At the end of the time, the groups presented their work. During the assessment of group work, rubrics developed on four levels were used. The criteria included the accuracy of the assignments, the ability to work in a collaborative process, and the ability to listen to team members and other peers.

During the creative application phase, students were given worksheets with angles on them. They first draw an approximate drawing of the angles, and then construct the angles using sticks (Figure 3). The trash is glued to the worksheets using glue. Students' mathematical skills were assessed for their practical work (Figure 4).



Figure 3. Establishing angles using sticks.

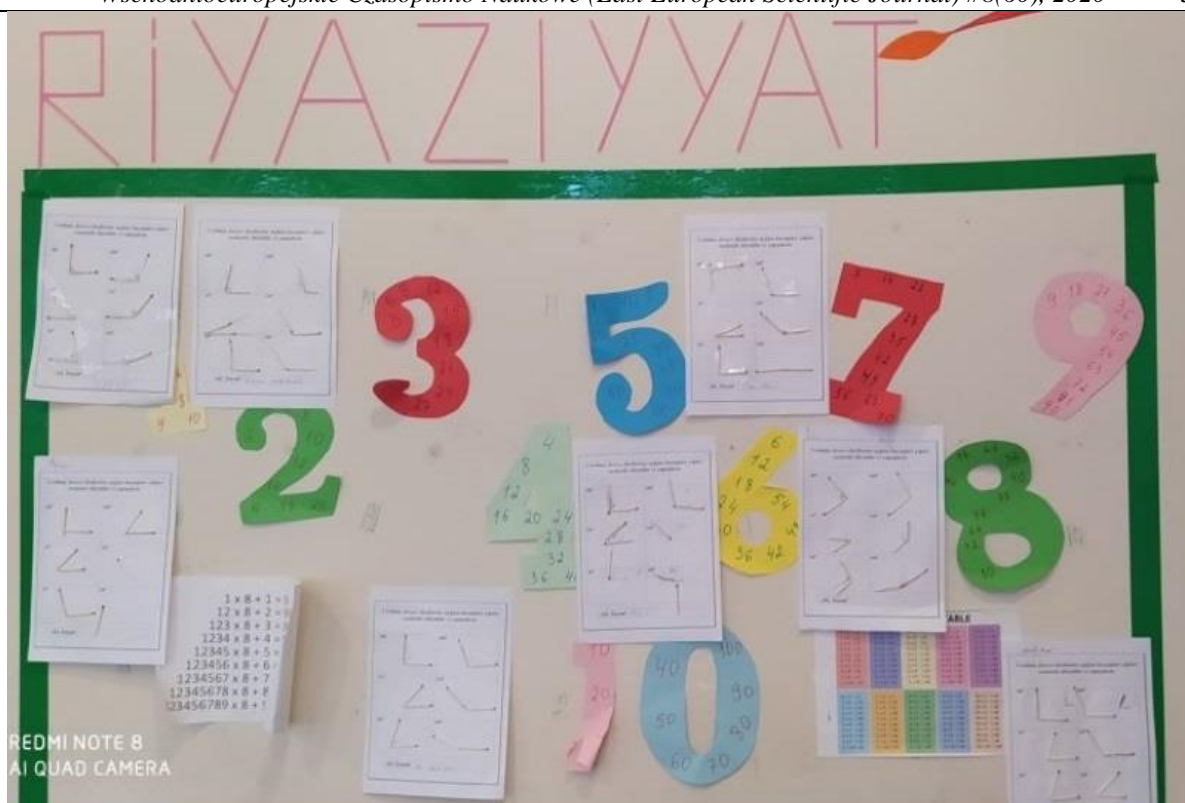


Figure 4. Handicrafts of students.

Conclusion. Today, there is a great need to develop education so that every member of society can live in a better future. The goal of educators is to prepare students not only for the final exams, but also for the future world. They need to shape and develop their skills for the 21st century and grow as global citizens. To achieve this, teachers need to work with new and well-equipped teaching methods. The approach of the teaching profession must change in order for today's students to meet the requirements of the future world and to develop a competitive global citizen.

Teaching STEM-based lessons requires great pedagogical skills and methodological training from teachers. The teacher who teaches such classes must be able to use integrated project-based teaching, effectively organize teamwork, and involve teachers of various subjects, including mathematics, physics, chemistry, biology, and technology in the learning process.

If subject-oriented education prepares students for exams and continuation of education, personality-oriented education should prepare students for life. Faced with such a dilemma, our schools are supported by projects implemented by both public and private institutions.

The STEM-based lessons I observe have great power in preparing our students for life. Simultaneous application of the knowledge gained in the training process, preparation of products necessary for today creates a basis for our students to choose a future profession. In the process of application, students face various problems, which prepares them for life situations, acquires the ability to solve the problem in

such situations. Great importance is attached to the application of theoretical knowledge learned in STEM-based classes. By performing practical tasks, students witness the application of theoretical knowledge. What they learn by «touching» it in the process of learning later becomes life skills. Tasks in design-based, project-based classes are based on analysis, reasoning, and especially mathematical knowledge and skills [8].

STEM training, which instills the ability to use scientific knowledge in solving real-life problems, will play a major role in the formation of our students' engineering skills. STEM also develops students' critical and critical skills such as problem solving, critical thinking, independent thinking, initiative, leadership, teamwork, communication, productivity, creativity, and digital literacy. The STEM-oriented learning process will enable the trainee to identify their skills and aspirations in a timely manner. This is very important in guiding them in the right choice of future profession and specialty. Thus, STEM-based lessons will shape the skills of students in the 21st century and make them the most active participants in the fourth industrial revolution.

And finally, our observations led us to make the following suggestions:

1. STEM centers should be established in general education schools;
2. The training of technologists-teachers teaching STEM lessons should be accelerated;
3. STEM centers and laboratories should be established in teacher training universities.

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COVID-19: INFLUENCE AND ROLE OF MASS MEDIA IN CONDITIONS OF SELF-ISOLATION OF YOUTH

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COVID-19: ВЛИЯНИЕ И РОЛЬ СМИ В УСЛОВИЯХ САМОИЗОЛЯЦИИ МОЛОДЕЖИ

Summary. This article discusses the role of the media in the self-isolation of young people during the spread of the Covid-19 pandemic. The media influence all spheres of society and have long been embedded in the social life of people. However, despite all the cautionary information about Covid-19, which is regularly broadcast on the Internet and television, the level of self-isolation among Russians remains quite low. Most often on the streets you can meet young people who continue to lead a normal lifestyle. The reasons for this behavior may be the characteristics of modern youth (18-40 years): infantilism, civil underdevelopment, etc., as well as objective reasons: work, helping relatives, etc. The article presents the results of a study on the reasons for non-compliance with the self-isolation regime by young people, as well as their perception of information about Covid-19 in the media.

Аннотация. В данной статье рассмотрен вопрос, посвященный роли СМИ в самоизоляции молодежи в период распространения пандемии Covid-19. СМИ оказывают влияние на все сферы жизнедеятельности общества и уже давно встроены в социальную жизнь людей. Однако, несмотря на всю предостерегающую информацию о Covid-19, которая регулярно транслируется в Интернете и телевидении, уровень самоизоляции среди россиян остаётся довольно низким. Чаще всего на улицах можно встретить молодежь, которая продолжает вести обычный образ жизни. Причинами такого поведения могут быть как особенности современной молодежи (18-40 лет): инфантилизм, гражданская недоразвитость и т.д., так и объективные причины: работа, помощь близким и т.д. В статье представлены результаты исследования, посвященные причинам несоблюдения режима самоизоляции молодежью, а также их восприятию информации о Covid-19 в СМИ.

Key words: Covid-19, young generation, viral distribution, public opinion, media.

Ключевые слова: Covid-19, молодое поколение, распространение вируса, общественное мнение, СМИ.

Постановка проблемы. Пандемия коронавируса COVID-19 разрушает все отрасли экономики: авиаперевозки, гостиничный бизнес, общественное питание, культура, организация досуга и развлечений и др. Продолжающаяся пандемия COVID-19 подчеркивает взаимосвязь нашего современного глобализированного мира. Поскольку социальное дистанцирование в такой