

STEM ALBANIA

THE NEED

In a world that's becoming increasingly complex, where success is driven not only by what you know, but by what you can do with what you know, it's more important than ever that our youth be equipped with the knowledge and skills to solve tough problems, rather than gather and evaluate evidence and make sense of information. These are the types of skills that students learn by studying **science, technology, engineering, and math**—subjects collectively known as **STEM**.

STEM competencies are increasingly required for workers both within and outside specific **STEM occupations**. The jobs of the future are STEM jobs as the demand for professionals in STEM fields is projected to outpace that of trained workers and professionals. New technologies and **STEM knowledge** lie at the core of the ability to manufacture better, smarter products, improve health care and preserve the environment. Therefore, **investing in STEM education is critical to the individual and the country's economic future**.

The last decade has seen a wave of wide-ranging reforms in the education system in Albania aimed at reorienting the education system and the curricula towards **developing the new skills needed in the 21st century society**. In addition, there has been a proliferation of initiatives and projects related to the implementation of specific components of the education reform.

For instance, the **'Junior Achievement'** AADF sponsored program offers elective courses to 11th and 12th graders in high schools throughout Albania aimed at fostering work-readiness, entrepreneurship and financial literacy skills. Students learn about the 21st century global marketplace through: Business Ethics, Success Skills, Student Company, Be Entrepreneurial and Leader for a Day. Another initiative aimed to improve educational outcomes for children and boost local development through increased connections between parents, teachers, is the **'School as Community Center'** (SCC, 2014 – 2020) national initiative of the MoES. More recently, an IADSA funded project **'SCC – the Ecosystem of Education for Sustainable Development'** (2015 – 2017) aims to consolidate a model SCC which integrates the best educational outcomes for students by building a number of STEM skills: Innovation, Creativity, Entrepreneurship, ICT through an experiential hands-on approach to the curricula. Another important outcome of the project is emphasizing community development and local growth via education programs tailored to tap on and boost local development trends in order to meet local community needs.

Despite these important initiatives, **more needs to be done especially with regard to the investment in STEM education**. An analysis of the education system in the country reveals that not enough of our youth have access to quality STEM learning opportunities and too few students see these disciplines as springboards for their careers. In fact, very few students enroll on STEM compared to other graduate

programs in the country. However, the number of Albanian students wishing to enroll in STEM graduate programs abroad shows an opposite trend with greatest part of them (80 %, according to EducationUSA Albania) choosing disciplines, such as Computer Science, Electrical Engineering and Applied Math. This might indicate that it is rather the poor investment on STEM education in Albania that is driving youth to look at alternative career paths if they do not have the means to pursue quality STEM education abroad.

The picture of poor investment in STEM education in Albania is reflected in a major **skill gap** in the country's active workforce. An analysis of the current situation with knowledge and skills in the national economy clearly reveals **lack of skilled labor** as a major impediment for doing business (Investment Climate Survey, 2009; BEEPS survey, 2008). Workforce education was cited as a major constraint by over 35% of firms that acquired new technology. In addition, skills gaps were found in all sectors of the economy according to three NES (Skills Needs Survey) surveys held in 2008, 2010 and 2012 in Albania (working report 2014, Skills 2020 Albania).

THE GOALS

Given the above, setting a clear priority for investing in STEM education should be one of the major strategies of the national strategy on education. The STEM program aims to ensure an equitable distribution of quality STEM learning opportunities and talented teachers so that all students could have the chance to study and be inspired by science, technology, engineering, and math and have the chance to reach their full potential. Building on evidence-based approaches the STEM education program aims to use evidence from research and evaluation to build promising practices to improve STEM education in the country and guarantee the impact of such investment.

THE STRATEGY

Schools form a critical part of a broader STEM education ecosystem which includes pre-schooling, vocational education and training, higher education and workplace training and development. The program has identified five key areas for national action through which school education has the greatest leverage:

1. Supporting STEM education opportunities within school systems;
2. Increasing student STEM ability, engagement, participation and aspiration;
3. Increasing teacher capacity and STEM teaching quality;
4. Facilitating effective partnerships with tertiary education providers, business and industry; research and technology institutes, public and private, etc.
5. Building a strong evidence base.

1. STEM School

The STEM School project is focused on concrete action that lifts foundational skills in STEM learning areas, develops mathematical, scientific and technological literacy, and promotes the development of the 21st century skills of problem solving, critical analysis and creative thinking.

Objectives

Recognizing the importance of a focus on STEM in the early years the project goal is to maintain and enhance this focus throughout schooling years. The STEM Albania project aims to:

- Support and improve STEM education opportunities within school systems;
- Enhance STEM experience of students through provision of elective courses on science, technology, engineering, and math;
- Develop instructional materials, STEM modules, learning resources, and courses, including materials that can be integrated into curricula (such as videos, assignment and activity ideas, computer visualizations and simulations);
- Increasing teacher capacity and STEM teaching quality;
- Increasing student STEM ability, engagement, participation and aspiration.

Activities

Collect and develop exemplar teaching modules, in partnership with university and Research institutes to assist in the delivery of best practice STEM teaching and learning including a focus on:

1. **Curricula Development:**
 - a) Developing STEM modules and learning materials that can be integrated into curricula to provide students with strong foundational knowledge in STEM and related skills; b) developing advanced elective STEM courses to ensure that students are inspired to take on more challenging STEM subjects.
2. **Capacity Building:**
 - a) Increasing teacher capacity and STEM teaching quality through providing trainings in best models of STEM teaching methods; b) train school staff and on aspects relating to management and resources related to STEM.
3. **FUN-Science Clubs:**
 - a) Making STEM learning a fun and expiring experience by means of establishing youth science clubs, to the aim of increasing youth engagement, participation and learning; b) making STEM relevant by engaging in project-based collaborative learning that makes use of mathematical, engineering and technological concepts to provide real world solutions for current problems.

2. Virtual STEM

A virtual classroom is an instrument used in STEM education for conducting live classroom like sessions over the internet. Virtual classroom systems can provide high levels of interaction for distance learning initiatives. This educational methodology utilized in STEM programs, reflects asynchronous group communications and collaborative approaches to education and training.

Objectives

Using virtual classrooms in STEM education aims to:

- Improve access to advanced educational experiences by allowing students and instructors to participate in remote learning communities using personal computers;
- Offer the possibility to enrich the curriculum through higher quality and/or challenging nature, and help students meet measurable standards of learning;
- Promote a greater count of students to splurge into the field of education;
- Give access to students to potentially participate anywhere, in anytime and allow them to select their pace of interaction and fulfill grade or diploma requirements more quickly.

Activities

1. **E-books:** a) developing electronic teaching and learning modules on STEM subjects that can be used online making use of most innovative methods in online teaching and learning.
2. **STEM Virtual Classroom:** a) STEM educators will be able to share innovative STEM content, effective STEM teaching strategies, and research on STEM education operating primarily but not exclusively online; b) students will develop online collaboration and participation skills;
3. **Management platform:** a) making use of and capitalizing on existing virtual infrastructure already in place provided by national initiatives of the MoES (i.e., Smart Classroom);
4. **Advanced STEM:** a) Code STEM is a computer programming competition that puts high school student's coding skills to the test by solving problems created by professionals; b) Robotic Class is a program that seeks to help young people develop their engineering and technology passion and proficiency through new, high-quality robotics curricula, use of digital technologies, robotics clubs, and competitions.

3. STEM Network

Due to a different education system compared to developed countries like USA and Western Europe, Albania suffers from lack of advance curricula focused on STEM subjects. This makes Albanian students less competitive in STEM subjects compared to their foreign peers. However, most of the Albanian students (80%) advised by EducationUSA office in Albania report being interested in pursuing education in applied science disciplines, such as Computer Science, Electrical Engineering, Applied Math, etc. Interestingly, when they fill the school application form related to advance courses, they tend to leave it blank because generally they haven't had any specific curriculum to take. Despite the curricular reform undertaken in the recent decade by the MoES more needs to be done with respect to advancing STEM education in Albania.

Objectives

Thanks to the four year experience working closely with EducationUSA and High School students all over the country (85 high schools per year), we are able to identify the students and teachers needs related to STEM programs and through this professional experience we are set to design a program that will develop the student capacity and improve their opportunities. Our objectives are:

- Furthering the mission of EduUSA's Competitive College Clubs (CCC) program aimed at supporting the best and brightest high school students to apply to competitive U.S. colleges and universities;
- Developing and implementing activities including study groups, intensive SAT, ACT and TOEFL preparation, reading assignments, lectures, community service projects;
- Including preparation courses on STEM subjects on the CCC program portfolio.

Activities

1. **SAT subject test:** a) Test preparation for, Math, Biology, Chemistry (11th grade students); b) Advance Courses in applied science (to include as part of their school curriculum, example: Advance Math);
2. **STEM Club:** (Science Club, Technology Club, Engineering Club, Math Club) / accompanied by certificates and letter of recommendation);
3. **STEM Ambassador:** Extracurricular program that enable students to have a go at solving some real-life STEM challenges for themselves. Each resource features a mentor (STEM Ambassador) who tackles these types of real-life math challenges in their day-to-day STEM job role;
4. **STEM Olympics:** Annual Competitive Competition in STEM subjects;
5. **STEM Library:** Testing books, general books related to stem subject.

4. STEM in Community

Because learning happens everywhere, both inside and outside of formal school settings our program aims to establish collaborations with community school centers, science and research institutes, industry and business actors to bring high-quality STEM content and experiences to students from key local community stakeholders. The objective is that of advancing new approaches to the design and development of STEM learning opportunities for the youth and the public in informal environments. The program seeks provide multiple pathways for broadening access to and engagement in STEM learning experiences by means of intensified, school and community, public and private and key stakeholder collaboration.

Objectives

- Increase and sustain youth and public engagement in STEM: increase the number of youth who have an authentic STEM experience each year prior to completing high school;
- Implement effective approaches for improving STEM teaching and learning in and with the community;
- Facilitate the dissemination and adoption of effective STEM instructional practices nationwide;
- Promote STEM education experiences that prioritize hands-on learning in informal environment to increase student engagement and achievement;
- Enhance STEM experience of students: training and re-training to match workforce skills to the demands of a rapidly-changing global economy and the STEM workforce;
- Better serve groups under-represented in STEM fields: increase the inclusion of students from underrepresented groups in STEM.

Activities

1. **STEM Outreach and Public awareness:** building a communication strategy to develop activities aimed at raising public awareness and increasing youth and public engagement in STEM through public thematic activities, conferences and events;
2. **STEM Ecosystem of key stakeholders:** a) creating the network of key stakeholder collaborators for local development and growth through STEM to provide opportunities for employees to interact with and inspire the next generation of engineers and technologists by serving as local school advisors, extracurricular activity mentors and career role models for students in communities where they live and work.; b) STEM internship programs with industry, business, etc.
3. **STEM Resource Center:** a) Collaborative Planning; b) Exploratory Pathways; c) Research in Service to Practice; d) Innovations in Development; e) Broad Implementation.