Moldova Competitiveness Project (MCP) – Educational Robotics: Acess2Tech Careers

Project Overview

The June 2014 ratification of the Association Agreement and the Deep and Comprehensive Free Trade Agreement with the European Union enabled Moldova to expand its trade significantly. Funded by USAID and the Swedish International Development Cooperation Agency (Sida), the Moldova Competitiveness Project (MCP) is making the most of these economic benefits by improving the quality of Moldovan products and encouraging the country's private sector to participate in the European Union and other higher-value markets. By focusing simultaneously on workforce development, trade, and investment, the project is strengthening Moldovan businesses along the value chain. One key activity is the youth-focused robotics education program focused on creating career pathways for youth to enter into Moldova's in-demand information and communications technology (ICT) sector.

The Challenge

Moldova is in the grips of a migration crisis with thousands of youth leaving the country each year to seek employment. Yet there is an opportunity for well-paying jobs in Moldova's information and communications technology (ICT) sector as demand for these services continues to grow. The USAID Moldova Competitiveness Project's educational robotics program targets youth via the education system to increase the supply of qualified ICT professionals entering the workforce. The program provides access to science, technology, engineering, arts, and mathematics (STEAM)-focused curricula and activities. By providing an inspirational STEAM learning environment, the educational robotics program offers a pathway for Moldovan youth to engage in the sector and qualify for jobs in the ICT industry — and, in turn, encourages them to invest in their home country's economy. Targeted interventions in education and skills development to bridge this gap can have a game-changing impact on the migration rate.

Today's global economy demands STEM professionals who are critical thinkers and innovators, with practical experience in technology and engineering. But in Moldova, opportunities to embrace STEM are limited in the labor force and also in the classroom. How can Moldova combat the shortage of skilled workers in STEM? By educating the future of the country's economy — youth. To nurture the next generation of STEM professionals, Moldova's government, education, and business communities are making STEM improvement a national priority and tackling a number of challenges.

For one, traditional curricula lack an emphasis on information technology (IT), one of Moldova's rapidly growing sectors. Furthermore, with fewer students studying STEM in university, the sector's entrepreneurial ecosystem is faltering. The decline in STEM education in Moldova over recent years threatens the entire economy. So the Moldova Competitiveness Project (MCP),

funded by USAID and implemented by Chemonics, is creating opportunities for young learners to experience STEM in the classroom from an early age and potentially as a career.

The Process

In partnership with the Moldovan Ministry of Education, MCP is introducing STEM in Moldova's classrooms through educational robotics. Robotics captivate students with the exciting and hands-on application of science and coding. Across 76 educational institutions and seven libraries in Moldova, MCP is implementing RoboClub, an educational robotics initiative that brings real-world engineering challenges to the classroom, making it an accessible and fun activity for students. More than 10 years of data from the U.S. FIRST foundation show that children exposed to educational robotics are two times more likely to major in science, engineering or other related fields.

As they are introduced to educational robotics in the classroom, youth in Moldova are inspired to pursue future careers in science, technology, engineering, and math. An array of sensors, batteries, motors, and cables lies before wide-eyed students. These children see the opportunity to build, tinker, and explore. But for educators, this is also a long-term investment in the next generation of STEM professionals that the country greatly needs.

Guided by their imaginations, tools, and teachers, they assemble robotics sets as part of their curriculum. The robotics sets enable students to build, program, and test real-life robotics technology. From understanding forces and motion to interpreting rotation sensor data, the students experience a fully functioning robotic system. For Andrei Copaci, a 13-year old boy from Chisinau, Moldova, this exposure to robotics inspired a passion for IT: "I dream to become an IT engineer and I know technology can change the world," says Andrei. "Now, I just play with robots, but I am being challenged to create robots that will be of use for the entire society."

Catching children at a young age is key to creating a lifelong interest in these topics: Students like Andrei who have early exposure to robotics are twice as likely to major in science or engineering. STEM literacy is especially critical for Moldova's IT sector, which currently employs more than 20,000 people and will need thousands more in the coming years to meet rising demand. This educational program is laying a critical foundation not only for the students involved but also for the country as a whole.

The Solution

The RoboClub initiative began as a small pilot in six schools in 2014 and has since expanded nationwide to 112 schools and 13 libraries. More than 4,500 Moldovan youth and 150 teachers currently participate in the program. The inclusion of rural schools has also had the benefit of decreasing the digital divide between rural and urban areas and has introduced some of the most marginalized and remote communities to modern educational technology. Several rural school teachers succeeded in including over 20% of their school's students in robotics classes, championing the initiative and demonstrating its value.

Teachers were provided with international standards teaching materials for project-based learning that better engage children's attention and increase their overall interest in education. This focus on continuous teacher training to help update their knowledge, skills, methodologies, while also encouraging them to embrace new and innovative practices, has been a critical part of the program's success. It has further decreased the digital divide between urban and rural schools and has provided access and inclusive activities for otherwise marginalized communities.

MCP trains teachers in using robotics for educational activities, and equips schools with LEGO robots, creating 'RoboClubs' where students aged 7 to 18 can gain a hands-on application of science and engineering. Students learn to build and program robots to perform different tasks and develop soft skills like problem-solving, critical thinking, and working in teams, which are lacking in the traditional Moldovan curriculum.

In addition to targeting the rural urban divide, the project is also seeking to break down gender barriers. Among STEM professionals, women are sorely underrepresented. The RoboClub initiative breaks this trend by offering girls practical experience that shapes their professional development. Through educational robotics, girls not only build creativity and problem-solving skills but also gain the confidence to pursue a STEM career. The initiative gives girls early exposure to STEM and the opportunity to turn the play into practice through robotics competitions and summer camps. Half the beneficiaries are from rural areas, and more than 30% are girls.

MCP supported the Association for IT Development to organize the second edition of the GirlsGoIT Summer Camp in July 2016. With guidance from professional mentors and trainers, 40 girls from 10 Moldovan localities received training in web applications development and basic IT skills. The GirlsGoIT participants became local ambassadors of the program by spreading knowledge in their communities and inspiring others to pursue a career in IT.

In addition, MCP's educational robotics initiative introduced students to the First Lego League robotics competition in early 2016. One of the most important international youth competitions in the field of technology and robotics, First Lego League takes place in 80 countries and introduces young people to the fun and excitement of science and technology. Moldova's winning team competed at international robotics competitions in Estonia and Spain, an invaluable opportunity for exposure to the global STEM community.

As girls and boys in Moldova gain exposure to STEM, they also gain enthusiasm. Thousands of students are at the helm of the country's STEM education improvement efforts, and with robotics in their academic portfolio, they gain the skills, resources, and passion to confidently pursue STEM careers and set out on a path for success.

Sustainability

The Educational Robotics program in Moldova is highly sustainable, due to MCP's investment in capacity building delivery partners. To open a robotics club, schools and libraries must pass

through a rigorous application process, starting with the training of trainers and proving their commitment to the program, and schools and libraries must co-fund the costs of the Robotics equipment. MCP encourages local community involvement to co-fund robotics kits, competitions, and other essential investments, totaling about $165,000 as of the end of 2017. This includes school budgets, private businesses, citizens and local governments. Local fundraising efforts ensure the buy-in of parents, teachers and the local community for the project.

In addition, due to long-term cooperation with the Ministry of Education, Educational Robotics is now an optional subject in the Moldovan National Curriculum. Shifting Robotics to a curriculum subject increases its legitimacy in the eyes of parents, students, and teachers, and qualifies it to be funded from the public budget, contributing to the sustainability, affordability, and accessibility of the program. It is through this collaborative and coordinated approach to programming that the activities and successes will be sustainable beyond the life of the project.

The Team

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