

# The ACTEA project – findings and results

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**Abstract—** In this paper the Erasmus+ ACTEA project is presented, with its goals, ambitions and results.

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## I. CONCEPT

The Applied Curricula in Technology for East Africa (ACTEA) project is a project under Erasmus+ Key Action 2, Capacity-building in the Field of Higher Education, that was started by the European Union to facilitate the modernization of higher Education in countries surrounding the EU. The program encourages higher education institutions in the EU Member States and partner countries to engage in structured cooperation through the establishment of "consortia". Since 2013 the Program included Sub-Saharan Africa.

STEM-education is very relevant for East-African countries, as producing added value is a way of improving life standard in these developing countries. Moreover there is a high demand for technicians from investors, NGOs and the emerging mid-class in Ethiopia, Uganda and Tanzania, supported by legislative attempts to increase local employment. To cope with this demand, there is a need for skilled people, trained in relevant engineering trades, but they are hard to find, due to the strong theoretical approach in universities instead of practice-oriented competence-based teaching. This is directly related to the lack of modern curricula in engineering and industry-grade equipment.

The ACTEA project aims to fulfil the specific needs in engineering, provide better skills matching, deliver course material in 2 specializations, Computer Aided Manufacturing Technology and Electrical Engineering & Automation and, establish technologic laboratories, with virtual and remote accessibility, establish learning tools, give academic staff additional training on technology and in developing technologic course material according to EU standards.

To ensure a good skills matching, the project includes research on both labour market demands and competences included in current curricula. This includes the development, distribution and analysis of surveys for stakeholders (teachers /

students / local labour market / output competences from secondary education). During the project, pre- and post-measurements of all training activities are performed as well, to assess the impact of the training events and improve the trainings in the long run.



Fig. 1. ACTEA logo

## II. OUTCOMES AND IMPACTS

The results are disseminated and exploited with train-the-trainer sessions, Master Classes and with training of a pilot group of internal and external stakeholders. Good practices and results are made public through e-resources, radio and local media. The Business Integration Bureau favours cooperation with local business, for trainings, employing students or as client for end-products. All is done according to a well-defined quality assurance scheme.

The impact on the short term is increased technological and pedagogic knowledge, increased operational capacity, increase in engineering students, and a better cooperation with local industry. On the long term, the project aims at an increase in employability, in added value produced locally, sustained life-

long-learning and long-term high-quality knowledge gain in technology.

The project has so far accomplished the following:

- Developed a curriculum of 17 courses of 92 ECTS, including practical assignments and assessment strategy.
- Delivered industry-grade equipment worth €50k for each East-African partner, both hands-on and virtual labs, and mobile industrial labs. This is also made available to external stakeholders through the Business Integration Bureau.
- Performed specific online training on the course material, development of technology courses, development of audio-visual learning content and e-learning.
- Setting up of sustainable model for business industry centres in universities which have allowed more linkages between universities and industry. So far over 30 industry partners have been connected to the 6 south partners.
- Memoranda of Understanding between industry and universities to allow industry staff to teach in universities and staff members to participate in practical training in industry.
- Re-training of over 200 university teaching staff members and external stakeholders in practical teaching to allow students receive more update relevant information. This has been done in tandem with universities in the Europe during the Master Classes.
- Technology Roadshows for teaching technology in distant locations, to showcase possibilities for inclusive approach in skilling people with lesser opportunities like refugees.



Fig. 2. Technology Roadshow

The project met with a lot of challenges.

There was the Covid-19 pandemic, which started March 2020. This immediately showcased the weakness of

digital cooperation. But we continued with the development of courses and went to online trainings.

Even more devastating was the war in Tigray, which started November 2020. We lost one of the best partners from Mekelle University. It is hard not to be personally effected by this terrible situation, when you have been to the local coordinator's home and family.

Nevertheless, we still managed to reach out to many people during the project.

We did Master Classes in October 2021 in Tanzania, we welcomed people from industry, we were on national television, which started a lively communication with external stakeholders. We did a Technology Roadshow to Zanzibar, and in April 2022 the first IoT application on the island was built.



Fig. 3. Master classes Tanzania

In January 2022 we did Master Classes in Uganda, with mixed teams, to train university's and industry's staff. We visited companies, to prove the relevance of the project, and find ways to keep academics up-to-date with the modern trends.

During the Technology Roadshow, we brought along our mobile lab to teach about industrial technology. The reaction during these visits was overwhelming, as if this was the opportunity participants were waiting for. We showed the project outputs, and how to use them in their own work. This attracted a lot of attention of philanthropic and development organizations, which should ensure sustained operation between academics, companies, communities and government.

### III. RESOURCE ALLOCATION AND SUSTAINABILITY

One Million Euros were allocated by the European Union . The universities have done additional co-financing of close to half a million euros.

The project sustainability is being done through the following:

- Setting up of a business unit in each university where industry members can bring technical problems in engineering and automation to be solved by teams of students and lecturers for a fee, allowing triple-helix collaboration and high-quality knowledge gain. The fee is shared amongst the technical team, the universities and the Business Unit for expenses.
- External stakeholders can also use or rent out the mobile industrial technology labs for training of their own staff or new employees.
- Follow-up projects are established through national and international funding agencies.

#### IV. ENGAGEMENT WITH EXTERNALS

External stakeholders have been integrated through invitations to all project activities such as trainings on dissemination events that have happened in the university.

In addition, a Technology Roadshow was done through various towns in East Africa to reach members of the communities like industry and technical colleges that were far from the participating partners, hence showcasing the potential of the mobile industrial technology labs to reach distant locations and have an inclusive approach to teaching technology.

During the pilot teaching internships are organised with local industry, but also teaching staff doing company visits and business leaders coming to the universities' campuses, for increased understanding and sustained relevance of the technology courses.

The strong involvement from public and private organization is clear in the elaborated list of associated partners, a total of 15, with all external stakeholders represented. The associated partners can emphasize the importance and impact on the labour market, thus supporting sustained operation, beyond the project's scope.

The collaboration with local industry is very important as this is mutually beneficial for both parties. This can be for hiring graduated students, staff training, internships, jury-duty, and delivery of consumables or equipment.



Fig. 4. Manufacturing company visit

Representatives of local labour market gave suggestions on the needed competences of technical profiles. The Business Integration Bureau, or existing services, is there for targeting specific local labour market, such as NGO's, private companies, government, foreign or local investors.

Sustained project work, even after the project run-time can only be achieved with a good and meaningful cooperation with local stakeholders. The first job of the BIB in the project was to perform a SWOT-analysis to this goal, to check if there is cooperation, why it is successful or not, what is needed to perform better and the way to do so.

Later the BIB will evolve toward a supporting department for sustained public-private cooperation, for legal support, contracts, start-up support, IP-related matters etc.

After the project, the target higher educational institutes can take an important role as training centre, but also deliver quality end-products, do dedicated modelling and calculations for private companies. This calls for up-to-standard knowledge and continuous training with the staff involved, which is ambitioned in the follow-up projects with 4 consortium members and 2 new universities.



Fig. 5. Nile Brewery visit

#### V. LEARNINGS & LEADERSHIP ADVICE

In pre-proposal phase: believe in your project, do not write projects for the sake of the budget. These projects are

challenging as it is. If the implementation does not interested you, better not do it.

When the project starts, build your coordination scheme. We opted for a tandem with an African and European coordinator, which ensured direct communication. In your own institution, you need someone to intensively interact with, for instance your direct superior.

You should build your network first. We invited the ambassadors in Antwerp, we arranged meetings in the target countries with the ministry, embassy, business leaders, funding and sectorial organizations. This gave often the project new direction or smoothed implementation.

You should build your administration first. Engineers would like to start developing, implementing and building, the fun stuff, so to say. But administration of these huge projects is not easy. A good system should allow easy reporting, easy copy-paste of the data and be digital.

During the project, you should be a leader, know the project, know how to solve the individual tasks, know the funding rules. Make sure you are recognized, do not be afraid to demand the attention of the management of the institutions involved. You should be genuine and friendly. People will open up to you, and you avoid intercultural conflicts.

You should give opportunities to the right people, the ones who implement the project, the staff that would benefit from training.

And finally, never be afraid to ask for help, communicate a lot.



Fig. 6. Networking event

## VI. FUTURE PLANS

We are one of the first projects of its kind in Africa, which was an honour and a challenge at the same time. During the project, the relevance of our assumptions became even more clear and we feel that the end of our project in November 2022 is only the beginning of deeper collaboration between the partners.

In this respect, 12-year projects have started with Mbarara University of Science and Technology in Uganda and Ardhi University in Tanzania, where the partners of ACTEA can

continue to work on technology transfer, training and entrepreneurship.

A follow-up Erasmus+ project is submitted with 2 partners in Tanzania and 4 in Uganda and 4 in the EU on Applied AI.

We submitted a project to continue our work on Internet of Things on Zanzibar.

We started cooperation in technology, IT, healthcare, education and social work with Muni University in Arua, and with the Mountains of the Moon University in Fort Portal, both Uganda.

This summer we are organizing our Final Symposium in Dar Es Salaam, with a focus on electrical engineering, project management & strategy, labour market skills, quality control, business management.

We will present the projects of student and staff on the equipment and with the course material, related research, and future plans.

In the round table on sustained operation, the EU partners will present the opportunities for Africa-EU cooperation within their countries and the EU Programs. The African partners present their project ideas, funding opportunities and needs for international partners.

## VII. CONCLUSION

The ACTEA project was a very challenging and at the same time rewarding project. It offered opportunities for all partners involved and opened the way for future cooperation in many aspect of teaching industrial technology and beyond. The set of courses, the new equipment and the training provided should help the East-African partners to engage with the local labour market and industry.

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