

Increase in cooperation between Industry and Post Graduate via OpenLab's and MobileLab's in South Africa

Momir Tabakovic¹, Marc-Oliver Otto, Walter Commerell, Csilla Csapo², Herman Vermaak³

1 FHTW- University of Applied Sciences Technikum Wien, Giefinggasse 6, 1210 Wien,
momir.tabakovic@technikum-wien.at

2 THU - Technische Hochschule Ulm University of Applied Sciences, Prittwitzstr. 10, 89075 Ulm,
Marc-Oliver.Otto@thu.de

3 Central University of Technology, Free State (CUT), Private Bag X20539, Bloemfontein, 9300, South Africa,
hvermaak@cut.ac.za

Abstract

This paper will present the concepts of the EURYDICE project funded by the Erasmus + program. Within this project the focus on renewable energies with the overall goal to enhance employability. The energy generation landscape in South Africa is undergoing a fundamental transition, as the vision of the energy strategy is to contribute to an affordable energy for all. This vision will be supported by innovative labs and portals which will be developed within this project.

One of the goals is closing the gap between TVET (Technical and Vocational Education and Training Colleges) studies and diploma study by the definition of industrial experience requirements for University of Technology (UoT) diploma students. This leads to an increased preparedness and "studyability" of UoT diploma students. Industrial stakeholders will be integrated into the process. The project will develop an "Industrial Portal" as a working tool.

To increase industry cooperation in post graduate education "OpenLabs" and "MobileLabs" will be developed. It is intended that industry brings industrial problems into the "Labs", which will then be solved by the students.

Keywords: *employability, student, labs, renewable energy, industrial portal*

1. Introduction

To cover the energy generation demand, South Africa used to rely and is still relying on fossils with the known negative effects of a centralized energy system and the negative impacts of the pollution and waste on the environment, society and health. The energy generation landscape is undergoing a fundamental transition since some years, as the vision of South Africa's energy strategy is to contribute to an affordable energy for all and to minimize the negative effects of energy supply and usage on

human health and the environment. It also promotes energy efficiency technologies across all sectors.

During the last year the South African government re-affirmed its commitment to renewable energy as part of the country's energy mix a couple of times and in the new Integrated Resource Plan (IRP) [1] which stipulates the South Africa's power generation roadmap until 2030. The latest IRP 2018 shows significant goals for renewable energy sources. It includes wind power, solar PV, and gas allocations that have to be developed, maintained and managed with the result that a significant number of new jobs and employment possibilities will be generated in this sector within the following years.

Industry often complains that practical/applied experience of the graduates is missing and that it would take long to bring the young starters "on track". This lack of practical experience with different impacted problems for all groups – students, universities, graduates and industry - can be found on all the layers of the education system in South Africa: vocational training, diploma studies, bachelor and post-graduate studies. [2][3][4][5]

The opportunity for Central University of Technology (CUT), Durban University of Technology (DUT) and Tshwane University of Technology (TUT) to get involved with industry partners is limited and it is also affecting the opportunities for student placements and exposure to industry as well as the initiation of real-world case studies and research projects. The statistics for each of the target groups can be found in the table1.

	CUT	DUT	TUT
Diploma Students	4000	4100	7500
Bachelor Students	2000	3000	1900
Post-graduate Students	110	140	560
Industrial Partners	80	250	300
Africa partner Universities	5	5	20

Table 1. Statistics for each of the identified target groups

The overarching aim of the EURYDICE project is to increase students' employability in the field of renewable energies, on the basis of closer collaboration between university and industry. In parallel, the project also addresses the priorities "New innovative curricula/educational methods/development of training courses", "Cooperation between educational institutions and business" as well as "Quality and Relevance of Higher Education in Partner Countries".

2. Focus of the project

The project focuses on the higher education framework in renewable energies lasting from vocational training up to doctoral studies with the overall goal to enhance employability. An analysis identified the following concrete shortcomings within the (higher) engineering education and to which the institutes need to respond to within the framework of this project ([2][3][4][6]):

- There is a gap between the TVET and university diploma studies, where practical industrial experience is demanded to increase the student's preparedness for university diploma studies.
- There is only limited cooperation between university and industry.
- There is a low success rate within the first semesters at university.
- There is no mandatory industrial internship in the bachelor curriculum.
- There are only a few bachelor projects/thesis done in collaboration with industry.
- There is no shared use of infrastructure between university and industry.
- Very limited number of industrial problems are solved through university research.
- Very limited transfer of knowledge from university to industry and vice versa.

The overarching aim of the EURYDICE project is to increase students' employability in the field of renewable energies, on the basis of closer collaboration between university and industry.

The project will perform an analysis of the status quo and identify gaps and measures for each HEI. The developed curriculum enhancements enable the HEIs to integrate them into their curriculum. The already identified gap between TVET and HEI will have an immediate impact on the student marks. Industry understands universities' problems and universities understand industrial problems and take the technical ones into the lectures and their laboratories. The developed "Industrial Portal" will enable and smooth the process of industrial placements divided into specific levels. The impact on students will take place as soon as the industrial partners are in place. The "Fast-track Acceleration Programs" will enable some students to explore the possibility of becoming self-employed by creating their own innovative start-ups in the RES sector.

The designed "Open Labs" and "Mobile Lab" will enable the university for real case studies and enable transfer from university to industry and vice versa. The "Mobile Lab" as mobile show-case enables HEIs to move the Lab to another university or to the people as e.g. to a governmental event, to an industry booth, to schools, to rural areas, etc. Students will be integrated into the design of the labs and benefit from the first day.

3. Industrial Portal

One of the measures is the innovative “Industrial Portal” that enables the industry/university to offer matched placements for the students’ needs at different levels of education. The industrial stakeholder will be identified and integrated into the process. The project will develop an “Industrial Portal”, based on existing software systems, as working tool for industry, offering industrial placement to students’, searching industrial placements. For bachelor students minimum industrial experience requirements are defined by UoT (University of Technology) and discussed with industry. The developed “industrial portal” will be used to match industrial offerings to the students, but also be an opportunity for students to search placements at their education level.

Increasing industrial experience in UoT bachelor program by integration of practical training into the curriculum. Due to the fact that the fully formal integration into universities curriculum needs more time as the project duration the enhancements will be documented as proposal for the individual UoT. The UoT can make intermediate use as recommendation to the students. The closer collaboration between university and industry automatically brings university staff closer to industry experts. It is expected, that the real-world case study problems will be more and more integrated into the lectures as well as into practical laboratory experiments, without any formal curriculum changes.

4. Open Lab and Mobile Lab

Another measure will be the designed “Open Labs”, which offer a new sustainable cooperation between industry and university in the field of renewable systems leading to a win-win situation. The “Mobile Labs” enable innovative use cases that involved students of all levels, the industry and the society. The laboratory may also be used as mobile infrastructure in harsh environmental conditions to validate systems under real case conditions. New innovative ways of knowledge transfer are also integrated into the project including assisting of companies in R&D Transfer oriented cooperation projects, enabling for Spin-off – Entrepreneurial Design, transformation from knowledge into marked demanding solutions, and Innovation Circles (Regional Think Tank with experts, young academics, students, companies and civil organizations) in the field of RES.

Due to the developed “OpenLabs” and “MobileLabs” industry will be able to bring industrial problems into the “Labs”, which will then be analysed and solved by the research students.

The participating European HEIs are running partly such labs with good experience, each European HEI in a different field. Together with the South African partners and their local experience it is likely, that new well fitted labs (laboratories) will be designed and used (even remote accessible) successful together with the industry

in common projects and research. It is likely that some equipment is sponsored by industry, because they benefit from well-educated students already working with industrial equipment. Due to the fact that the “Open Labs” and “Mobile Labs” are also showcases, industry will benefit if their components are shown in these labs. In other fields like automation this is already a common practice from bigger industrial companies within South Africa.

Due to the “Mobile Lab” the HEIs in South Africa will be enabled to show renewable energy solutions into rural areas and to industrial partners. They can use the “Mobile Lab” as attraction in these areas. The Open Labs that are remotely accessible, as well as the Mobile Open labs, will enable the HEIs to show disadvantaged people in the remote rural areas how electrical power can be harvested from renewable sources. The technology can be taken to the people. Staff and students can be involved in informing the community on efficient use of renewable energy and thus attending to the socio-economically issues of the community. It will also be an opportunity to involve and attract more female students from schools to get involved in studies in the relevant study area of renewable energy. Bringing the attractiveness and demanding technical engineering knowhow to female students at schools can have a positive influence on the number of female learners pursuing a career in the renewable energy field.

The selection of students to participate within the project will also take into account the issue of all inclusivity as well as aligning with the diversity of the student population.

5. Gender equality and diversity management

Female students and project stakeholders have been identified as a special and relevant target subgroup. Gender equality and diversity management are a key element in the university strategies of the consortium members. Within the framework of bilateral projects university representatives have already the opportunity to cooperate in small projects, like exchange workshops and International Girls’ Days.

In 2014 the first international Girl’s Days took place in cooperation with the UUAS and the UASTW. Bilateral exchange workshops did not only take place between the universities in Ulm and Vienna but also with the South African partners. During the visits of representatives from South Africa in Ulm, gender equality and diversity management were picked out as central topics for the workshop. UUAS as project leader attaches great importance to the above mentioned topics in the planned project. Thanks to the active contribution to the aim “family friendly”, UUAS as well as UASTW have been awarded as “Family-friendly workplace”. These national certificates will be granted by governmental institutions and count as a seal of quality that relevant gender equality aims will be implemented in the universities.

6. Methodology

The project deals with the development of an innovative view on High Education. Within the project ideas, new concepts as well as hardware & software applications will be developed. The project will perform an analysis of the status quo and identify gaps and measures for each HEI. The developed curriculum enhancements enable the HEIs to integrate them into their curriculum. The already identified gap between TVET and HEI will have an immediate impact on the student marks within the beginning bachelor studies. The first phase the project is introducing mechanisms for UoT's bridge between qualification and industry. Internship; writing thesis in industry; real case projects; having lecturers from industry in the lectures on a regular base. Interaction between the relevant stakeholders will be facilitated with workshops that will provide the platform for discussion and knowledge sharing and transfer between participants. The Open Labs and mobile labs will be the main instruments to assist in the optimal use and exploration of the results of the project. The innovative idea of sharing specialized infrastructure between universities due to the remote access to the "Open Labs" enables selected students from partners to analyse systems remotely. Each "Open Lab" will have a different focus related to the different participating South African HEIs. This idea is leading to stronger cooperation between universities and between the students of the different universities. The "Open Lab" is not just a laboratory, where students do always the same practical experiment with small scale simplified problems; it is a technical incubator for renewable energy systems. Students and industry can experience with different solutions for one problem, they can integrate the local needs into the problem solving. The opportunity of cooperation with new project partners allows the positioning as a reliable and competent research facility, and thus enables the teams to increase the acquisition capacity/ability, thereby guaranteeing the ongoing, successful activities of the R&D facilities. The third phase is using external modalities as a wide mechanism for dissemination. The open labs will be accessible to immediate communities to the South Africa partner institution but also geographic regions during transportation of the open labs across partners. Using universities' lab infrastructure by students (open labs), industry partners will have access to the labs for applied research which also speaks to sustainability of the open labs equipment through joint efforts. Using universities' lab infrastructure by industry (open labs) for industrial research and analysis, due to the fact, that small and medium enterprises can't afford expensive labs.

The industrial portal is another sustained tool for dissemination it is earmarked to outlive the project and be open to other UoTs. The branding of the mobile open lab, is a silent marketing of the project, consortium partners will make use of internal and external media networks to disseminate the progress and results of the project in collaboration of their industry partners. The sustained and increased research network access between SA and EU partner institutions will occur.

7. Conclusion and next steps

The foreseen results are improving the quality of higher education and enhance its relevance for the labour market and society. The project has specific focus on gaps that present themselves between TVET and UoTs, the vehicle that has been identified as core to the project is using curriculum developments.

The developed curriculum enhancements are feasible to implement, because the HEIs follow the same goals - increasing the graduation rate and employability rate of their students as well as getting industrial satisfaction. At the end the performance and rating of the HEIs will increase. The faculty management in the HEIs highly support the project, because they see a big step towards their faculty goals. Due to these common objectives of HEIs and the project, it is realistic that the curriculum enhancements on several levels will be integrated into the universities curriculum by the universities faculties.

It is feasible that the developed and offered “Fast-track Acceleration Programs” will reach a high contribution of students, because the programs are one of the enabler for a successful industrial career. If the expected success story of this program is shown, it is likely that the programs are integrated into universities curriculum and course offering.

In the next years the students’ employability will be increased through industry exposure and relevant labs (Open and Mobile) as well as exposure to international experts and students.

8. Acknowledgment



The project is Co-funded by the Erasmus+ programme of the European Union

9. References

- [1] Integrated Resource Plan 2018, an updated draft plan from the Department of Energy in South African published in August 2018

- [2] Implementing Work-Integrated Learning in Technical and Vocational Education and Training Colleges a presentation from the Swiss-South African Cooperation Initiative in 2016
- [3] The Issue of Quality in the TVET System a report from the UNESCO International Centre for Technical and Vocational Education and Training (UNEVOC) in 2013
- [4] Forging TVET college partnerships – Implications for the Post-School education and training system, a report from the Human Resource Development Council for South Africa (HRDC) in July 2014
- [5] Statistics on Post-School Education and Training in South Africa: 2016, a report from the Department of Higher Education and Training (DHET) in South Africa released in March 2018
- [6] VitalStat Public Higher Education 2016 – Published by Council of Higher Education (CHE) in South Africa in 2018