ASEE International Forum
Seattle Sheraton / Seattle, WA
June 14, 2015
Paper ID #14292

Presentation of SALEIE- project supported by the EU-EACEA in the framework of Lifelong Learning

Prof. Anna Friesel, Technical University of Denmark

Anna Friesel is Professor at the Center for Electro-technology, DTU Diplom - Technical University of Denmark, Campus Ballerup. She is also the president of the EAEEIE - European Association for Education in Electrical and Information Engineering, which is a European non-profit organization, with members from nearly seventy European Universities, most of them teaching in the area of Electrical and Information Engineering (EIE). Anna Friesel is a member of the IEEE Educational Activities Board (EAB) Curricula and Pedagogy Committee (CPC) as a European representative. The mission of the CPC is "to promote the continued evolution of university curricula, resources, and pedagogical practices across IEEE's fields of interest in engineering, computing, and technology (ECT)". She collaborates regularly with many technical universities in Europe, Latin America and USA on topics related to improvement of engineering education. Her research interests include mathematical modeling, system dynamics, control theory, and educational methods in automation, robotics, and in engineering in general.

Prof. Tatjana Welzer, University of Maribor, Faculty of Electrical Engineering and Computer Science
Dr. Ian Andrew Grout, University of Limerick

Ian Grout is a lecturer within the Department of Electronic and Computer Engineering at the University of Limerick, Ireland. He received his PhD from Lancaster University (UK) in 1994 and has been a lecturer at the University of Limerick since 1998. Prior to joining the University of Limerick in October 1998, he was a lecturer in the Engineering Department at Lancaster University. His subject areas include microelectronics, design, test, and design for testability. In addition, he is also involved in the area of remote engineering and internet based laboratories

Prof. Dorian Cojocaru, University of Craiova, Romania

Dorian Cojocaru received the Ph.D. in Automation from the Romanian Ministry of Education in 1997. He is active as a full university professor, head of Mechatronics and Robotics Department and PhD coordinator. He is acting as expert for Romanian Agency for Quality Assurance in Higher Education and other national and international research and academic bodies. His present areas of research are: computer vision, robotics and mechatronics, and new trends in technical higher education. He has published more than 10 books, more than 200 papers in various scientific journals and international conference proceedings and he coordinated more than 15 research national and international programs.

Presentation of SALEIE- project supported by the EU-EACEA in the framework of Lifelong Learning

Abstract
This paper presents the objectives and actual results of the EU supported project which runs from October 2012 to November 2015, named SALEIE1 - Strategic Alignment of Electrical and Information Engineering in European Higher Education Institutions. This project sets out to firstly explore and then provide models for ways in which Higher Education Institutions of Europe in the Electrical and Information Engineering disciplines can respond to current challenges. The main technical challenges addressed by this project are: Green Energy, the Environment and Sustainability, Communications and IT, Health, and Modern Manufacturing Systems including Robotics. The aims of this project are also to ensure all learners, irrespective of their background or disabilities equal opportunity to education.

Introduction

The EU identifies “New Skills for New Jobs” as an imperative for the future. This project focuses on Electrical and Information Engineering (EIE) modules and programmes aligned to the “new” jobs of the future – those in the key global technical challenge areas. The project offers a team of EIE technical expert academics who are very well placed to both propose new curricula, but also to develop models sensitive to new teaching methods and the needs of all learners. In the SALEIE project there are 45 European universities. The project sets out to firstly explore and then provide models for ways in which Higher Education Institutions of Europe in the Electrical and Information Engineering disciplines can respond to current challenges. This is one of the projects under patronage of the EAEEIE2 (European Association for Education in Electrical and Information Engineering), which is a European non-profit organization, with members from nearly seventy European Universities, most of them teaching in the area of Electrical and Information Engineering.
The specific objectives of this project are to produce:
• Model programme and module curricula in the current global technical challenge subjects, like: green energy, the environment and sustainability, communications and it, health, and modern manufacturing systems including robotics.
• Models for maximizing accessibility of programmes to all learners irrespective of their background or personal challenges, also including disabilities like: dyslexia and dyspraxia; visual and audio impairments, Asperger, autism, depression, anxiety. Models which will ensure all learners equal opportunity to education.
• Models for programme and module specifications to enable HEIs and employers to have greater understanding and clarity of student knowledge and level of achievement.
SALEIE project includes also following activities:
• A survey of existing programmes in the key challenge subjects including content details
• A review of the integration of generic, transferable competences appropriate to employment in key challenge area modules.
• A collation of examples of best practice examples in the key challenge subjects
• A survey of the project partners of the scale of diversity of disabilities and widening participation practices across Europe.
• A review of how HEI's industrial partners view support to learners

• The design and development of best practice support models for different types of disabilities and specific needs.

In the following we describe our current achieved results of the project's work packages WP3 (Global Challenges) and WP4 (Widening Participation and Student Support) and WP5 (Policies and practices in engineering education in different EU-countries).

Project Approach

Illustration of the SALEIE project's main themes is shown in figure 1.

Figure 1. SALEIE Project Workpackages and Main Themes

The methodology that this project is following is to audit current practice, design new models, integrate the models into trial institutions, monitor and evaluate the trials and analyse, report and disseminate the findings.

As a first step questionnaire surveys have been developed, launched and the results have been analyzed for an audit of the current situation and current practices in interest areas of this project. The surveys have been designed to audit:

• The skills required of graduates able to help industry to respond to the current global technical challenges.
• Programmes and modules that develop these key skills, the Institution offering them, their technical content and level of development.
• The volume and types of learners with specific needs that are currently registered on EIE programmes across Europe.
• Equal opportunities and diversity policies and practices.
• The level and types of support systems in place for the students with specific needs.
• Policy and practices associated with programme and module specification including how well understood current specifications are to ERASMUS exchange partners and employers (EU supported exchange programme).

In the Technical Challenges workpackage the objective are to identify:

• The key challenges that affect Europe and that the project network can address and to offer proposals
• The skills required of graduates able to help industry to respond to the current global technical challenges.
• Programmes and modules that develop these key skills, the Institution offering them, their technical content and level of development.
• The volume and types of learners with specific needs that are currently registered on EIE programmes across Europe.

The generic structure of any programme, including those orientated to the key global technical challenges, comprise a set of technical modules including generic engineering and mathematics knowledge and skills built on a foundation of generic skills (sometimes called transferable skills), study skills and employability behaviors that prepare the graduate for employment. Pedagogy plays an important part in enabling learning especially for all students and especially for the students with disabilities.

The first stage in the project was to identify existing programmes orientated to the key global

challenges. This exercise produced two main results, firstly a report3 on the findings of the research and secondly key questions for a project partner survey on currently offered programmes. The survey allowed us to produce a shortlist of the key technical challenges that the project network are in a good position to take forward to propose model programmes and modules that partners are able to develop.
.

Existing programmes orientated to the key global challenges

A review of the recognized Global Technical Challenges that was undertaken to lay a foundation for the choice of the challenge areas our project would focus on. From an initial list of 15 a shortlist of 5 were investigated more deeply. The 5 selected are:

1. ICT convergence challenges in education.
2. Science and technology challenges including robotics.
3. Energy challenges
4. Clean water & Sustainable development and climate change
5. Health issues

All of these areas require Electrical and Information engineers to take them forwards to make Europe competitive in the global market place. The current state of these areas and a number of specific sub-areas from a European perspective have been analyzed, then the top-level criteria for curricula in these technical areas have been identified. The identified criteria include: sector and academic relevance; flexibility and responsiveness to changes in the technical area to enable it to remain up to date; Modularity to allow parts to be shared through student exchanges and placements; Stakeholder involvement in design including industry to ensure the skills required are being delivered by the programme; Degree of interoperability the support modules give each other in building a cohesive and comprehensive programme; Degree of conduciveness – in addition to providing qualified graduates this is the degree to which the programme can lead to further studies and the attainment of learner personal aspirations; Learning Outcomes – the need for clear and accurately definition both at the programme and modular levels; Balance between the theoretical and/or conceptual elements and the practical application. A full list of these criteria can be found in the report3. A number of specific programmes currently available in European Universities in the technical challenge areas is also noted in our report. This compendium of current programmes provides a solid foundation for building a better understanding of programmes and modules that will help Europe respond to the technical challenges for the future as our project will develop in its second half.

Survey4

The objective of this survey, issued both in paper form (pdf) and through the SurveyMonkey online survey service, was to gather information from partners about their current provision of programmes aligned to the global technical challenges. The survey is a tool to understanding the current capability within the project partnership and the analysis of the survey results will lead to next step, which is design of new programmes. The responses have been collected by means of a SurveyMonkey questionnaire (39 questions). For now the database records a number of 66 responses5 (56 complete questionnaire answers) from 20 EU and EU associated countries. The questions of interest and their answers are:

1. Rate your involvement in teaching Electrical and Information Engineering (EIE) students: Most of responders (70.27%) indicated that it is their job, while only 27.03% are partially involved (2.7% - No EIE field teaching); The 70.27% percent accounts for a high level of confidence on answers that require EIE expertise.
2. Please indicate the nature of teaching/faculty involvement: 97.7% of the answers were provided by full time teaching staff; 23% of them ticked also Part Time (11%) and External Visiting (12%). Total: 44 answers.
3. How many teaching staff members are involved in teaching within your curriculum? 67% of the organizations have less than 50 people involved in teaching within the EIE curriculum.
4. Which of the study programmes listed below fits better with those taught within your institution/ faculty/department: figure 1 offers a broader image of the responses (Other proposals of programmes that might be related to EIE education: Lighting; Artificial Intelligence, Information Science and Systems, Micro and Nanoelectronics, Multi-media, Transmission; Medical Imaging.

Based on the survey data we may conclude the following:
1. A general agreement on the degree structures has been reached during the Bologna process. First degrees should require 180 to 240 credits (ECTS) (equivalent to 3 to 4 years fulltime) and the Masters should require 90 to 120 credits (ECTS) after the first degree, with a minimum of 60 credits at Master level. Based on the national reports for 2012 related to the Bologna Process – EHEA, an average of 66.78% of first cycle study programmes falls within the ones requiring 180ECTS. Some countries did not provide such information (e.g. Estonia, Spain. In general, most of the first cycle programmes (Bachelor) accounts for 180 ECTS (European Credits Transfer System) and the main option for the Master level is for 120 ECTS.
2. EIE education is mainly supported by means of programmes in:
- Systems Engineering, Systems and Control, Computer and Systems Engineering
- Biomedical Engineering
- Power Engineering, Renewable Energy Systems Technology

3. Most of the modules/courses that claim to respond to key challenges are related to research that is performed within the host University/ Faculty/Department.
Based on the survey findings, it can be concluded that within the project partner institutions there is breadth and depth of programmes already considered aligned to the global challenges. The results also indicate a strong willingness to share experiences of teaching these modules across the project partnership.

Widening Participation and Disabilities

In this work package we explore approaches to widening participation in EIE programmes across Europe. The specific needs of learners with disabilities pertinent to education in EIE are investigated and analyzed. Consideration are also given to conventional Higher Education learners, those studying part-time, distance learners, International students, lifelong learners, students with disabilities and those who traditionally do not see conventional higher education as their route to personal development. Each of these types of learner have different support needs especially in relation to developing

competence in laboratory skills and generic, transferable competences (such as group working, presentation skills, creativity, etc.). The work package-WP46,7 explores the implications on the education system of students with disabilities (reference of best practice across Europe in supporting students with such issues, eg: Dyslexia, Dyspraxia, Mental Health, Autism, Aspergers, etc.).
As we are aware of the importance of technology in the educational processes and life of disabled students, one of products of the SALEIE project is also SALEIE Student Support Centre8. The Centre will be a meeting point for all involved parties with point on students with disabilities, to supporting, irrespective of their background or personal challenges, theirs equal opportunities to education and appropriate support. The Centre will also sustain the legislation and policies documents for disabled students in EU counties and worldwide as well as research results in this area that are partly presented in our paper.
The main focus of this work package is to develop the Student and Staff Support Hub. This is an on-line resource8 (Figure 2) that is publically accessible either directly or via the main SALEIE project.

Figure 2. Student and Staff Support Hub

The purpose of the website is to provide a Hub that is a focus for individuals who wish to know more about access to and participating in higher education across Europe. It aims to be a “one stop shop” for information on higher education access and participation for individuals with disabilities. The way in which a website is set-up and the content/information is provided (the structure of the website) is important to enable maximum benefit for the user. The structure of the Student and Staff Support Hub was determined through discussions between the work package 4 partners and identifies the following key considerations:

- The target audience (end user group) needed to be identified.
- The expected range of information that each end user group would want to see
- Taking into account webpage accessibility for different users.
- Using the available and developing standards in web accessibility.
- Content creation by the SALEIE partners
- Identifying and linking to existing sources of information from relevant and reputable sources.

From discussions, the following four target end user groups were identified with a range of information requirements:

- Students
- Academic staff members
- Non- Academic staff members
- Other interested

In order to support the development of the Hub, a number of considerations were required like:

1. Identification of key persons and their responsibilities in the website development.
2. Adopt a unique presentation for the Hub.
3. Consistency in style across all web pages.
4. Consistency in content (use of appropriate English language)
6. Localisation to specific EU languages where appropriate.

7. Ease of navigation.
8. Do not place too much information on a single page.
9. Follow website accessibility best practice.
10. Ability to aid accessibility by having two versions of the website: first version is a text only version (specifically aimed to support users with visual disabilities) and the second version uses graphics and colours, using suitable fonts and colours.
11. Usefulness.
12. Ensure that the website is accessible from all Internet browsers.
13. Consider the use of web analytics to assess the use of the website.
14. Consider the use of social media to promote and access the website.
15. Consider the inclusion of a public area (for everyone) and a private area (for SALEIE partners)
16. Use of cookies: cookies policy.
17. Sustainable after the end of the SALEIE project.
18. Development of the final version of the website in parallel with maintaining the current version of the website.
19. Make the website wording “warm and personal”.
20. Develop a “one stop shop” for student support across Europe.
21. Any access requirements (such as usernames and passwords) to be held centrally (and securely) by the project coordinator.

We will also include the case studies and models of good practice found within the project and view them in a range of different languages.
Case studies will include:
• How disability support is organised (on a formal level) in the institution
• National level initiatives to recruit and support students with disabilities
• Institutional level.
• How departments provide support to students with disabilities in EIE (lectures, tutorial, laboratories, etc.).
• How teaching and learning material in EIE (such as laboratory arrangements and learning materials) are adapted to students with disabilities in EIE.
All resources will be created so they are accessible and easy to use by interested in higher education institutions.

Conclusion

This paper outlined the aim and scope of the SALEIE project and its role in the future development of engineering programs for global challenges. The key elements of the results of surveys have been presented. Student and Staff Support Hub for students with special needs is presented and is available for students, academic staff and administrative staff in different European languages with some examples of “best practice”. The results of a survey of existing EIE programmes in the key challenge areas are presented. Following five areas of interest for future global challenges were identified and presented.

Acknowledgment

The presented results were financially supported by the EU-EACEA in the framework of Lifelong Learning Programme, under the SALEIE grant no. 527877-LLP-1-2012-1-UK-ERASMUS-ENW entitled: Strategic Alignment of Electrical and Information Engineering in European Higher Education Institutions.

Bibliography

1. Project website http://www.saleie.co.uk
2. EAEEIE-organization http://www.eaeeie.org/?q=node/16
3. "Report on existing programmes orientated to the key global challenges." SALEIE Project Report. Main contributors: Marian Poboroniuc (Romania), Anthony Ward (UK), Nina Bencheva (Bulgaria), Gheorghe Livint (Romania), Noel Jackson (UK), Ernest Cachia (Malta), Antoanela Naaji (Romania), Dimitar Dimitrov (Bulgaria), Yoana Ruseva (Bulgaria), Dorin Popescu(Romania), Dorian Cojocaru(Romania), Laura Grindei (Romania), Gert Jervan(Estonia), Jean-Marc Thiriet (France).http://www.saleie.co.uk/Deliverables/Deliverable3_1.html
4. "SALEIE – WP3 Global Challenges Survey",http://www.saleie.co.uk/Deliverables/Deliverable3_2.html
5. "WP3 Report on Survey n=39" ,http://www.saleie.co.uk/Deliverables/Deliverable3_3.html
6. "SALEIE – WP4 Widening Participation and Disabilities Survey",http://www.saleie.co.uk/Deliverables/Deliverable4_1.html
7. "Building a shared understanding of the skills and competences in order to respond to the current global technical challenges", Friesel A, Ward A, Mrozek Z, Poboroniuc M, Welzer T ; IEEE EDUCON 2014, Istanbul, Turkey 3-5 April 2014.
8. "Student and Staff Support Hub";http://dftgroup.valuehost.pro/saleie/Student_Support_Hub.php
9. Preliminary findings to design EIE curriculua harmonised to the technical global challenges." Poboroniuc, MS, Cojocaru, D, Livint, G, Ward A, Cachia, E, Bencheva, N. 24th EAEEIE Annual Conference on Innovation in Electrical and Information Engineering. Chania, Crete, 30th – 31st May 2013.