

## Strategic Alignment of Electrical and Information Engineering in European Higher Education Institutions – Erasmus Network Project

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**Strategic Alignment of Electrical and Information Engineering in European Higher Education Institutions (SALEIE) – Erasmus Network Project:** *The paper considers an Erasmus Network Project: "Strategic Alignment of Electrical and Information Engineering in European Higher Education Institutions". An overview of the main objectives, partnership, target groups, project outcomes and results is done. Some conclusions and plans for the future of the project are presented.*

**Key words:** *Electrical and Information Engineering, Higher Education, Higher Education Institutions (HEIs), Curriculum, Students with special needs.*

### INTRUDUCTION

Higher education plays an essential role in society, creating new knowledge, transferring it to students and fostering innovation. EU-level actions help higher education institutions throughout Europe in their efforts to modernise, both in terms of the courses they offer and the way they operate [1]. Although some European universities are among the best in the world, the potential of higher institutions is not being fully realised. Curricula are not always up to date, not enough young people go to university. National governments are responsible for their education and training systems and individual universities organise their own curricula. However, the challenges facing higher education are similar across the EU and there are clear advantages in working together.

During the 1990s fundamental world-wide changes occurred following the rise of international markets, communication and information technology in the 1980s. These can be summarised in terms of the globalisation, individualisation, digitalisation and information boom [2]. Higher education has to be deeply involved in these new and related phases both through education and training (new competences for new jobs in lifelong learning), through (applied) research and the new knowledge to be implemented through high-impact innovation. The current world of work also needs more and better-educated and multi-skilled graduates. Consequently, higher-education institutions are experiencing the need to reformulate their institutional missions and strategies.

Developing learners' competence is an important part of the mission of HEIs. The term "converging competences" points to the need not only to train individuals for specific tasks, but to educate the whole person. Education is about acquiring skills, but also about acquiring values and attitudes. As education policies move from an emphasis on process to a stronger emphasis on the results of the education processes, learning outcomes have come to be seen as an essential feature of policies both [3].

Globalisation and technological development are radically changing the landscape of higher education. Over the next twenty years the demand for higher education is expected to grow exponentially, from the current 99 million students worldwide to 414 million by 2030 [4]. Technology and the expectations of students are also changing. Students increasingly expect to choose what they learn, how they learn and when they learn, according to their individual needs and interests. They are ready to do it in their country of origin, abroad, via courses offered online or via blended forms of learning combining all of these possibilities. HEIs (Higher Education Institution) must increase their attractiveness; actively promote international mobility of students and staff; provide world-class innovative curricula as well as excellence in teaching and research opportunities; and enter into cooperation and strategic partnerships with other HEIs, government institutions, the private sector and civil society around the world. Furthermore they must make a stronger contribution to economic growth by encouraging innovation and ensuring that higher education responds to labour market needs. Digital education, and in particular the emergence of massive open online courses is also bringing new incentives for strategic

partnerships between education institutions, and new opportunities to reach potential students who may not be able to travel or take a break from employment but who are eager to profit from higher education offers outside their country.

Other challenge facing HEIs is the inclusion of the students with disabilities in academic studies. Despite the revolution in social and legislative policies on provision of equal opportunities for education and employment for people with disabilities, there is still a long way to go [5]. The UN Convention on the Rights of Persons with Disabilities (CRPD) and the Optional Protocol to it were adopted by the UN General Assembly in 2006 and entered into force on 3 May 2008. The Convention represents a shift in the approach: people with disabilities should not be perceived as object of charity medical treatment and social protection, but as 'holders' of rights, able to claim these rights and to live their lives in dignity and autonomy as active members of society [6]. The aim of the European Disability Strategy 2010-2020 is to empower people with disabilities so that they can enjoy their full rights, and benefit fully from participating in society and in the European economy, notably through the Single market [7]. This Strategy focuses on eliminating barriers. The Commission has identified eight main areas for action and one of them is Education and training.

### **SALEIE GOALS AND OBJECTIVES [8]**

Most of the global challenges identified in [9, 10] will require well prepared and innovative EIE teachers and graduates in order to solve their related technical problems. The main challenges addressed by this project are:

1. Ensuring graduates are prepared to enable Europe to respond to the current global technical challenges in the Green Energy, the Environment and Sustainability, Communications and IT, Health, and Modern Manufacturing Systems (including Robotics), that is, a "new skills for new jobs" approach. This will embrace conventional education, lifelong learning and training for entrepreneurship.
2. Ensuring that programme and module governance is sufficiently well understood that issues of mobility, progression and employment are understandable by appropriate stakeholders including the accrediting bodies for professional engineers.
3. Ensuring all learners, irrespective of their background or personal challenges, including: dyslexia and dyspraxia; visual and audio impairments; and mental disabilities such as aspergers, autism, depression, anxiety are given equal opportunity to education and are appropriately supported.

The activities being undertaken in this project are important to the future of EIE education across Europe. 44 European partners (mostly higher education institutions) and 1 associated partner are involved in the project SALEIE. The objectives of the project are:

- Build a shared understanding of the skills and competence needs of graduates to help European Companies respond to the current global technical challenges.
- Enhance current understanding of academic programmes and modules in terms of technical content and level of learner achievement as a means of improving clarity of learner skills and competence for mobility, academic progression and employment. At present careful scrutiny of application forms is often required when learners apply for academic experiences (such as work placements and ERASMUS exchanges) to fully understand how well the learner meets pre-requisite requirements; and how exchange programmes meet home institution requirements.
- Build a common understanding of current practices and issues associated with marketing programmes and the support of students from unconventional backgrounds and those with special needs. In this context special need are

taken to include, but not be limited to students with: physical mobility problems; dyslexia and dyspraxia; visual and audio impairments; and mental disabilities such as aspergers, autism, depression, anxiety. Students with special needs often require adjustments to be made to infrastructure and teaching practices, adjustments that need to be carried out with sensitivity to the students involved.

The specific objectives of this project are to produce:

- Model programme and module curricula in the current global technical challenge subjects;
- Support for students with learners with personal challenges during their study and when wishing to undertake periods of study abroad through ERASMUS exchanges, for example;
- Models for maximising accessibility of programmes to all learners.

The methodology that this project will follow 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 in this project questionnaire surveys will be used for an audit of the current situation and current practices in interest areas of this project. Specifically the surveys will set out 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 these students.
- Policy and practices associated with programme and module specification including how well understood current specifications are to ERASMUS exchange partners and employers.

The project will develop model curricula in these global technical challenge areas. These curricula will be able to be adopted by higher education institutions to broaden their academic programme portfolio specifically focussed towards key need areas. Any survey and common curricula extraction restricted to one country is likely to produce outcomes that reflect local capabilities and needs. Such a restricted survey cannot be matched by the breadth and depth of experience that can be gathered through an established and mature network as in the case of this project.

This project also looks in detail at the widening participation agenda to increase the pool of potential learner applicants and to the support needs some of them may have. The project has a focus on support systems for students with specific needs so that, once engaged with the education system they are not disadvantaged through lack of understanding and ability of institutions to make appropriate adjustments. In areas where support is weaker, Europe may be missing or losing students with real talent in EIE who will add future value to GDP. Again the breadth and depth of experience of partners from across Europe should easily outperform any single country synthesis of best practice in support and marketing of programmes to learners with specific needs.

A project website will be created containing, publically visible, all results and outcomes as they emerge and as an on-going resource after the project ends. The website will be referenced from the EAEEIE's site. Contact will also be made with other relevant EU projects with a view to mutual referencing.

At all stages throughout the project careful attention will be paid to the design and deployment of measurable indicators of our activities. For the surveys, number and

breadth of respondents will be amongst the key measures. For the models more qualitative measures based on independent feedback (from non-partner HEIs and Industrial representatives) will be amongst the important measures. For the trial phase, feedback from the pilot institutions will be important quality indicators.

### CONCLUSIONS

A centre for excellence widening participation and support for learners with specific needs will be created in of the publically visible part of the project website. Visitors will be able to view all the case studies and models of good practice found within the project and view them in a range of different languages. All resources will be created so they are accessible and easy to use by interested higher education institutions.

Based on more than a 20 year history of collaboration on education in the Electrical and Information Engineering discipline area through the European Association for Education in Electrical and Information Engineering, the project SALEIE will enhance Europe's ability to educate all learners who wish to engage with higher education in programmes tuned to the global technical challenges we currently face. The project will broaden the access to EIE programmes through optimization of marketing and subsequent support to students with special needs.

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**The paper has been reviewed.**