Analyze a Policies for Higher Education Institutions in Electrical and Information Engineering

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ABSTRACT

This paper deals with the process of identification of the needed changes within higher education to meet future challenges. The work is related with the work package Policy of the LLP SALEIE program "Strategic Alignment of Electrical and Information Engineering in European Higher Education Institutions". The analysis includes a review of the needs and impact of administrative policy as it impacts the design, development, delivery, assessment and review of academic programmes. The final objective of this global task is to bring together policy administrators from institutions across Europe to review current practices and to identify examples of best practice, to build a common understanding of governance and policy implications on the strategic changes associated with the project, and create a centre for excellence in the policy area. The paper presents the designing process of a questionnaire regarding the above problems. The objective is to achieve as broad coverage of European higher education institutional responses as possible.

Keywords: Lifelong Learning Programme, higher education, policy, survey, questionnaire.

1. INTRODUCTION

An important effort was put into practice during the last years regarding the subject of policies in education. The importance of the education process, at all levels from primary schools to higher education, and life long education, is widely recognized. The new trend in education science is linked to policy. In the field of education, it is very important to move forward from local actions to coherent policies.

The European Commission pays a specific attention to the assessment of key competences in initial education and training and by consequence elaborated a policy guidance regarding subject. A new way to see the education process is identified by the term 'Rethinking education'. The purpose is to help Member States by identifying the fields in which the efficiency of education and training systems can be improved. The final result is a number of best practice policies in EU and beyond and a comparative study regarding this subject. The research defines two major aspects: first it analyses the needed reforms in education assessment and, second it presents the corresponding policies, as a coherent set of measures to be put in practice.

From this document [1], few items are being listed below, only as examples, being recognized as policy responses from EU Member States:

"(1) Engaging textbook and resource developers and publishers during policy development in order to help them prepare for subsequent changes to the curriculum and assessments.

(2) Enabling teachers to reduce their reliance on textbooks and providing training and support for teachers in carefully selecting and developing a wider range of resources.

(3) Recognising that developing key competences means integrating them comprehensively rather than in distinct and isolated sections appended to otherwise traditional resources.

(4) Encouraging teachers to use resources flexibly, for example by using end of unit tests at the beginning of units in order to identify students' difficulties and refocus their teaching accordingly."

Continuing to explore other new researches in the field of education policy, we are able to exemplify with policies regarding doctoral studies [2]. The authors start from the evidence that widening participation was a subject from policies regarding undergraduate education. They extend the emerging widening participation on doctoral education. The case study is England and for us, it is interesting that the subject includes the related policy "an analysis of Widening Participation Strategic Assessments produced in 2009 by 129 English higher education institutions (HEIs) reveals an emergent institutional awareness of this new development. Finally, a research agenda for widening participation to research degrees, focusing on research students, HEIs and policy-makers, is outlined. The conclusion calls for this agenda to be pursued at

institutional, national and cross-national levels so that future policy can be made and implemented on the basis of a robust evidence base."

Another related subject is the connection between higher education research and policy in education [3]. The topics of this volume suggestively identify the field of education where a coherent set of measure must be aggregated into policies. The authors focus on the relationships between higher education research and higher education policy. Case studies regarding educational policies cover an important number ofcountries: Canada, Australia, Japan, Chile. Another interesting subject from this book is related with policy makers' identification.

A well appreciated teaching system in Europe is the one from Finland. From this point of view, a comparative study regarding policy making processes with respect to teacher education in Finland and Norway was published [4]. This paper focuses on policy making processes in the field of teacher education in Finland and Norway. "Particular attention is given to the roles different actors play in these processes and the potential effects of their involvement on the teacher education programs in the two countries." The analysis is based on a set of questionnaires for experienced policy makers in the area of education.

Two main conclusions emerge from the upper examples related to the research in education literature:

- policy is a specific subject which must be defined and understood in a different way than isolated actions,

- questionnaires are useful tools for identifying best practice example from policy in education point of view.

The paper will follow by describing the project Strategic Alignment of Electrical and Information Engineering in European Higher Education Institutions - SALEIE in the context of the Lifelong Learning Programme LLP - paragraph II, the "Policy" as an important subject for SALEIE program (Work Package 5) – paragraph III, a general view of the survey regarding policy – paragraph IV, details regarding the design process of the questionnaire needed for the survey – paragraph V. Conclusions – paragraph VI, Acknowledge and References will end the presentation.

2. SALEIE A LIFELONG LEARNING PROGRAMME (LLP)

The Lifelong Learning Programme (LLP) is an European program following to the Socrates, Leonardo da Vinci and ICT / Open & Distance Learning [5]. It envisages activities supporting all type of learning opportunities from childhood to old age in every single life situation.

Four types of sectorial sub-programmes aim different stages of education and training processes: for schools the sub programme Comenius, for higher education the sub programme Erasmus, for vocational education and training the sub programme Leonardo da Vinci, and for adult education the sub programme Grundtvig.

In order to complement the sectorial sub-programmes, a number of transversal programmes were financed. The main purpose of this type of transversal programmes is to support the European cooperation between entities involved in different sectorial sub programmes. Other additional targets are the quality and the transparency of Member States' education and training systems.

The LLP programme supports four key activities:
- Policy cooperation and innovation,
- Languages,
- Information and communication technologies - ICT,
- Dissemination and exploitation of results.

Other two programmes were developed in the frame of LLP:
the Jean Monnet programmesupporting the teaching, reflection and debate on the European integration process at higher education institutions, and Eurydice support gathering, monitoring, processing and circulating reliable and readily comparable information on education systems and policies throughout Europe.

The project SALEIE - Strategic Alignment of Electrical and Information Engineering in European Higher Education Institutions has been funded by means of support from the European Commission in the frame of Lifelong Learning Programme. The SALEIE 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 purpose of this programme is to create a range of outcomes that will benefit educational institutions, programme designers and faulty in the EIE area and demonstrate their applicability and added value across Europe [6], [7]. The dissemination plan ensures the outcomes of the project will reach the head of every known EIE providing academic department across Europe.

Finally sustainability is ensured through a commitment from the EAEEIE to maintain the outcomes beyond the life of the project.

According to the SALEIE proposal, "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 that 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."

3. POLICY AS IMPORTANT SUBJECT FOR SALEIE

Policy cooperation among Member States and the EU institutions is based on the "strategic framework for European cooperation in education and training (ET2020)", which is complemented by a number of funding programmes.

SALEIE project brings together more than 40 partners in Europe having good experience regarding selectively policies in higher education [6], [7]:
-      University of York UF has good results for strategies in relation to disability matters, compliance with current disability legislation, policy and training to college welfare teams and University staff on,
-      Instituto Superior Técnico from Portugal assumes, as part of its strategic policy, the involved in several networks andinternational programmes to promote student mobility, both at undergraduate and postgraduate levels, as well as internships for participating in IST's research activities, such as CLUSTER, CESAER, TIME, ATHENS and MAGALHAES-SMILE.

-      The University of Craiova Romania was involved in many EU funding projects European focussing on policy for higher education or for lifelong learning, including the PAHRE programme Creating an Observatory for Raising Awareness on the EU Social Inclusion Policy in the South-West Region of Romania.
-      The University of Rennes France implemented policies regarding life long learning (LLL) at the three levels of higher education (Bachelor, Master and Doctorate), on international joint laboratories and on international joint education programmes (joint masters, mainly). In the frame of its internal policy, this partner has strongly encouraged this type of activities since more than twenty years.

-      Tallinn University of Technology Estonia will primarily focus on enhancing the competitiveness of EIE education within Europe, especially in relation to modern global technical challenges. TTU will also (in cooperation with Estonian Ministry of Education and Research) participate actively on policy development.
-      For the FH Vorarlberg University of Applied Sciences from Germany, the Erasmus Policy Statement is seen as part of the University's institutional strategy.
According to the SALEIE proposal [6], [7], the project teams will work within the framework of the 'Open method of Coordination' that aims to help partners/countries to critically reflect upon their own polices in the context of European cooperation and to learn from other countries practices, for example:
-      Policy makers and practitioners from one country will gain from the experiences of their counterparts elsewhere in Europe in implementing reforms in areas of shared interest and concern in particular in tuning programmes to meet the graduate needs for the global technical challenges for ALL students.
-      Comparisons of the partners' performance and exchange of best practices will raise the general level of capability in student support, policy and marketing systems.
-      Identify how certain factors can support or hinder implementation of higher education or LLL strategies/policies.

-      Identify elements of successful approaches to foster higher education/lifelong learning, its quality, quantity and recognition, through national/regional/local and institutional policies.
-      Support transnational policy learning between participants and give new insights

An important issue inside SALEIE is the problem of students with special needs. A dedicated meeting regarding this subject already took place at Bordeaux in France in April 2013. A practical result obtained after this meeting is the final form of a questionnaire for the specific survey.

Equal opportunities and widening participation to higher education are high on the political agendas of the EU and many individual countries within it. It is almost expected that all Universities are equipped and able to support any student irrespective of their physical, personal and mental situation. Fair and equitable treatment is a key requirement as a matter of policy. Students with special needs should be given equal opportunities in respect of international exchanges and work placements. The policy work package of this project explores the special issues of such students as well as the general transparency issues of module content, level of achievement and assessment.

The method of questionnaire based survey will be widely used during SALEIE development. From the policies point of view, these surveys will set out to audit, for example, equal opportunities and diversity policies and practices or policy and practices associated with programme and module specification including how well understood current specifications are to ERASMUS exchange partners and employers.

Provided the cooperation inside SALEIE, project partners will gain new insights into model curricula for programmes to meet the global technical challenges and policies, procedures and practices in widening participation, marketing programmes, supporting students, programme and module governance and generic key technical challenge curricula. Specific groups within the project [6], [7] who will benefit form this approach are curriculum designers and academics, specifically in programmes orientated towards the key global technical challenges (WP3); student support administrators (WP4), ERASMUS exchange administrators and recruiters (WP4), Industrial experience and internship administrators (WP4), and policy makers (WP5).

From the policy point of view, the key beneficiaries of the SALEIE project will be HEI administrators and policy makers. They will benefit from improved understanding of the variations in programme administrative policies and practices across Europe. As part of WP4 and WP5 institutions with excellent policies, procedures and practices in widening participation, student support or programme governance will be identified.

The final report and an executive summary will be sent to the head of department of all known EIE departments across Europe as identified in the THEIERE and EIE-Surveyor project monographs [8], [9]. Each head of department will be asked to forward the communication to their industrial partners, academic policy makers, student support

administrators and teaching staff. By using this resource, the majority of current providers of EIE programmes will be reached and through them relevant administrators and industrial partners. After presenting the general interest of SALEIE project for policy, it follows details regarding the dedicated work package "Policy". From the proposal for SALEIE project [6], [7], there are listed here the main items (objectives and actions) for WP5.

Findings in previous EAEEIE Thematic Network projects undertaken by networks have identified differences in Quality Assurance procedures and administrative practices across Europe and that establishing new and making changes to existing programmes in European HEIs are governed tovarying degrees at the National, Regional and Institutional level. Given this variation and the fact that work packages 3 and 4 are focussed on change within Higher Education to meet future challenges, a review of the needs and impact of administrative policy as it impacts the design, development, delivery, assessment and review of academic programmes is included.

The objective of this work package is to bring together policy administrators from institutions across Europe to review current practices and to identify examples of best practice, to build a common understanding of governance and policy implications on the strategic changes associated with the project, and create a centre for excellence in the policy area.

The methodology will be to commence with an audit of current practices. The project partners will be used as the route to obtaining responses to these surveys from within their own institutions and their networks. The objective will be to achieve as broad a coverage of European higher education institutional responses as can be achieved. The results of the surveys will be collated and analysed. The analysis report will be published on the project website.

The survey will address the following questions, as a minimum:

- What autonomy does academic staff have in proposing new modules and programmes.

- Who, if not academic staff, are monitoring programme and module needs to respond to the changing industrial environment.

- What policies and practices are in place in respect of assessment of learning outcomes.

- How closely aligned are assessments and module and programme learning outcomes and how are these monitored.

- How policy takes account of the needs of Professional Engineering bodies.

- Differences in policies and practices with respect to non-conventional learners.

- The existence and content of equal opportunities and widening participation policies and practices.

- How are the needs of learners with specific needs communicated within the institution and to whom.

- What policies are in place to ensure learners with specific needs are supported.

- How are ERASMUS and Industrial partner institutions supplied with information about modules and programmes.

Activities in this work package will include:

- A survey of administrative practices across Europe in respect of the design, development, delivery, assessment and review of academic programmes.

- Work package meetings in partner institutions.

- The identification of examples of best practice.

- The design of a policy in EIE resource website as part of the project site.

4. THE SURVEY FOR SALEIE'S WP5 – A GENERAL VIEW

Between the tools that were proposed to be used in the frame of SALEIE project, the surveys play a major role. Inorder to implement a survey, it is needed to use a specific set of questionnaires. It is also the case for WP5 Policy.

Surveys will be designed to explore current administrative policies and practices across Europe. The typical content of the survey is outlined in the work package description above.

The surveys will be distributed amongst project partners for their completion and by their networks to widen the picture across Europe. The questionnaires will also be made public on the project website to enable any other institution who wishes to contribute to the project to do so.

The results of the surveys will inform partner institutions policy makers and, through them, the wider community, and highlight examples of best practice. Visits of partners to institutions with identified best practices will be made to raise visibility and enable best practice to be spread across the project network.

The designing process of the questionnaire started with identifying the theoretical base governing the surveys in the field of educationrelated to important international bodies that were used for clarifying the theoretical aspects regarding policies in education:

- European Union (EU) documents for methodology, performance data, literature survey, national system analyses and case studies [10].

- United Nations Educational, Scientific and Cultural Organization (UNESCO) documents for quantitative research methods in educational planning [11].

- Organisation for Economic Co-operation and Development (OECD) documents regarding standard international questionnaire on migrant education policies [12].

- Higher Education Policy Commission, West Virginia higher education systems USA documents regarding questionnaire [13].

- The Vancouver Board of Education's Advocacy Committee documents regarding educational policy questionnaire [14].

Most important idea that was discovered, putting together the theoretical information [15], [16], [17] and practical implementation, [18], [19], [20], is the definition of a policy that discriminate between a series of actions and a true policy.

Following the Anderson model [21], a policy must accomplish the following five stages:

- Problem formation: "relief is sought from a situation that produces a human need, a deprivation, or dissatisfaction." (in [20] the first two stages in the Anderson model — problem formation and policy agenda — were collapsed into one stage).

- Policy formulation: "pertinent and acceptable proposed courses of action for dealing with public problems are developed."

- Policy adoption: "support is developed for a specific proposal such that the policy is legitimized or authorized."

- Policy implementation: "the application of the policy to the problem."

- Policy evaluation: "an attempt is made to determine whether or not the policy has been effective."

It remains to define the field of interest in which the policy is applied, who are the policy makers for each stage, whichare the specific subjects focusing on and what levels of the educational hierarchy are interesting for the survey.

5. THE SURVEY FOR SALEIE'S WP5 – PRACTICAL ASPECTS

First, taking into account the SALEIE proposal, the partners with major contribution to WP5 were identified.

They are: University of Craiova, Czech Technical University Prague, University of Rennes 1, University of Toulouse 3 Paul Sabatier, Gheorghe Asachi Techical University of Iasi, Slovak University of Technology, Technical University of Cluj-Napoca, Politechnica University of Bucharest, Copenhagen University College of Engineering, Riga Technical University, Swedish Telepedagogic Knowledge Centre AB, University of Vigo, University of Kosice, Haute Ecole de la Province de Liege, University of Maribor and Ege University International Computer Institute.

Using the previous experience and the general aspects from the previous paragraph, a first draft was produced and a debate regarding it was started between partners. Following an iterative process, seven different versions were obtained.

A lot of comments were received for the first five questions which were introduced, following the Anderson model, regarding the assessment policies.

As already specified, a policy starts from identifying a problem, and continues by formulating the policy and by the adoption the laws for its implementation. After the implementation of the policy, the evaluation of the results obtained follows. During the problem identification phase, "relief is sought from a situation that produces a human need, a deprivation, or dissatisfaction." During the policy formulation phase, "pertinent and acceptable proposed courses of action for dealing with public problems" are developed. During the policy adoption phase, "support is developed for a specific proposal such that the policy is legitimized or authorized." During the policy implementation phase, there is the "application of the policy to the problem." During the policy evaluation phase, "an attempt is made to determine whether or not the policy has been effective." E.g. using the information received from professional organisation we understand that the engineer diploma holders have a gap in their understanding of ecological problems. And/or using the information received from regional accreditation association we understand that the engineering curricula have not enough hours for ecological problems. By consequence the problem of preparing the students for

ecological problems was identified. This is a reason of introduction of the first question.

It remains to identify how to formulate the corresponding policy and to adopt the laws for its implementation. This justifies the following four questions.

By "assessment policy" we identify the official valuation procedures put in work at different level (institutional, regional, national) for different subjects related to higher education in electrical and software engineering.

The target of the survey is higher technical education: electrical and information technology engineering. Both levels, national and institutional, are interesting from the point of the project.

For questions 1 to 5, ten different options were proposed in order to identify the level of the hierarchy involved into the related stage of the policy: A. national legislature, B. national executive staff, C. executive agencies (e.g., national educational department), D. universities management boards, E. faculty management boards, F. external consultants, G. existing policies and practices on universities levels, H. other national policies and practices, I. professional organisation, J. regional accreditation association, K. other. On a four-point scale, with a "1" representing "not important" and a "4" representing "very important", the answering specialist is asked to rate each of the upper listed levels of hierarchy (entities) in terms of their relative importance in the problem corresponding phase of national's assessment policy.

A similar answer on a scale from "1" to "4" is asked on the sixth question for rating the current objectives of the national assessment policy related to: A. increasing accountability to public, B. improving teaching, C. improving student learning, D. improving academic program efficiency, E. facilitating intranational comparisons, F. facilitating international comparisons, G. other.

The next 26 questions have the answers organized on four different levels of higher technical education studies in electrical and information technology: bachelor, master, doctoral and lifelong education. For each of these levels there are three options for answering: Yes, No and I do not know.
The subjects of these questions are:
-    changes in national's assessment policy in the last five years,
-    new policies initiated from a national level,

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- autonomy of university,
- assessment of learning outcomes,
- the standardized procedures for ranking of universities, as over all institutions,

- ranking of engineering programs between similar programs in the country,

- the electrical and information engineering teaching system adaptation to the changing in industrial environment,

- the electrical and information engineering teaching system adaptation to needs of Professional Engineering bodies,

- how ERASMUS and industrial partner institutions are supplied with information about modules and programmes,
- how closely aligned are assessments and module and programme learning outcomes and how are these monitored,

- the interactions between universities, local government, civil society and the wider community in order to improve the engineering education quality,
- which institution(s) has/have the authority to develop, approve and change engineering curricula,
- developing monitoring systems in place to assess changes in students' knowledge, skills, values, attitudes and behaviour with regard to new industrial and market needs,
- the level and type of minimum education required to qualify for different positions in electrical and information engineering domain,
- the definition of specific skills which are required in order to carry out the duties of different positions in electrical and information engineering domain,
- the type and least amount of prior directly related work experience typically required for a person coming into different positions in electrical and information engineering,
- act to improve the educational outcomes for students with special needs, and determine how are communicated their needs within the institution and to whom,
- to support universities to meet the actual costs of providing public education,
- to ensure equitable learning outcomes for all students because poverty is a significant factor influencing a student's learning and success in school,
- to pay attention on the importance of class size and class composition with respect to providing optimal teaching and learning environments,

- to support universities in order to improve the educational outcomes for immigrant students,

- reference to the right to education, actions against racism, racial discrimination, xenophobia and related intolerance,

- human rights education,
- supporting students to express themselves freely, to have responsibility, to participate in decision making and to organize for their own interests,
- to the increasing level of cultural diversity in school.

For different problems, in different countries, many different cases could be identified. There were two options. First: to ask for an effort when answering and giving an average mark for different cases. Second: to complicate the questionnaires by dividing each question relating with all cases. Finally the first option was chosen. For each answer „YES" to a question, a comment is asked and that will help the answering specialists to tune their responses.

A future SALEIE meeting dedicated to this survey will produce the final form of the questionnaire, refining questions, eliminating ambiguities and adding important questions which could miss from this draft.

6. CONCLUSION

The papers deals with a specific problem take into account by SALEIE LLP program: the policies in the field of technical higher education, electrical and information engineering. Regarding this subject, the process of design of a questionnaire needed to implement the specific survey was presented, focusing both on theoretical and practical aspects.

After obtaining the final form of the questionnaire, this will be implemented in order to support the online access in SurveyMonkey.

Following the SALEIE proposal [6],[7], the surveys will be distributed amongst project partners for their completion and by their networks to widen the picture across Europe. The questionnaires will also be made public on the project website to enable any other institution who wishes to contribute to the project to do so. The results of the surveys will inform partner institutions policy makers and, through them, the wider community, and highlight examples of best practice. Visits of partners to institutions with identified best practices will be made to raise visibility and enable best practice to be spread across the project network.

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