Strategy of FEECS at the Process of Opening to World on the Threshold of 21st Century

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Abstract: To be successful faculty for future time many continual changes are necessary to undertake. The paper describes strategy of the Faculty of Electrical Engineering and Computer Science (FEECS), Technical University Ostrava, in the light of the new environment and conditions as for example "Sorbonne Declaration" is. From the very beginning of its existence, the Faculty introduced a credit system of studies, which is compatible with the European credit transfer system ECTS. The credit system is applied at the Faculty in all subjects of study and in the course of the whole length of studies. The credit system contributes to a high degree of flexibility of the studies. Trends and issues in learning structures in higher education are closely connected with the credit system. International grounds of opening to world are discussed as well as the necessity of an accreditation process. Steps undertaken by the Faculty leading to opening to world are described in detail as for example independent external evaluation process as a tool of quality assurance of the Faculty, partnership with industry as a successful way to prepare an engineer for a fast changing market that can be used for shortening the distance between university and enterprise to transform the students into versatile, competitive and qualified professionals. In final part are mentioned important activities leading to the extension of international contacts of the Faculty.

Keywords: credit system, quality assurance, accreditation, international activities, partnership with industry

1. Trends and issues in learning structures in higher education in Europe

Universities' central role in developing European cultural dimensions is stressed in the Sorbonne declaration [5] from 25th of May 1998. It emphasized the creation of the European area of higher education as a key way to promote citizens' mobility and employability and the Continent's overall development.

Four main directions which may foster transparency in qualification structures in Europe are being suggested.

* The gradual adoption of an ECTS-compatible credit accumulation system. This would enhance the flexibility of national/institutional systems, bring them more in line with each other and with world systems, and ease mobility both within and from outside the EU/EEA area.

* The adoption of a common, but flexible frame of reference for qualifications. A rigid, uniform model (like the 3-5-8 model) is neither desirable nor feasible in Europe. In line with the analysis of existing systems and reforms in progress, the following broad frame could serve as a common reference, while at the same time allowing for flexibility and differences in countries and subjects (length of studies are expressed not in years, but as the number of academic credits that must be successfully completed (one academic year corresponds to 60 ECTS credits)):

- sub-degree level (certificate, diploma): 1 to 2 years worth of ECTS credits;

- first degree level (bachelor degree): no less than 3, no more than 4 years worth of ECTS credits;

- master level: about 5 years worth of ECTS credits, of which at least 12 months worth of master-level credits;

- doctoral level: variable (about 7 or 8 years in total).

The main conditions for meaningful first degrees of the bachelor type are being set out. Key factors are the introduction of new curricula (instead of a sheer re-packaging of existing ones), a guaranteed level (gauged on the basis of knowledge and competencies acquired rather than time spent), real possibilities on the market labour, a clear

separation from postgraduate studies, and formal accreditation. Short master programmes (12 months) present specific opportunities for intra-European mobility and international competitiveness.

* An enhanced European dimension in quality assurance, evaluation and accreditation:

- compatible quality assurance systems, especially regarding the setting of threshold standards based on learning acquired (outputs) rather than on time spent and curriculum content (inputs);

- independent evaluation leading to European quality labels in broad subject areas; the current vacuum for independent evaluation in Europe would best be filled through agencies independent from national and European authorities, and working along subject lines; they could draw on existing and future European-wide subject-based networks;

- a coordinated approach to quality standards for transnational education, which raises the question of the recognition of foreign private providers.

* Empowering Europeans to use the new learning opportunities. Compatible credit systems, understandable degree structures, increased quality assurance and an more European labour market are structural improvements which would create a whole new range of learning opportunities for all; their impact would be even greater if they were combined with measures such as short master degrees favouring new types of mobility, and the elimination of remaining obstacles to student and teacher mobility.

The combined impact of the suggested action lines would also make European higher education more understandable and attractive to students, scholars and employers from other continents; they would enhance European competitiveness and thus help to consolidate (or in the eyes of many, to re-establish) its role and influence in the world.

2. International dimension as important factor of opening to world

Example: One school in France (CPE Lyon) has more than 30% of students studying abroad for a year or two either in industry or in university. They have the opportunity to gain both industrial and international experience during their studies.

We may ask following question : why do students choose the option of a year in industry or university ?

Many students answer that the major factors are to gain industrial experience in an international context, to improve language skills, to prepare for a year of study abroad, to test their ability to adapt to a new environment and to identify the type of work they would like to do after graduation This last factor becomes very important when the students are asked what they gained from their year in industry abroad. In general most of students say that this experience was useful in gaining their first job, many of them also say that it enabled them to identify the career they would like to follow.

The industrial and international experience means that the students' CV will attract the attention of the recruiter, especially for multinational companies, and also the student gains in maturity, self-assurance, autonomy, adaptability, and responsibility. The student also acquires a taste for mobility.

Clearly the engineering professional of the future, and indeed of the present time, requires a global perspective.

According to the 1999 [6] survey conducted by Cendant International Assignment Services the worldwide expatriate population is growing. International staff in an enterprise is necessary for many reason, as for example transfer of knowledge or individual development. International staff develop cultural awareness and sensitivity, learning how to evaluate other people regardless of their background. Diverse teams are being created with members of different nationalities, attributes and experience all coming to the table together. Expatriation is on the increase and more graduates and middle managers are being sent abroad. Many workers are recruited from universities. The international lifestyle is very attractive on campus. Fluency in language is important and in most cases necessary aspect of studying and working abroad.

ACCREDITATION is one of the keywords that one will hear used in studying abroad and all over the academic world. It is a word that pops up time and time again for different fields of study, for nations and, in some countries, there are even several accrediting bodies within nations. Some accrediting bodies are created according to

government guidelines. Others have been given the opportunity to self-regulate – that is universities can operate according to guidelines that they agree to amongst themselves. Others create an organizing body to deal with accreditation. In all cases the aim is to improve quality of the education that courses can offer and to prevent courses springing up that provide students – often to great expense – with an education that is not satisfactory. This is why accreditation is so important; non-accredited courses (and there are many all over the world) may or may not provide a suitable education.

3. Steps undertaken by the FEECS onto opening to world

3.1 Credit system

At the same time when Faculty of Electrical Engineering and Computer Science acquired independence in 1991, a credit system of studies was introduced, which is compatible with the European system of ECTS. To the difference from systems in which the plan of studies is defined as fixed, the credit system brings about a certain relaxation in terms of both content and time. That enables students to adjust their plans of studies according to their individual needs.

The studies are divided into two stages. The first stage takes nominally 2 years and must be concluded by the so named Expert Examination. The Expert Examination is focused on principal subjects of the general obligatory basis of studies, elementary for the studies of electrical engineering branches and computer science. Students are expected to prove knowledge of theoretical principles from the field of electrical engineering and information science and their ability to apply basic notions of mathematics and physics in relation with these theoretical principles at this examination.

After completing the 1st stage, students are divided into five lines according to the general fields of study:

1. Electronics and Telecommunications

specialization: telecommunication technology, radiocommunication technology, optoelectronics, power semiconductor systems, electronic devices designing,

2. Measurement and Control

specialization: measurement and control within the industries, measurement and control within medical electronics, control and information systems,

3. Power Engineering

specialization: electrical apparatus, electric drives and power electronics, mechatronics,

4. Electrical Power Engineering

specialization: energy transfer and distribution, industrial power systems, power systems within transport,

5. Computer Science

specialization: computer science, computer science and applied mathematics, automation of measurement and technical diagnostics.

Students broaden their education in the above mentioned types of specialization within the line of their field of study. The credit system contributes to a high degree of flexibility of the studies. That is true both in terms of the pace of studies and in terms of professional specialization through selection of the courses studied. The credit system makes it possible to increase students' independence and responsibility and at the same time create the profile of their qualifications. It supports mobility of students among all schools working under this system.

3.2 Accreditation of FEECS

In addition of the external evaluation process, the FEECS undergoes a process of accreditation regularly (with the periodicity of about once every five years). The aim (and meaning) of this process is to verify whether the Faculty meets the demands laid on university institutions and furthermore to submit pursuant recommendations concerning facts and phenomena in which shortcomings occur at the Faculty, according to an independent and external survey (a committee appointed by the Ministry of Education and Physical Training of the Czech Republic). Results of an accreditation are analyzed by the Faculty and have an immediate influence on its further work. Another feature which documents quality of instruction at FEECS is its graduate's opportunity to acquire the degree European Engineer (EUR ING), which makes professional practice in the countries of the European Union easier. This title is a confirmation of a high professional standard and moral qualities of the bearer and is granted by the European Federation of National Associations of Engineers (FEANI) seated in Paris. Granting of this degree has been possible since September 1995.

3.3 Evaluation as a tool of quality assurance

Evaluation is a procedure of self and outside assessment done by experts with competence for the educational process in Electrical Engineering and Computer Science (EECS). It is the systematic inventory, interpretation and assessment of facts and data of the teaching process and the scientific environment of a department or school of learning (unit) with the aim to reflect the current level of its own educational process in comparison to the mission and vision of the unit and the common accepted requirements of a modern education.

Evaluation is a tool to force pressure of change in the sense of quality assurance .

The absence of sufficient objective criteria of the quality of the educational process in the EECS is substituted by the assessment of an internal evaluation report, written by a team of professors, scientific co-workers and students of the unit, together with a several days visit of a group of peers (professors from other universities and engineers from industry) in the unit. The peers group writes the external evaluation report with special recommendations for changes in the unit.

To make sure that the internal report gives a straightforward view on the unit and following the conviction that the results of external evaluation have always subjective components, the procedure of evaluation should function without administrative pressure or monetary consequences for the unit and should be voluntary. It is therefore problematic and not the intention of the evaluation to use the results for a ranking of the units.

It is worth mentioning again that the evaluation will work best, if it is a completely self-controlled procedure without influence of the university management or ministries of education. The unit itself, hopefully supported by the university, has to take the costs for the evaluation. To make it sure that the (sometimes not cost-neutral realizable) recommendations of the peers can be realized in the education of EECS, the unit should negotiate with the university management and set up a plan of the realization for the period up to the next evaluation. A sufficient interval between evaluations seems to be five years.

3.4 Independent external evaluation process of the FEECS

FEECS does not rank among the faculties with a long tradition, nevertheless it won very good position between the other faculties of both VŠB-Technical University Ostrava and electrical engineering in Czech Republic during the time of its short existence. The evidence of that is also contained in the conclusions of External Evaluation Report of Teaching and Learning of the FEECS, which was drawn up in the end of year 1998 at the occasion of the independent evaluation process done by the group of European experts within the Phare Multi-Country Programme in Higher Education ZZ-95.20 Quality Assurance in Higher Education. As a chair of the group was nominated Dr. Stephen Gergely, Fellow of the Institute of Electrical Engineering, Coventry University, UK, and project manager was Mrs. Anne-Kathrine Mandrup, Centre for Quality Assurance and Evaluation of Higher Education, Denmark.

The Report was written on the basis of many planned meetings between the external group and representatives of all participants of teaching and learning process of FEECS, further on the basis of many visits in offices, laboratories and other important rooms used for teaching and learning. As a good starting point for the evaluation served a self assessment document prepared by a team consisting of some of the leaders of the Faculty. Most important conclusion of the Report is following: The Faculty provides a good, traditional, master level education in a large number specialized streams. Details are reachable on FEECS' s internet address (http;//fei.vsb.cz).

3.5 Partnership with industry as an optimal tool for education of students regard to fast changing market

One of the main problems faced by electrical engineering and computer science schools nowadays is how to prepare an engineer for a fast changing market [4]. To transform the students into versatile, competitive and qualified professionals, the distance between School and Enterprise must be shortened, and partnership with industry is a successful way that can be used for this.

From the very beginning of its existence, the FEECS has attempted to keep in touch with industrial and other companies to a maximum extent. The main reasons are:

- teachers gain knowledge of new needs in companies and organisations and according to that innovate the curricula,
- management of the Faculty provides information to the companies and organisations (potential "customers" to the "product" of the university - its graduates) about new subjects of study and types of specialisation, and conversely, they adjust the curricula on the basis of information and requirements which arise in these companies and organisations.

For several years already the Faculty has organised a meeting with representatives of companies at the beginning of a year where the above mentioned principles are brought into focus. On average, about 50 representatives of companies from the Czech Republic, mostly from the north Moravian region, participate in this meeting. Co-

operation of FEECS with industry and commercial companies and organizations ranks among points of particular interest.

4. What is necessary to do in near future

The following objectives (Bologna Forum – [1]) seem to be of primary relevance in higher education within European region:

♦ Promotion of the international competitiveness of the European higher education system

♦ Adoption of a system essentially based on two main cycles, undergraduate and graduate. Access to the second cycle shall require successful completion of first cycle studies, lasting a minimum of three years. The degree awarded after the first cycle shall also be relevant to the European labour market as an appropriate level of qualification. The second cycle should lead to the master and/or doctorate degree as in many European countries.

♦ Establishment of a system of credits - such as in the ECTS system - as a proper means of promoting the most widespread student mobility.

Promotion of mobility by overcoming obstacles to the effective exercise of free movement with particular attention to students, access to study and training opportunities and to related services

- Promotion of European co-operation in quality assurance with a view to developing comparable criteria and methodologies
- Promotion of the necessary European dimensions in higher education, particularly with regards to curricular development, inter-institutional co-operation, mobility schemes and integrated programmes of study, training and research.

As mentioned above, many important activities have already been undertaken by FEECS. But many are necessary still to realize:

4.1 Academic links with institutions abroad

There are some strong links but mostly on the level of the individual. They are unconnected rather than systematic. Contacts with corresponding foreign faculties are still sporadic. Relatively good are contacts with the Slovak Republic and Poland, especially in the area of conference organisation; in some cases work started on joint research programmes and we also co-operate on preparation of international projects.

4.2 Participation in European exchange programmes

The level of the participation of European exchange programs is relatively low. Contacts with the foreign countries are rather sporadic. Few people, as an exception rather than as a rule work or worked abroad. The Faculty participated actively in the TEMPUS projects, but has not asserted itself in the present projects of the E.U.

First necessary step for the enhancement of the participation in European exchange programmes is so called information package. The information package provides general information of the institution participating in a programme of exchange of students. Exchange is based on the basis of ECTS system, which was developed by the Commission of the European Communities in order to provide common procedures to guarantee academic recognition of studies abroad. It provides a way of measuring and comparing learning achievements, and transferring them from one institution to another. This is achieved through the use of a common ECTS credit unit and a common ECTS grading scale. ECTS also improves access to information on foreign curricula.

4.3 Internationalization of the curriculum

Internationalization of the curriculum in general is missing. However, various attempts were done in previous, but mostly on the basis of the personal contacts.

We are convinced that FEECS will be in future a truly international school and welcomes students as well as teachers of many foreign countries.

4.4 System based on two main cycles

Most important task of FEECS for future will be adoption of the 2-cycles system. Although there were realized in previous time sporadic attempts with the system in Czech universities, the implementation of the system was not too much successful. Graduates of the first cycle should be good professionals prepared for practice in given field of study. This aspect was mostly overlooked. The problem of implementation of the 2-cycles system in given country is immediately connected with professional assertion of the graduates in practice after first stage of study. Strategy of FEECS in building of the system takes the problem into account.

5. Conclusions

The FEECS is a young faculty which, in spite of its short existence, confirmed its viability and recorded a remarkable and dynamic development in difficult times. New trends in learning structures in higher education in Europe are great motivation for future development of the Faculty. Strategy of the development oriented on opening to world gives good chance to be a successful faculty.

There are good assumptions for implementation of the expected changes. Graduates all of the Czech electrical engineering faculties always could get an employment corresponding to their professional specialization. A lot of important and prominent positions in both foreign universities and industrial enterprises in many countries of western Europe, USA and Canada are good evidence of the fact. This feature refers not only to previous time but also to recent graduates, as we can see in many cases. Even students spending some time in foreign universities, mostly connected with a completion of their diploma work, are coming back with an acknowledgement of their work. The situation is given to our opinion by very well student's knowledge of theoretical principles from the field of electrical engineering and their ability to apply basic notions of mathematics and physics in relation with these theoretical principles. The reason of the situation is, to our opinion, in long term experience and tradition of the process of teaching and learning in technical-electrical engineering fields, that was not interrupted by political changes all the time in 20th century.

Weak point of our students – most students have little knowledge of languages - is a barrier to the full utilization of many possibilities within different student's mobility projects. Starting the process of opening to world taking into account European activities in higher education we believe that the mobility of our students will increase in future time. We believe that new possibilities given by programmes of exchange of students will be good motivation for our students particularly for overcoming the language barrier.

6. References

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