

HOW TO REALIZE AN INTERNATIONALIZATION COMPONENT IN ENGINEERING CURRICULA

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ABSTRACT

The paper shows some good practice for the realization of the internationalization component in engineering curricula. Experiences with internships abroad, Master thesis assignments at and exchange programs with foreign universities, as well as a joint Master's program together with a university abroad, are explained. Internships abroad are most popular and about 70% of all students make the choice to spend at least 3 months of their study in a foreign country. Joint Master's programs, taught by universities in different countries, are the ultimate way for internationalization. Four years of experience with such a program are explained.

KEYWORDS Internationalization, internship, student exchange, joint Master's program.

INTRODUCTION

The world is changing quickly and globalization is becoming increasingly important. Production facilities of West European companies are moved to East Europe, East Asia and Latin America and also IT-activities are more and more transferred all over the world, in particular to India. To survive, even small and medium sized enterprises have to work internationally.

For that reason institutes of higher education seriously need to prepare their students for working in an international setting. From this point of view, it is amazing that in the United States, the origin of many famous multinationals, only about 2% of the students gain experience abroad during their study.

PROBLEM ANALYSIS

Convinced of the need for internationalization, the question is how to realize this goal in practice. After the implementation of the Bologna structure, which has been introduced to stimulate student mobility within Europe, students should have the opportunity to continue with a Master's study in a foreign country after a Bachelor's study at their home university. However, at the moment students hardly take this opportunity; almost all students prefer to continue with a Master's program at their home university or at an institution directly related to it.

This means the internationalization component has to be implemented within the existing curricula. The Faculty of Engineering Technology of the University of Twente¹ in the Netherlands tries to do this in the following ways:

- Internships abroad, both in European and non-European countries
- Promoting exchange programs for courses at foreign universities
- Master thesis assignments at foreign universities
- Joint Master's program together with a foreign university

In the next section the approaches will be explained more in detail.

APPROACHES

A joint Master's program has been developed together with a partner university abroad for a group of students, but the other three mentioned approaches require an individually tailor-made realization and therefore are time intensive. Further details will be provided in the next subsections.

INTERNSHIPS

The philosophy of the Faculty is to schedule the internship in the second year of the Master curriculum, just before the students are starting with their Master thesis assignment. At that moment students will be able to apply all possible knowledge and skills, acquired during their Bachelor program and the first year of their Master study, for the benefit of the internship assignment. The duration of the internship is at least 3 months. The Faculty actively stimulates the students to go abroad and about 70% of all students are doing nowadays an internship in a foreign country. Analyzing the data it can be concluded, that students more and more prefer an internship far away from the home university in a completely new cultural environment; in the category internships abroad the proportion of internships outside Western Europe increased from 52% to 66% within one year.

A bit more than half of all students organise internships themselves, by contacting companies or universities, sending application letters and making agreements about the execution of the internship. Roughly a third of the internships result from direct contacts in industry and the academic network of the Chair, where the student is doing a Master specialization. Also the Student Mobility Centre of the Faculty mediates in finding a place, and in particular offers interesting internships through the international exchange organization IAESTE. About 10% of all students obtain an internship via IAESTE.

¹ www.ctw.utwente.nl/en/

For an internship of three months, which is equivalent with about 20 EC credit points, students have to write a report of about 30 pages, which will be assessed by a member of staff from his/her Master track specialization.

EXCHANGE PROGRAMS

The Faculty stimulates the participation of its students in exchange programs and also offers hospitality to foreign students. However, the interest of students in taking courses at other universities is relatively small for various reasons. An important factor is that the recognition of the level of the concerning courses and the credit points accordingly can be a problem, for instance when the student exchange takes place at a - for the home Faculty - rather unknown university. This means that student exchange usually happens within a relatively small network of universities, like for instance the European Consortium of Innovative Universities (ECIU). For a Socrates Erasmus exchange an official agreement between both universities is required on department level, specifying the number of exchange students on a yearly base and the length of the stay at the host university. The Socrates Erasmus program offers extra grants for exchange students.

Related to the content and the scheduling of the curricula of both the home and the host university, it proves to be rather difficult for an exchange student to compose an efficient program of courses at the host university. Usually a program of at most 15 EC can be realized during one semester (instead of 30 EC) and that makes it rather unattractive. It would be very helpful, if exchange students could have a choice from a number of good balanced clusters of integrated courses focussing on a certain theme and taught on a certain level during one semester for 30 EC. Our Faculty redesigned the first semester program of the international Master in 'Industrial Design & Manufacturing' (see subsection 3.4) with the goal to make it also attractive for exchange students as an optimized program of 30 EC. To realize the goals for internationalization, it would be a good thing when more universities would offer good balanced clusters of courses for exchange students focussing on different specific themes.

MASTER THESIS ASSIGNMENTS

The third mentioned opportunity for students to gain international experience is the execution of a Master thesis assignment in a foreign country. Even more than with the first two options, it is important that supervision of the assignment on an adequate level

can be guaranteed. Usually colleagues from local universities in the host country will be involved in the supervision of Master thesis projects. Student exchange for Master thesis assignments has been realized not only with European universities, such as in Germany and Scotland, but also with universities in Japan, Hong Kong and Brazil. A complication is, that according to the exam regulations the final examination has to be organized at the home university. As a rule the supervisor is invited to participate in the examination session in the Netherlands. In practice the number of students doing a Master thesis assignment abroad is relatively small.

JOINT MASTER'S PROGRAM

Since four years our Faculty is teaching an international joint Master's program in 'Industrial Design & Manufacturing' (IDM) together with the University of Dortmund (Germany), intended for students with a Bachelor's degree in Mechanical Engineering (Ponsen *et al.* 2002). The program focuses on the entire process of product realization in a life-cycle oriented way. Characteristic is the advanced integration of high-tech knowledge and skills in design and manufacturing engineering on the one hand and industrial engineering oriented subjects, such as marketing, production management, quality and cost engineering on the other. All courses are taught in English.

Combining the strengths of both partners means that courses are taught by staff members from both faculties and that students spend time at both universities for lectures and laboratory work. The first year of the program mainly consists of courses and during the second year an assignment in industry and a Master thesis assignment have to be done individually. After the first semester in the Netherlands all students move to Dortmund for the second semester. The semester curricula have been (re)designed in such a way that each semester program can be offered as an independent, good balanced entity for exchange students (see subsection 3.2). A big project integrates the subjects of most of the courses taught in the program. This project gives the students the experience of working in a multicultural team and applying the knowledge gained from coursework to real-life business situations.

The development of the curriculum together with the University of Dortmund started in 1998 with financial support from the Dutch Ministry of Education, stimulated as a realization of cross-border co-operation in higher education. The target group for the program does not consist only of students from both partner universities, students from other European and non-European countries are welcome too. Due to lack of governmental funding for non-EU-students, these students have to pay a much higher

tuition fee. Since 2001 students from Germany, the Netherlands, China, Indonesia, India, Turkey, Libya, Brazil and Mexico have participated in the program. Each year about 15 students are starting with the IDM program, but a couple of IDM courses are offered also to regular students. Till now the participation of German students is less than the participation of Dutch students, due to the fact that most of the German universities do not have (completely) implemented the Bachelor/Master structure at the moment, but this will change within a few years.

Teaching the program now for more than 4 years the following experiences can be summarized:

- Studying together with other students from all over the world and working together in multicultural project teams is for students very challenging. The study tempo proved to be better than the study tempo in regular programs.
- Good selection of students from non-European countries is very important, but at the same time rather difficult. Level and attitude proved to be much more important than knowledge of specific subjects.
- Members of staff from both partner universities did learn a lot from each other, as well from the technical as from the educational point of view.
- Dealing with exam regulations from two totally different universities is rather complicated. The European Credit Transfer System (ECTS) functions as a good basis for credit points and mark registration.

CONCLUSION

The final conclusion is that about 70% of our students gain an international experience during their study, most of them by means of an internship abroad. Participation in a joint Master's program, however, with students from different cultures and taught by universities in different countries, offers an ultimate opportunity for an intensively international experience.

REFERENCES

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