

Alternative Training of Engineers. Extension.

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Abstract: Alternative training is a possible way to strengthen enterprise - university relations, to prepare engineers with more practical competence. The authors presented at the ICEE'99 Conference in Ostrava - Prague the first results of the successful adaptation of a French educational form at the Technical University of Budapest, Hungary. This paper is devoted to the continuation, extension of activities related to alternative training of engineers.

There are common elements in the French and Hungarian practice, like the active participation of enterprises in the whole education process (program, contract, training, evaluation); method of-tutorship (learner - industrial tutor - academic tutor); regular evaluation (written documents, oral presentation, jury); application of long alternation (6 months at the enterprise - 6 months at the university); importance of communication (native, foreign language), management skills.

Some differences in the status of the learner, length of the training, financial aspects, etc. are caused by the diversity of the legal, cultural, educational, economic conditions of the two countries.

The new educational form develops further in both countries. This paper concentrates mainly on two elements: the Hungarian situation in alternative training (and practical placements in general), the extension activities towards Central and Eastern Europe. As a conclusion it is predicted that the alternative training will become an important part of engineering education with intense international cooperation.

Keywords: alternation, evaluation, employment, partnership, extension.

1. Introduction

The educational experiment of the introduction of alternative training of engineers based on French know-how was begun in 1995 at the Technical University of Budapest (TUB - now it has a new name: Budapest University of Technology and Economics - BUTE). The first students began their studies in 1996. The project is realized by several partners. Here follows a short presentation of the main consortium members. The CNAM is a large French continuing education institution, founded more than 200 years ago, with great experience in economy - education links. *Ingénieurs 2000* - a French Association created for the management of alternative training. *Dunaferr*, *Danube Ironworks Co.* is one of the largest Hungarian enterprises. Different *unions*, *chambers of entrepreneurs* (GVK, MIKOSZ) were involved as well. The German participant *IBISTRA* is a consulting company. The activities were supported by the EU Phare program, the French Ministry of Foreign Affairs, and the partners own funds. The Hungarian Ministry of Education (especially Departments of International Programs and Higher Education) participates actively in all main steps (initiation, realization, extension) of the program.

This experimental phase can be characterized by the following elements:

- Methodology of alternation (double tutorship, regular academic and industrial evaluation, long period - 6 months at enterprise, 6 months at university - in the last 4 semesters of engineering training).
- New subjects in the curriculum (related to the professional modules and to special human skills like communication, foreign, native languages).
- Application of special educational methods (training at enterprises, distance learning etc.).
- Legal status of the learner: student + contract with an enterprise (scholarship).

The realization of the whole program was carried out in a close university-enterprise co-operation with the active participation of the consortium members. There were 4 professional modules (architecture, environment, process engineering, steel structures). The number of students involved in the experimental phase was approximately 30.

A more detailed description of the experimental project (especially the methodological elements) can be found in [1]. There exists a home page of the program (<http://tutor.nok.bme.hu>), all main documents, description of events are available on address [2].

The activities related to alternating training in 1996-98 proved the possibility of the adaptation of the French know-how to the Hungarian conditions. The experiment was a success from the viewpoint of methodology and international cooperation. There remained open questions mainly in administrative-organizational and financial aspects. The consortium members decided to continue their joint work.

Since 1998 (the end of the experimental phase) both the French and Hungarian partners have been developing their alternative training. There are results in the following fields:

- Extension in methodology. The role of new information technology and distance learning increases in the training.
- International extension of the educational process. There is some experience about the learners' industrial periods in foreign countries. BUTE is a consortium member of EU Leonardo project MESIPA (Methodology for the Evaluation of Student Industrial Placement Abroad) with objectives to create some common elements of evaluation on European level.
- Extension in Hungary. All elements (methodology, cooperation, administration etc.) are in development at BUTE and in the whole higher education. The law about the vocational education tax has been modified, creating a financial source for the training.
- Extension to Central and Eastern Europe. The first steps have been made for the creation of a regional network of engineering schools delivering alternative training.

This paper will discuss in the following 2 paragraphs some questions related to the last 2 topics.

2. Practical placements, alternative training in Hungary

The Hungarian activities of the consortium were continued in the framework of a TEMPUS University Management Joint European Project (TEMPUS UM JEP 13352/98). The objective of this project is the creation of the administrative-organizational background of the training (foundation of the BUTE Alternating Engineering Training Office, recruitment of staff, purchase of equipment, creation and training of the networks of faculty representatives, experts in human resources etc.). As the aim was the acceptance of the new educational form on national level the project was developed from the beginning in a close cooperation with enterprises, higher educational institutions, Ministry of Education, other interested organizations. It turned out soon that there is a need of a wider range of practical placements. However the consortium considers its main task the development of the alternative training (of type as described in Introduction), it was open to the investigation of the other practical placements as well. The placements were divided into 3 groups depending on the length and importance of methodological elements (we remark that even a special terminology borrowed from the wine making - which is important both in France and Hungary - is used: white, rosé, red alternation). This paragraph is devoted to the presentation of the situation concerning industry related educational forms and the activities carried out by the consortium members.

2.1 History of practical placement in the training of Hungarian engineers

The history of the practical training of the second half of the XX-th century can be divided into 3 periods:

- Before 1990. Hungary had a state owned economy. The practical work meant low efficacy physical work both for the students and professors.
- 1990ties. There was a decline in the industry related educational activities in the period of the transition, privatization of the Hungarian economy.
- Today. Related to the beginning of the economic growth there is an increase in general in the economy - higher education relations based partly on the new EU and the old Hungarian experience.

The scenario presented above is typical for the Central-Eastern European countries, now is the moment to recreate the new economy - education links.

2.2 Legal, financial conditions

The university programs in Hungary are based on a Requirement of Qualification, which consists of common, special elements and is specified in a government edict. The technological (engineering) programs contain a compulsory - at least 12 week - practical placement as a common element, there is no special requirement.

There is a new law about the professional education tax (initiated by the participants of this project, especially by the Ministry of Education and Dunaferr Co.) which makes possible to reduce some costs of the enterprises in case of a practical placement longer than 8 weeks.

The current situation is that only some educational institutions organize the practical placements together with enterprises. There are examples when the institution organizes the placement at its laboratory or there is no placement at all.

2.3 Activities of the TEMPUS project

The main activities will be presented. They can serve as a model for the creation of similar alternative educational forms.

- Feb, 99. Current state of art of alternating education, conference at Seregélyes (H). Participants: consortium members, representatives of enterprises, of other higher educational institutions, of governmental bodies.
- Mar, 99. Creation of Alternating Engineering Training Office at International Education Center of BUTE (staff recruitment, basic documentation, equipment).
- Apr, 99. Creation of networks (academic - faculty representatives, university tutors; industrial - human resource managers, industrial tutors).
- Apr, 99. Detailed documentation (first variant of materials: general information, for university, enterprise, student, tutor).
- May, 99. Training of industrial specialists by CNAM, Ingénieurs 2000 in Paris (F).
- June, 99. Training of academic specialists by CNAM, Ingénieurs 2000 in Paris (F).
- Aug, 99. Presentation at ICEE 99. Beginning of the extension toward Central-Eastern Europe.
- Nov, 99. Presentation, extension to the Hungarian higher education at Vasszécsény (H).
- Dec, 99. Legal condition of the new training on university level.
- Jan, 00. German experience, investigation of foreign industrial placements at the Hannover (D) meeting.
- May, 00. Presentation, extension to Central-Eastern European universities at the conference in Visegrad (H). (Details in the next paragraph.)
- June, 00. Presentation, extension to Hungarian enterprises, discussion of the financial conditions. Seregélyes (H).

More activities and more detailed description are on the Internet, see [2].

2.4 Management of alternating education on university level

As this training supposes the joint work of economy and education there is a need in new management methods. The main task is creating and operating common training forms, procedures, methods:

- Creating information materials, introducing the training to university professors, managers, students, tutors, companies.
- Marketing activity - involving of new modules and new companies.
- Coordination between the two training sites (university - enterprise).
- Coordinating and organizing (if it is not organized on departmental level) the courses created for the alternating education (professional and human subjects).
- Managing the tutoring system, monitoring the evaluation.

3. Extension to Central and Eastern Europe

Representatives of regional universities were invited to a conference. The consortium members presented the main ideas of the alternating education, the activities necessary for a network were defined. This extension will be coordinated in the future by CNAM.

3.1. Presentation of the training (by CNAM)

- Aim of alternation: to define a real partnership between university and enterprise in the content, methodology, place of acquisition of knowledge, know-how, know of behavior ("savoir, savoir faire, savoir être"). It is usual (but not compulsory) that the acquisition of knowledge is mainly at an academic place, of know-how is at an industrial place, and know of behavior is shared.
- Legal questions: the character of alternation (initial or continuing education), the status of learner (employee, student, special - short work contract or apprentice contract), the responsibility of university, enterprise, financing, the nature of degree, diploma.

- Pedagogical questions: participation of economic organizations in the curriculum development, the actors of evaluation and jury, the choice and task of tutors, the content and the validation of academic, industrial period, the interactivity between them, the recruitment procedure of the learner, the duration of the alternation period.

3.1. Organization of a pre-network for alternative education

At the Visegrad conference there were representatives of universities from 12 countries. It was decided that in a 4 months period in each country a document containing the following elements will be prepared:

- Feasibility study on possibility of the introduction of alternating education at the given institution.
- Proposal for a team consisting of interested universities, enterprises.
- Examination of legal, financial, economic situation with respect to the alternation.
- Definition of the sectors (professional modules) where there are needs in engineers formed by this way.

4. Conclusion

However the French partners have a 10-years experience and the Hungarian partner has an experience almost 5-years there are many questions unsolved related to the alternative training. We mention here only the integration to the ECTS (European Credit Transfer System) and the stable, long-term solution of financial questions. Despite of these uncertain moments the authors predict, that (as a result of the needs of global world, industry) some type of practical placement will be for all engineering students, the number of foreign industrial placements will increase, and at least about 5-10% of all engineers will be formed by alternating education. In this paper we wanted not only to present our experience, but we would like to find new partners in this interesting, useful activity.

5. References

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