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## **“Engineering Demand and Offer in Europe”**

BEST Symposium on Education, Milan

13<sup>th</sup> - 21<sup>st</sup> April 2007

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## Summary

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BEST Symposiums on Education are public events organized by the Educational Committee of BEST (**EduCo**) and a Local Best Group. In such events students from all over Europe gather in order to discuss and express their opinion on Educational issues.

The duration of the event is one week and discussion topics are arranged by EduCo in association with thematic Networks. These Symposium topics were developed by EduCo in collaboration with the project Teaching and Research in Engineering in Europe (TREE).

The Symposium was run by the Educational Committee of BEST (**EduCo**), and the hosting local BEST group of Milan. During the Symposium the discussions were held in two or three groups, that were facilitated by EduCo members. Discussion notes were taken by BEST members. Prior to the working sessions, each group was briefed by one of the participating professors.

At this Symposium there were 18 participants from 12 different European countries. Most of them were finishing their studies or working towards PhD. The participants were ensured to have sufficient background knowledge to participate actively in the discussions by reading the topic introductions provided by EduCo, by participating in the preparatory session, where several professors gave some information about access to higher education and undergraduate research.

## **Introduction – PhDs**

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After completing a Master's degree it is possible for a student to apply to a doctoral program (PhD). The PhD is a course of education scheduled to take three or more years of study. It is made up of a training component equivalent to no less than 1 semester of full-time study and a dissertation. The dissertation is an independent piece of scientific work that meets international standards within the subject area. If the dissertation is approved, then it has to be defended at a public dispute.

## **The Discussion**

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### **1<sup>st</sup> Discussion Group**

After introduction made by professor Bricola Valeria, from Polithenico di Milano as an expert on the topic, the group started to discuss about doctoral program. The first questions were: Why is it not simple to start Doctorated Studies? Do doctoral students need academic mobility the most? How is PhD respected in your country?

**Netherlands:** Students cannot find much information about doctoral programs in universities. Indeed, there are companies that encourage going for PhDs but most of them don't really require PhD when getting hired. The result, students have no motivation to get PhD.

**Greece:** Students have to pay for PhD. The companies or the university don't support students financially. As a consequence, students that want to get a PhD do it abroad and have the PhD in another country.

**Romania:** Bologna process just started in Bucharest so there is no much promotion and infrastructure for PhD. The companies do not really appreciate PhD. Also, like in Greece, the costs for PhD program can be a problem.

**Poland:** Some students do PhD just because they are paid scholarship.

**Professor:** Northern countries have different way to handle PhD that the ones in the south. The north ones considered the PhD. In the north the doctoral degree reflects your preparation and knowledge. (Germany, Holland, Belgium, Scandinavian countries) But in south and west, the impression is that you do PhD just because you want more study period. Not really recognized as in the northern countries.

### **How can we improve the image of the PhDs?**

The general consensus was that it is important to create a proper image for doctoral degree that promotes real benefits of the program for all involved stakeholders (students, companies, universities).

### **How important is for a person to go aboard during his/her PHD?**

General impression was that going abroad is always useful for the personal development, but not necessary for the doctoral studies. The students, who are goal-oriented just want to do the PhD and are not interested in travelling. But, there are also students (like the ones for Greece) that usually go for PhD abroad.

## **2<sup>nd</sup> Discussion Group**

Professor Maffioli participated in this group as an expert.

It was discussed why students after having finished their master degrees decide to go for a PhD. The ideas were that PhD makes it easier to find a job as your studies let you specialise in a specific field. It was also mentioned that some student inclination to go for a PhD depends on their faculty.

Doctoral degree usually allows students to pursue research career. In some countries, like Slovenia, the government supports students, who go for a PhD. Other countries, like Italy, require passing exams in order to get the grant. There are grants from the university and the state. On the other hand, there are countries like FYROM, where students don't choose to get PhDs because they cannot afford and the government does not provide money for it. Also, it is not very useful for the future for them to make a PhD.

## **Conclusion**

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The doctoral program can be very useful for personal development for students and creates a lot of future opportunities, no matter if they have to go abroad or not for the PhD.

The problem in most countries is that the program is not well promoted among students and companies (They do know the real benefits of PhDs). Because of that there are not so many available PhDs for the students. The students that usually decide to do a PhD are usually interested to follow an academic or research career.

Another problem is that in some countries the students have to pay for the PhD and because of that there are even less students capable of doing PhDs after master degrees.

## **Introduction – Market**

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According to the Bologna declaration programmatic intention of generating “*a new enhanced European cooperation*” especially focused on higher education and employability. The recent significant changes in the educational and vocational systems as well as in the international macroeconomic contexts bring about the need of enhancing the engineering curricula according to the labor market demand. Volumes and statistical analysis are sometime not enough to understand the issue, we need also students’ feedback.

## **The Discussion**

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### **1<sup>st</sup> Discussion Group**

The discussion started with some questions from Dr Marinoni Clementina.

*Most important competences in universities: technical or social & soft skills?*

**England:** There are no skills the courses focus on the technical side, students learn them through extra-curricular activities.

**Portugal:** Though students consider them very important there are no soft or social skills, they only grow in your free time, and everything is based on theoretical level.

**Poland & Vienna:** Studies in the pre-Bologna process, gets a lot of business skills, like communication projects and groups work.

**Istanbul:** Doesn’t get enough soft skills at university, they expect from students to learn them through other channels

**Bucharest** (computer science): No social or soft skills, there is only a management and a civilization course but those are not really serious. Skills are developed through work.

**Greece:** There are mainly technical skills, but also some soft and social skills that you can develop in much ways like team projects.

**Belgium** (economics): There is few - engineering focus, technical focus on economics and more focus on alternative skills.

**Rome:** There is nothing on a compulsory basis, only optional, but most students are afraid to take the chance.

Are competences developed at the theoretical or practical level?

**England:** On the bachelor level there is only theoretical since universities do not consider skillful enough to do projects. There are more projects on master level, with a mentor from the university and a contact person from a company.

**Portugal:** They are mainly developed during the thesis preparations, when students communicate with companies through their professors.

**Italy:** They are developed practically on bachelor level and theoretically on the master level in order to prepare people for a PhD.

**Poland & Vienna:** In Poland they are introduced on a higher level but in Vienna they have companies' presentations on lower level.

**Bucharest (computer science):** On the first three years universities get very few practical applications. On the 4th & the 5th there are more projects and home work. Some are individual but others are in teams so that some social skills, mainly on the theoretical level, can be developed. Knowledge you gain from university is not that much updated so students should have a job while they are still studying.

**Greece:** Mostly theoretical though it is becoming a bit more practical on last years of studies.

Methods used by universities to teach these skills

**England:** In association with the university and a mentor from a company.

**Poland & Vienna:** Visiting companies for which sometimes students have to pay. When the university doesn't provide services, most students will look for other ways in order to learn on their own.

**Istanbul:** Competitions are an useful tool that helps to gain experience.

**Bucharest (computer science):** There are courses, laboratories, home works (practical assignments), mostly on programming. The duration is from one or two weeks time frame for some of them and for others last an entire semester.

**Greece:** Laboratories, projects and teams of two. The university might help students to find internships, but it's not compulsory.

Next, the group made a brainstorming to answer several questions/ideas :

<b>Skills needed for the labor market</b>	<b>Experiences before graduating</b>	<b>Expectations from a job</b>	<b>Qualifications of travelling abroad for a work</b>	<b>Reasons for returning to home town</b>
Individual work	practise	well paid	languages	money
Practical working knowledge	internships	friendly environment	experience in travelling	family
Basic academical knowledge	travels	knowledge	single	new opportunity independence

## 2nd Discussion Group

The group made brainstorming to answer several questions/ideas:

<b>Skills needed for the labor market</b>	<b>Experience before graduating</b>	<b>Reasons to change job</b>	<b>What do we gain after changing a job</b>
Technical knowledge	Practise	Lack of ability to earn promotion	More skills
Soft skills	Internships	Poor working environment	New experiences
Economic skills	Project Based Learning	Bad salary	New people
Global (general) knowledge			New cultures (if travelling to other country)
Speak foreign languages			Personal development
Basic culture of the country			

Which competences is your university developing? Only technical or also social or managerial? How is it able to combine them? Which methods your university use to teach these skills? In your university do you have mostly theory or practical work?

**Lithuania:** Students do a lot of practical work during the student life.

**Netherlands** (technology and management, innovation management): There is project management and also theory. There is the combination of projects and lectures. There are no relations with the companies, only in the master thesis. In the university you can develop communication skills but there are also courses for free at night and during weekends.

**FYROM:** There is practical work for the final thesis. During the first three years there are lots of theoretical courses. After there is more practical work

**Poland & Italy** (computer science, economic and industrial management): In Poland there is a lot of theory and formulae but in Milan they pay more attention on soft skills but at the same time there is lack of technical details.

**Poland** (environmental engineering): On the first years universities get very little practical knowledge. On the 3rd there are more projects, you have to work in teams and also have an internship. There is a career office which helps you with the development of soft skills such as presentation skills. This office also helps them to have an internship.

**Greece:** During the first years of studies you have the whole picture of everything. Lot's of labs and projects but they are not enough. You also have to go for an internship but you have to search on your own.

**Turkey:** During the first two years of the four-year-bachelor you get a basic knowledge of everything. After this you choose what you want to do and you finish your bachelor. 20% of students from social science faculties (art, history, management, economics...) have a ten-week internship in Turkey.

### 3<sup>rd</sup> Discussion Group

#### What skills do engineers need to be competitive in the labor market?

- Firsthand experience by internship and work on the fields
- Practical experience (internships, stages, etc) due some universities provide only the theoretical programs and not also practical programs.

#### Which experiences do you want to get before you graduate?

- Internships
- Practical programs (more hours spend in laboratories, on the field, etc)
- University supported travel abroad (scholarships)
- Job (inside the university, connected to studies)

#### What do you expect from a job?

- Good salary
- Job that can allow you have a normal family life
- Safe jobs (no danger to health, no political problems (war, army revolt) etc. )

**Teachers:** What competences are developed at your university? Are they only technical or also social, managerial skills? Is what you learn more theoretical or practical? What methods are used at your university to develop these skills? Do you consider that management skills are important and if companies consider they are important?

**Austria :** The students learn some skills ( for example: communication and presentation skills, teamwork, etc.) but most of knowledge is only theoretical.

**Slovenia & FYROM:** theoretical background is very strong, is more than a normal engineer needs, but, the practical part is a problem

**Greece :** Students learn a lot of technical information and have a certain direction in their study

and they can specialize in management. But the same problem as before : no enough practical part.

**Romania** : Students have to do internship for the university (part from the year credits points), also university provides management and marketing courses. The problems is with the internships, since most of the companies do not offer places.

**For which reason would you come back home if you were working abroad?**

- Friend & Family
- No secure job anymore.
- Not being able to adjust to way of living abroad
- Not being able to find the expected job abroad
- After getting some experience abroad -> finding a good and well payed job back home

### **Conclusion**

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In Europe there are universities which develop more the technical skills and others that pay more attention on social and soft skills.

In the same way, other universities have developed their competences at theoretical level and others at practical level.

In order to develop these skills, universities have established cooperation with companies. There are also visits organised by the companies but sometimes the students have to pay to participate. In the universities there is also a career office and with the combination of Job Shops that Local BEST Groups organise, they help the communication between companies and students. Moreover, some universities organise competitions and internships can be compulsory. Finally, some universities have implemented the project based learning.

## **Introduction – Life Long Learning**

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Lifelong learning (LLL) in higher education institutions is characterised by great diversity within and between EU Member States and includes not just courses but a whole range of academic services for adults (e.g. coaching, various forms of advice and guidance, validation, consultancy and so on) and for enterprises and other organisations.

It is separated into *Professional* development courses and *master courses*.

**Professional development** courses aimed at particular groups – medics, lawyers, architects, engineers, researchers, accountants, managers, nurses, and teachers and so on, who already hold a higher level diploma. The courses often relate to new policy or legislation, new research findings, or new technological developments. They may involve attendance at the institution or maybe be partly/fully by distance/e-learning. Sometimes the courses are offered in collaboration with professional associations. They may, but rarely do, carry some kind of certificate or accreditation; and they usually carry fees.

Masters courses (and pre-Bologna equivalents) aimed at identified needs among particular professional groups. The learners may have a first degree in the same field and wish to upgrade their formal qualifications, but often they have a first degree in a different field (eg masters in management for engineers). These masters' courses usually carry fees, sometimes paid for by the individuals, sometimes by their employer. Often they are delivered outside of 'normal' hours in the evenings, weekends or partly/wholly by distance/e-learning.

Even if Lifelong learning is an essential element of the European Higher Education Area, there was no reference to it in the action points and it remained secondary to the main concerns of the process.

The Trends report prepared for the European University Association (EUA) on 2001, showed that the development of lifelong learning in universities was extremely patchy, confirming the general lack of priority being given to the issue.

## **The Discussion**

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### **1<sup>st</sup> Discussion Group**

The discussion started with some questions to Iannone Eugenio (Vice President of Market and Application Engineering) in order for students to be able to understand what LLL includes.

Most of them find it difficult to provide a specific definition of LLL programs.

Time is really indispensable and the duration, costs and place of a LLL should be considered for people that have families.

Companies should pay the expenses of the program and in time that allows those who participate to learn and be able to transfer the knowledge they get. It is preferably for these programs to make attendance of few hours per week obligatory in order not to lose the contact with other projects somebody may work for.

The structure of a LLL program depends on the profession. So far there are some programs like Leonardo, Erasmus. Grundig and others but there is not a strict definition on how to develop it.

Some students think that company should have his own structure related to its needs and capabilities. The important thing is to reach the appropriate level taking into account the difference between the employees.

Another option is to have a standardized level of LLL recognition though it is difficult to be implemented. Internships between universities and companies are useful to get a person introduced to the current development in the world.

Both companies and employers benefit from a LLL program, but when it comes to pay the cost there is a difficulty on deciding who benefits more in order to pay. Companies that force people to participate in any kind of such program should cover the cost, since the knowledge that employers will get is for improving company's productivity, but if it has to do with personal ambitions then each one who wants to participate has to take care of this fact. Government should also take into account the importance of a LLL program and give some financial support.

<b>PROS</b>	<b>CONS</b>
Keep up to date with advance in professional field	Time
Simpler access to knowledge for people over 30	Cost
Get paid from the company during a course	Stress(learning all the time in order to be productive)

## **2nd Discussion Group**

In this group there wasn't any expert to help students understand what LLL finally is. For this reason a lot of time during the discussions was spent in order to make it clear. Finally they didn't manage to reach a definition. It was only proposed the followed one but the students didn't agree: "Life Long Learning is a process which requires time and is regulated by requirements to be fulfilled and is supervised by an institution".

If you have time and money, with LLL you don't get stuck in one point of your life. LLL we can use wherever and whenever. There can be also some problems like : travelling in order to attend it might be a problem or the fact you have to spend lot of time on it and you have also to pay for it. LLL, it broadens one's mind. Therefore it's quite important and useful. It is also important for EU as it enhances market economic environment (many stakeholders will be involved and payed for these programs) and it is an answer to USA and China for continuing development and improvement in order to built a better technological environment but also will give money and work to many people.

Universities should provide LLL through specialized courses. Companies should also provide it because employees have to be updated and this can be achieved with projects and/or trainings but they have to be coordinated by the universities. So, universities should provide the knowledge through courses, projects and trainings and companies support it financially. All the students agreed that the LLL program should be optional, otherwise is like military service.

About the collaboration between the three stakeholders, students agreed that companies should finance these programs. One of them stated that there is no contact between the stakeholders: participants go to university as it offers the program and the company may support it financially. There isn't any kind of relationship.

The structure of a LLL program depends on the profession. There should be theoretical and practical part. Some of the students think that these programs should be more practical oriented and that is also very difficult to have a fixed structure. The program shouldn't be fixed as the participants might work at the same time so they don't have so much free time.

The group agreed that the duration of such a program always depends on the profession.

The most important disadvantage of LLL is the money that an adult has to spend in order to participate in this, in case a company doesn't finance the program.

There was also the idea to find a way to attract people with “social disadvantages”, so we have to create a proper environment.

It was also mentioned that when older people keep learning this might become bad for the young ones who won't be able to find a job. But at the same time, without LLL, you are staying behind. Lack of time was also mentioned as a problem of LLL.

Finally the group agreed that LLL is good for people who have been working for a long time in order to be competitive.

### **3<sup>rd</sup> Discussion Group**

#### **Universities should encourage the long life learning program? And How?**

Universities should be a centre of learning for people and should make people aware of what is the offer. The way to do it, is to make more promotion. For example, in Romania, people think they'll lose time using a program like this, and not understand the values for the person (personal development, cultural)

Another problem is that, for example, in FYR Macedonia, there is no support for these programs (Erasmus, LLL, etc.) inside the universities.

#### **LLL should be compulsory or free?**

LL should be compulsory for universities but free for peoples.

#### **Collaboration between different stakeholders for trail program?**

For example, to improve the communication between companies and universities, in Poland, some companies have an "ambassador".

But also, the Universities should contact the companies, and help with other contacts to another universities or companies. Inside the companies. Also, the public relation office people should try to promote universities research inside companies. In Romania, for example, companies started to realize in last years that they have to finance university to have good workers

#### **Who do you think should pay for this?**

→ half university half company

### **Conclusion**

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For most students it was difficult to understand and clarify the structure, the duration and the exact definition of a Life Long Learning program.

Most of them focused on the whole number of activities you participate in order to improve your knowledge on a specific field.

– BEST Symposium on Education, Milan –

The duration and the structure of such program should be optional according to the profession. Universities and companies should collaborate perfectly for this and provide some support to employs that want or be obliged to participate on that from the company they work.

A LLL program should be optional especially when it comes to conditions that require transport from one place to another for few or many weeks.

Such programs can benefit employees, companies and universities unless all of them try for the best result.

## Credits

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Board of European Students of Technology is a non profit student organization, run by students and working for students. Our purpose is to promote Europe among Europeans.

All comments should be addressed to the Educational Committee of BEST to the following e-mail address: [education@BEST.eu.org](mailto:education@BEST.eu.org).

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