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**TUNING INDUSTRIAL**  
**EDUCATIONAL STRUCTURES IN**  
**EUROPE**  
**Part II**

**Defining and Updating**  
**Practical Competences in the Subjects**  
**Relevant for the Industrial Sector**

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## **Part I**

# **TUNING RESEARCH ON PRACTICAL COMPETENCES FOR WORKING IN ENTERPRISE**







## **Chapter 1**

### **PRACTICAL PLACEMENT IN THE CONTEXT OF UNIVERSITY-ENTERPRISE SYNERGY**

Simona LACHE, Doru TALABA\*

#### **1.1. EUI-Net – promoter of University-Enterprise cooperation**

Universities have always been considered as important generators of knowledge, agents for technology transfer and knowledge diffusion for the enterprises. Meanwhile, the higher education institutions (HEIs) are under pressure to increase not only the knowledge flow and the technology transfer but also the flow of people to and from the socio-economic environment. However, Universities are currently facing a deep restructuring process especially during the last decade, as result of the European integration with the goal of creating an attractive Higher Education system, in an efficient socio-economic area across Europe. Moreover, given the importance of tradition in the University sector, a lack of flexibility in their organizational systems and content of educational structure has been noted, thus requiring new mechanisms to secure the quality of the educational and research output/results.

On the other hand, enterprises need knowledge for immediate use in practice to meet the market needs and ultimately to generate profit. Therefore companies tend more and more to look for University resources to supplement and substitute the rather expensive in-house effort. Many industrialists in Europe have voiced dissatisfaction with the conditions for European industry, and have taken steps - or threaten to take such steps - to move either the whole operations of the firm or subsidiaries thereof to regions outside Europe. EUI-Net (European University-Industry network) works towards a greater understanding of such attitudes, to assemble and to coordinate the European efforts towards a better cooperation between

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universities and enterprises, to disseminate the cooperation models and to promote best practice at European level.

As a result of three years activity within a partnership that includes almost all European countries – represented both at university and enterprise level, several ways of cooperation have been identified (practical placement, graduation theses, joint master courses, cooperative research, etc.) Company's major objectives from cooperation with Universities are accessing complementary resources and skills, achieving research synergies that would increase their productivity and keeping up with major technological developments. For universities a great interest is to develop the connexions with Enterprises through research and to integrate the results of research in their teaching. Working with the industry provides other pedagogical and academic value to the students and academics. They can be involved in solving practical problems and gain access to knowledge developed outside the academic environment.

## **1.2. Practical placement added values**

When speaking about university – enterprise synergy, one of the major added values resulting is the enhanced quality in student education and training by practical placement, for their rapid integration on the labour market. This is regarded as acquired skills and competences better corresponding to the employer requirements as well as development of entrepreneurship among the graduates. Considering micro enterprises and SMEs as the motor of the European economy, it is important to encourage the entrepreneurial spirit of young educated people that would start-up their own companies after graduation. On the other hand, inquiries performed among employers revealed their major requirements towards the candidates for recruitment, in terms of academic knowledge, skills, key qualifications and personal competences (Zirra, 2006):

- excellent academic results,
- practical training (first practical training in industry during study),
- excellent Language competences (Mother tongue and English – at least),
- international experience (international practical training),
- team working,
- analytical and strategic thinking,
- entrepreneurial thinking and acting,



- initiative and open to changes,
- communicative,
- open minded and open to Lifelong Learning.

Summarizing, we can say that the present trend of globalization is leading the enterprises to recruit globally, as consequence the importance of international experience during the study, social competences and languages are increasing, the most important selection criteria being practical experience, languages, stays abroad.

The above list and the conclusions drawn from it represent first reasons for considering the student practical placement of utmost importance for education in university; they also have to be taken into account when analyzing the practical stages of students and redesigning them in terms of objectives, structure, content and framework as a key part of the curriculum at European level. Moreover, during the last years universities all over Europe agreed on the necessity of development of a European credit system for the student practical experience as system of European recognition of practical placements and studies in enterprises.

### **1.3. Possible steps in promoting quality of practical placement**

After three years activity within EUI-Net, the discussion about developing a reliable framework for practical placement in higher education at European level highlights two main issues: the strong cooperation with enterprises and the international dimension. Of course, a question may arise: how to achieve such a complex framework, to meet several demands? European networks such as EUI-Net may be the answer, by representing platforms for experience and knowledge exchange, facilitating the student practical placement at international level, implementation of the research results in teaching and improvement of the European innovation capacity.

First step has to be the integration of practical placement as compulsory part of the study programme. This process involves new pedagogical concepts complementary to the Tuning methodology, related to: the role of practical stages credit system as an accumulation system and establishing a link between practical competences acquired during the stages in enterprise and ECTS credits; development of the role of practical stages in the context of teaching, learning, assessment and performance, within the framework of curriculum design; the role of enterprise involvement in the learning, teaching, and assessment processes, in relation to quality assurance and evaluation.



The next stage would be the development of concepts and tools for improvement of quality of practical placements in co-operation with higher education and enterprises. Due to the informal learning within practical placements, the concept for quality assurance is easily applicable for other sectors of LLP, especially for the Leonardo da Vinci programme. On the other hand, the quality system for the practical placements will remove the barrier of lack of trust from the point of view of Universities with respect to the organisation of these training activities in enterprises especially for the case of micro-enterprises and SME's.

At this point it must be recognized that nowadays the Universities prefer to organise these activities with large companies because of the simple approach and low cost of the activity itself. However, this context clearly discriminates the micro-enterprises and SMEs, and the Universities owe to pay a closer attention to this sector.

In conclusion, more attention should be given in the future to the following issues related to student practical placement:

- quality enhancement: through covering the gap in the current quality systems operational in the academic world that do not include a clear process for the practical placement of students in enterprises;
- promoting performance in Higher education by enhancing and homogenisation of the skills acquired by the students during the practical placements in enterprises;
- promoting innovative schemes for organisation and quality control of practical placements in enterprises;
- promoting the European Dimension in the University curriculum by elaborating development of a system for practical placement of students that take into consideration the possible mobility of students at European level.

Since the above mention subjects are dealing with the establishment of a Quality standard and ECTS credit system for the trans-national practical placement of students, they all address the policy recognition of qualifications from Lisbon strategy. This will facilitate the recognition of skills acquired by the students during the trans-national practical placements and thus the recognition of the entire adjacent qualification.

## References

Edmund Zirra, presentation within EUI-Net workshop meeting at Karlsruhe University of Applied Sciences, 28-30 November 2006, ([http://www.eui-net.org/Project\\_documents/Karlsruhe%20280%20November%202006/Edmund%20Zirra%20E-HsKA+CC%20presentation.ppt](http://www.eui-net.org/Project_documents/Karlsruhe%20280%20November%202006/Edmund%20Zirra%20E-HsKA+CC%20presentation.ppt))



## Chapter 2

### METHODOLOGY OF THE RESEARCH

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#### 2.1. Participants and procedure

As presented in the first volume of the research, the population investigated consisted of three groups, considered as the most important stakeholders involved in the mission of university to educate students: the academics, the employers and the graduates. The participants from each group were asked to fill in a questionnaire with three sections: generic competences (see Appendix 1 in the first volume of the research), specific competences (see Appendix 2 in the same volume) and practical competences (see Appendix 1.1).

Participants from 20 countries answered the questionnaires. The procedure of contacting the respondents was described in detail in Chapter 2 of the first volume. In the end, a total of 240 valid questionnaires were retained: 77 Academics, 64 Employers, and 99 Graduates. Most of the missing data were from the paper-based version of the questionnaire, for which the respondents did not answer all the questions. The on-line form of the questionnaire did not allow the uploading of the filled questionnaire unless all the questions were answered. The detailed presentation of the population of the research being made in the above mentioned chapter, only a shorter version will be provided in this chapter, in order to facilitate the independent reading of the two volumes.

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### The group of Academics

Most of the Academics who answered the questionnaires were from Portugal (11), Spain (10), Romania (9), Germany (8), Slovakia (6), and Lithuania (5). The areas relevant for the enterprises the academics have referred to were divided into six categories: biotechnology, economy and management, education and social sciences, technical & engineering (for all engineering domains, including civil engineering and architecture), fundamental sciences (chemistry, physics, and mathematics), education and social sciences, IT, automation & computer sciences and others (see Tab. 2.1).

**Tab. 2.1.** Areas relevant for the enterprise sector the Academics refer to

Enterprise area category	Biotechnology	Economics, management	Education and social sciences	Technical & engineering	Fundamental sciences	IT, automation, computer	Other
Percent	2,59%	15,58%	10,39%	29,87%	9,09%	18,18%	14,28%

As shown in the table above, most of the Academics have made reference to the Engineering sector (29,87%), IT, Automation, and Computer sciences (19,18%), and the Economy and Management sector (15,58), which are the most frequent in the enterprise sector. As for other sectors, they are less represented.

### The group of Employers

Most of the Employer respondents were from Lithuania (11), Spain (9), Bulgaria (5), France (5), and Malta (5); they were divided according to their position in the enterprise in the following categories: managers (for any managing position), experts without managerial role (important positions), owners and other, such as consultants (see Tab. 2.2). The respondents were selected by the project partners from enterprise managers and owners, human resources managers, and other persons having contacts with employed graduates in their professional life - such as experts or trainers.



**Tab. 2.2.** Positions held in the organization by the respondents in the group of Employers

Position category	Expert	Manager	Owner	Other
Percent	17,18%	68,75%	7,81%	6,25%

According to the **field of activity**, the employers were divided into 7 categories: IT and communication services, software industry, manufacturing, business (including financial consultancy), services (other than IT and communication), continuing education (such as E-learning, human resource development), and others (see Tab. 2.3).

**Tab. 2.3.** Fields of activity for Employers

Field of activity category	IT, Communications	Software	Manufacturing	Services	Business	Continuing education	Other
Percent	18,75%	12,5%	23,43%	26,56%	9,37%	6,25%	3,12%

The enterprises the Employers were from were divided according to the number of employees into the following categories: Very small (1-10 employees), Small (11-200 employees), Medium (201-1000 employees), and Big (more than 1001 employees).

**Tab. 2.4.** Size of enterprise according to number of employees

Size category	Very small	Small	Medium	Big
Percent	23,73%	50,85%	8,47%	16,95%

This was rather an empirical categorization, but for practical reasons connected to the statistical analysis, the size of the enterprise was reorganized into 2 categories, according to the value of the median (40 employees): 50% of the Employers were from enterprises with 40 employees or less, and 50% more than 40 employees. We consider that the presence of representatives from very small, small and medium sized enterprises in the group of Employers corresponds to the increasing importance of the enterprises of this kind when it comes to employing graduates and to their openness to dialogues with the universities (see Tab. 2.4).



## The group of Graduates

**Gender, age, and year of graduation** The Graduates who answered the questionnaire were 64,6% male and 35,4 female respondents, mainly from Romania (29), France (14), Austria (10), Malta (8), and Spain (6).

**Tab. 2.5.** Percentage regarding the age in the group of Graduates

Age category	Under 24 years	25-27 years	28-32 years	Over 33 years
Percent	26,4%	26,4%	22,2%	25%

The **average age** of the graduate respondents was 29,57 years; therefore, 30 years was the cutting point when making intra-group comparisons, even if the median value was 27, because we considered that a period of 3-4 years of practical experience is optimal for having a realistic image of the work requirements (see also the choice of cutting point by year of graduation).

For the experience in the field of work we have chosen the **year of graduation** as a criterion for comparison. In order to have a larger range of respondents in terms of work experience, the group also comprises respondents who had graduated more than 5 years before.

**Tab. 2.6.** Percentage according to the year of graduation

Period of graduation	Before 1999	2000-2002	2003-2004	2005-2006	After 2006
Percent	35,1%	7,3%	23,7%	21,6%	12,3%

The frequencies according to the age group are presented in the table below (see Tab. 2.6). The mean value of the year of graduation being between 2001 and 2002 and the median between 2002 and 2003, we choose the cutting point for intra-group differences 2002 as year of graduation

**Employment situation, diploma level and area of employment** At the moment when they answered the questionnaire, the majority of the graduates were employed in a position related to their degree (72,70%), some were in positions not related to their degree (13,12%), some were involved in further study (9,08%), some were looking for their first job (3,08%) and 2,02 were in other situations.

It has to be mentioned that the first category of respondents (employed in a position related to the diploma degree) also comprises



graduates who were employed, but who were involved in further studies at the same time, as for instance, most of the Romanian graduates. The great majority of the graduates had a bachelor degree or an equivalent diploma – 71,43%, the other 26,53% had a master degree and 2,04% a doctoral degree.

The fields of employment for the group of graduates were as follows:

**Tab. 2.7.** Fields of employment for the Graduates

Field of activity category	Software	IT and communications	Logistics	Industry and manufacturing	Quality assurance	Public administration	Tourism and services	Banking and finance	Sales and commerce	Marketing and advertising	Environment	Other
<b>Percent</b>	4%	11,1%	6,1%	21,2%	10,1%	6,1%	3%	10,1%	8,1%	3%	6,1%	11,1%

Almost a quarter of the respondents works in industry and manufacturing (21,2%), while others work in different other areas, such as IT and communication (11,1%), banking and finances (10,1%), quality assurance (10,1%), and others. The diversity of the areas of employment and of the countries the graduates are from provide a large range of perspectives on the issues related to the competences required by the labour market.

## 2.2. Design and instruments

The design of the research was somehow similar to the initial Tuning research – a section for Generic competences and a section for Specific competences for enterprise, and a new section for Practical skills (see Appendix 1.1<sup>†</sup>).

The questionnaires, in English, were available in two formats: on-line and downloadable Word format. Each group had a set of three questionnaires organized in one folder (on-line version) or a paper-based one. Thus they were able to answer the three sections in one form. The Generic Competences Questionnaire – GESKE - had different tasks for Academics vs. Employers and Graduates, but the Specific Competences Questionnaire –

<sup>†</sup> The whole set of the questionnaires used in the research is presented in Appendices 1.1, 1.2, and 1.3 in the first volume of this report.



SPECOE – had a common task for the three groups<sup>‡</sup>. The Practical Competence Questionnaire – PRASKE – had a task which was common for the three groups: the comparison between the importance of skills for working in an enterprise and the extent to which they are developed at university, using a 4-step scale.

For the on-line format, the questionnaire could be sent only in the moment when all the fields had been filled in. The Word format questionnaire could be filled in either in electronic format and sent as attachment to the research coordinator, or printed, filled in by hand, scanned and sent as an attachment or by regular mail. In the last two cases, some relevant fields could remain unfilled, thus leading to the invalidation of the questionnaire. The considerable number of items to be answered required more than 30 minutes and some of the respondents were not able to do it on-line, or preferred to do the filling in of the questionnaires in a fractionated manner. This variation regarding the way in which questionnaires could be filled in was chosen in order to adapt to the possibilities of the respondents flexibly.

In one case (Hungary), the questionnaires were also translated into the local language for the respondents who were not fluent in English, but they could not be taken into account because of the language differences and because of the fact that the translated version did not preserve the exact format of the content.

### **The Questionnaire for Practical Skills for Enterprise – PRASKE**

*Structure and content of the questionnaire* The section dedicated to the practical competences of the questionnaire consisted of two types of items: in the first part a list of 13 items describing practical competences plus two items for adding supplementary competences if the respondents considered it necessary; in the second part, 2 questions were added for free answers on the tutoring system and 5 questions with scaled answers on the objectives and content of the practical placement, the formative value of the tutoring, and the length of the practical placement. The first part, 13+2 items, was organized, like the previous questionnaire, on 4-step scales, according to two evaluation criteria: the level of importance and the level of achievement during the students' practical placements<sup>§</sup>.

The 13 skills out of the 20 initial items were selected after the process of defining and assessing held by the group of experts were relevant for

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<sup>‡</sup> For details on the design and instruments of the whole research, see Chapter 2 in the first volume of this report.

<sup>§</sup> See Appendix 1.1.



adapting to the organization and functioning of the enterprises. The main idea in asking the respondents to rate the importance of the skills and the extent to which the skills were developed during the studies was to determine the discrepancies between the two and to identify, thus, the training needs both for the practical placement and for the general education at university.

The items of the scale were the following:

1. Capacity to understand the technical documentation in the relevant area of competence
2. Understanding of enterprise workflows
3. Understanding and use of the enterprise work standards and discipline
4. Skills to perform elementary practical tasks required in order to achieve a practical placement project (e.g. operating, computing, measuring etc)
5. Knowledge and use of health, safety and environment regulations in a practical placement project
6. Understanding of job requirements in terms of work performance
7. Ability to use professional terminology
8. Ability to use company-specific language and acronyms
9. Capacity to understand and act according to organisational culture, history and traditions
10. Knowledge of organisational goals and values
11. Understanding of organisational power structures and of formal and informal relationships
12. Ability to establish successful and satisfying relationships with organisational members
13. Skills in self-directed learning and information research in order to solve practical problems.

***The structural unity of the questionnaire*** Tested by factor analysis, the internal consistency is high: the factor analysis shows, at the level of importance, the existence of a general factor that explains 37,66% of the total variance, which includes items 2-12, and two less general factors, explaining 11,87% (item 1) and 8,70% of the total variance (item13). For the level of achievement, there are only two factors: the first explains 53,08% of the variance and includes items 1-3 and 5-14; the second explains 8,81% of the variance (item 4).

***The metric qualities of the questionnaire*** are good. The inter-item Pearson correlations are almost all significant at  $p \leq ,05$ . The value of the Cronbach's  $\alpha$  for the first criterion – Level of importance is 0,860 for the whole scale. The value of Spearman-Brown coefficient for split-half method is 0,760, and the correlation between the two halves is 0,612. The values of  $\alpha$



for the first and second halves are 0,788 and respectively 0,792 (see Tab. 2.8). For statistical details on the reliability analysis for the level of importance, see Tabs. 1.3.1, 1.3.2, and 1.3.3 in Appendix 1.3.

The value of  $\alpha$  for each of the 13 items is over 0,843, which proves the internal consistency and homogeneity of the scale for the first criterion – level of importance of the practical competences. It was not necessary to exclude any item (see Tab. 1.3.2 in Appendix 1.3).

**Tab. 2.8.** Reliability statistics for level of importance vs. level of achievement of practical competences

Criterion			Part A Level of importance	Part B Level of achievement
Cronbach's Alpha	Part 1	Value	,788	,843
		N of Items	7(a)	7(a)
	Part 2	Value	,792	,892
		N of Items	6(b)	6(b)
	Total N of Items		13	13
Correlation between the first and the second half			,612	,827
Spearman-Brown coefficient - unequal length			,760	,906
Guttman Split-Half coefficient			,758	,905

The value of the Cronbach's  $\alpha$  for the second criterion – Level of achievement is 0,925 for the whole scale. The value of Spearman-Brown coefficient for split-half method is 0,906, and the correlation between the two halves is 0,827. The values of  $\alpha$  for the first and second halves are 0,843 and respectively 0,892 (see Tab. 2.8). For statistical details on the reliability analysis for the level of importance, see Tabs. 1.4.1, 1.4.2 and 1.4.3 in Appendix 1.4.

The value of  $\alpha$  for each of the 13 items is over 0,915, higher than for the first criterion, which proves the internal consistency and homogeneity of the scale for the second criterion, too (see tab. 1.4.2 in Appendix 1.4). The scale has internal consistency for the two criteria and can be used without further adjustment.



## Chapter 3

### **PRACTICAL COMPETENCES FOR WORKING IN ENTERPRISE**

Marcela Rodica LUCA, Mariela PAVALACHE-ILIE\*

#### **3.1. Practical competences and skills: expanding the Tuning methodology to the practical preparation for industry and enterprise**

The competences given by the university, generic and topic-specific, or enterprise-specific have to be connected to the real-life requirements by periods of practical placements. In function of the length, place, content, and nature of the practical placement, the students complete thus their professional formation. In this frame, the role of the practical placement is to link the two worlds: the University and the Enterprise. Two worlds with different mentalities, different perspectives and different objectives have to co-operate in constructing complex, flexible competences. The university designs curricula that anticipate the requirements of the enterprises and other entities that employ graduates. In his effort to offer the clients - the students, specializations with employability on the labour market, the university takes into account the competences needed by different fields of activity, the explicit and implicit requirements of the potential employers and other stakeholders, such as professional bodies.

The planned curricula are delivered to each cohort of students, but the touchstone of the whole process is the extent in which the competences achieved by the graduates fit the requirements of the available jobs. At the other end of the process, there are the employers with their need in terms of competences that are not completely covered by the theoretical part of the curricula. In this context, the practical placement plays a key role in graduates' understanding "hands-on" of what working in an enterprise really

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is, which are these requirements in deed, and what is expected from the to know and to do.

For the student, the practical placement could be a trial period during which, apart from learning new competences, he can test his existing competences and abilities, see if a job in an enterprise is suitable for him/ her, prospect the job market, make career plans, adapt to the organization. For the employer, the practical placement could also be a trial period, during which he can find the right candidates for different jobs.

At the end of practical placement period, the students gain a set of practical competences related to working in the field of their specialization. For each profession, these practical competences have a subject-specific component, but when talking about working in enterprise, the enterprise-specific component of the competence profile should be also acquired. The content of the enterprise-specific competences differ from an area to another, but for the enterprise generally speaking some common denominators can be identified. For the purpose of our research, after eliminating less relevant competences, 13 practical competences were identified for working in enterprise.

### **3.2. The importance of practical competences for working in an enterprise**

#### **The evaluations of the three groups together**

Same as for the generic and specific competences, the respondents were asked to rate on a scale of 4 steps the importance and the level of achievement of 13 practical skills as they result from the practical placement stages of the students. Analyzing the ratings for the level of importance of the respondents in all three groups, it results a hierarchy of the practical competences (see Tab. 3.1 and Tabs. 2.1.1 and 2.1.2 in Appendix 2.1).

***The most important practical competences*** The most important practical competence is considered the "Capacity to understand the technical documentation...". In decreasing order of importance, the other practical competences considered as important are "Skills in self-directed learning and information research in order to solve practical problems", "Ability to establish successful and satisfying relationships with organisational members", and "Understanding of job requirements in terms of work performance".



The practical competences expected to be achieved by the graduates during their practical placement in enterprise are related not only to the "technical" aspects of the work, but also to the capacity to learn and adapt on a daily basis to all sort of requirements and tasks in the process of working, in an autonomous way, without external guidance.

Adapting to the work requirements is a continuous process of learning and the capacity to do it is much appreciated. The other two competences are relevant for the general person-organization fit and the job performance itself. A new employee is expected to establish good relationships with co-workers and to understand the performances expected from him/ her. Both competences are involved in the successful accomplishment of the job.

**Tab. 3.1.** The hierarchy of the importance of practical competences as rated by the three groups together – in descending order of means

	Item	Mean	Rank
P01A	Capacity to understand the technical documentation in the relevant area of competence	3,4142	1
P13A	Skills in self-directed learning and information research in order to solve practical problems	3,3724	2
P12A	Ability to establish successful and satisfying relationships with organisational members	3,3054	3
P06A	Understanding of job requirements in terms of work performance	3,2563	4
P07A	Ability to use professional terminology	3,2301	5
P04A	Skills to perform elementary practical tasks required in order to achieve a practical placement project (e.g. operating, computing, measuring etc)	3,2259	6
P10A	Knowledge of organizational goals and values	3,2092	7
P03A	Understanding and use the enterprise work standards and discipline	3,1715	8
P02A	Understanding of enterprise workflows	3,1506	9
P11A	Understanding of organizational power structures and of formal and informal relationships	3,1130	10
P09A	Capacity to understand and act according to organisational culture, history and traditions	2,9414	11
P08A	Ability to use company-specific language and acronyms	2,9289	12
P05A	Knowledge and use of health, safety and environment regulations in a practical placement project	2,8661	13

***The less important practical competences*** In the hierarchy of the practical competences, some competences are considered as less important and these issues are interesting to be discussed. Even if the literature in the



field of organizational behaviour emphasises the importance of the organizational socialization of the new employees, it seems that for the respondents in our research this is a lesser importance competence. Issues as knowing the organizational culture, history and traditions maybe are not so important at the end of practical placement because not all the graduates placed for the practical stage in an enterprise will be eventually employed (see also Tab. 3.1).

Communicating in the organization implies the use of the professional and organizational jargon and but this also seems to be unimportant for the student in practical placement. Not for all the specialties that have practical placements there is a requirement to accomplish a practical placement project as a tool of evaluation. Under these circumstances, knowledge of health, safety and environmental regulations is not so important as well.

### **The evaluations made by the group of Academics**

The differences between the three groups can be learned from the presentation of the evaluations made by each group. The four most important practical competences in the opinion of the Academics are presented in Tab. 3.2. The competences are the almost same as in the top for the three groups together, with one difference – on the 4<sup>th</sup> rank is rated "Ability to use professional terminology"; the rank of importance also differs.

**Tab. 3.2.** The 4 most important practical competences according to Academics – in order of ranks

<b>Item – Practical competence</b>		<b>Rank</b>
P13	Skills in self-directed learning and information research in order to solve practical problems	1
P01	Capacity to understand the technical documentation in the relevant area of competence	2
P12	Ability to establish successful and satisfying relationships with organisational members	3
P07	Ability to use professional terminology	4

For the Academics, the most important competence is related to self-directed learning; the capacity to understand technical documentation comes on 2<sup>nd</sup> rank. The competence on the first rank (see Tab. 3.2) has an average rating of 3,35 points (between "Considerable" and "Strong" importance), whilst the last one "Ability to use company-specific language and acronyms" has 2,68 points (between "Weak" and "Considerable"). For details on the ranking for the group of Academics, see Tab. 2.1.3 in Appendix 2.1). In the



opinion of Academics, the less important practical competences are the following: "Knowledge and use of health, safety and environment regulations in a practical placement project", "Capacity to understand and act according to organisational culture, history and traditions", and "Ability to use company-specific language and acronyms".

### **The evaluations made by the group of Employers**

For the group of Employers, the most important four competences are the same as for the three groups together, and the first rank is held by the capacity to understand and use the technical documentation. The 2<sup>nd</sup> rank is held by the self-directed learning skills. In this respect, the Employers rated similarly to the Graduates and thus influenced in a larger extent the hierarchy of the competences for the whole population of respondents (see also Tabs. 3.1 and 3.3).

**Tab. 3.3.** The 4 most important practical competences according to Employers – in order of ranks

<b>Item – Practical competence</b>		<b>Rank</b>
P01	Capacity to understand the technical documentation in the relevant area of competence	1
P13	Skills in self-directed learning and information research in order to solve practical problems	2
P04	Skills to perform elementary practical tasks required in order to achieve a practical placement project (e.g. operating, computing, measuring etc)	3
P06	Understanding of job requirements in terms of work performance	4

For the employers, it is also important that the students have the "Skills to perform elementary practical tasks required in order to achieve the practical placement project". On the 4<sup>th</sup> rank comes "Understanding of job requirements in terms of work performance" as in the general ranking for the three groups. The competence on the first rank (see Tab. 3.3) has an average rating of 3,47 points (between "Considerable" and "Strong" importance), whilst the last one "Knowledge and use of health, safety and environment regulations in a practical placement project" has 2,88 points (between "Weak" and "Considerable"). For details on the ranking for the group of Employers, see Tab. 2.1.4 in Appendix 2.1). In the opinion of Employers, the less important practical competences are similar to the opinion of Academics, but the order differs: "Capacity to understand and act according to organisational culture, history and traditions", "Ability to use company-



specific language and acronyms", and "Knowledge and use of health, safety and environment regulations in a practical placement project".

### **The evaluations made by the group of Graduates**

The evaluation of the Graduates preserves the two most important competences common with the group of Employers: "Capacity to understand the technical documentation in the relevant area of competence" and "Skills in self-directed learning and information research in order to solve practical problems". For the 3<sup>rd</sup> rank, this group chooses the competence "Ability to establish successful and satisfying relationships with organisational members", and for the 4<sup>th</sup> rank "Ability to use professional terminology" as in the hierarchy established for the group of Academics. The competence on the first rank has an average rating of 3,46 points (between "Considerable" and "Strong" importance), whilst the last one "Ability to use company-specific language and acronyms" – same as for the group of Employers – has 2,91 points (between "Weak" and "Considerable"). For details on the ranking for the group of Graduates, see Tab. 2.1.5 in Appendix 2.1).

**Tab. 3.4.** The 4 most important practical competences according to Graduates – in order of ranks

<b>Item – Practical competence</b>		<b>Rank</b>
P01	Capacity to understand the technical documentation in the relevant area of competence	1
P13	Skills in self-directed learning and information research in order to solve practical problems	2
P12	Ability to establish successful and satisfying relationships with organisational members	3
P07	Ability to use professional terminology	4

In the opinion of Graduates, the less important practical competences are the same as for Employers and Academics, only the order differs: "Ability to use company-specific language and acronyms", "Capacity to understand and act according to organisational culture, history and traditions", and "Knowledge and use of health, safety and environment regulations in a practical placement project".



### Inter-group similarities in evaluating the importance of practical competences

Taken separately, the three groups have very similar rankings for the importance of the practical competences. A synthetic view of the similarities is presented in Tab. 3.5. The similarities between all three groups for the first two choices are interesting because they are related to the work tasks by understanding the technical documentation and the capacity to learn independently.

**Tab. 3.5.** Similarities and dissimilarities between the three groups concerning the most important practical competences

Practical competences	Group
<ul style="list-style-type: none"> <li>• Capacity to understand the technical documentation in the relevant area of competence (1)</li> <li>• Skills in self-directed learning and information research in order to solve practical problems (13)</li> </ul>	Academics, Employers & Graduates
<ul style="list-style-type: none"> <li>• Ability to establish successful and satisfying relationships with organisational members (12)</li> <li>• Ability to use professional terminology (7)</li> </ul>	Academics & Graduates
<ul style="list-style-type: none"> <li>• Skills to perform elementary practical tasks required in order to achieve a practical placement project (e.g. operating, computing, measuring etc) (4)</li> <li>• Understanding of job requirements in terms of work performance (6)</li> </ul>	Employers only

As a general issue, the Academics and the Graduates have more similarities between them. As in the case of the generic and specific competences for enterprise (see Volume 1 of this research report), Employers have a different perspective on what is needed to be known in order to be successful in an enterprise. For them, on the list of the most important practical competences, there are two competences that are related to the very concrete aspects of working: skills for performing elementary practical tasks and understanding what the expected work performance is. One can say that the Employers are focused rather on competences that allow employees to better fit the job requirements. For details on the comparative ranking for the three groups, see Tab. 2.1.6 in Appendix 2.1).



### **Inter-group differences in evaluating the importance of practical competences**

The significance of the differences between the ways the three groups perceive the importance of the practical competences can be pointed out by one way ANOVA analysis. Significant differences (at  $p \leq ,05$ ) were found for the way the three groups evaluated the level of importance practical competences of the following practical competences:

- Understanding the enterprise workflows (2) – rated significantly higher by Graduates;
- Ability to use company-specific language and acronyms (8) – rated significantly higher by Graduates;
- Understanding of organisation power structures and of formal and informal relationships (11) – rated significantly higher by Graduates.

For statistical details on the one way ANOVA analysis, see Tab. 2.2.1 in Appendix 2.2. The ANOVA multiple comparisons analysis points out another practical competence for which there are differences in evaluating the importance:

- Skills to perform elementary practical tasks required in order to achieve a practical placement project (e.g. operating, computing, measuring etc) (4) – rated significantly higher by Employers.

For details on the multiple comparisons analysis, see Tab. 2.2.2 in Appendix 2.2.

When comparing the groups of respondents in pairs, the following significant differences are identified, which give a clearer idea about the nature of the differences (see below).

#### ***Practical competences for which Employers rated higher than Academics:***

- Skills to perform elementary practical tasks required in order to achieve a practical placement project (e.g. operating, computing, measuring etc) (4) – the difference is significant at  $p \leq 0,013$ .
- Understanding of job requirements in terms of work performance (6) – the difference is significant at  $p \leq 0,049$ .
- Understanding of organisation power structures and of formal and informal relationships (11) – the difference is significant at  $p \leq 0,047$ .

This analysis also emphasises the fact that the Employers are focused on the importance of competences that facilitate work performance and adapting of the employees to the organization. This kind of competences is more important for them than for the Academics. For details on the t test for the significance of the differences between the two groups, see Tab. 2.2.3 in Appendix 2.2.



***Practical competences for which Graduates rated higher than Academics:***

- Understanding the enterprise workflows (2) – the difference is significant at  $p \leq 0,017$ .
- Ability to use company-specific language and acronyms (8) – the difference is significant at  $p \leq 0,000$ .
- Understanding of organisation power structures and of formal and informal relationships (11) – the difference is significant at  $p \leq 0,014$ .

The Graduates are also more focused than the Academics on the importance of competences that facilitate adapting to the organization. For details on the t test for the significance of the differences between the two groups, see Tab. 2.2.4 in Appendix 2.2. There are no significant differences between Employers and Graduates in evaluating the importance of the practical competences.

**Intra-group differences in evaluating the importance of the practical competences**

The intra-group differences in the case of practical skills are less numerous than in the case of generic competences or in the case of specific competences for enterprise. Thus, there are no differences between Employers coming from small vs. large enterprises, or between graduates according to age. The only intra-group differences found are according to gender and according to year of graduation.

***Gender differences in the Graduates group*** Female respondents usually rated higher all than men for all competences, with one exception: "Capacity to understand the technical documentation in the relevant area of competences", for which male respondents rated higher, but the difference for this item is not statistically significant. For details on the t test for the significance of mean differences, see Tab. 2.3.1 in Appendix 2.3. For only 2 practical competences out of other 12 the differences between average ratings are significant:

- Capacity to understand and act according to organisational culture, history and traditions (9) – the difference is significant at  $p \leq 0,000$ .
- Knowledge of organisational goals and values (10) – the difference is significant at  $p \leq 0,014$ .

Apart from the fact that in the previous questionnaires we had the same tendency of the female respondents to rate the importance of the competences higher than male respondents, there is another coincidence. In



the questionnaire for generic skills<sup>\*\*</sup>, female respondents rated significantly higher a competence that is somehow related to those above mentioned: "Understanding the cultures and customs of other countries". This concern of female for social aspects in the society and in the organization seems to be a constant characteristic.

***Differences according to the year of graduation*** Graduates that finished their studies after 2003 tend to rate higher the importance of the practical competences, but the differences are significant for only 4 competences out of 13. For details on the t test for the significance of mean differences, see Tab. 2.3.2 in Appendix 2.3.

- Capacity to understand the technical documentation in the relevant area of competence (1) – the difference is significant at  $p \leq 0,040$ .
- Understanding of enterprise workflows (2) – the difference is significant at  $p \leq 0,041$ .
- Knowledge and use of health, safety and environment regulations in a practical placement project (5) – the difference is significant at  $p \leq 0,023$ .
- Ability to use company-specific language and acronyms (8) – the difference is significant at  $p \leq 0,015$ .

This superior rating of the importance of competences by newer graduates is also present in the first part of our study (generic and specific competences for enterprise). In the case of generic competence, Graduates after 2003 valued more than older ones their importance. The difference in perspective may be an age effect, but also could be related to the differences in curriculum or to the positions they held in organizations.

### **3.3. The achievement of practical competences at university**

#### **The evaluations of the three groups together**

Comparatively with the evaluation of the level of importance, a second evaluation was asked for the level of achievement of the practical competences. The results of these comparisons are resembling to the results in the first part of the research. The rating of the level of achievement given by the three groups together gives a hierarchy of the way they see how these

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<sup>\*\*</sup> See Chapter 3 in the Volume I of this research report.



practical competences are developed by the practical placement during the studies (see Tab. 3.6).

***The best achieved practical competences*** At the level of the three groups, the competences in the top of the achievement are the following: "Ability to use professional terminology", "Capacity to understand the technical documentation in the relevant area of competence", "Skills in self-directed learning and information research in order to solve practical problems", and "Skills to perform elementary practical tasks required in order to achieve a practical placement project (e.g. operating, computing, measuring etc). The above mentioned practical competences are related to the technical aspects of the work: use of professional terminology, understanding of technical documentation, skills for practical tasks, self-directed learning. For statistical details on the hierarchy of the achievement of practical competences, see Tab. 2.4.1 in Appendix 2.4.

**Tab. 3.6.** The hierarchy of the achievement of practical competences as rated by the three groups together – in descending order of means

	<b>Item</b>	<b>Mean</b>	<b>Rank</b>
P07B	Ability to use professional terminology (7)	2,9370	1
P01B	Capacity to understand the technical documentation in the relevant area of competence (1)	2,8866	2
P13B	Skills in self-directed learning and information research in order to solve practical problems (13)	2,8613	3
P04B	Skills to perform elementary practical tasks required in order to achieve a practical placement project (e.g. operating, computing, measuring etc) (4)	2,8529	4
P12B	Ability to establish successful and satisfying relationships with organisational members (12)	2,5588	5
P06B	Understanding of job requirements in terms of work performance (6)	2,5443	6
P02B	Understanding of enterprise workflows (2)	2,4538	7
P03B	Understanding and use of the enterprise work standards and discipline (3)	2,4304	8
P10B	Knowledge of organisational goals and values (10)	2,4160	9
P05B	Knowledge and use of health, safety and environment regulations in a practical placement project (5)	2,3824	10
P11B	Understanding of organisational power structures and of formal and informal relationships (11)	2,3235	11
P09B	Capacity to understand and act according to organisational culture, history and traditions (9)	2,2353	12
P08B	Ability to use company-specific language and acronyms (8)	2,2269	13



Two of these practical competences are between the most important as previously rated by the three groups together: "Capacity to understand the technical documentation...." And "Skills in self-directed learning...". The average ratings of the levels of achievement are between 2,93 (first rank) and 2,22 (last rank) which means that the levels of achievement evaluated are under the value of 3, corresponding to "Considerable" (see the mean values in Tab. 3.6). The practical placements during the studies enable students to achieve practical competences of high importance, but the level of achievement is under the level of importance. A more detailed analysis of this issue will be developed in paragraph 3.4.

***The less achieved practical competences*** Between the practical competences, the less achieved are considered to be the following: "Understanding of organisational power structures and of formal and informal relationships", "Capacity to understand and act according to organisational culture, history and traditions", and "Ability to use company-specific language and acronyms". These competences are rather related to the organizational socialization process and it seems that there is much to be done in order to respond to these competence needs in higher education.

### **The evaluations made by the group of Academics**

For the group of Academics, the 4 best achieved practical competences are similar to the general ranking for the three groups together (see Tab. 3.7). The most important competence (rank 1) is has an average rating of 3,18, whilst the least important (rank13) is rated 2,41. The emphasis in the Academics' evaluation is on "Ability to use professional terminology" as the best achieved competence. For details on the ratings and ranking for the group of Academics, see Tab. 2.4.2 in Appendix 2.4.

**Tab. 3.7.** The 4 best achieved practical competences according to Academics – in order of ranks

	<b>Item</b>	<b>Mean</b>	<b>Rank</b>
P07B	Ability to use professional terminology	3,1818	1
P01B	Capacity to understand the technical documentation in the relevant area of competence	3,1688	2
P13B	Skills in self-directed learning and information research in order to solve practical problems	3,1558	3
P04B	Skills to perform elementary practical tasks required in order to achieve a practical placement project (e.g. operating, computing, measuring etc)	2,9221	4



In the opinion of Academics, the level of achievement is over the value of 3 ("Considerable") for the first three competences, but as one can see from the Tabs. 3.8 and 3.9 (see below), as well as from the comparative ranking presented in Tab. 2.4.6 in Appendix 2.4, they are the only group with this generous evaluations. The other two groups have more exigent opinions. The competences considered by the Academics as being less achieved are: "Knowledge and use of health, safety and environment regulations in a practical placement project", "Ability to use company-specific language and acronyms", and "Capacity to understand and act according to organisational culture, history and traditions". Two of these competences are related to the organizational socialization and only one is "technical".

### **The evaluation made by the group of Employers**

For the group of Employers, at the end of the practical stages in enterprise, the best achieved practical competences are the same as for the group of the Academics, but the ranks differ, as well as the average values of the ratings (see Tab. 3.8). The best achieved practical competence (rank1) is rated 2,82 (under the value of 3 – "Considerable"), whilst the least achieved (rank 13) is rated 1,82 (under the value of 2 – "Weak"!); the emphasis in the evaluation of the Employers is on "Skills to perform elementary practical tasks required in order to achieve a practical placement project" as the best achieved practical competence during the practical placement.

**Tab. 3.8.** The 4 best achieved practical competences according to Employers – in order of ranks

<b>Item</b>		<b>Mean</b>	<b>Rank</b>
P04B	Skills to perform elementary practical tasks required in order to achieve a practical placement project (e.g. operating, computing, measuring etc) (4)	2,8254	1
P01B	Capacity to understand the technical documentation in the relevant area of competence (1)	2,6825	2
P07B	Ability to use professional terminology (7)	2,6190	3
P13B	Skills in self-directed learning and information research in order to solve practical problems (13)	2,4921	4

In the population of the research, the group of the Employers seems to be the least satisfied with the level of achievement of the practical competences. The competences considered as being less achieved are: "Knowledge of organisational goals and values", "Understanding of organisational power structures and of formal and informal relationships",



and "Capacity to understand and act according to organisational culture, history and traditions". In the case of Employers' evaluations, the bottom of the hierarchy is occupied by practical competences that are related to the organizational socialization.

### **The evaluation made by the group of Graduates**

For the group of Graduates, the best achieved practical competences are similar to those of Academics and Employers, but in a different order. They are more generous than the Employers when evaluating the level of competence achievements, but more exigent than the Academics.

**Tab. 3.9.** The 4 best achieved practical competences according to Graduates – in order of ranks

<b>Item</b>		<b>Mean</b>	<b>Rank</b>
P07B	Ability to use professional terminology (7)	2,9490	1
P13B	Skills in self-directed learning and information research in order to solve practical problems (13)	2,8673	2
P04B	Skills to perform elementary practical tasks required in order to achieve a practical placement project (e.g. operating, computing, measuring etc) (4)	2,8163	3
P01B	Capacity to understand the technical documentation in the relevant area of competence (1)	2,7959	4

The competence ranked first has an average rating of 2,94, and the last, ranked the 13<sup>th</sup>, is rated 2,22 points. However, the Graduates consider that the level of achievement of all practical is under the value of 3 ("Considerable"). For the Graduates, the best achieved practical competence is "Ability to use professional terminology", as for the Academics (see Tab. 3.9).

In the opinion of Graduates, the less achieved practical competences are: "Capacity to understand and act according to organisational culture, history and traditions", "Understanding of organisational power structures and of formal and informal relationships", and "Ability to use company-specific language and acronyms". These competences are the same as for the groups of Academics and Employers.



### **Inter-group similarities in evaluating the achievement of practical competences**

When evaluating the level of achievement of the practical competences during the studies, the three groups totally agree on which are the first 4 best achieved competences, what differs is only the ranks (see the analysis performed above for each group of respondents).

- Capacity to understand the technical documentation in the relevant area of competence (1)
- Skills to perform elementary practical tasks required in order to achieve a practical placement project (e.g. operating, computing, measuring etc) (4)
- Ability to use professional terminology (7)
- Skills in self-directed learning and information research in order to solve practical problems (13)

For statistical details of the comparative ranking for all the practical competences, see Tab. 2.4.7 in Appendix 2.4.

### **Inter-group differences in evaluating the achievement of practical competences**

The similarities between Academics, Employers and Graduates concerning the ranking of the achievement of practical competences are related mainly to the order of ranks, but when comparing the ratings, the groups differ. As a general trend, the Academics rated higher than the other two groups the level of achievement of all 13 practical competences. The most exigent ratings as in the previous questionnaires belong the Employers: they gave the lowest ratings for 12 out of 13 competences (see Tab. 2.4.6 in Appendix 2.4).

The ANOVA analysis for the significance of inter-group differences shows that for the same 12 practical competences the values of average ratings/ groups do indeed differ, and all the values of  $p$  are under 0,03. The only item for which there are no differences between groups is item # 4: "Skills to perform elementary practical tasks required in order to achieve a practical placement project (e.g. operating, computing, measuring etc)". For statistical details of the ANOVA analysis see Tab. 2.5.1 in Appendix 2.5.

A more detailed analysis performed by Games-Howell multiple comparisons method shows the matter of differences between each group compared with the two other. For 9 competences there are 2 inter-group differences and for one competence there are 3 inter-group differences in



rating the level of achievement, and the values of  $p$  are all under 0,04. For the statistical details of the analysis, see Tab. 2.5.2 in Appendix 2.5.

Another analysis of the meanings of differences between the ratings of the three groups considered in pairs - the  $t$  test - highlights significant differences. The most of the significant differences are, as expected, between Academics and Employers: 12 out of 13 with a  $t$  significant at  $p \leq 0,04$  (see Tab. 2.5.3 in Appendix 2.5). Between Employers and Graduates there are 10 out of 13 differences with a  $t$  significant at  $p \leq 0,02$  (see Tab. 2.5.4 in Appendix 2.5). The less numerous significant differences are between Academics and Graduates: only for 4 competences out of 13 the value of  $t$  is significant at  $p \leq 0,03$  (see Tab. 2.5.5 in Appendix 2.5).

As a general issue, as for the previous questionnaires<sup>††</sup>, the Academics are more content and the Employers the less content with the level of achievement of all the practical competences. These inter-group differences indicate differences in perspective on the adequacy of the education given by the university and could be a future direction of the research.

### **Intra-group differences in evaluating the achievement of practical competences**

*Differences between the Employers* The size of the enterprise influences the ratings of the level of achievement of practical competences for the following 8 items:

- Capacity to understand the technical documentation in the relevant area of competence (1)
- Understanding of enterprise workflows (2)
- Ability to use professional terminology (7)
- Ability to use company-specific language and acronyms (8)
- Capacity to understand and act according to organisational culture, history and traditions (9)
- Knowledge of organisational goals and values (10)
- Understanding of organisational power structures and of formal and informal relationships (11)
- Skills in self-directed learning and information research in order to solve practical problems (13).

For each of these competences the Employers from large enterprises rated significantly higher than those from small enterprise, which indicates

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<sup>††</sup> See the first volume of this report, chapters 3 and 4.



that they are more content than the last ones. The t test is significant at values of  $p \leq 0,05$  (see also Tab. 2.6.1 in Appendix 2.6).

***Differences according to age of Graduates*** Younger Graduates rated significantly higher the following 5 competences:

- Understanding of enterprise workflows (2)
- Understanding and use of the enterprise work standards and discipline (3)
- Understanding of job requirements in terms of work performance (6)
- Ability to use company-specific language and acronyms (8)
- Ability to establish successful and satisfying relationships with organisational members (12).

The differences between average values of the ratings are significant at values of  $p \leq 0,05$  (see also Tab. 2.6.2 in Appendix 2.6). The younger Graduates consider these competences related mainly to the adapting to the actual work requirements to be better achieved than older Graduates do.

***Differences according to year of graduation*** As expected, the age differences being related to the differences in year of graduation, almost the same competences are rated higher by those graduation after 2003, with one exception, the item # 6. For items # 2, 3, 8, 12 the differences are significant at values of  $p \leq 0,03$  (see Tab. 2.6.3 in Appendix 2.6).

### **3.4. Differences between the level of importance of practical competences and the actual level of their achievement**

#### **The differences in the opinion of the three groups considered together**

The Academics, the Employers and the Graduates had to evaluate the importance of the 13 practical competences and the extent to which the competences were developed by the university degree (level of achievement). Considering the three groups together, the differences between the level of importance and the level of achievement are significant for all 13 competences, at a value of  $p = 0,000$  (see Tab. 2.7.1 in Appendix 7). The values of the differences are less than 1 point (on a 4 steps scale), and for 8 items out of 13 the difference is over 0,7 (see Tab. 3.10 below and Tab. 2.7.1 in Appendix 2.7) .



For the three groups together, the practical competences listed below are underachieved during the stages of practical placements:

- Knowledge of organisational goals and values (10)
- Understanding of organisational power structures and of formal and informal relationships (11)
- Ability to establish successful and satisfying relationships with organisational members (12)
- Understanding and use of the enterprise work standards and discipline (3)
- Understanding of job requirements in terms of work performance (6)
- Capacity to understand and act according to organisational culture, history and traditions (9)
- Ability to use company-specific language and acronyms (8)
- Understanding of enterprise workflows (2)

**Tab. 3.10.** The most significant differences of mean between importance and achievement of practical competences according to Academics, Employers and Graduates together

Item		Mean	Std. dev.	Std. error mean	t	df	Sig. (2 tailed)	Rank of importance
Pair 10	P10A - P10B	,79412	1,04116	,06749	11,767	237	,000	7
Pair 11	P11A - P11B	,78992	1,09755	,07114	11,103	237	,000	10
Pair 12	P12A - P12B	,74790	1,09636	,07107	10,524	237	,000	3
Pair 3	P3A - P3B	,74262	1,00275	,06514	11,401	236	,000	8
Pair 6	P6A - P6B	,71730	1,00013	,06497	11,041	236	,000	4
Pair 9	P9A - P9B	,71008	,97001	,06288	11,293	237	,000	11
Pair 8	P8A - P8B	,70588	,98386	,06377	11,068	237	,000	12
Pair 2	P2A - P2B	,70168	1,00593	,06520	10,761	237	,000	9

***High importance, low achievement*** Analysing the discrepancies between the importance and the achievement for the competences ranked according to importance gives an image of how important are the competences considered underachieved. The 4 competences rated by the three groups together as being the most important have all mean differences over the value of 0,5 (see Tab. 3.11).



**Tab. 3.11.** Mean differences between the level of importance and the level of achievement for the 4 most important practical competences as rated by Academics, Employers and Graduates together

Rank	Item	Mean difference
1	Capacity to understand the technical documentation in the relevant area of competence (1)	,52521
2	Skills in self-directed learning and information research in order to solve practical problems (13)	,51681
3	Ability to establish successful and satisfying relationships with organisational members (12)	,74790
4	Understanding of job requirements in terms of work performance (6)	,71730

When considering separately the ratings of each group, the Employers and the Graduates are much less satisfied than the Academics: the first ones have 11 competences with differences larger than 0,7, the second ones 7, and the last ones none.

### **The Academics' opinion**

The Academics consider that the differences between the level of importance and the level of achievement of the practical competences are not so large than the other groups do. Even if the differences between importance and achievement are significant at  $p \leq 0,02$  for 9 out of 13 competences there is only one competence with more that 0,5 point of difference: item # 12 - "Ability to establish successful and satisfying relationships with organisational members". For details on the t test for the significance of mean differences, see Tab. 2.7.2 in Appendix 2.7.

### **The Employers' opinion**

In the case of Employers, the differences for all 13 practical competences are positive and significant at  $p = ,000$ , and for 7 out of 13 the difference is larger than 1 point (see Tab. 3.12).

The Employers are very seriously not content with the level of achievement of the following practical competences, comparing with their level of importance:

- Knowledge of organisational goals and values (10)



- Understanding of organisational power structures and of formal and informal relationships (11)
- Capacity to understand and act according to organisational culture, history and traditions (9)
- Understanding of job requirements in terms of work performance (6)
- Understanding of enterprise workflows (2)
- Understanding and use of the enterprise work standards and discipline (3)
- Ability to establish successful and satisfying relationships with organisational members (12)

**Tab. 3.12.** The most significant differences of mean between importance and achievement of practical competences according to Employers

Item		Mean	Std. dev.	Std. error mean	t	df	Sig. (2 tailed)	Rank of importance
Pair 10	P10A - P10B	1,3333	,9333	,1176	11,340	62	,000	6
Pair 11	P11A - P11B	1,2222	1,0071	,1269	9,632	62	,000	9
Pair 9	P9A - P9B	1,2063	1,0026	,1263	9,551	62	,000	11
Pair 6	P6A - P6B	1,1613	1,0113	,1284	9,042	61	,000	4
Pair 2	P2A - P2B	1,1429	,9308	,1173	9,746	62	,000	8
Pair 3	P3A - P3B	1,1270	,9068	,1142	9,864	62	,000	7
Pair 12	P12A - P12B	1,0635	1,1198	,1411	7,538	62	,000	5

The largest discrepancies in the opinion of the Employers are between competences that are related to the understanding of the organization, to the job performance requirements and to interpersonal relationship. For details on the t test for the significance of mean differences, see Tab. 2.7.3 in Appendix 2.7.

### **The Graduates' opinion**

For the group of Graduates, the differences between the level of importance and the level of achievement are significant for all 13 practical competences (see Tab. 2.7.4 in Appendix 2.7), but the differences are not larger than 0,918. For 7 competences out of 13, the differences are larger than 0,071 (see Tab. 3.13).



**Tab. 3.13.** The most significant differences of mean between importance and achievement of practical competences according to Graduates

Item		Mean	Std. dev.	Std. error mean	t	df	Sig. (2 tailed)	Rank of importance
Pair 8	P8A - P8B	,9184	1,0120	,1022	8,983	97	,000	11
Pair 2	P2A - P2B	,8571	,9082	9,174E-02	9,343	97	,000	7
Pair 11	P11A - P11B	,8571	1,0745	,1085	7,897	97	,000	10
Pair 10	P10A - P10B	,8163	1,0586	,1069	7,634	97	,000	6
Pair 3	P3A - P3B	,7857	1,0769	,1088	7,222	97	,000	9
Pair 6	P6A - P6B	,7245	1,0232	,1034	7,009	97	,000	5
Pair 12	P12A - P12B	,7143	1,0936	,1105	6,466	97	,000	3

The Graduates are not content with the level of achievement of the following practical competences, comparing with their level of importance:

- Ability to use company-specific language and acronyms (8)
- Understanding of enterprise workflows (2)
- Understanding of organisational power structures and of formal and informal relationships (11)
- Knowledge of organisational goals and values (10)
- Understanding and use of the enterprise work standards and discipline (3)
- Understanding of job requirements in terms of work performance (6)
- Ability to establish successful and satisfying relationships with organisational members (12)

For details on the t test for the significance of mean differences in the case of Graduates, see Tab. 2.7.4 in Appendix 2.7.



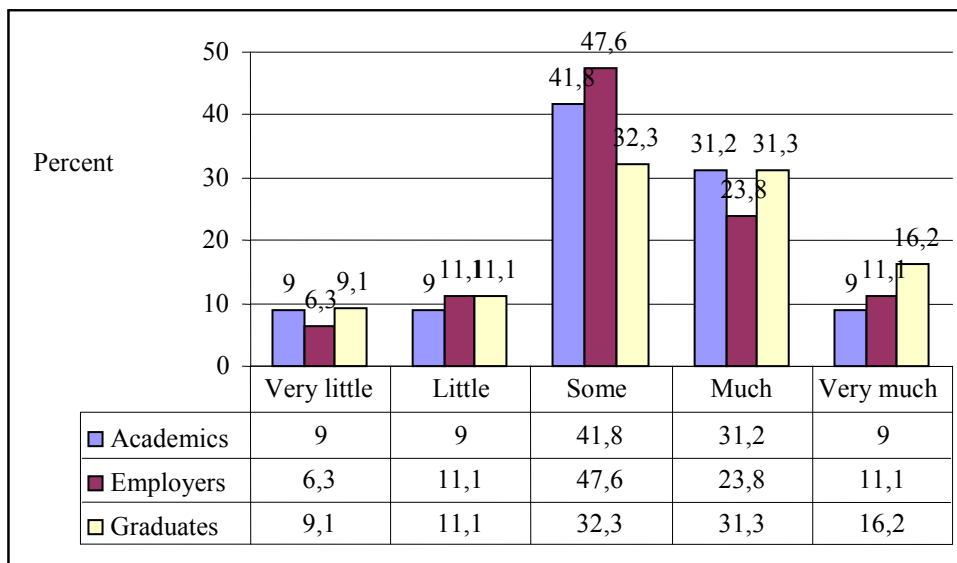
### 3.5. General evaluations of the practical stages

The items at the end of questionnaire required answers concerning the opinions on issues such as the objectives, the content, the formative value and the length of practical placement.

#### Is the practical placement adequate in terms of objectives?

The question #18 was "Do you feel that practical placement during the studies is adequate in terms of objectives?" with 5 answer options, from "Very little" to "Very much" (see Fig. 3.1). The most content with the degree of adequacy of the objectives of the practical placement are the Graduates, their average rating for this item was 3,44, comparing to 3,20 for the Academics, and 3,22 for the Employers, but the ANOVA analysis for the differences does not show any statistically significant inter-group differences.

For the three groups together the mean value of the item is 3,25 which means that they are satisfied with the objectives of the practical placement over the average value of 3 – "Some", but under the value of 4 – "Much".



**Fig. 3.1.** Item 18: Practical placement – adequate in terms of objectives

The frequency graph indicates that majority of the respondents in the three groups answered that they consider the objectives of the practical placement as being appropriate in "Some" extent (the middle of the 5 steps



scale) – 41,8% of Academics, 47,6% of Employers and 32,3% of Graduates (see Fig. 3.1).

Even if there are no inter-group differences between Academics, Employers and Graduates, one can notice an interesting intra-group difference: the younger Graduates rated higher than the older ones the adequacy of the objectives of the practical placement (see Tab. 2.8.1. in Appendix 2.8). The Graduates under 30 years had an average rating of 3,62 and those over 31 had an average rating of 2,95; the mean difference of ,702 is significant at  $p \leq ,003$ .

The same differentiation in opinions is found when comparing the answer of Graduates according to year of graduation (see also Tab. 2.8.2. in Appendix 2.8). The respondents who graduated after 2003 were much favourable in their ratings than those who graduated till 2002, and the differences are statistically significant.

There are no gender differences between Graduates in answering this question, neither other intra-group differences.

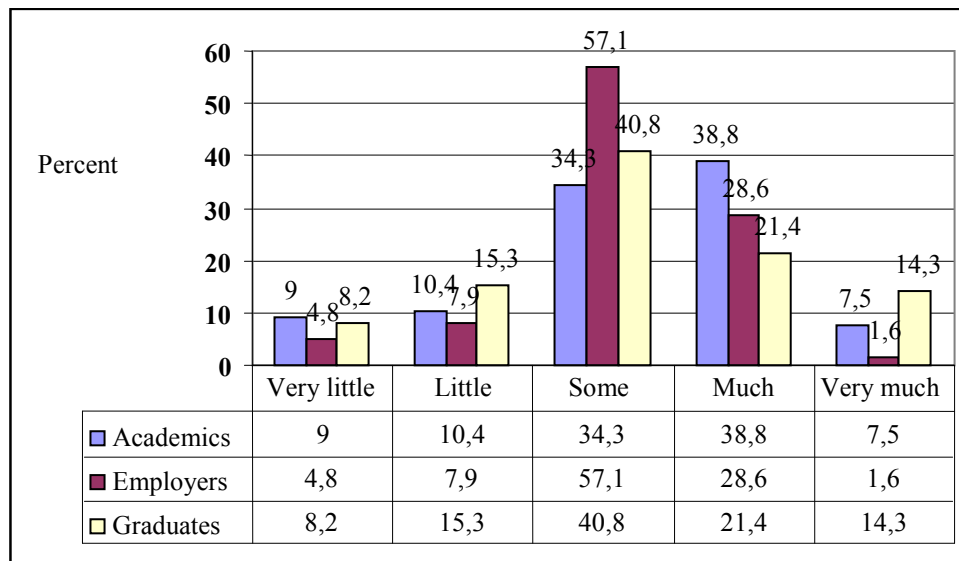
### **Is the practical placement adequate in terms of content?**

The question #19 was "Do you feel that practical placement during the studies is adequate in terms of content?" with 5 answer options, from "Very little" to "Very much" (see Fig. 3.2). The most content with the degree of adequacy of the content of the practical placement are the Academics, their average rating for this item was 3,25, comparing to 3,14 for the Employers, and 3,18 for the Graduates, but the inter-group differences are not significant by ANOVA analysis. For the three groups together the mean value of the item is 3,19 which means that they are satisfied with the objectives of the practical placement over the average value of 3 – "Some", but under the value of 4 – "Much".

The frequency graph indicates that majority of the respondents in the three groups answered that they consider the practical placement as being adequate in terms of content in "Some" extent (the middle of the 5 steps scale) – 34,3% of Academics, 57,1% of Employers and 40,8% of Graduates (see Fig. 3.2).

For this question too there are two intra-group differences: the first is that the younger Graduates rated higher than the older ones the adequacy of the content of the practical placement (see Tab. 2.8.1. in Appendix 2.8). The Graduates under 30 years had an average rating of 3,49 and those over 31 had an average rating of 2,71; the mean difference of ,773 is significant at  $p \leq ,001$ .





**Fig. 3.2.** Item 19: Practical placement – adequate in terms of content

The second difference is that the same differentiation in opinions is found when comparing the answer of Graduates according to year of graduation, at the same level of significance of the difference (see also Tab. 2.8.2. in Appendix 2.8). There are no gender differences between Graduates in answering this question, neither other intra-group differences.

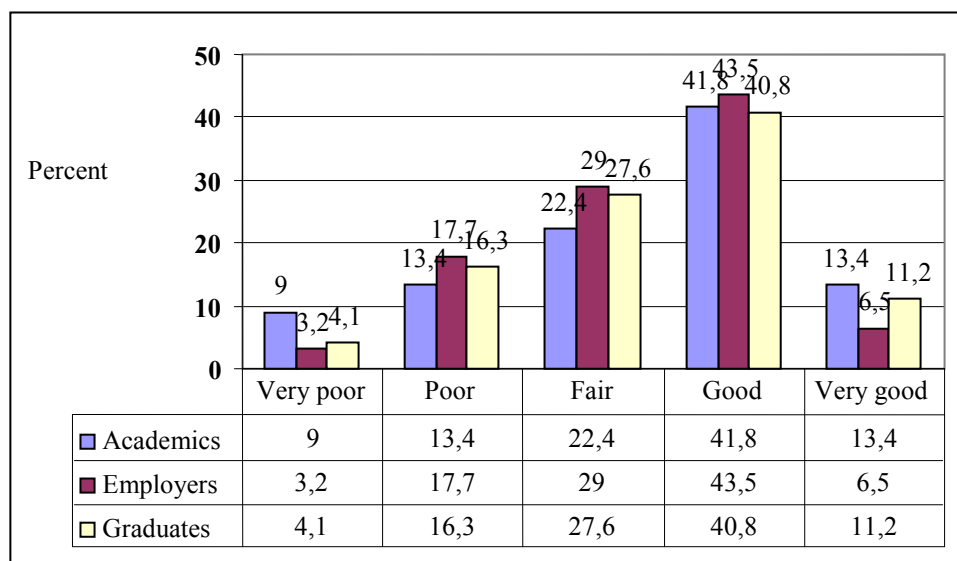
### **Which is the formative value of the tutoring during the practical placement?**

The question #20 was "How would you rate the formative value of tutoring during the practical placement?" with 5 answer options, from "Very poor" to "Very good" (see Fig. 3.3). The most content with the formative value of the tutoring during the practical placement are the Academics, their average rating for this item was 3,40, comparing to 3,32 for the Employers, and 3,38 for the Graduates, but the inter-group differences are not significant according to ANOVA analysis.

For the three groups together the mean value of the item is 3,37 which means that their degree of satisfaction with the formative value of the tutoring during the practical placement is over the average value of 3 – "Fair", but under the value of 4 – "Good". The frequency graph indicates that majority of the respondents in the three groups answered that they consider the formative value of the tutoring system as "Good" – 41,6% of Academics,



43,5% of Employers and 40,8% of Graduates, but the considerable number of ratings of "Poor" and "Very poor" influences the average rating (see Fig. 3.3).



**Fig. 3.3.** Item 20 – The formative value of the tutoring during practical placement

For the question #20 one can find the same differentiation: the younger Graduates rated higher than the older ones the formative value of the tutoring during the practical placement (see Tab. 2.8.1. in Appendix 2.8). The Graduates under 30 years had an average rating of 3,53 and those over 31 had an average rating of 3,07; the mean difference of ,516 is significant at  $p \leq ,014$ . The same differentiation in opinions is found when comparing the answer of Graduates according to year of graduation, at the level of significance of the difference  $p \leq ,026$  (see also Tab. 2.8.2. in Appendix 2.8). There are no gender differences between Graduates in answering this question, neither other intra-group differences.

### Opinions and suggestions of the respondents on tutoring

The importance of the tutoring system in achieving competences related to the world of work is a crucial one. The tutor is the link between the competences learned in the university and the requirements of the real jobs and real organizations. His role is to guide the student during the practical placement in organization and to help him to adapt to these requirements. In this respect, the respondents gave useful answers for the item #16: "Please insert here any comment you consider useful relating to the tutoring system



during the practical placement". Some of the suggestions were related to the importance of the tutoring and to the relevance of the work tutors perform with students:

*"Tutoring should play an important role during the practical placement". (Academic)*

*"Many tutors need a far greater appreciation of commercial working under pressure and commercial imperatives. Many have been isolated from day to day commercial working - perhaps exchange schemes would help". (Employer)*

Other answers suggested improvements of the tutoring system, such as centralizing the list of companies that provide practical placements, communication between university and employers or between students in different practical placements:

*"A list of companies (partners) where students could go should be provided, and only from that list students should be able to choose or to go to their own workplace if it is employed there from at least x months". (Academic).*

*"Partners should be provided with necessary info in order to properly conduct practical placement in both theoretical and practical aspects". (Academic).*

*"A successful tutoring system should include meetings / exchanges with other students who are in the same situation (e.g. fellow students that carry out their internship at the same time, in other companies)". (Graduate)*

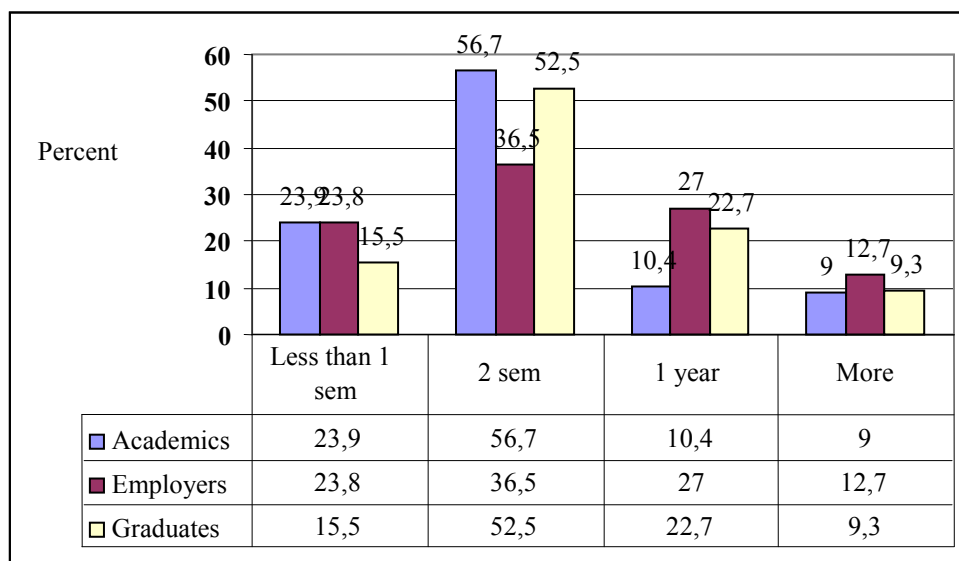
### **The total length of the practical placement**

The question #21 was "What is the total length of practical placement during the studies of first cycle (i.e. undergraduate level) in your field?" with 4 answer options (see Fig. 3.4). The countries of the respondents have very different higher education structure in terms of length of studies, number of cycles, or introducing already the Bologna system of 3 cycles.

The reason why we had two separate answers (two semesters vs. one year) is that the practical placement could be divided into 2 separate semesters or merged into a full year placement. The most of the respondents



answered that the length of the practical placement is 2 semesters: 56% of the Academics, 36,5% of the Employers and 52,5% of the Graduates.



**Fig. 3.4.** Item 21: The total length of the practical placement

One of the respondents notified in item #17 some country particularities of the length of the practical placement:

*".....in Germany it is 6 weeks before beginning the studies and 6 months during 2<sup>nd</sup> year". (Academic)*

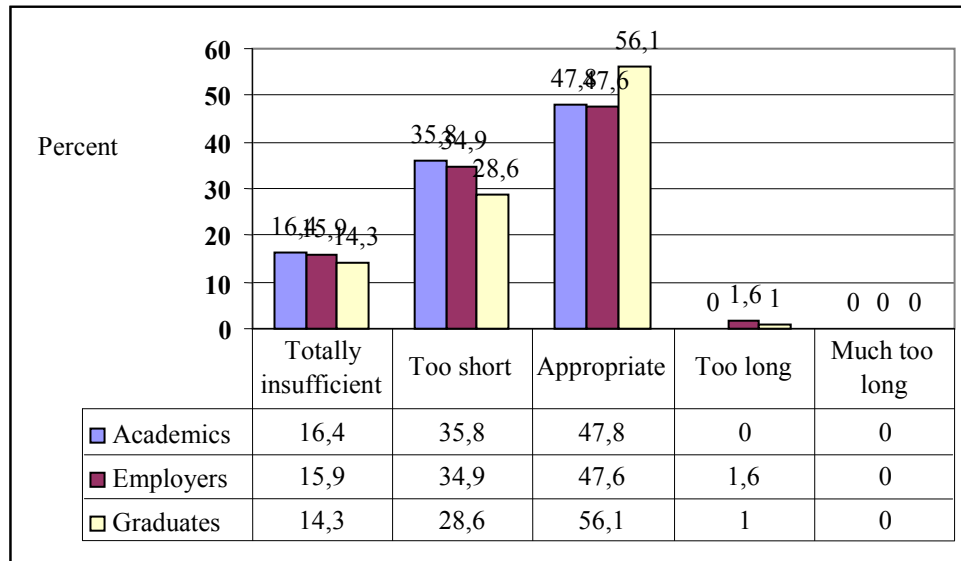
As they have different fields of specialization and different areas of activities in the case of Employers, the question is rather a preparatory question for the next one, concerning the relevance of the length.

### **Is the length of the practical placement sufficient?**

The question #22 was "The total length of the practical placement is:" with 5 answer options, from "Totally insufficient" to "Much too long" (see Fig. 3.5).

The most of the respondents considered that the length of the practical placement is appropriate to its objectives, but here were considerable answers of "Totally insufficient" or "Too short" in all the groups. There were no answers that the length of practical placement is "Much too long", and a few Employers considered it as being "Too long". The ANOVA analysis indicates no significant inter-group differences for this item.





**Fig. 3.5.** Item 22: Satisfaction with the length of practical placement

However, the t test indicates a slight intra-group difference between the younger vs. older graduates (see Tab. 2.8.2 in Appendix 2.8). The younger Graduates rated, as usual, higher the item than the older ones.

### Opinions and suggestions of the respondents on the practical placement

Some respondents expressed their opinion on the formative value of the practical placement. In their opinion, the role of the practical placement is to complete the preparation done at the university for the world of work. The practical placement gives students the opportunity to learn more about technology, organization functioning and to apply the theoretical knowledge achieved at university:

*"During the internship the students as well should learn about technology". (Academic)*

*"...during my study .... I was considered by school non-teaching staff how important is to understand "organizations" and requirements of today's markets". (Graduate)*



*"The internship should motivate the students. They should get the feeling that the theoretical skills learned at university are useful in industry". (Academic)*

Being involved into the "real thing", working day by day in an enterprise, the student learns:

*".... keeping formal rules of enterprise... (gains the) ability to fulfill tasks, solve problems, communicate with colleagues, coming with new ideas (creativity)". (Academic)*

It is rather unexpected that the most of the answers to item 17 were given by Academics, which gave good evaluations to the level of achievement of the practical placement, and not by the Employers, which were less generous in their evaluations. The only suggestion received from an Employer refers to the insufficient number of places and some possible dysfunctions:

*"Not enough is done, there are too few placements and many of those do not help the student". (Employer)*

In some countries and areas of activity a sensible issue is the evaluation of the competences achieved. The students have to know from the beginning the evaluation criteria and a closer collaboration between placement providers and universities:

*"A measurement system that will show which students (post or under graduate) really gained the competences that should at their practical placement. A checklist should be provided from the beginning and should be verified also by faculties' headcount with people from companies where students were doing practical periods, when it is completed. Also references are welcomed". (Academic)*

As a general issue, only few respondents gave supplementary comments, suggestions on the practical placement, tutoring or formative value of enterprise stages for the competences profile of the graduates.

At the end of the list of 13 practical competences, the respondents were invited to add, if needed, supplementary competences and to rate them on the same scale. For the whole population only 5 new items were added, but they are not relevant because they repeat, in different statements, competences that were listed in the previous two questionnaires, for generic and specific competences.



## Chapter 4

### **CONCLUSIONS OF THE RESEARCH ON PRACTICAL COMPETENCES FOR ENTERPRISES**

Marcela Rodica LUCA\*

Our research is an extension of the Tuning methodology to the trans-disciplinary competences required by working in an enterprise. In the first volume of this book, we presented the methodological issues and the results of our research on generic competences and competences that are specific to enterprises. The second volume deals with the methodological issues and the results of the research on practical competences for enterprises. As we stated in Chapter 5 of the first volume, the research did not focus on a specific subject-area, like the original Tuning research, but on any specialism whose graduates could be employed in an enterprise. From this point of view, the generic competences are practically the same, but the specific and the practical ones are rather "enterprise-focused".

By the term of enterprise we understand any entity in the industrial or manufacturing sectors, but also in the banking, finance and services field. The common denominator is the achievement of a product, either material or immaterial, that is meant for the clients. The respondents were academics from different fields of specialization, graduates and employers who were working in such sectors and were able to evaluate the importance of the specific and practical competences for the enterprise.

From the level of importance of the specific and practical competences we expected to extract an enterprise-sector competence profile that could inspire the redesigning of curricula that prepares graduates for the enterprise sector. The most important competences issued from this exploratory research could be landmarks for the formulation of educational objectives in different disciplines.

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#### 4.1. Methodological issues of the research

*The Questionnaire on Practical Skills for Enterprises* deepens the research on generic competences and enterprise-specific competences, by adding a new dimension to the competence profile already established in the first part of the research. The 13-item list can be considered a scale with structural unity and good internal consistency, statistically tested for both criteria: the level of importance of practical competences and the level of achievement during the practical placement. The values of all consistency indicators are good (see Chapter 2 of this volume). Therefore, the Questionnaire on Practical Competences for Enterprises can be used in its existing form.

*Limits of the research* As stated in the conclusions chapter of the first volume, the research as a whole, and the research on practical competences has some limits. One of the limits is that, though the respondents came from 20 European countries, having very different professional backgrounds, workplaces, universities, their number did not allow a randomization. The interpretations based on the statistical analysis are acceptable for an exploratory research, but must be reinforced with further research on larger numbers of respondents. The findings of the research are limited in their interpretation by its exploratory character.

#### 4.2. The level of importance of practical competences

*The most important practical competences* For all the three groups, the most important practical competences are the following: "Capacity to understand the technical documentation...", "Skills in self-directed learning and information research in order to solve practical problems", "Ability to establish successful and satisfying relationships with organisational members", and "Understanding of job requirements in terms of work performance".

It is supposed that, during the practical placement, the students become familiar with the technical documentation in their field of activity at an acceptable level. Based on the generic and specific competences for enterprises, they should be able to start a process of self-directed learning, which enables them to adapt to the requirements of a job without too much supervision. During this direct contact with the enterprise, it is important for



students to be able to relate in this formal environment. Another important competence is related to the response given to performance requirements.

***Inter-group differences*** Considering the evaluations made by each group, some differences appear in the hierarchy of the competences: for the group of Academics, the most important competence is "Skills in self-directed learning and information research in order to solve practical problems", for Employers, the most important practical competence is "Capacity to understand the technical documentation in the relevant area of competence", for Graduates the most important practical competence is the same as for Employers.

The significance of rating differences amongst the three groups was revealed by the ANOVA analysis. For 3 competences out of 13, the Graduates rated the importance of the following competences significantly higher than the other two groups: "Understanding the enterprise workflows", "Ability to use company-specific language and acronyms, and "Understanding of organisation power structures and of formal and informal relationships". This emphasis put by the Graduates on the importance of the level of the practical competences is understandable because they were confronted with the necessity to possess these practical competences in order to be successful. The Employers rated the importance of the following competence significantly higher than the other two groups: "Skills to perform elementary practical tasks required in order to achieve a practical placement project".

As a general issue, Employers and Graduates rated the importance of the practical competences at higher levels than Academics did. Taking the groups in pairs, the differences proved to be statistically significant by the t test for 6 competences, 3 for the Employers vs. Academics and 3 for the Graduates vs. Academics. As compared to Academics, Employers and Graduates are more focused on practical competences that facilitate work performance and the adaptation to the organisation.

***Intra-group differences*** For the Employers, no significant intra-group differentiations were found for rating the importance of the practical competences. For the Graduates, some differentiations were found according to gender and year of graduation.

Female respondents rated the importance for 12 out of 13 competences significantly higher, but the differences are statistically significant only for two items: "Capacity to understand and act according to the organisational culture, history and traditions" and "Knowledge of organisational goals and values". This tendency of female respondents to rate competences that are related to social issues higher than male respondents



was also present for the importance of generic and enterprise-specific competences (see the conclusions of the first volume).

The respondents who have graduated more recently rated the importance of the following competences significantly higher: "Capacity to understand the technical documentation in the relevant area of competence", "Understanding of enterprise workflows", "Knowledge and use of health, safety and environment regulations in a practical placement project", and "Ability to use company-specific language and acronyms". This "cohort-effect" was present also for the generic and enterprise-specific competences in the first part of the research.

***The less important practical competences*** For the three groups taken together, the less important competences are the following: "Understanding of organizational power structures and of formal and informal relationships", "Capacity to understand and act according to organisational culture, history and traditions", "Ability to use company-specific language and acronyms", and "Knowledge and use of health, safety and environment regulations in a practical placement project". These competences are related to the organizational socialization and, in the respondents' opinion, they are less important than the "technical" ones, listed in the first half of the importance ranking. For Academics, the least important competence is "Ability to use company-specific language and acronyms"; for Employers and Graduates, the least important is "Knowledge and use of health, safety and environment regulations in a practical placement project".

#### **4.3. The level of achievement of practical competences**

***The best achieved practical competences*** In the opinion of all the three groups, the best achieved practical competences during the practical placement are the following: "Ability to use professional terminology", "Capacity to understand the technical documentation in the relevant area of competence", "Skills in self-directed learning and information research in order to solve practical problems", and "Skills to perform elementary practical tasks required in order to achieve a practical placement project". These competences are rather "technical", being directly related to the accomplishment of the job tasks.

The practical placement plays a key role in connecting the theoretical competences with the practical ones. Some of the most important practical competences are amongst the best achieved: "Capacity to understand the



technical documentation in the relevant area of competence" (1<sup>st</sup> rank of importance) and "Skills in self-directed learning and information research in order to solve practical problems" (2<sup>nd</sup> rank of importance).

***Inter-group differences*** The groups taken separately placed approximately the same competences on the first positions regarding the ranking of the level of achievement, but the order is different: for Academics and Graduates the best achieved practical competence is "Ability to use professional terminology"; for Employers, the best achieved competence is "Skills to perform elementary practical tasks required in order to achieve a practical placement project".

The Academics rated higher than the other two groups regarding the level of achievement of all the 13 competences, and for 12 items the differences revealed by ANOVA analysis are statistically significant. The Employers were the most exigent when rating 12 out of 13 competences and the differences are also significant, either by the multiple comparison method, or by the t test for the groups taken in pairs. The Employers are the least satisfied with the level of achievement of practical competences.

***Intra-group differences*** As for the importance of practical competences, there are some intra-group differences in evaluating their level of achievement. There are significant differences between Employers from large vs. small enterprises for 8 out of 13 practical competences, which is the majority of it.

It seems that the Employers from large enterprises are again more satisfied with the level of preparation of the graduates during practical placements than those from small enterprises. Similar results were found for generic competences and for specific competences for enterprises, presented in the first volume of the present research. There are two possible explanations for this: one is related to the match between the professional preparation at university and the requirements of the jobs, and the other is related to the actual differences between graduates hired in large vs. small enterprises, as far as the level of preparation is concerned.

On the one hand, these differences could be attributed to the differences existing in the nature of work requirements for the two kinds of enterprises. The prototypical employer for which universities design their curricula is the large enterprise and it is possible that the graduates are indeed better prepared for working in it. The rise of the number of small and medium sized enterprises all over the European Union should lead to a change in the perspective of universities on the labour market and increase the concern for analysing the specific competence needs of this type of employers.



On the other hand, it is possible that the differences are originated in the quality of the graduates the employers can afford to hire according to the size of the enterprise. It is well known that large enterprises usually offer higher salaries than the small enterprises do, attracting thus the top of each cohort of graduates. Consequently, when evaluating the level of achievement of competences, it is possible that Employers from small vs. large enterprises refer to real differences in the level of preparation.

There are also intra-group differences with the category of the Graduates: younger Graduates, who graduated after 2003, evaluate higher the level of achievement for 5 out of 13 practical competences. The same tendency was found in evaluating the level of importance of the practical competences. The respondents who have graduated more recently are more satisfied with the level of achievement, but this could be an "age effect": they tend to be more generous when evaluating the achievement, as well as the importance of competences. Other explanations could be attributed to the change of the curricula in the recent years as well as to the real differences in competences.

***The least achieved practical competences*** For the three groups together, the least achieved practical competence is "Ability to use company-specific language and acronyms". For the groups of Academics and Graduates, the least achieved competence is "Capacity to understand and act according to the organisational culture, history and traditions" and for the group of Employers is "Ability to use company-specific language and acronyms" –the same as for the three groups together. The level of rating of the Employers for this particular competence is very low (1,82 points on a 4-step scale)! These competences, related to the organizational socialization are not achieved at a satisfactory level during the practical placement.

#### **4.4. Differences between the level of importance and the level of achievement of practical competences**

Even if the practical placement leads to the achievement of practical competences at satisfactory levels, there are discrepancies between the level of importance and the level of achievement for all 13 practical competences, for the three groups together, as well as for the groups of Employers and Graduates taken separately. For the group of Academics, there are only 9 competences out of 13 for which the differences between importance and achievement are statistically significant by paired sample t test.



Some simple comparisons could also support this. The average ratings of the level of importance are between 3,41 and 2,86 average points for the three groups together, 3,35-2,68 for Academics, 3,47-2,88 for Employers, and 3,46-2,91 for Graduates (for details, see Tab. 2.1.7 in Appendix 2.1). The average ratings for the level of achievement are between 2,93 and 2,22 average points for the three groups together, 3,18-2,41 for Academics, 2,82-1,82 (!) for Employers, and 2,94-2,22 for Graduates (for details, see Tab. 2.4.7 in Appendix 2.4). This means that the level of achievement is under the level of importance for all comparisons according to the groups taken separately and together.

The inter-group differences are however important for the perspective on the importance-achievement balance. Academics are the most satisfied by the level of importance as compared to the level of achievement of the practical competences - 3,35/ 3,18 for the most important competence (0,17 points difference) and Employers are the least satisfied – 3,47/ 2,82 for the most important competence (0,65 points difference). The same results are the bottom end of the hierarchies. The relevance of the least important practical competences is rated in comparison with their level of achievement: the Academics rated 2,68/ 2,41 for the least important competence (0,27 points difference), the Employers – 2,88/ 1,82 (1,06 points difference), and the Graduates rated 2,91/ 2,22 (0,69 points difference).

***High importance/ low achievement*** The practical competences rated in the top of the hierarchy of importance are definitely achieved at unsatisfactory levels as it results from the t test for mean differences for the three groups taken together. Competences such as "Capacity to understand the technical documentation in the relevant area of competence", "Skills in self-directed learning and information research in order to solve practical problems", "Ability to establish successful and satisfying relationships with organisational members", and "Understanding of job requirements in terms of work performance" are considered as the 4 most important competences by the three groups together, but the mean differences between importance and achievement are over the value of 0,50 points on the 4-step scale. Considering the ratings of the groups taken separately, the difference between the level of importance and the level of achievement of the most important competence is 0,18 for the group of Academics, 0,79 for the group of Employers and 0,66 for the group of Graduates. The trend, as already mentioned above, is that Employers are constantly the least satisfied and Academics the most satisfied with the importance-achievement balance.



#### **4.5. Discussion on qualitative aspects of practical placements**

Practical placements play a key role in the preparation of the graduates for the world on work. Under these circumstances, having a closer look on what is required and what is actually achieved in terms of practical competences during the practical placement could give an idea on what improvements are necessary in the curricula. Practical placements give students the opportunity to taste the real world of work, to understand the way enterprises function, on the way employers, supervisors, mentors conceive the competence profile of a specialist who works in an enterprise.

In the first part of the research, we emphasized the importance of generic skills such as team work, communication in interdisciplinary teams and with non-specialists, planning and time management, elementary computing skills, IT skills, decision making, concern for quality, and will to succeed. These generic competences are completed at the end of the first cycle of studies by the enterprise-specific competences, such as applying knowledge of mathematics, physics, chemistry and other sciences in their profession, basic knowledge of design of technical systems, preparing, processing and presenting data using appropriate qualitative and quantitative techniques and packages.

After the second cycle, some higher level enterprise-specific competences are required, such as recognizing and analyzing novel problems, planning strategies for their solution, analyzing, synthesizing and summarizing information, presenting scientific material and arguments to an informed audience, understanding the impact of the present and future technologies on the markets.

The enterprise-specific competences that are constantly important across the higher education cycles, as stated in the first part of the research are: systemic approach to practical problems, ability to identify, formulate and solve practical problems, skills in the evaluation, interpretation and synthesis of information and data, and receiving and responding to a variety of information sources. For all practical competences, the level of importance increases for the second cycle.

All the above mentioned generic and enterprise-specific competences achieved in university are refined, completed and adapted to the actual requirements of working in enterprises during the practical placements. For most of the specialisms, the practical placement involves a project, which is a great opportunity to "learning by doing" in achieving competences such as "Skills in self-directed learning and information research in order to solve practical problems", "Capacity to understand the technical documentation in the relevant area of competence", "Skills to perform elementary practical



tasks required in order to achieve a practical placement project", "Knowledge and use of health, safety and environment regulations in a practical placement project", "Ability to use professional terminology", and "Ability to use company-specific language and acronyms".

When working full time in the enterprise for a certain time, several other competences are achieved, which will also help the graduate in adapting to a future job: "Understanding of enterprise workflows", "Understanding and use of the enterprise work standards and discipline", "Understanding of job requirements in terms of work performance", "Capacity to understand and act according to organisational culture, history and traditions", "Knowledge of organisational goals and values", "Understanding of organisational power structures and of formal and informal relationships", and "Ability to establish successful and satisfying relationships with organisational members".

The objectives of the practical placement stages are considered as adequate by the majority of the respondents, but the level of the evaluation is different: 3,20 average points out of 5 for Academics, 3,44 for Graduates and 3,22 for Employers, but the differences between groups are not statistically significant. This means that the respondents are satisfied with the adequacy of the objective slightly over the mean value of 3, but not very satisfied.

The situation is similar for the appropriateness of the content of the practical placement, for which the values of the average points are 3,25 out of 5 for Academics, 3,14 for Employers and 3,18 for Graduates, but the inter-group differences are not statistically significant. In this case, too, the level of satisfaction regarding the adequacy of the content of practical placement barely goes over the average value of 3 points.

Concerning the formative value of the tutoring during practical placement, the respondents seem to be a bit more satisfied: 3,40 average points out 5 for Academics, 3,32 for Employers and 3,38 for Graduates. Again the level of satisfaction is average, not good. The achievement of the practical experience is mediated by the tutor, which is an "insider" to the enterprise. His/ her role is to facilitate the achievement of the competences and the adaptation to the job requirements and to give students a new perspective on the meaning of their university preparation. Why is the respondents' level of satisfaction with the formative value of tutoring not higher? Everyone agrees on this formative value, but nobody seems to be very satisfied with it. On this issue, the university should reflect and try to improve the system of tutoring.

The length of practical placement is evaluated as sufficient in the present state by the respondents, but one can raise the question "Where to place students for practice?" Big companies traditionally have practical placement agreements with universities, but small and medium-sized



enterprises do not, and here is one weak point of the actual system. The SMEs have an increasing weight on the labour market, but they are each able to offer only a small number of places for practical placements and this puts universities in the situation to prefer large enterprises as partners for the practical training of their students. Including a larger number of SMEs amongst the partners of the university when organising students' practice involves an increase in the efforts of universities to coordinate, supervise and evaluate the quality of the training during the practical placement.

This concern for adapting the curricula in order to achieve competences valuable for small and medium sized enterprises, such as entrepreneurial spirit, and increased capacity to apply knowledge into practice, autonomy and will to succeed, should become more and more present in universities.

Our research was not focused on subject-specific competences, but rather on cross-subject competences, common to all specialisms employable in enterprises of all sizes. Especially for the practical competences, the competences identified as being of high importance and low achievement have to be in the focus of the curricula adjusting. Reorganising the practical placement in order to allow students a more flexible orientation between potential jobs could include not only the improvement of the tutoring system, but also the extension of the university-enterprise partnerships to the SMEs sector.

The employers' and the graduates' perspective offer universities the other-side perspective on the process and content of higher education, a post-hoc feedback on the quality of the higher education and the match between the structure of competences achieved by graduates and the reality of the enterprise.







## **Part II**

# **EUI-NET PROJECT ACTIVITIES AND SUCCESSION STORIES**







## Chapter 5

### **PRACTICAL PLACEMENTS OF STUDENTS: EXPECTATIONS, EXPERIENCES AND BENEFITS**

Mariela PAVALACHE-ILIE<sup>††</sup>

The focus of EUI-Net is the link between the university and the world of work, which is meant to ensure partnerships, cultural and language awareness, to maintain the core university values, while coping with the rapidly changing environment and the developing European citizenship. According to Chiriacescu's (2006) analysis, universities have progressively stopped being closed cities and they have become entrepreneurial universities with the mission of offering not only education.

The preoccupations of European universities are constant and very varied and they are marked by specific national conditions, patterns already validated by practice, economic constraints and the ambition to capitalize the good practices of their partners.

Within the project, a conference took place between May 14 and 16, 2007, with the theme: European Models and Best Practice on Students' Practical Placement, which was attended by academics and employers from all the countries involved in the project. These countries were: Belgium, Bulgaria, Estonia, France, Finland, Greece, Italy, Lithuania, Spain, Romania and UK.

The meeting from Rome was an opportunity for the members of the EUI-Net project to present their theoretical approaches and the practical ways of ensuring practical placements for students in various European countries from different fields: electrical engineering, economics, metrology, quality, security etc. The interventions of the participants have included the presentation of the logic through which practical placements are considered and organized, as an integrating part of higher education. Reference was also made to various national experiences of in-company strategies, with emphasis on the main dimensions, such as assistance, length, credits, portfolio/project, forms of evaluation and financing.

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Analyzing the proceedings of the meeting, similarities and peculiarities can be noticed at the level of each country, as well as attempts of international collaboration between the participant countries. Although marked by their own history and traditions regarding education, which trigger certain uniqueness, European universities still have an intersection element of politics and practices in point of practical placement.

There are different names given to practical placements: in-service training (Lithuania), in-company training (Spain), professional practice for students (Romania), industrial placement or work placement (UK), internship (France, Estonia), but all of them describe the same reality, that of a practical activity which students do in an enterprise during their university studies.

In realizing the partnership between university and industry, the practical placement of students is very important. The training programs are designed to complete the students' theoretical instruction by offering the opportunity to work in a challenging environment. Practical placements bring students a lot of benefits on a challenging labour market, such as practical oriented knowledge, training in high-tech domains and development of entrepreneurial skills.

### **5.1. Partners and actors**

The partners of this process are the universities and enterprises which assume specific duties, all of which are oriented towards the students' professional integration, in accordance with the objectives of their academic education, personal abilities and enterprise needs. The official agreement signed between three actors underlines the commitment of each part with respect to his partners. Pasternak and Eboueya (2007) consider that the students' commitment looks at the completion of their placement on the whole, a fact that requires motivation, rigor, availability and honesty, as well as the observation of the rules or procedures of the company. In its turn, the company proposes a useful training subject for the student and for itself and gives the means for the acquisition of required competences. Last, but not least, the higher education institution has the obligation to facilitate students' integration in the enterprise, to ensure assistance to the student during the practical placement, with the help of a teacher who will take care of the progress of students' work and will organize the internship fairs and full-time job fairs.

ASET the Association for Sandwich Education & Training, which comprises nearly all UK Universities expresses this way the mutual benefit of



practical placement. *“Primarily, placements help academic institutions to provide graduates with qualities that employers have informed them that they require. The links with industry, which placements promote, also help us to keep abreast of changing requirements and can lead to other joint ventures such as custom-built training courses and collaborative research”* cited Sunley (2007).

Normally, the initiative and the coordination of the partnership with the extra academic environment belong to the university and focuses on underlining some cooperation directions. In the case of Transylvania University of Braşov, Romania (Lache, 2007), the three main directions are: *students’ education and training* by identifying the needs of the economic environment and changing the academic curriculum in terms of these needs, *research and development* by scientific research and technological transfer and *training in alternative systems* like long-life education, open distance learning and low frequency.

The actors that participate in a practical placement are the students, who are similar to a nucleus around which the whole process gravitates, the representatives of the higher education institution, and different members of the company (the representative of the HR department, experts who can be part of an academic team or who can participate in the board of the examination for admission or for final examinations); to them, the representative of the origin country is added in the case of international placements.

## 5.2. Practical placement patterns

The main reason for the existence of practical placements is linked to the student’s acquisition of competences which, in a specific context, will ensure the employability skills that employers are seeking, the so called graduate students’ employability. Practical placements are integrated in the educational process ensuring a special form of synergy, which completes the ones described by Talabă (2006) between teaching and research, as two main activities in Higher Education. In the organization and proceeding of practical placements, the partners are the universities and the enterprises, sometimes supported through legislative members at a national and European level; enterprises offer students the possibility to check the applicability of the theoretical knowledge offered by universities, to transform declarative knowledge into procedural knowledge (*savoir-faire*), being known that the procedures obtained in field work, prior to the undertaking of the declarative



stage, have positive effects on the efficiency of learning and the good use of the gained knowledge.

Because the learning that is offered by the university is different from what the workplace gives, practical activity creates the premises for a two-way transfer between the workplace and the academic study, as shown by Gush and Hall (2007). A sequence of the learning process used in work-based learning requires the application of relevant knowledge or theory that sustains the definition of the problem, the analysis and understanding of the problem, the generation of possible outcomes to solve the problem, the implementation of a chosen solution and the evaluation of the result.

The issue of the relation between work and learning has been approached by many researchers, as Wangsa and Uden (2007) have shown; they have defined four forms of work-integrated learning (WIL): (1) WIL used to access Higher Education programs, (2) WIL as general preparation for the real world, (3) WIL as the primary form of study and (4) WIL as preparation for future employment. Duignan, cited by Wangsa *et al.* defines two different models of work placement:

- Laissez-faire: a model where the student receives minimal information regarding what he/she is expected to derive from the placement, the details regarding the tasks in the work environment being at the discretion of the host.
- Formal-structure model: all the aspects of the practical placement are carefully anticipated, projected and watched over by the university in a close collaboration with the enterprise, which, in its turn, does a tripartite learning contract.

At an attitudinal level, an in-company activity produces changes in the way in which students refer to the world of work and to the building of their own professional identity. The students' attitude in the workplace changes due to their involvement in operational processes and to the responsibility that they take regarding the tasks that have to be learned and managed on one's own. Moreover, students who are in a practical placement are committed to experience reflection, self-management and individual responsibility for personal and professional development.

Having been found that the traditional educational system is insufficient for responding to the new societal needs, Sotiropoulos and Metzios (2007) argue in favour of the need to transform and adapt the university curriculum to the imperatives of the economy, in order to be able to define the creativity and innovation concepts in the educational context in precise terms, making them operational. According to Gibb (2000), there are behaviours which are associated with entrepreneurship education, which stimulate the development of the proactive people, who think strategically and who take initiatives, and he enumerates the following: opportunity



seeking and grasping, solving problems creatively, managing autonomously, using judgment to take calculated risks.

The creativity and innovation are key elements for designing high-value goods and services and for developing advanced business practices, a fact that imposes a reconsideration of the role of the modern university. A means which could help students prepare to cope with an increasingly competitive environment, characterized by complexity and uncertainty, is to participate in real life activities, where they need to practice their creativity and the capacity to innovate. Enterprises, such as learning organizations, offer a good environment for practicing these personality aspects, because it has been proven that creativity is mostly generated by a challenging environment and a climate of trust and openness. That is why students' practical placements in enterprises offer contacts with the entrepreneurial culture, cross-disciplinary application of knowledge and flexible self-learning.

The innovation process model proposed by Sotiropoulos and Metzios (2007) comprises three processes: knowledge creation, innovation and learning to learn. By applying this educational pattern in universities, students can learn more from the methods used in industry, they will accept this pattern more easily will have the opportunity to become aware of the utility of the creative and innovative approach regarding the concrete problems of professional life.

### **Placement goals and objectives**

In defining the objectives of a practical placement, reference should be made to the interests of all of the partners – students, employers, higher education institution, theoretical studies and the experience of the participants. From this point of view, the conference from Rome was really meaningful.

There are different forms of defining the objectives of practical placement, but there is a common point that can be identified in the approaches of all the participants in this European project.

Specialists from the University of La Rochelle (Pasternak and Eboueya, 2007) think that practical placements must ensure the development of technical and learning skills, staff relations, planning and organizing, personal and professional awareness and communication skills. The objective of the internship developed by the Institut Universitaire de Technologie Paris Jussieu (Micheli *et al.*, 2007) is different from working in company. It aimed to enhance students' creativity, autonomy and responsibility by conducting technological studies on their own.



A rich synthesis of the benefits that practical placements have upon students, employers and higher education institutions has been realized by Wangsa and Uden (2007) and Pasternak and Eboueya (2007) as follows:

Students manage to understand and use in a better way the abstract theory, to assimilate the corporate culture, to be exposed to a diverse range of working styles and to establish a network of professional contacts. At the same time, they have the opportunity to enrich both generic and technical skills, to have access to an employer's reference, to experience the day-to-day operations of a real business and to have access to real business resources (Wangsa *et al.*, 2007).

The entrepreneurial experience allows students to enrich their competences and skills by using learning patterns which are hardly used at university, such as:

- The reciprocal training with the help of colleagues, not only that of the instructor;
- Learning by doing;
- Learning by means of interpersonal exchanges and debates
- Learning by guided discovery
- Learning in a flexible and challenging environment
- Learning starting from its own errors
- Learning by solving problems.

From the major benefits for partner enterprises identified by recent studies there are two which must be mentioned. One of them is the students' input of new ideas, resulted from the energy, enthusiasm, creativity and the innovative perspective of the reality of the organization. Another aspect that must be mentioned regards the recruitment of future employees, due to the opportunity to monitor students' performance, with a view to longer term employment and to training students with specific skills, appropriate for the organization.

Concerning university, placements allow the evaluation of the level from the study program which would meet the employers' needs, the establishment of partnerships with enterprises that can contribute to the modernization of the material base of the university.

The collaboration between partners, as well as the short term finalities represented by the assistance of each student in practical placement also have long term objectives, which are centred on ensuring the graduates' employability; this can be achieved by consultations between employers, academics and alumni as to form an adequate curriculum development process, which will respond to the exigencies from the dynamic knowledge-based society. The experts from enterprises can also intervene in the educational process as members of an academic team, their participation



ensuring the introduction of some topics that are not part of the traditional curriculum of the university. In addition, they can also offer practical examples based on real industrial situations that illustrate academic topics. At the Institute of Technology of Paris Diderot University after the reform of the vocational degree, experts from the industry have been asked to participate in the teaching team, their lectures representing 25-40% of the total and comprising tutorials and practical works.

### **Tuning the methodology applied for Practical Placements**

In order for practical placements to be as efficient as possible for students, it is necessary that the correct needs that these internships must meet be identified. This way, some of the results offered by the research conducted in several European countries during EUI-Net in 2006 are useful and interesting to present. The research design followed the TUNING methodology; the third section of the EUI-Net questionnaire was designed to investigate the importance of practical competences and skills resulted from practical placements for adapting to the work requirements and to the level at which the competences and skills are developed by a university degree.

Luca (2007), who conducted the research, presented the results of the analysis of responses from 264 questionnaires from Austria, Belgium, Bulgaria, Cyprus, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Lithuania, Malta, Poland, Romania, Slovakia, Spain, and the UK. There were three groups of respondents: academics, employers and graduates. They had different perspectives on the ideal configuration of skills and competences needed for a good adjustment of graduates to the job requirements. All respondents evaluated the 13 practical skills and competences selected by a jury of specialists from a larger list. The importance of the skills differs (most of all statistically) from one group to another, as an expression of the different approaches and experiences of each one. Nevertheless, all of them have placed the *Capacity to understand the technical documentation into the relevant area of competence* on one of the first three places. The employers and the academics also consider *Skills of self-directed learning* important; the academics and graduates consider it useful to have the *Ability to establish successful relationships*.

Only employers place the *Skills to perform elementary practical skills* on the first three places; in the same way, only graduates consider that they must have the *Ability to use professional terminology*. The conclusion of this research reveals some interesting issues related to the goals of practical placements. At the same time, the fact that the differences between groups are larger for the pair academics- employers than for the pair academics-



graduates raises several challenges for the university: there is a need for a larger receptivity for the employers' needs to ensure the graduates' capacity to adapt to the requirements of the world of work.

### **Organizational structures to support placement achievements in enterprises**

Starting from the conclusion of several studies quoted by Wangsa and Uden (2007), according to which a proper structure of placement will optimize the positive outcomes and benefits of placement, all the universities present at the conference from Rome comprise organisms meant to establish a link with the industry partner and to assist students in accomplishing the practical activity in an enterprise. In the university of La Rochelle there is the Conseil et Accompagnement à la Professionalisation des Etudiants (council for professional assistance for students), in Romania there is the Department of Connections between the University and the Economic, Social and Cultural Environment, in Estonia the Careers service of Tallinn university of Technology.

These organisms, in a close collaboration with enterprises, formulate rules that stipulate the conditions in which the placement must take place, the students' rights and obligations, the activities that will take place in the enterprise, as well as the way in which the placement will end, with grades/marks and the credits that go with it.

A distinctive aspect between the participating countries is the students' option for practical placements and the type of support that they receive from the university. In France, the students of the Institut Universitaire de Technologie Paris Jussieu (Micheli *et al.*, 2007) have to search and to find an enterprise for their practical placements; it is considered that even the action of searching for a practical placement will bring about the development of the abilities to explore the work field and of the abilities to communicate with and persuade the employer. The French students' practical placements are supported by an apprenticeship contract with a salary.

In Spain (Laburu *et al.*, 2007), even though engineering student in-company training periods are desirable, they are not compulsory but volunteer. Either an enterprise offers the Escuela Politécnica de San Sebastián a position for a student to spend a training period there, or a student looks it for himself, there is a contract signed between the university and the company. There can be an economic compensation for the student if the company wants, but it is not compulsory and there is no fix rate. There can be problems regarding the salary because some students chose to execute well



paid jobs instead of focusing on the aspects that regard learning and completing the theoretical aspects as well as the applicative ones.

In many countries, students may choose to perform the practical placement in a partner university from another country, with a Leonardo da Vinci mobility; in this case, they are also assisted by EU representative. From the students' point of view, the students's advantages are represented by joint practical and international experience, two strategic key points in their future career development.

An interesting and useful alternative, in the case of limited resources (financial, time, disadvantaged regions, etc) is the Virtual Mobility in international student placements, described by De Gruyter and Van Petegem (2007). Virtual Mobility is defined by the [elearningeurope.info](http://elearningeurope.info) portal as *“the use of information and communication technologies to obtain the same benefits as one could have with physical mobility but without the need to travel”*. Virtual placements illustrate the idea that there are equal opportunities for all and state the democratisation of education.

The Virtual Mobility may be integrated in students' placements, either as a complete alternative or as a support mechanism. Maybe even more than in face-to-face placements, in virtual mobility there is a need for a thorough preparation of the process, which looks at all those involved; a precondition is the existence of an ITC learning environment. The students who are preparing for a virtual placement must have support actions at the social, cultural and linguistic levels (preparatory modules or courses) and e-competences and e-skills (using the new social software such as collaborative workspaces or webconferencing). At university level, a virtual placement requires a good definition of the project (objectives, tasks, time, budget etc.) and a clear distribution of roles prior to the activity.

At the pedagogical level too, the academic team faces a challenge. On the one hand, it has to project and organize the virtual activities, such as guided independent self-study, collaborative learning, problem/project based learning. On the other hand, an adjusted approach to assessment is necessary by means of designing the assessment procedures and by offering formative feedback. All the actors must be e-literate. One of the advantages of this way of placement is that a professional experience is no longer location dependent.



### 5.3. The place of practical training in the university curriculum

Practical placements can last a few weeks or hours, depending on the philosophy of each university regarding the role and structure of this form of completion of the student's preparation. Also, there are differences regarding the way practical placements are distributed throughout an academic year, as well as on the entire study period, according to the level of studies and the type of specialization.

At Jussieu, France (Micheli *et al.*, 2007) and the Faculty of Computing, Engineering and Technology, Staffordshire University (Sunley, 2007), the practical placement lasts one year and at the Student Business Projects of Helsinki School of Economics, it usually lasts 2 to 4 months. At Escuela Politécnica de San Sebastián (Laburu *et al.*, 2007), the duration of an in-company training period is limited to three months (450 h), in any moment of the year, although most of the students do it during the summer holidays. Also, at the School of Management and Technology of Felgueira, Polytechnic Institute of Porto, Portugal (Duarte, 2007), the practical placement lasts for half a year in the second part of the studies, according to the Bologna Process.

At the University of Bucharest, the main modalities to organize the professional practice for students are: internship (8-12 weeks), professional/industrial placement (12-26 weeks), volunteering (variable duration), visits in organizations (4-6 hours during a workday), work shadowing (one day-several weeks), training courses (2-3 days in a firm, in an instructional centre), and part-time jobs.

#### The co-ordination of practical placements

In order for the practical placement to produce the expected results, it is necessary that the coordination be assumed by both institutions involved by means of one person each, which should integrate the university and workplace experience, developing an effective learning environment, guiding and facilitating student learning. The activity must be planned, organized and monitored by an academic supervisor and an industry supervisor. Micheli *et al.* (2007) in France, Laburu *et al.* (2007) in Spain, Lache (2007) in Romania point out that the academic and enterprise tutors build the practice path of the students together.

Coll, cited by Wangsa and Uden (2007), defined the coordinator as “an educator whose specialization is to provide meaningful learning



experiences in the form of work situations and to assist students in relating these experiences to their educational goals“. Among the responsibilities of the university coordinator, we can also find the following: to monitor the placement process, to develop and maintain relationships with employers, to provide the link between enterprise and faculty, to promote the professional status of the program, to enhance students' learning and oversee their assessment.

The effectiveness of a practical placement, write Wangsa and Uden (2007), is conditioned by the activity of the industry supervisor, who has an important set of functions and responsibilities. From these, we mention the following:

- Orienting the student within the organization
- Setting clear work objectives for the student
- Monitoring the students' workplace performance
- Identifying skill deficiencies and organizing appropriate training opportunities.

It is advisable that this supervisor be a person with experience and seniority, able both to offer special assistance and to facilitate the students' assimilation of corporate culture, as a stage of organizational socialization. Along with developing technical and professional skills, this person can offer students some models of organizational behaviour with a view to building team cohesion, to helping students internalize the values and norms of the company.

One problem which is quite often encountered is represented by the poor qualities of supervisions, usually triggered by the fact that supervisors are not appropriately prepared for this role. That is why they should be trained before they start coordinating the program. Usually, it is necessary that the industry tutor be helped by the academic tutor to overcome difficulties linked to the absence of pedagogical skills.

### **Finalizing practical placements**

In several countries, practical placements can take two different forms: a practical period in a company, and end-of-studies (diploma) project. In both situations, the ways of finalizing students' practical placements are quite similar for all the countries that participated in the EUI-Net; the countries that have recently joined the UE have adopted the patterns of the already member countries, as well. In all these countries, students must write a report on their professional activity, or they have to design and develop a project under the dual responsibility of the academic and enterprise tutors.



Usually, students present their report or project orally in front of a board of examiners that also comprises the two tutors.

If the student is in the last year of studies, in a master program or Ph.D., he elaborates the graduation/dissertation thesis or the Ph.D. reports during the placement. Just like the projects, these papers are presented in front of a mixed board made up of academic and enterprise experts. Depending on the situation, the board gives three marks (good, fair, not good) or a grade, in accordance with each country's system of evaluation, to which study credits are associated, as allocated to practical placements in the curriculum.

The evaluation of the project accomplished during the placement can be a summative or a formative one, assigned at the middle of the placement year. Micheli *et al.* (2007) show that At IUT Paris Jussieu, the evaluation criteria regard the development of technical and personal skills, as well as the general attitude, work capacity and organization, information capacity and report quality.

### **Evaluating practical placements**

In order to improve the quality and efficiency of placements, it is necessary to evaluate the students' and employers' satisfaction. In the research conducted at Escuela Politécnica de San Sebastián (Laburu, 2007), it has been observed that companies stress emotional and interpersonal aspects more than purely technical or scientific ones.

The Careers Service of Tallinn University of Technology (Krispin, 2007) in partnership with other Estonian universities has conducted four surveys related to internship in 2005-2007, which comprised students, graduates, internship coordinators and employers. Amongst the conclusions of their research, we would like to mention the following:

- Students, as well as graduates, consider that the time allocated to placements is insufficient
- The internship coordinator activity holds no appeal for academics because it represents additional workload for university staff.

The study presented above is a type of marketing, according to the classification of Kirkpatrick (1976), as a form of evaluation with an affective nature; moreover, it gives little objective information regarding the efficiency of the placement. At the learning level, the competences gained by the students are evaluated by means of practical reports and projects.

A similar evaluation is also performed by Galanaki (2007), the investigated subjects being represented by company placement officers, the



level of satisfaction being excellent and very good -90%. A clue that shows the quality of the obtained competences through practical activities in enterprises is the high number of job offers after the placement – 82%, 55% of the graduates having accepted.

### **Quality management of the students' practical stages**

The preoccupation for quality is constant at the level of all the processes that take place in universities, special organisms being created for this purpose. The quality of the practical placements is determined by contents, duration, allotted credits (established in the university curriculum) and the quality of resources, the stage organization, the procedures of monitoring and evaluating the students' acquired competences. In order for practical placements to achieve their purpose, it is necessary, as Helerea *et al.* (2007) have shown, to design and accomplish a quality assurance system, which comprises: (1) establishing objectives and quality assurance policies for practical stages, (2) establishing organizational structures and responsibilities regarding practical stages, (3) drawing up documents and human resources assurance, (4) monitoring, analyzing and improving the quality of the educational process through practice stages.

There are no patterns for elaborating a quality assurance system for practical placements; because their structure is influenced by the general management of the university, by the philosophy of the university regarding the place and role of the practical placements, by economic and political-social factors both at a national and international level. Whatever the adopted system is, in order to be efficient and functional, it must attract the participation of the whole staff and promote a new system of values in the university and in the company, specific to the quality culture, which includes continuous improvement, focus on clients, extended cooperation and partnership.

### **5.4. European experiences regarding students' practical placements**

The partner countries of the EUI-Net project have had different experiences in integrating students in the practical activity of the enterprises, each representing a particular type of principle for organizing practical placements. From now on, we will shortly present some experiences of good



practice, in order for the students' professionalization to be efficiently inserted in the work field.

## **Bulgaria**

The essential objective of the European Technology Platforms (ETPs) is the development of a strategic research agenda (SRA) for leading technologies by the reunion of technological know-how, industry, regulators and financial institutions. Shoikova (2007) presents the 31 ETP's whose role has evolved from defining strategic priorities for research to contributing to set the framework under which these investments will provide higher returns for the European economy and society. Two of these platforms are proposed as Joint Technology Initiatives in Bulgaria. They will allow a better use of the funds coming from the private sector, from the member countries and from the EU for research in the two fields (nanoelectronics and technology for embedded intelligence and systems). The benefits that the ETP can bring to the industry, academics and students in practical placement are: (1) built partnerships to share risk, pool resources and competences worldwide, (2) to generate innovation thanks to the knowledge and experience sharing and (3) build consensus around technology development strategies.

## **UK**

One of the difficulties graduates face is that the subject-specific skills do not always trigger success on the work field. The competences employers expect from the candidates who apply for a job are different from those acquired by students at university, in their academic work. That is why an academic from Staffordshire University and an industrial practitioner (Uden and Moran, 2007) have been preoccupied with forming students with "graduate attributes", which means generic skills through problem-based learning.

The identification of generic skills started in the UK by HEA-Funded Project, "Transferable Skills in Third Level" conducted to the identification of the transferable skills which are important for undergraduate students. Examples of these skills are communication skills, planning skills, multi-tasking, assessing and evaluating one's own and the others' work, identifying and managing ethical issues. Amongst the higher-level skills necessary for a successful insertion in the work field, one can mention the meta-cognitive skills which allow the individual to explain-observe phenomena, to solve real-world problems or to analyze problems and to think critically. According



to the authors of the article, all these skills can be learned successfully by using a problem-based learning which starts with problems rather than the exposition of disciplinary knowledge.

Gibson, cited by Wangsa and Uden (2007), synthesizes nine WIL models with their structure and their disciplines of application, which are applied in different domains of Higher Education in the UK. From these we present some of the most interesting. The *pre-course experience* model is adequate for agriculture classes and offers work experience as a pre-requisite for entry. The *sandwich course* consists of a twelve-month-“thick” sandwich or six-month-“thin” sandwiches used for engineering courses. The *co-operative programs* contain periods of work experience integrated into the overall curriculum and are appropriate for business, sciences and engineering courses. The *cognitive apprenticeship and Job shadowing* solicits the attender of the course to observe a professional while doing his activity and to be pre-socialised organisationally; the model can be applied for law and political science courses. The *fieldwork* consists of a short period in an agency to observe and learn about the organizational culture of the workplace, and it proves useful for students in social work, science, geography courses. The *placement or practicum* is useful for medical, nursing, engineering courses and consists of extended periods in work settings, with a view to learning skills and gaining experience of required for future work.

## Portugal

At the School of Management and Technology of Felgueira (Duarte, 2007), Polytechnic Institute of Porto, Portugal, they are implementing the Bologna Process which imposes a constraint regarding time: the concepts that used to be discussed during four or five years must now be adjusted in order to cover only three years. In order to surpass the impossibility to ensure a practical placement in the three years, it was decided to introduce the Business Simulation course (2 semesters) in a simulated entrepreneurial environment which was set up at school and during which the students had to create a new virtual business. They are working in small groups in order to increase their competences on team working and cooperation. After they have formulated the business idea, they develop a survey to evaluate the going outside, closer to their potential clients; they must analyze the results of their survey with statistical software. If the results are positive, the students simulate the undertaking of all the steps for opening a business and at the end of the year they elaborate the business report which will be



submitted to a jury evaluation. The students have a team teacher at least 8 hours a week, who should help them on problem solving.

With these projects, as Duarte says, the university hopes to offer students a good basis to, to give them a good preparation to face the real world business and to make them agents of the economic and sustainable development.

## **Romania**

Lache (2007) describes an indirect consequence of the EUI-Net Thematic Network, represented by the INTENGIT project (INTensive ENgineering IT), which has as an objective to promote the innovation by developing an integrated approach for training in IT and engineering, with a view to providing skills and competences to students through placements in European companies that develop integrated solutions. The INTENGIT project is designed to complete students' education by offering the opportunity of working in a challenging environment using the trans-national mobility of Leonardo da Vinci program.

The target groups comprise students from Transylvania University of Braşov, in their final year of study at the undergraduate level, M.Sc. level, who are training for their graduation/dissertation thesis, and Ph.D. students developing theses in the field integrated engineering. During the program, the host EU company provides tutorials for students by means of a responsible assigned from the HR department and an individual coach of sufficient seniority who defines and makes a follow up of the technical work. In this project, the third partner besides the university and the EU company is the subsidiary of the EU Company in Romania. The student develops a project within the local partner company with the purpose to test the competences, skills and knowledge acquired during the training stage. This project will be analyzed by the assigned employees; both from a technical and an economic point of view, and attempts will be made to implement it within the company.

The added value assured by the trans-national mobility scheme proposed by the INTENGIT project is related mainly to the following issues:

- Updated knowledge according to the new approach of training in IT intensive technical engineering applications.
- More insight on product-oriented and customer-oriented design.
- Skills on team working and networking (by dealing with work in a trans-national company).



A case study regarding the organization of the professional practice for the students at the University of Bucharest, Romania, is presented by Iucu (2007). After conducting a needs analysis focusing on the main academic and administrative weak points of universities, the principle objectives of the reform of the educational system in Romania were formulated, amongst which we note: higher education should relate closer to the labour market and practical activities in university should be optimized and greater emphasis should be placed on vocational courses, in training specialists.

A particular aspect of this university, common for all higher education institutions in Romania, is the organization of practical placements as an element of the extra psycho-pedagogical training course offered to the graduates who want to teach at the pre-university education and higher education institutions. This course is held by licensed teaching staff from training departments. The main activities related to the pedagogical practice are: participating in the activities of institutional development, observing the didactic activities run in school, developing, running and assessing didactic activities, developing evaluation exams.

## **Italy**

An interesting experience of hosting staggers and apprentices is presented by Millevolte and Mustica (2007), managers of a small company in the fields of training and multimedia communication. They faced the problem of incompatibility between the competences that the universities create to graduates and the competences necessary to enterprises, especially to those from the tertiary sector, the so-called transversal competences: problem-solving ability, cooperative work, creativity, criticism, which cross all professions and represent the basis of each company's expertise today.

They point out repeatedly that the main difficulty the students who come in practical placements face is represented by the almost total inability to apply the concepts acquired in the course of study. For surpassing this problem, the authors propose some ways in which placements can become more efficient, ways that look at an adequate duration, an accurate plan and a strong relevance of the tutors' role.

Regarding the length of the placement, it is desirable that it should not last less than 3 months, the minimum necessary time for the student to understand the organizational dynamics and the host's structure. Shorter periods transform the placement in an obligation that must be fulfilled to accumulate credits and this does not motivate the host enterprise. The planning of the internship must specify the objectives of the study from the very beginning both for the student and for the enterprise, the topic/subject



must be chosen by the student in concordance with his/ her professional interests, but also with the needs of the company. Finally, the tutors must visit the workplace and collaborate with the enterprise in projecting the internship and in the assistance of the student, so as to help him/ her learn the practical experiences of the elements acquired during the theoretical preparation. The tutor from the enterprise ensures the students' integration in the organization and guides them in the practical aspects from their project.

But the company tutor does not have the pedagogic preparation to emphasize the connection between the practical experience the students can gain in company and the theoretic elements learned over the course of their studies.

This way, the internship can be a sensor in the life of the company, able to provide the feedback necessary to universities, so as to improve their curriculum, their training forms and to propose students projects that are in concordance with the competences that will ensure their adjustment to the "time to market" logic.

## **Finland**

The network between students and companies is ensured at the Helsinki School of Economics (HSE) (Narits, 2007) by the Students Business Projects (SBP) which allows students to accomplish a company project such as: research, report, survey, operational plan, benchmarking or process description. The subject of the project can be from any of the following domains studied at the HSE: management, accounting, finance, marketing, logistics, law, organizations etc. The SBP is a concept which has been created especially for research or study projects carried out for companies. The cooperation between students is encouraged so that a company project can be accomplished as teamwork, with several viewpoints included in the analysis.

Amongst the benefits of a company project, we can mention:

- Convenience: HSE takes care of putting together and managing the research group.
- Reliability: The researcher guarantees that the work will be done properly and the end result will meet quality requirements.
- Diversity: the project can be commissioned on any subject researched or taught at HSE.
- Expenses: despite the fact that the projects are a chargeable activity, the idea of Company Projects is not to make profit, but to promote compatibility between study and working life.



## Lithuania

Being given the diffusion of information technology and the pervasive use of internet, the e-education can be an alternative to traditional learning, which should allow a wide professionalization of the European citizens. Rutkauskiene *et al.* (2007) discuss the national and international projects, networks, and systems for the development of e-learning and its delivery to the rural areas of Lithuania. The expansion of life long learning by means of e-learning is limited in Lithuania by two paramount problems: persons willing to study have to improve their skills of using information technologies, many e-learning courses are developed without assessing the potential users' needs. That is why, the Lithuanian Ministry of Education and Science devised an e-learning strategy which is accomplished by means of projects supported by EU Social and Regional Funds.

The aim of the project Rural Internet Access Points (RIAPs 2) started in October 2006 is to enlarge the RIAPs network in rural areas and integrate the existing RIAPs into a unified administration system. In order to adapt this network to the users' needs, a survey was carried out all over Lithuania, "The use of e-services in rural Lithuanian regions", with the purpose of analyzing the peculiarities regarding the way in which residents and small and medium enterprises use e-services in rural regions. Using a questionnaire based survey and focus group discussions, the researchers have reached the following conclusions:

The main reasons for distance learning are: to improve skills and capacities, to study in the convenient place, to study only useful and interesting subjects. Most of the respondents would like to study by themselves at home, at the work place, in community education centres and in the specialized education centres. The main obstacles for e-learning are represented by financial difficulties, limited technical facilities, lack of information about distance education courses and the lack of computer skills.

All these conclusions could be considered arguments for the need to develop the information infrastructure in Lithuania, a premise for the access to education in a world in which the university has an essential role in configuring society.



## 5.5. Conclusions about practical placements in EU

The need of practical placement cannot be denied, as it has been reinforced by needs analysis conducted at the beginning of several European projects dedicated to the improvement of the cooperation between universities and enterprises. Among the major benefits, we can mention the students' becoming familiar with the real world of work, the anticipatory organizational socialization, a better understanding and valorisation of the theoretical knowledge by means of concrete applications, useful for the companies. For the academia, it is useful to identify with the help of employers and experts from industry the changes that have to be made in the curriculum in order to ensure the graduates the competences necessary for competitiveness in working, integration and adaptation in the changing and insecure environment of the contemporary world.

By means of work integrated learning, virtual mobility, problem based learning, simulations, team working, the graduates' employability is enhanced. Despite the relatively wide variety of practical placements, all of them are organized so as to harmonize students' and universities' interests with those of the companies in which they now work as apprentices, only to become professionals and experts in the future.

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## Chapter 6

### CO-OPERATION TRANSYLVANIA/ RO–THURINGIA/ DE - 12 YEARS OF SUCCESSFUL PROJECT WORK WITHIN MOBILITY

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In 1995 started a new co-operation between the partners in Thuringia and Transylvania and a lot of student mobility measures followed in the years since that time. Both sides shared experience and learned about their individual conditions and a new chapter in the relations between the established mobility structures of Europe and the new membership candidate (at that time) - Romania - was opened. At the beginning the new vocabulary and the unique opportunities had to be submitted to the students and the teaching staff as well. There were no reservations to go this way and so the curiosity was born to establish a new partnership in both regions. The co-operation started at different fields of EU projects and the results are precious contacts and project co-operations with both parties, many individual experiences at student's side and this experience make this co-operation that exemplary.

#### Introduction

The co-operation between partners who are not well acquainted yet is sometimes a difficult task as trust and mutual understanding always have to be built especially when a new situation comes up for at least one of them and regulations at European level are totally new and the curricula for students do not foresee a placement in industry neither in the home country nor in any European country. So at the early beginning obstacles had to be

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identified, the understanding to go abroad for a while and to work in another language in a foreign environment had to be developed.

An international conference in 1995 in close connection with the 50<sup>th</sup> anniversary of the University in Brasov brought some promoters of European projects to Transylvania and the opportunities of transnational mobility was explained to the teaching staff and the students. Not many of them understood the real chance and that it should come true for them soon. So a lot of questions had to be answered before the first candidates were found. The preparation on both sides took a longer period of time but then the breakthrough was done.

This paper discusses several of experiences, obstacles and success stories in the co-operation between new partners in 1995 and nowadays these partners form a solid partnership with mutual benefits. Numerous student exchanges were done and new levels of co-operation were built. The new dimension for the participating enterprises led to new open-mindedness to extend the integration of the new member countries in Europe by practical measures and to learn from each other. This co-operation led to new partners in other countries and at different sectors of work.

Synergies between mobility actions and other projects are on the focus of peers. Special focus was made on the synergies and results of common activities between the different strands of the European education programs. The paper concentrates on the aspects of benefits of the partners, networking as it is at present in Germany and in Romania, the role of incoming students (incomings) for the success of the partnership and the different types of networks. The summary shows some aspects of the current needs and achievements.

## **6.1. A story of successful cooperation**

### **It started in Brasov**

*An invitation from Prof. Sokrates Kaplanis from T.E.I. in Patras/ GR was sent to Ilmenau/ DE as both were partners in many mobility and pilot projects under COMETT (Community action program in education and training in technology) – one of the EU programs before LEONARDO DA VINCI. The University of Brasov in Transylvania celebrates the 50<sup>th</sup> anniversary of its foundation and this meeting was the start of new partnerships.*

At the greeting ceremonies and speeches a lot of experiences were



presented to invite the students of this university and the staff to join the projects of other countries. All participants were curious about the specific conditions and expectations in a country that still was not member of the European Union. Many things were completely new but there were interested professors who listened to the invitations and experiences. The offers from the experienced people from many EU countries sounded interesting but still far away from a realization. So many questions were discussed and a view for the future was developed. Mihai Cernat – at that time associate professor of electrical engineering in Brasov - was open minded to develop the conditions and criteria of a participation of his students within the next years in Germany.

The obstacles seemed enormous, but the partners had hoped and trust in their own power to overcome these difficulties. Nobody knew how this adventure would end. But immediately both sides started to find out the way to send out and receive students for practical work experience – or student placements as they are called within the mobility programs. Frank March did not know what would happen in his region. Especially the conditions in Germany for such integration were completely incalculable. But there was optimism for the partners that helped in this phase. A first reaction from the invited students from Brasov was practically zero, as most of them did not understand what was meant with the presentations. A break for a student placement abroad was not part of the curricula in Romania. It can be said that the systems really were different and the prognoses were unclear – a typical challenging situation!

### **The break through – difficulties and solutions**

*At that time political movement was on the way that the Central and Eastern European Countries should be integrated within a shorter period of time to European funding programs. COMETT at that time had the opportunity to serve as well outgoing students as incomings. So bilateral relationships were possible and this helped to build bridges easily.*

Soon the partners found out what was to be done and after a few months the first applicants sent their forms to Germany - to the COMETT UETP Thuringia (UETP – University Enterprise Training Partnership) and a lot of questions and obstacles had to be overcome. The UETP in Thuringia was prepared to give grants for the students and the host companies put some extra money on the table that the students could afford their stay in Germany. The UETP found accommodations according to the student's budgets and it worked.



The requests for the embassies were new and with the help of permanent contacts and support from the DAAD (German academic exchange service) the understanding for such applications was developed. At the early beginning it lasted some time but later the procedures speed up and the preparation periods could be shorter than before. Within the years many students came from Romania to Germany and the moment came that German students went to companies and institutions in Transylvania. A lot of understanding was necessary because the Romanian infrastructure in industry was in change and the new situation must be understood. It was a typical break up feeling and the results showed – everything was worth the efforts.

The success of the initial student placements caused that many other initiatives and mutual visits were developed. German partners went to Brasov and found a meanwhile improved region and staff from Brasov University went to Germany to solve problems. Prof. Cernat was there several times and this was part of the success. His recommendations and know-how was important for the later applicants/ participants. Both parties learned a lot that time and this was certainly because of similar situations after the cold war in both regions of their respective country. It was time to speed that process and both sides did!

### **Outcomes, results and figures**

*Many students, staff and young graduates were changed between Thuringia and Transylvania since 1995. The partners created new initiatives and worked permanently and very successful in a thematic network called EUI-Net (European-University-Industry network). The positive results justify all efforts that were made. The new partnership is a real success story or best practice.*

Caused by the activities other universities in Romania were interested to join the activities in student mobility and some new connections were established. The University in Bucharest joined but the main flows were between Brasov and the consortium in Thuringia including the partners in industry.



## Some figures and facts

**Tab. 6.1.** Student placements in Thuringia/ Germany

	<b>Number of place-ments</b>	<b>Study courses</b>	<b>Sending University</b>
2002	3	Electrical engineering Electronic circuits	Brasov
	1	Marketing Economy	Bucharest
2003	4	Electrical engineering Civil engineering Automation Automotive industry	Brasov
2004	11	Electrical engineering Informatics Multimedia Agricultural machines	Brasov
2005/ 06	3	Electrical engineering	Brasov

**Tab. 6.2.** Student placements in Romania

	<b>Number of place-ments</b>	<b>Study courses</b>	<b>Sending university in Thuringia</b>
2000	1	Social affairs	FH Erfurt
2001	3	Conservation Restoration	FH Erfurt
	2	Architecture	FH Jena
	2	Social affairs Architecture	Weimar
2002	1	Legal affairs in industry	FH Schmalkalden FH Erfurt
	2	Conservation Restoration	
	1	Social sciences	Jena
2004	1	Economy	Ilmenau

FH = Fachhochschule - University of Applied Sciences

The a.m. figures could be realized by financial contributions from regional Ministry of culture in Thuringia, by additional grants from host companies and by project orientated grants from Thuringian mobility



projects. The encouragement of the Thuringian LEONARDO-Office in initiatives like that with Brasov was one fact to gain the second place at European Quality in Mobility Award 2006.

### **Additional highlights of the long lasting co-operation**

A critical situation appeared when a student broke both legs during his first week in Weimar in an accident. With the help of an open minded hospital in Weimar, an excellent insurance, the trust and flexibility of the host company and high engagement of himself as well the placement was brought to a successful end. The company modified the task and sponsored a lap top computer. The supervisor in Brasov gave all the support he could give from far away.

Three placement students prepared their diploma thesis in Germany and defended the results successfully in Brasov after their return.

Two students extended their stay in Ilmenau by an additional study semester at TU Ilmenau within the framework of Socrates program.

A female student from Brasov was offered twice a (relatively well paid) summer job in her host enterprise in Ilmenau. That is as well an additional work experience for her personal career. After her graduation she works currently with a limited work contract in her former host company.

## **6.2. Specific experience and examples**

The sector of staff exchange is used to widen the scope of co-operation between the partners. The LEONARDO-Office Thuringia has the unique selling proposition in this field as it for many years runs projects to bring staff from industry to educational institutions and vice versa. This measure is a unique opportunity to combine the necessities of a project management with the needs of the partners. It is still a relict from the COMETT program and supports the measures to bring people from universities and enterprises in a transnational way together.

Especially form small and medium sized enterprises SME such measures are very interesting and should be kept in the future. The grant give to the participants contributes to the efforts the mobile people have. But more



important is often the bridging function. Many companies do not have marked contacts to teaching bodies abroad and appreciate the co-operation with such institutions. Within that sector many mobility activities were done in the past.

In 2001 four workers of Thuringian enterprises went to the University of Baia Mare. In 2003 two university staff from TU Ilmenau went to different SMEs in Brasov and discussed opportunities to place students from Ilmenau to Brasov in specific fields of study. At this occasion information events were organized to present details about incoming funding in Thuringia. The staff from TU Ilmenau has the appropriate contacts to enterprises and took home some applications on the spot. At the same time some high schools (German gymnasiums) were visited and information were given to participate on several projects in mobility. So 8 pupils from Brasov took part at the Ilmenau student summer course in 2005 and 2006.

In 2004 a member of the TU Ilmenau went to an enterprise in Brasov for change of experience in the research sector and another university staff visited a Romanian social station to prepare new student placements.

In 2001 a group of professors from Brasov went to Ilmenau to share experience in project management, to find new partners for co-operation in a big variety of scientific co-operations. Since that time a big thematic network is doing research about the co-operation between universities and industry and all the accompanying factors – the EUI-Net led by the University in Brasov. A long partnership came to a successful point with enthusiastic staff from Brasov and many new experiences in the field of running such a huge project with all European countries as partners and some enterprises.

### **6.3. Conclusions and recommendations from a long-term partnership**

1. Open minded partners can form partnerships and run mobility projects at European level.
2. There should be no secrets between the partners and many ideas can be developed to develop a success story.
3. New member states bring in new ideas and challenges and give new impetus to the structures of Europe.
4. Successful partnerships are based on individual relations between people who trust each other and this influences the collaboration.



5. The improvement of student mobility must be based on long-term experience and evaluation of projects. The expertise is there and should be kept for the next program structure between 2007 - 2013.
6. Mobility projects including their partners need long-term stability to develop trust and mutual understanding. This can be given by a strategic orientation within the coming program of Lifelong Learning LLL and the sector of university-enterprise co-operation needs a separate place. International offices at the universities are not in the position to take care for these co-operations as they do not have the connections to industry. Career services are suitable structures to cover that field.
7. Mobility projects need networks to act with high efficiency to cover the needs in preparation, realization, supervision and evaluation including preparation of new concepts.
8. The quality of projects and individual mobility measures has to follow agreed and fixed – the Quality charter integrated 2004 is the first step in that direction but only a framework. Detailed activities have to be carried out by all partners in the process chain.
9. Additional grants and sources of funding are necessary to cover the needs of individual mobility. Sources can be additional contributions from the companies, governmental money from local/ regional ministries and bodies and more money from the EU program.
10. Future concepts need the flexibility to take care for incoming students as an instrument for the promoters and participating partners.
11. The combination or parallel use of different strands of EU programs and projects provides the opportunity to complement needs of target groups and to extend the service of a promoter in mobility.
12. Regional networks with associations of universities and enterprises improve the efficiency of mobility projects as the efforts to run them are reduced.
13. Transnational networks are lobbying instruments to improve the work of contractors. They can use electronic platforms for placement settings and databases for job and application purses. They can provide training offers for promoters and newcomers.
14. Promoters need platforms to communicate and to exchange experience, results and visions. The platforms should provide podia for discussions and to meet each other face to face.
15. Quality assurance is going to be a future key factor in the mobility projects and new methods to co-operate with transnational operating companies have to be developed.
16. The co-operation with National Agencies leads to trustful work in a country by respecting the different role the players play. This can cover the needs for use of all grants given and earned by a country when all



partners help each other. It is in the real sense of the European Idea/ Dimension.

### Abbreviations and terms

COMETT	– COMmunity action in Education and Training in Technology
DAAD	– Deutscher Akademischer Austauschdienst (German Academic Exchange Service)
NA	– National Agency
R&D	– research and development
UETP	– University Enterprise Training Partnership (AUEF in French)
Incomings	– European slang for incoming students – coming from an outside country into a host country

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## **Chapter 7**

### **UPON UNIVERSITY – ENTERPRISE COOPERATION AT BRASOV, ROMANIA**

Simona LACHE\*

#### **7.1. Present challenges for university**

The beginning of this new century has brought radical transformations in the society organization. These transformations reflect, in the first place, into the social institutions, among which the university represents a major exponent. It is just that for the university change does not seem to be something new: along the centuries it has proved to be the most flexible of the social institutions, always open for improvement in order to serve in the best way to the society. As a standing proof, nowadays it exists under various shapes, from the traditional university to the virtual one.

The labour market globalization has changed dramatically the demands for higher education graduates: besides good professional knowledge, there is the need for very good communication skills, entrepreneurial abilities, and foreign languages knowledge. If we are searching through the transversal competences required by the employers, two issues stand out in relief: the practical experience gained during the university studies through the practical placement activity and the international experience. University has tools for fulfilling both: practical stages are part of the academic curricula and international mobility through Socrates/Erasmus Programme works now for several years in Europe and in Romania, as well. Besides this, there is of course the Leonardo da Vinci mobility Programme that joins together the above mentioned requirements and gives the possibility to the student to gain practical experience in an international environment.

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## 7.2. How we do it at Brasov

The preoccupation for improvement of the education system, in the sense of adapting to the new requirements identified on the market, has been always a priority for Transilvania University of Brasov. For the last almost 20 years we passed through several transformations, as the entire Romanian society, trying to remain focused on the education quality delivered to our graduates. Of course the new challenges have been sensed at Brasov too; in the following paragraphs some ways of dealing with them will be presented.

In the recent past, when the Romanian economical situation was on a descendent slope, the lack of culture in the human resource field of the Romanian companies made very difficult the university task of finding practical placement for students. The companies seemed not to understand they have to contribute to the professional training of their future specialists by offering practical places and carrying on the activity in quality conditions.

The situation is changing nowadays, since many international companies developed units and subsidiaries in Romania: quite often in the decision making process for choosing the location of the new company, the university is one of the first places visited by the investors. The first contacts with Transilvania University of Brasov were relevant for the companies that ultimately chose Brasov for developing new business, and we have here the example of Siemens PSE, Ina Schaeffler, Autoliv, LMS International, Stabilus.

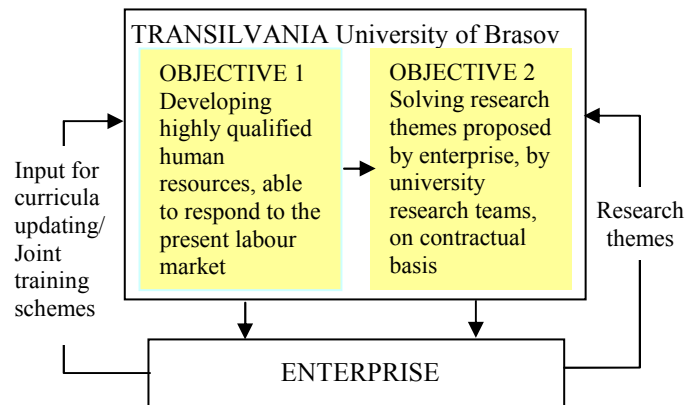
On the other hand, the university understood, at its turn, that the cooperation with the enterprises (in the largest sense of this word) can be efficiently developed only in a structured way. In this respect the Department of Links between the University and the Economic, Social and Cultural Environment (DESC) has been developed, aiming to be the interface between university and the extra-academic environment, regarding the cooperation on three main directions:

- Students education and training: by developing cooperation in practical placement, graduation / dissertation thesis with subjects proposed by the economic environment; identifying the needs of the economic environment and changing the academic curricula in terms of these needs;
- Research and development: scientific research and technological transfer;
- Training in alternative systems: life-long education, open distance learning, low frequency, by launching the university offer into the economic environment, on one hand, and by identification the needs



of the extra-academic environment and their tuning to the university offer, on the other hand.

University – enterprise cooperation model is shown in Fig. 1 and takes several forms: research support, cooperative research, knowledge transfer, technology transfer.



**Fig. 1.** UTBv – Enterprise

The cooperation model under which Transilvania University of Brasov develops such cooperation consists in university providing spaces for companies to organize laboratories equipped with means and at standards according to their requirements. In return, the university provides following services: training the students in subjects of interest for the company, developing research project with subjects proposed by the company, working with the company as partners in national and European projects, human resources recruitment. This model has been used in several cooperation schemes with *Siemens PSE*, *Motorola*, *Oracle*, *Ina Schaeffler*, *Viessmann*, *Autoliv*, *LMS International*.

**Research support** Research support involves contributions of both money and equipment to the university by industry. This type of contribution is valuable as it provides great flexibility to upgrade laboratory and develop programs in certain areas of interest.

**Cooperative research** It is a quite new achievement that the university has developed cooperative research consortiums with industry to pursue research and development in some common areas of interest. These centres provide formal structures to advance technology through various types of cooperation between university and industrial companies, among which research contracts represent an important mean.



In this respect several examples may be presented: direct cooperation with the industrial company – through research contract (financed by the company); cooperation with industrial companies in the framework of national research projects – *Excellence Research Programme* (financed by the government); cooperation with industrial companies in the framework of international research and education projects – *FP5, FP6, FP7, Leonardo da Vinci, Socrates/Erasmus*.

**Knowledge transfer** Knowledge transfer involves many activities that include both formal and informal means of communication, interactions and personnel exchanges at student and faculty level. Involvement of the companies in the university curricula is one of the most important mechanisms for knowledge transfer. Often students work on corporate problems for their theses and dissertations, in companies such as: Siemens PSE, Ina Schaeffler, Dacia-Renault Group, Continental Automotive Systems, LMS. Cooperative education programs, internship and job placement for students and recent graduates provide means for knowledge transfer.

On European level, the Leonardo da Vinci mobility students programme provides useful tools for knowledge transfer, as well. The weak points identified in relation with the practical oriented activity can be compensated by the trans-national mobility, which provides increased chances for students on the labour market, develops the innovative spirit of young people and entrepreneurship skills.

**Technology transfer** Technology transfer is generally based on the collaborative research with the industry; different models have been developed along the years: business incubators, science parks, technology parks, etc. all being created to foster entrepreneurship and business development.

At Brasov, the attempts carried on this subject have been materialized in The Innovative Technology and Business Incubator *Products and Technologies for Sustainable Energy – PRO-ENERG*, developed by Transilvania University. It aims to promote the initiation and development of innovative companies, based on advanced technologies in the domain of sustainable energy, mainly in the following directions: energetic efficiency of the industrial processes, renewable energy systems, and energetic performances of buildings. The target groups are represented by:

- New companies (preferably set-up by the Transilvania University graduates) able to promote the university research products, the innovative spirit of the academic community and the entrepreneurial experience of the economic environment;



- Small enterprises interested in reorienting their activity in the sustainable energy domain,
- Medium and large enterprises interested in developing innovation and technologic transfer departments on the above mentioned directions.

### 7.3. Practical placement for students

Coming back to students and their benefit from the university-enterprise cooperation, several success stories can be presented.

***Practical placements at Siemens PSE*** Siemens PSE started the activity in Brasov in 2001, with approx. 20 employees within a location of the university, in the student Campus. From the beginning until today a fruitful cooperation has been developed mainly with the Faculty of Electrical Engineering and Computer Science and Faculty of Mathematics-Informatics. More then 50 students do the practical stage in the company each year and many of the graduates chose to join Siemens after graduation (the company has grown up to 550 employees nowadays). Besides this, there are ongoing joint European projects in education and research (i.e. EUI-Net - within Socrates/Erasmus TN, VEGA - within FP6) and several activities in the field of technologic development and transfer (laboratories in the university developed with Siemens PSE support).

***Practical placements at INA Schaeffler*** The relations between INA Schaeffler and Transilvania University go back to the '90<sup>th</sup> and the real cooperation at the students level began as soon as the company became operational in its new location near Brasov. The mutual trust has been built step by step and the result consists today in some facts and figures: 2 research centres, one in Mechanical Engineering and one in Technological Engineering developed in the university by INA Schaeffler; around 100 practical places offered each year for students from faculties of: Mechanical Engineering, Technological Engineering, Material Sciences, Economic Sciences, Law and Sociology; lectures and conferences presented by company specialists on subjects of interest for students.

Many of the students that did the practical stages at INA Schaeffler were interested to develop their diploma thesis with subjects proposed by the company and continued to remain with the company after graduation. This year a new challenge has been appeared: the Innovation Award of Schaeffler Group, for which Transilvania University has been invited to submit



applications and proposals. The process is still ongoing.

***Practical placements at Autoliv*** Autoliv had a more custom oriented approach in the relation with the university. The two parties agreed upon developing a joint master program, “Safety Systems for Automotives”, with the content oriented on the company needs. The lectures are taught by teams of specialist from Autoliv and UTBv and the students are graduates from our university employed by the company (which is also paying for the education fees). We are now in the second year of this program, preparing to select the third generation of students, and the feedback is positive from both sides (students and company). In order to offer an appropriate training, the company renovated and provided proper facilities for two rooms in the university: one lecture room and a PC lab.

***Practical placements at LMS International*** The cooperation with LMS International went very fast: the Belgian company had the first visit at the university in September 2005 (before taking the decision upon where in Romania the location of the new company would be), in December 2005 the Romanian subsidiary became operational and in June 2006 there was inaugurated the Competence Centre in Simulation and Analysis of Engineering Systems, as a joined centre of excellence in engineering developed in partnership between LMS and Transilvania University.

The centre organizes training programs in physical testing and simulation and develops joined R&D programs, with a focus on mechatronic engineering applications in the automotive and aerospace industries. *“In one year, we have created a solid team of engineers and IT professionals in Brasov, Romania. Our Eastern European Centre in Brasov supports the steady growth of our R&D capacity in our five other development locations in Europe and the US,”* commented Jan Leuridan, Executive Vice-President and Chief Technical Officer. *“Through our partnership with the Transilvania University of Brasov, we want to establish a strong commitment to the education of future engineers and develop promising R&D projects in the fields of virtual simulation and testing”.* *“The development of the joined Competence Center for Simulation and Analysis of Engineering Systems with LMS strengthens the industry cooperation initiatives of the Transilvania University of Brasov and supports further developments in the field of simulation and computation technologies”*, concluded Prof. Dr. Ing. Ion Visa, Rector at the Transilvania University of Brasov. *“The collaboration with LMS International will contribute to the quality of the learning process and the span of the research and development projects at national and European level”.*

The cooperation with LMS within a Leonardo da Vinci student



mobility project represents another issue: five students from Transilvania University benefited from three months practical stage at LMS Belgium, and other five will go into placement in September. The first flux feedback is very good. The students were really thrilled by what they gained through the mobility (professional and personal experience, both practical and international) and the company assessed the work of two students (out of five) as excellent. The overall results were very good. In fact, some of the students will be invited, after graduation, to join LMS.

## 7.4. Conclusions

The university – enterprise cooperation, intensively developed in the last years at Transilvania University of Brasov, has contributed and continues to contribute to fulfilling the following objectives:

- Development of a managerial frame (based on cooperation between university and companies), in order to ensure all the conditions for achieving quality in students practical stages.
- Education and training of highly qualified human resources required for working in company environment, by providing the appropriate training frame for acquiring / improving knowledge, skills and competences at undergraduate / M.Sc. / Ph.D. level.
- Improvement of education and training carried on in the university by developing student centred training programs, promoting team working and improving the transversal competences and skills.
- More insight on product-oriented and custom-oriented design, market oriented activities.
- Development and implementation of innovative training methods, based on permanent experience exchange between academic staff and specialists from companies.

The ultimate aim is, of course, to provide a solid academic background to our graduates, whom combined with the practical experience would deliver on the labour market reliable specialists.

The task is not easy at all, it requires students motivation, company will and university effort to create an integrated structure able to fulfil all 'actors' interest. An efficient cooperation is based on good and real time communication, seriousness and commitment. Steps have been taken but there is still a lot to do for reaching all the goals we set for our students' education.



## **APPENDICES**







# **APPENDIX 1**

## **QUESTIONNAIRES USED**







**Appendix 1.1.**

**QUESTIONNAIRE ON PRACTICAL COMPETENCES FOR ENTERPRISE  
PRASKE**

**for Academics, Employers and Graduates  
- A, E, G**

This questionnaire presents a series of questions related to the skills and competences that result from the practical placement of the students.

Please answer all the questions.

Please select the appropriate / best option in each case, using the following scale:

- 1 = none;
- 2 = weak;
- 3 = considerable;
- 4 = strong.

<b>Skills and competences</b>	<b>Importance</b> None-1; Weak-2; Considerable-3; Strong-4	<b>Level to which developed by university degree</b> None-1; Weak-2; Considerable-3; Strong-4
1. Capacity to understand the technical documentation in the relevant area of competence		
2. Understanding of enterprise workflows		
3. Understanding and use of the enterprise work standards and discipline		
4. Skills to perform elementary practical tasks required in order to achieve a practical placement project (e.g. operating, computing, measuring etc)		
5. Knowledge and use of health, safety and environment regulations in a practical placement project		



6. Understanding of job requirements in terms of work performance		
7. Ability to use professional terminology		
8. Ability to use company-specific language and acronyms		
9. Capacity to understand and act according to organisational culture, history and traditions		
10. Knowledge of organisational goals and values		
11. Understanding of organisational power structures and of formal and informal relationships		
12. Ability to establish successful and satisfying relationships with organisational members		
13. Skills in self-directed learning and information research in order to solve practical problems		
14. Other – specify..... (feel free to add new competences)		
15. Other – specify..... (feel free to add new competences)		

16. Please insert here any comment you consider useful relating to the tutoring system during the practical placement:

17. Please insert here any comment you consider useful on the evaluation of the practical placement during the studies:



**Quality evaluation issues for current practical stages in your country**

18. Do you feel that practical placement during the studies is adequate in terms of objectives?
1. Very little
  2. Little
  3. Some
  4. Much
  5. Very much
19. Do you feel that practical placement during the studies is adequate in terms of content?
1. Very little
  2. Little
  3. Some
  4. Much
  5. Very much
20. How would you rate the formative value of tutoring during practical placement?
1. Very poor
  2. Poor
  3. Fair
  4. Good
  5. Very Good -
21. What is the total length of practical placement during the studies of first cycle (i.e. undergraduate level) in your field?
1. Less than two semesters
  2. Two semesters
  3. One year
  4. More
22. The length of the practical placement is:
1. Totally insufficient
  2. Too short
  3. Appropriate to the objectives
  4. Too long
  5. Much too long -

**Thank you for filling in the questionnaires!**



## COVER LETTER FOR THE QUESTIONNAIRES

### EUROPEAN RESEARCH ON GENERIC, SPECIFIC AND PRACTICAL COMPETENCES AND SKILLS FOR ENTERPRISES

The EUI-Net project is a European project that reflects the priorities of the European Policy Statement of participating Universities and the Erasmus University Charter for the reinforcing of a strategic institutional approach and commitment to European co-operation. One of the objectives of the project is to update and upgrade continuously both curricula and syllabi in higher education, in order to make them compatible across European universities and to contribute to a European innovation process.

This updating and upgrading process has to be based on the requirements of the labour market. In this respect, the contribution of the enterprises in all fields and of all sizes is vital in defining the needed competences and skills. Feedback on the competency profile of graduates, coming from employers and former graduates who already work in enterprises, help universities to tune their curricula to the dynamic reality of the labour market. The perspective of academics is also taken into account in this process of research.

The TUNING network has already produced inspiring competency profiles for topics such as: business, chemistry, educational sciences, geology, history, mathematics, and physics<sup>§§</sup> [1]. The present research aims to expand the TUNING methodology to the field relevant for enterprises. The targeted respondents are graduates (group G), employers (group E), and academics (group A), who are asked to answer three types of questionnaire each: one questionnaire on generic skills for enterprises (GESKE), another questionnaire on specific competences (SPECOE), and a third questionnaire on practical skills resulted from practical placement of students (PRASKE).

The present research is important also for restructuring higher education to meet the requirements of the Bologna process, on two levels: the 'first cycle' (undergraduate level) and the 'second cycle' (postgraduate). Competences and skills may have different importance at the end of these two levels of higher education, and this difference needs to be reflected in future curricula.

Answers to the questionnaires will help academics better to tune the curricula with real life requirements. The research team is grateful for your contribution in this challenging undertaking!

It is really important to complete all the questionnaires as we can only enter your responses into the research database if you have answered all the questions. Respondents from all over Europe are invited to answer the questionnaires.

**YOUR ANSWERS WILL BE KEPT CONFIDENTIAL!**  
**THANK YOU FOR YOUR TIME AND PATIENCE!**

The research team

Contact person: [marcela.luca@unitbv.ro](mailto:marcela.luca@unitbv.ro)

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<sup>§§</sup> Gonzalez, J., Wagenaar, R. eds. (2003). *Tuning Educational Structures in Europe*. Final Report. Phase One. University of Deusto & University of Groningen.



**Appendix 1.3.**

**Reliability analysis for PRASKE – scale A – Level of importance –  
practical competences for enterprise**

**Tab. 1.3.1.** Cronbach's alpha for the 13 items scale – level of importance of practical competences

<b>Cronbach's Alpha</b>	<b>Cronbach's Alpha Based on Standardized Items</b>	<b>N of Items</b>
,860	,859	13

**Tab. 1.3.2.** Item-Total statistics for level of importance of practical competences

	<b>Scale Mean if Item Deleted</b>	<b>Scale Variance if Item Deleted</b>	<b>Corrected Item-Total Correlation</b>	<b>Squared Multiple Correlation</b>	<b>Cronbach's Alpha if Item Deleted</b>
P1A	37,8067	29,549	,373	,345	,858
P2A	38,0630	27,722	,566	,392	,847
P3A	38,0504	27,483	,636	,506	,843
P4A	37,9958	29,034	,467	,373	,853
P5A	38,3487	27,899	,478	,329	,853
P6A	37,9622	27,480	,605	,439	,845
P7A	37,9916	28,962	,459	,308	,854
P8A	38,2857	27,429	,556	,415	,848
P9A	38,2689	27,109	,591	,438	,846
P10A	38,0000	27,831	,569	,519	,847
P11A	38,0966	27,531	,565	,429	,847
P12A	37,9076	28,700	,500	,415	,851
P13A	37,8445	29,372	,420	,272	,856



**Tab. 1.3.3.** Reliability statistics for level of importance of practical competences

<b>Cronbach's Alpha</b>	Part 1	Value	,788
		N of Items	7(a)
	Part 2	Value	,792
		N of Items	6(b)
	Total N of Items		
<b>Correlation Between Forms</b>			,612
<b>Spearman-Brown Coefficient</b>	Equal Length		,759
	Unequal Length		,760
<b>Guttman Split-Half Coefficient</b>			,758

a The items are: P1A, P2A, P3A, P4A, P5A, P6A, P7A.

b The items are: P8A, P9A, P10A, P11A, P12A, P13A.



**Appendix 1.4.**

**Reliability analysis for PRASKE – scale B – Level of achievement –  
practical skills for enterprise**

**Tab. 1.4.1.** Cronbach's alpha for the 13 items scale – level of achievement of practical competences

<b>Cronbach's Alpha</b>	<b>Cronbach's Alpha Based on Standardized Items</b>	<b>N of Items</b>
,925	,923	13

**Tab. 1.4.2.** Item-Total Statistics for level of achievement of practical competences

	<b>Scale Mean if Item Deleted</b>	<b>Scale Variance if Item Deleted</b>	<b>Corrected Item-Total Correlation</b>	<b>Squared Multiple Correlation</b>	<b>Cronbach's Alpha if Item Deleted</b>
P1B	30,2966	59,588	,526	,353	,924
P2B	30,7288	55,875	,757	,637	,916
P3B	30,7542	56,152	,741	,617	,917
P4B	30,3390	61,553	,383	,239	,928
P5B	30,8093	57,593	,645	,493	,920
P6B	30,6398	55,261	,775	,649	,915
P7B	30,2500	59,967	,509	,379	,925
P8B	30,9534	57,125	,668	,530	,919
P9B	30,9449	55,533	,733	,627	,917
P10B	30,7627	54,667	,771	,668	,915
P11B	30,8602	54,819	,788	,669	,915
P12B	30,6271	55,154	,758	,664	,916
P13B	30,3220	58,730	,595	,478	,922



**Tab. 1.4.3.** Reliability Statistics for level of achievement

<b>Cronbach's Alpha</b>	Part 1	Value	,843
		N of Items	7(a)
	Part 2	Value	,892
		N of Items	6(b)
	Total N of Items		
<b>Correlation Between Forms</b>			,827
<b>Spearman-Brown Coefficient</b>	Equal Length		,905
	Unequal Length		,906
<b>Guttman Split-Half Coefficient</b>			,905

a The items are: P1B, P2B, P3B, P4B, P5B, P6B, P7B.

b The items are: P8B, P9B, P10B, P11B, P12B, P13B.



**APPENDIX 2**

**STATISTICS FOR PRACTICAL COMPETENCES**







**Appendix 2.1.****Ranking PRASKE – level of importance – by means****Tab. 2.1.1.** The ranking of the importance of practical competences made by Academics, Employers, and Graduates together – in decreasing order of means

<b>Item</b>	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Rank</b>
<b>P01A</b>	<b>239</b>	<b>1,00</b>	<b>4,00</b>	<b>3,4142</b>	<b>,66101</b>	<b>1</b>
<b>P13A</b>	<b>239</b>	<b>1,00</b>	<b>4,00</b>	<b>3,3724</b>	<b>,63464</b>	<b>2</b>
<b>P12A</b>	<b>239</b>	<b>1,00</b>	<b>4,00</b>	<b>3,3054</b>	<b>,66327</b>	<b>3</b>
<b>P06A</b>	<b>238</b>	<b>1,00</b>	<b>4,00</b>	<b>3,2563</b>	<b>,73308</b>	<b>4</b>
P07A	239	1,00	4,00	3,2301	,66213	5
P04A	239	1,00	4,00	3,2259	,64103	6
P10A	239	1,00	4,00	3,2092	,73204	7
P03A	239	1,00	4,00	3,1715	,70403	8
P02A	239	1,00	4,00	3,1506	,74071	9
<b>P11A</b>	<b>239</b>	<b>1,00</b>	<b>4,00</b>	<b>3,1130</b>	<b>,77771</b>	<b>10</b>
<b>P09A</b>	<b>239</b>	<b>1,00</b>	<b>4,00</b>	<b>2,9414</b>	<b>,80748</b>	<b>11</b>
<b>P08A</b>	<b>239</b>	<b>1,00</b>	<b>4,00</b>	<b>2,9289</b>	<b>,79333</b>	<b>12</b>
<b>P05A</b>	<b>239</b>	<b>1,00</b>	<b>4,00</b>	<b>2,8661</b>	<b>,81405</b>	<b>13</b>

**Tab. 2.1.2.** The ranking of the importance of practical competences made by Academics, Employers, and Graduates together – in order of items

<b>Item</b>	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Rank</b>
P01A	239	1,00	4,00	3,4142	,66101	1
P02A	239	1,00	4,00	3,1506	,74071	9
P03A	239	1,00	4,00	3,1715	,70403	8
P04A	239	1,00	4,00	3,2259	,64103	6
P05A	239	1,00	4,00	2,8661	,81405	13
P06A	238	1,00	4,00	3,2563	,73308	4
P07A	239	1,00	4,00	3,2301	,66213	5
P08A	239	1,00	4,00	2,9289	,79333	12
P09A	239	1,00	4,00	2,9414	,80748	11
P10A	239	1,00	4,00	3,2092	,73204	7
P11A	239	1,00	4,00	3,1130	,77771	10
P12A	239	1,00	4,00	3,3054	,66327	3
P13A	239	1,00	4,00	3,3724	,63464	2



**Tab. 2.1.3.** The ranking of the importance of practical competences according to Academics – in decreasing order of means

Item	N	Minimum	Maximum	Mean	Std. Deviation	Rank
P13A	77	1,00	4,00	3,3506	,62337	1
P01A	77	1,00	4,00	3,2987	,67013	2
P12A	77	1,00	4,00	3,2468	,71000	3
P07A	77	2,00	4,00	3,1818	,57873	4
P04A	77	2,00	4,00	3,1169	,58431	5
P06A	77	1,00	4,00	3,1169	,79429	6
P10A	77	1,00	4,00	3,0909	,65256	7
P03A	77	1,00	4,00	3,0779	,62337	8
P02A	77	1,00	4,00	3,0000	,79472	9
P11A	77	1,00	4,00	2,9481	,79300	10
P05A	77	1,00	4,00	2,7792	,78846	11
P09A	77	1,00	4,00	2,7792	,64120	12
P08A	77	1,00	4,00	2,6883	,73017	13

**Tab. 2.1.4.** The ranking of the importance of practical competences according to Employers – in decreasing order of means

Item	N	Minimum	Maximum	Mean	Std. Deviation	Rank
P01A	63	1,00	4,00	3,4762	,64401	1
P13A	63	2,00	4,00	3,3810	,58000	2
P04A	63	2,00	4,00	3,3651	,60379	3
P06A	62	2,00	4,00	3,3387	,62577	4
P12A	63	2,00	4,00	3,3175	,61763	5
P10A	63	1,00	4,00	3,2857	,72798	6
P03A	63	2,00	4,00	3,2222	,70584	7
P02A	63	2,00	4,00	3,1905	,69229	8
P11A	63	1,00	4,00	3,1746	,77334	9
P07A	63	1,00	4,00	3,1270	,68373	10
P09A	63	1,00	4,00	3,0317	,86076	11
P08A	63	1,00	4,00	2,9048	,75593	12
P05A	63	1,00	4,00	2,8889	,84455	13



**Tab. 2.1.5.** The ranking of the importance of practical competences according to Graduates – in decreasing order of means

Item	N	Minimum	Maximum	Mean	Std. Deviation	Rank
P01A	99	1,00	4,00	3,4646	,65952	1
P13A	99	1,00	4,00	3,3838	,68074	2
P12A	99	1,00	4,00	3,3434	,65717	3
P07A	99	1,00	4,00	3,3333	,69985	4
P06A	99	1,00	4,00	3,3131	,73743	5
P10A	99	1,00	4,00	3,2525	,78693	6
P02A	99	1,00	4,00	3,2424	,71558	7
P04A	99	1,00	4,00	3,2222	,69334	8
P03A	99	1,00	4,00	3,2121	,75960	9
P11A	99	1,00	4,00	3,2020	,75566	10
P08A	99	1,00	4,00	3,1313	,81624	11
P09A	99	1,00	4,00	3,0101	,87476	12
P05A	99	1,00	4,00	2,9192	,81662	13

**Tab. 2.1.6.** The comparative ranking of the importance of practical competences according to Academics, Employers and Graduates – in order of items

Item	Mean A	Rank A	Mean E	Rank E	Mean G	Rank G
P01A	3,2987	2	3,4762	1	3,4646	1
P02A	3,0000	9	3,1905	8	3,2424	7
P03A	3,0779	8	3,2222	7	3,2121	9
P04A	3,1169	5	3,3651	3	3,2222	8
P05A	2,7792	11	2,8889	13	2,9192	13
P06A	3,1169	6	3,3387	4	3,3131	5
P07A	3,1818	4	3,1270	10	3,3333	4
P08A	2,6883	13	2,9048	12	3,1313	11
P09A	2,7792	12	3,0317	11	3,0101	12
P10A	3,0909	7	3,2857	6	3,2525	6
P11A	2,9481	10	3,1746	9	3,2020	10
P12A	3,2468	3	3,3175	5	3,3434	3
P13A	3,3506	1	3,3810	2	3,3838	2



**PRASKE – Inter-group differences for the level of importance****Tab. 2.2.1.** ANOVA analysis – for the significance of inter-group differences for the level of importance of practical competences

<b>Item</b>		<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
P2A	Between Groups	3,520	2	1,760	3,216	,042
	Within Groups	124,766	228	,547		
	Total	128,286	230			
P8A	Between Groups	9,375	2	4,688	7,724	,001
	Within Groups	138,374	228	,607		
	Total	147,749	230			
P11A	Between Groups	4,178	2	2,089	3,468	,033
	Within Groups	137,329	228	,602		
	Total	141,506	230			



**Tab. 2.2.2.** ANOVA analysis - Multiple comparisons between groups for the level of importance (Games-Howell)

Dependent Variable	(I) GRUP	(J) GRUP	Mean Difference (I-J)	Std. Error	Sig.
P2A	academics	employers	-,2340	,1289	,174
		graduates	-,2859(*)	,1160	,049
	employers	academics	,2340	,1289	,174
		graduates	-5,1948E-02	,1192	,890
	graduates	academics	,2859(*)	,1160	,049
		employers	5,195E-02	,1192	,890
P4A	academics	employers	-,2636(*)	,1119	,032
		graduates	-,1208	,1007	,450
	employers	academics	,2636(*)	,1119	,032
		graduates	,1429	,1035	,349
	graduates	academics	,1208	,1007	,450
		employers	-,1429	,1035	,349
P8A	academics	employers	-,2526	,1358	,130
		graduates	-,4791(*)	,1222	,000
	employers	academics	,2526	,1358	,130
		graduates	-,2266	,1256	,169
	graduates	academics	,4791(*)	,1222	,000
		employers	,2266	,1256	,169
P11A	academics	employers	-,2761	,1352	,111
		graduates	-,3035(*)	,1217	,037
	employers	academics	,2761	,1352	,111
		graduates	-2,7417E-02	,1251	,973
	graduates	academics	,3035(*)	,1217	,037
		employers	2,742E-02	,1251	,973

\* The mean difference is significant at the 0,05 level



**Tab. 2.2.3.** Significant differences between Academics and Employers for the level of importance of practical competences

Item	Group	N	Mean	Std. dev.	Std. err. mean	t	df	Sig. (2 tailed)
P4A	academics	69	3,1014	,5977	7,195E-02	-2,518	128,664	,013
	employers	63	3,3651	,6038	7,607E-02			
P6A	academics	69	3,0870	,8178	9,845E-02	-1,990	125,901	,049
	employers	62	3,3387	,6258	7,947E-02			
P11A	academics	69	2,8986	,8070	9,716E-02	-2,002	130	,047
	employers	63	3,1746	,7733	9,743E-02			

**Tab. 2.2.4.** Significant differences between Academics and Graduates for the level of importance of practical competences

Item	Group	N	Mean	Std. dev.	Std. err. mean	t	df	Sig. (2 tailed)
P2A	academics	69	2,9565	,8123	9,779E-02	-2,409	166	,017
	graduates	99	3,2424	,7156	7,192E-02			
P8A	academics	69	2,6522	,7441	8,958E-02	-3,945	1540,488	,000
	graduates	99	3,1313	,8162	8,204E-02			
P11A	academics	69	2,8986	,8070	9,716E-02	-2,490	166	,014
	graduates	99	3,2020	,7557	7,595E-02			



## Appendix 2.3.

**PRASKE – Intra-group differences for the level of importance****Tab. 2.3.1.** Gender differences for the level of importance of practical competences

Item	Group	N	Mean	Std. dev.	Std. err. Mean	t	df	Sig. (2tailed)
P9A	Male	64	2,7656	,90400	,11300	-4,044	97	,000
	Female	35	3,4571	,61083	,10325			
P10A	Male	64	3,1094	,83793	,10474	-2,513	97	,014
	Female	35	3,5143	,61220	,10348			

**Tab. 2.3.2.** Differences for the level of importance of practical competences according to year of graduation

Item	Group	N	Mean	Std. dev.	Std. err. mean	t	df	Sig. (2tailed)
P1A	before 2002	41	3,2927	,74980	,11710	-2,085	95	,040
	after 2003	56	3,5714	,56752	,07584			
P2A	before 2002	41	3,0732	,81824	,12779	-2,068	95	,041
	after 2003	56	3,3750	,61975	,08282			
P5A	before 2002	41	2,7073	,87304	,13635	-2,318	95	,023
	after 2003	56	3,0893	,74533	,09960			
P8A	before 2002	41	2,9024	,88896	,13883	-2,467	95	,015
	after 2003	56	3,3036	,71146	,09507			



**Appendix 2.4.****Ranking PRASKE – level of achievement – by means****Tab. 2.4.1.** The ranking of the achievement of practical competences according to Academics, Employers, and Graduates together – in decreasing order of means

<b>Item</b>	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Rank</b>
P07B	238	1,00	4,00	2,9370	,76322	1
P01B	238	1,00	4,00	2,8866	,79007	2
P13B	238	1,00	4,00	2,8613	,79137	3
P04B	238	1,00	4,00	2,8529	,74020	4
P12B	238	1,00	4,00	2,5588	,93835	5
P06B	237	1,00	4,00	2,5443	,91315	6
P02B	238	1,00	4,00	2,4538	,87870	7
P03B	237	1,00	4,00	2,4304	,87358	8
P10B	238	1,00	4,00	2,4160	,96744	9
P05B	238	1,00	4,00	2,3824	,84245	10
P11B	238	1,00	4,00	2,3235	,93251	11
P09B	238	1,00	4,00	2,2353	,93417	12
P08B	238	1,00	4,00	2,2269	,86602	13

**Tab. 2.4.2.** The ranking of the achievement of practical competences according to Academics, Employers, and Graduates together – in order of items

<b>Item</b>	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Rank</b>
P01B	238	1,00	4,00	2,8866	,79007	2
P02B	238	1,00	4,00	2,4538	,87870	7
P03B	237	1,00	4,00	2,4304	,87358	8
P04B	238	1,00	4,00	2,8529	,74020	4
P05B	238	1,00	4,00	2,3824	,84245	10
P06B	237	1,00	4,00	2,5443	,91315	6
P07B	238	1,00	4,00	2,9370	,76322	1
P08B	238	1,00	4,00	2,2269	,86602	13
P09B	238	1,00	4,00	2,2353	,93417	12
P10B	238	1,00	4,00	2,4160	,96744	9
P11B	238	1,00	4,00	2,3235	,93251	11
P12B	238	1,00	4,00	2,5588	,93835	5
P13B	238	1,00	4,00	2,8613	,79137	3



**Tab. 2.4.3.** The ranking of the achievement of practical competences according to Academics – in decreasing order of means

Item	N	Minimum	Maximum	Mean	Std. Deviation	Rank
P07B	77	2,00	4,00	3,1818	,66347	1
P01B	77	1,00	4,00	3,1688	,73274	2
P13B	77	1,00	4,00	3,1558	,72665	3
P04B	77	1,00	4,00	2,9221	,66424	4
P02B	77	1,00	4,00	2,8571	,91356	5
P06B	77	1,00	4,00	2,7662	,95829	6
P10B	77	1,00	4,00	2,7662	,95829	7
P12B	77	1,00	4,00	2,7143	,97140	8
P03B	76	1,00	4,00	2,7105	,81348	9
P11B	77	1,00	4,00	2,5974	,96327	10
P05B	77	1,00	4,00	2,4805	,82095	11
P08B	77	1,00	4,00	2,4156	,90830	12
P09B	77	1,00	4,00	2,4156	,87885	13

**Tab. 2.4.4.** The ranking of the achievement of practical competences according to Employers – in decreasing order of means

Item	N	Minimum	Maximum	Mean	Std. Deviation	Rank
P04B	63	1,00	4,00	2,8254	,85269	1
P01B	63	1,00	4,00	2,6825	,79971	2
P07B	63	1,00	4,00	2,6190	,81178	3
P13B	63	1,00	4,00	2,4921	,87755	4
P12B	63	1,00	4,00	2,2540	,91525	5
P06B	62	1,00	4,00	2,1774	,75800	6
P05B	63	1,00	4,00	2,1270	,75117	7
P03B	63	1,00	4,00	2,0952	,75593	8
P02B	63	1,00	3,00	2,0476	,68223	9
P08B	63	1,00	4,00	2,0000	,80322	10
P10B	63	1,00	4,00	1,9524	,70548	11
P11B	63	1,00	4,00	1,9524	,81178	12
P09B	63	1,00	4,00	1,8254	,77334	13



**Tab. 2.4.5.** The ranking of the achievement of practical competences according to Graduates – in decreasing order of means

Item	N	Minimum	Maximum	Mean	Std. Deviation	Rank
P07B	98	1,00	4,00	2,9490	,73740	1
P13B	98	1,00	4,00	2,8673	,68320	2
P04B	98	1,00	4,00	2,8163	,72292	3
P01B	98	1,00	4,00	2,7959	,77272	4
P12B	98	1,00	4,00	2,6327	,88966	5
P06B	98	1,00	4,00	2,6020	,90519	6
P05B	98	1,00	4,00	2,4694	,88753	7
P10B	98	1,00	4,00	2,4388	1,00582	8
P03B	98	1,00	4,00	2,4286	,91944	9
P02B	98	1,00	4,00	2,3980	,83407	10
P09B	98	1,00	4,00	2,3571	,99742	11
P11B	98	1,00	4,00	2,3469	,90931	12
P08B	98	1,00	4,00	2,2245	,84378	13

**Tab. 2.4.6.** The comparative ranking of the achievement of practical competences according to Academics, Employers and Graduates – in order of items

Item	Mean A	Rank A	Mean E	Rank E	Mean G	Rank G
P01B	3,1688	2	2,6825	2	2,7959	4
P02B	2,8571	5	2,0476	9	2,3980	10
P03B	2,7105	9	2,0952	8	2,4286	9
P04B	2,9221	4	2,8254	1	2,8163	3
P05B	2,4805	11	2,1270	7	2,4694	7
P06B	2,7662	6	2,1774	6	2,6020	6
P07B	3,1818	1	2,6190	3	2,9490	1
P08B	2,4156	12	2,0000	10	2,2245	13
P09B	2,4156	13	1,8254	13	2,3571	11
P10B	2,7662	7	1,9524	11	2,4388	8
P11B	2,5974	10	1,9524	12	2,3469	12
P12B	2,7143	8	2,2540	5	2,6327	5
P13B	3,1558	3	2,4921	4	2,8673	2



**Tab. 2.4.7.** The comparative ranking of the achievement of practical competences according to Academics, Employers and Graduates – in order of ranks

<b>Rank</b>	<b>Ranking of A</b>	<b>Mean A</b>	<b>Ranking of E</b>	<b>Mean E</b>	<b>Ranking of G</b>	<b>Mean G</b>
1	<b>P07B</b>	3,1818	<b>P04B</b>	2,8254	<b>P07B</b>	2,9490
2	<b>P01B</b>	3,1688	<b>P01B</b>	2,6825	<b>P13B</b>	2,8673
3	<b>P13B</b>	3,1558	<b>P07B</b>	2,6190	<b>P04B</b>	2,8163
4	<b>P04B</b>	2,9221	<b>P13B</b>	2,4921	<b>P01B</b>	2,7959
5	<b>P02B</b>	2,8571	<b>P12B</b>	2,2540	<b>P12B</b>	2,6327
6	<b>P06B</b>	2,7662	<b>P06B</b>	2,1774	<b>P06B</b>	2,6020
7	<b>P10B</b>	2,7662	<b>P05B</b>	2,1270	<b>P05B</b>	2,4694
8	<b>P12B</b>	2,7143	<b>P03B</b>	2,0952	<b>P10B</b>	2,4388
9	<b>P03B</b>	2,7105	<b>P02B</b>	2,0476	<b>P03B</b>	2,4286
10	<b>P11B</b>	2,5974	<b>P08B</b>	2,0000	<b>P02B</b>	2,3980
11	<b>P05B</b>	2,4805	<b>P10B</b>	1,9524	<b>P09B</b>	2,3571
12	<b>P08B</b>	2,4156	<b>P11B</b>	1,9524	<b>P11B</b>	2,3469
13	<b>P09B</b>	2,4156	<b>P09B</b>	1,8254	<b>P08B</b>	2,2245



**PRASKE – Inter-group differences for the level of achievement****Tab. 2.5.1.** ANOVA analysis – for the significance of inter-group differences for the level of achievement of practical competences

	Item	Sum of Squares	df	Mean Square	F	Sig,
P1B	Between Groups	9,109	2	4,555	7,631	,001
	Within Groups	135,482	227	,597		
	Total	144,591	229			
P2B	Between Groups	20,939	2	10,469	15,678	,000
	Within Groups	151,583	227	,668		
	Total	172,522	229			
P3B	Between Groups	11,104	2	5,552	7,730	,001
	Within Groups	162,311	226	,718		
	Total	173,415	228			
P5B	Between Groups	4,844	2	2,422	3,520	,031
	Within Groups	156,204	227	,688		
	Total	161,048	229			
P6B	Between Groups	10,822	2	5,411	6,859	,001
	Within Groups	178,296	226	,789		
	Total	189,118	228			
P7B	Between Groups	10,734	2	5,367	9,974	,000
	Within Groups	122,153	227	,538		
	Total	132,887	229			
P9B	Between Groups	13,677	2	6,839	8,170	,000
	Within Groups	190,014	227	,837		
	Total	203,691	229			
P10B	Between Groups	20,025	2	10,012	11,791	,000
	Within Groups	192,758	227	,849		
	Total	212,783	229			
P11B	Between Groups	11,675	2	5,838	7,193	,001
	Within Groups	184,221	227	,812		
	Total	195,896	229			
P12B	Between Groups	7,368	2	3,684	4,273	,015
	Within Groups	195,698	227	,862		
	Total	203,065	229			
P13B	Between Groups	14,706	2	7,353	12,813	,000
	Within Groups	130,268	227	,574		
	Total	144,974	229			



**Tab. 2.5.2.** ANOVA analysis - Multiple comparisons between groups for the level of achievement (Games-Howell)

Dependent Variable	(I) GRUP	(J) GRUP	Mean Difference (I-J)	Std, Error	Sig,
P1B	academics	employers	,4914(*)	,1346	,001
		graduates	,3780(*)	,1214	,004
	employers	academics	-,4914(*)	,1346	,001
		graduates	-,1134	,1248	,647
	graduates	academics	-,3780(*)	,1214	,004
		employers	,1134	,1248	,647
P2B	academics	employers	,7930(*)	,1424	,000
		graduates	,4426(*)	,1284	,004
	employers	academics	-,7930(*)	,1424	,000
		graduates	-,3503(*)	,1320	,010
	graduates	academics	-,4426(*)	,1284	,004
		employers	,3503(*)	,1320	,010
P3B	academics	employers	,5812(*)	,1482	,000
		graduates	,2479	,1338	,162
	employers	academics	-,5812(*)	,1482	,000
		graduates	-,3333(*)	,1369	,033
	graduates	academics	-,2479	,1338	,162
		employers	,3333(*)	,1369	,033
P6B	academics	employers	,5472(*)	,1554	,001
		graduates	,1226	,1396	,686
	employers	academics	-,5472(*)	,1554	,001
		graduates	-,4246(*)	,1441	,004
	graduates	academics	-,1226	,1396	,686
		employers	,4246(*)	,1441	,004
P7B	academics	employers	,5694(*)	,1278	,000
		graduates	,2394	,1153	,068
	employers	academics	-,5694(*)	,1278	,000
		graduates	-,3299(*)	,1185	,025
	graduates	academics	-,2394	,1153	,068
		employers	,3299(*)	,1185	,025
P9B	academics	employers	,5659(*)	,1594	,000
		graduates	3,416E-02	,1438	,971
	employers	academics	-,5659(*)	,1594	,000
		graduates	-,5317(*)	,1477	,000
	graduates	academics	-3,4161E-02	,1438	,971
		employers	,5317(*)	,1477	,000



<b>Dependent Variable</b>	<b>(I) GRUP</b>	<b>(J) GRUP</b>	<b>Mean Difference (I-J)</b>	<b>Std, Error</b>	<b>Sig,</b>
P10B	academics	employers	,7723(*)	,1606	,000
		graduates	,2859	,1448	,154
	employers	academics	-,7723(*)	,1606	,000
		graduates	-,4864(*)	,1488	,001
	graduates	academics	-,2859	,1448	,154
		employers	,4864(*)	,1488	,001
P11B	academics	employers	,5839(*)	,1570	,000
		graduates	,1893	,1416	,407
	employers	academics	-,5839(*)	,1570	,000
		graduates	-,3946(*)	,1455	,011
	graduates	academics	-,1893	,1416	,407
		employers	,3946(*)	,1455	,011
P12B	academics	employers	,4272(*)	,1618	,027
		graduates	4,851E-02	,1459	,944
	employers	academics	-,4272(*)	,1618	,027
		graduates	-,3787(*)	,1499	,026
	graduates	academics	-4,8506E-02	,1459	,944
		employers	,3787(*)	,1499	,026
P13B	academics	employers	,6674(*)	,1320	,000
		graduates	,2921(*)	,1190	,026
	employers	academics	-,6674(*)	,1320	,000
		graduates	-,3753(*)	,1223	,013
	graduates	academics	-,2921(*)	,1190	,026
		employers	,3753(*)	,1223	,013

\* The mean difference is significant at the .05 level.



**Tab. 2.5.3.** Significant differences between Academics and Employers for the level of achievement of practical competences

Item	Group	N	Mean	Std. dev.	Std. err. mean	t	df	Sig. (2 tailed)
P1B	academics	69	3,1739	,7467	8,989E-02	3,651	130	,000
	employers	63	2,6825	,7997	,1008			
P2B	academics	69	2,8406	,9014	,1085	5,657	130	,000
	employers	63	2,0476	,6822	8,595E-02			
P3B	academics	68	2,6765	,8185	9,925E-02	4,213	129	,000
	employers	63	2,0952	,7559	9,524E-02			
P5B	academics	69	2,4203	,8118	9,773E-02	2,148	130	,034
	employers	63	2,1270	,7512	9,464E-02			
P6B	academics	69	2,7246	,9684	,1166	3,573	129	,000
	employers	62	2,1774	,7580	9,627E-02			
P7B	academics	69	3,1884	,6480	7,801E-02	4,472	130	,000
	employers	63	2,6190	,8118	,1023			
P8B	academics	69	2,3623	,9231	,1111	2,395	130	,018
	employers	63	2,0000	,8032	,1012			
P9B	academics	69	2,3913	,9110	,1097	3,829	130	,000
	employers	63	1,8254	,7733	9,743E-02			
P10B	academics	69	2,7246	,9684	,1166	5,194	130	,000
	employers	63	1,9524	,7055	8,888E-02			
P11B	academics	69	2,5362	,9638	,1160	3,746	130	,000
	employers	63	1,9524	,8118	,1023			
P12B	academics	69	2,6812	,9925	,1195	2,563	130	,012
	employers	63	2,2540	,9153	,1153			
P13B	academics	69	3,1594	,7401	8,910E-02	4,736	130	,000
	employers	63	2,4921	,8776	,1106			



**Tab. 2.5.4.** Significant differences between Employers and Graduates for the level of achievement of practical competences

Item	Groups	N	Mean	Std, dev,	Std, err, mean	t	df	Sig, (2 tailed)
P2B	employers	63	2,0476	,6822	8,595E-02	-2,787	159	,006
	graduates	98	2,3980	,8341	8,425E-02			
P3B	employers	63	2,0952	,7559	9,524E-02	-2,402	159	,017
	graduates	98	2,4286	,9194	9,288E-02			
P5B	employers	63	2,1270	,7512	9,464E-02	-2,533	159	,012
	graduates	98	2,4694	,8875	8,965E-02			
P6B	employers	62	2,1774	,7580	9,627E-02	-3,073	158	,002
	graduates	98	2,6020	,9052	9,144E-02			
P7B	employers	63	2,6190	,8118	,1023	-2,663	159	,009
	graduates	98	2,9490	,7374	7,449E-02			
P9B	employers	63	1,8254	,7733	9,743E-02	-3,593	159	,000
	graduates	98	2,3571	,9974	,1008			
P10B	employers	63	1,9524	,7055	8,888E-02	-3,344	159	,001
	graduates	98	2,4388	1,0058	,1016			
P11B	employers	63	1,9524	,8118	,1023	-2,800	159	,006
	graduates	98	2,3469	,9093	9,185E-02			
P12B	employers	63	2,2540	,9153	,1153	-2,590	129	,011
	graduates	98	2,6327	,8897	8,987E-02			
P13B	employers	63	2,4921	,8776	,1106	-3,038	159	,003
	graduates	98	2,8673	,6832	6,901E-02			

**Tab. 2.5.5.** Significant differences between Academics and Graduates for the level of achievement of practical competences

Item	Groups	N	Mean	Std, dev	Std, err, mean	t	df	Sig, (2 tailed)
P1B	academics	69	3,1739	,7467	8,989E-02	3,156	165	,002
	graduates	98	2,7959	,7727	7,806E-02			
P2B	academics	69	2,8406	,9014	,1085	3,266	165	,001
	graduates	98	2,3980	,8341	8,425E-02			
P7B	academics	69	3,1884	,6480	7,801E-02	2,220	157,024	,028
	graduates	98	2,9490	,7374	7,449E-02			
P13B	academics	69	3,1594	,7401	8,910E-02	2,628	165	,009
	graduates	98	2,8673	,6832	6,901E-02			



**PRASKE – Intra-group differences for the level of achievement**

**Tab. 2.6.1.** Differences for the level of achievement of the practical competences by enterprise size

Item	Enterprise size	N	Mean	Std. dev.	Std. err. mean	t	df	Sig. (2 tailed)
P1B	Small	30	2,3667	,80872	,14765	-2,664	56	,010
	Large	28	2,8929	,68526	,12950			
P2B	Small	30	1,8000	,71438	,13043	-2,794	56	,007
	Large	28	2,2857	,59982	,11336			
P7B	Small	30	2,4000	,89443	,16330	-2,151	56	,036
	Large	28	2,8571	,70523	,13328			
P8B	Small	30	1,7667	,67891	,12395	-2,731	56	,008
	Large	28	2,3214	,86297	,16309			
P9B	Small	30	1,6000	,62146	,11346	-2,335	56	,023
	Large	28	2,0714	,89974	,17003			
P10B	Small	30	1,8000	,71438	,13043	-2,078	56	,042
	Large	28	2,1786	,66964	,12655			
P11B	Small	30	1,6333	,71840	,13116	-3,506	54,888	,001
	Large	28	2,3214	,77237	,14596			
P13B	Small	30	2,2000	,84690	,15462	-2,950	55,712	,005
	Large	28	2,8571	,84828	,16031			



**Tab. 2.6.2.** Age differences for the level of achievement of practical competences

Item	Age	N	Mean	Std. dev.	Std. err. mean	t	df	Sig. (2 tailed)
P2B	< 30 years	59	2,5932	,76831	,10003	2,963	96	,004
	> 30 years	39	2,1026	,85208	,13644			
P3B	< 30 years	59	2,5763	,91356	,11894	1,985	96	,050
	> 30 years	39	2,2051	,89382	,14313			
P6B	< 30 years	59	2,7966	,80472	,10477	2,701	96	,008
	> 30 years	39	2,3077	,97748	,15652			
P8B	< 30 years	59	2,4576	,83711	,10898	3,561	96	,001
	> 30 years	39	1,8718	,73196	,11721			
P12B	< 30 years	59	2,8305	,83362	,10853	2,802	96	,006
	> 30 years	39	2,3333	,89834	,14385			

**Tab. 2.6.3.** Differences for the level of achievement of practical competences by year of graduation

Item	Year of graduation	N	Mean	Std. error	Std. err. mean	t	df	Sig. (2 tailed)
P2B	Before 2002	40	2,1500	,86380	,13658	-	94	,015
	After 2003	56	2,5714	,78293	,10462	2,490		
P3B	Before 2002	40	2,1750	,93060	,14714	-	81,708	,025
	After 2003	56	2,6071	,88787	,11865	2,286		
P8B	Before 2002	40	1,9500	,81492	,12885	-	94	,006
	After 2003	56	2,4286	,82808	,11066	2,810		
P12B	Before 2002	40	2,3500	,92126	,14566	-	94	,013
	After 2003	56	2,8036	,81842	,10937	2,540		



**Appendix 2.7.****PRASKE – differences between levels of importance and achievement  
according to Academics, Employers, and Graduates****Tab. 2.7.1.** Paired Sample Test for differences of mean between importance and achievement of practical competences according to Academics, Employers and Graduates together – decreasing order of difference

	Item	Mean	Std. dev.	Std. error mean	t	df	Sig. (2 tailed)	Rank of impor- tance
Pair 10	P10A - P10B	,79412	1,04116	,06749	11,767	237	,000	7
Pair 11	P11A - P11B	,78992	1,09755	,07114	11,103	237	,000	10
Pair 12	P12A - P12B	,74790	1,09636	,07107	10,524	237	,000	3
Pair 3	P3A - P3B	,74262	1,00275	,06514	11,401	236	,000	8
Pair 6	P6A - P6B	,71730	1,00013	,06497	11,041	236	,000	4
Pair 9	P9A - P9B	,71008	,97001	,06288	11,293	237	,000	11
Pair 8	P8A - P8B	,70588	,98386	,06377	11,068	237	,000	12
Pair 2	P2A - P2B	,70168	1,00593	,06520	10,761	237	,000	9
Pair 1	P1A - P1B	,52521	,94433	,06121	8,580	237	,000	1
Pair 13	P13A - P13B	,51681	,97529	,06322	8,175	237	,000	2
Pair 5	P5A - P5B	,48319	,87495	,05671	8,520	237	,000	13
Pair 4	P4A - P4B	,37395	,80010	,05186	7,210	237	,000	6
Pair 7	P7A - P7B	,28992	,93003	,06029	4,809	237	,000	5



**Tab. 2.7.2.** Paired Sample Test for differences of mean between importance and achievement of practical competences according to Academics – decreasing order of difference

Item		Mean	Std. Dev.	Std. err. mean	t	df	Sig. (2 tailed)	Rank of importance
Pair 12	P12A - P12B	,5507	1,0646	,1282	4,297	68	,000	3
Pair 9	P9A - P9B	,3913	,7711	9,283E-02	4,215	68	,000	12
Pair 3	P3A - P3B	,3676	,8447	,1024	3,589	67	,001	8
Pair 6	P6A - P6B	,3623	,8039	9,677E-02	3,744	68	,000	6
Pair 11	P11A - P11B	,3623	1,0568	,1272	2,848	68	,006	10
Pair 10	P10A - P10B	,3478	,8715	,1049	3,315	68	,001	7
Pair 5	P5A - P5B	,2899	,8063	9,706E-02	2,986	68	,004	11
Pair 8	P8A - P8B	,2899	,8063	9,706E-02	2,986	68	,004	13
Pair 4	P4A - P4B	,2029	,6548	7,883E-02	2,574	68	,012	5
Pair 13	P13A - P13B	,1884	,8957	,1078	1,747	68	,0815	1
Pair 1	P1A - P1B	,1304	,8028	9,665E-02	1,350	68	,1822	2
Pair 2	P2A - P2B	,1159	,9320	,1122	1,033	68	,3095	9
Pair 7	P7A - P7B	-,0290	,7065	8,505E-02	-,341	68	,7344	4

**Tab. 2.7.3.** Paired Sample Test for differences of mean between importance and achievement of practical competences according to Employers – decreasing order of difference

Item		Mean	Std. dev.	Std. error mean	t	df	Sig. (2 tailed)	Rank of importance
Pair 10	P10A - P10B	1,3333	,9333	,1176	11,340	62	,000	6
Pair 11	P11A - P11B	1,2222	1,0071	,1269	9,632	62	,000	9
Pair 9	P9A - P9B	1,2063	1,0026	,1263	9,551	62	,000	11
Pair 6	P6A - P6B	1,1613	1,0113	,1284	9,042	61	,000	4
Pair 2	P2A - P2B	1,1429	,9308	,1173	9,746	62	,000	8
Pair 3	P3A - P3B	1,1270	,9068	,1142	9,864	62	,000	7
Pair 12	P12A - P12B	1,0635	1,1198	,1411	7,538	62	,000	5
Pair 8	P8A - P8B	,9048	,9954	,1254	7,215	62	,000	12
Pair 13	P13A - P13B	,8889	1,0335	,1302	6,827	62	,000	2
Pair 1	P1A - P1B	,7937	1,0948	,1379	5,754	62	,000	1
Pair 5	P5A - P5B	,7619	,9108	,1147	6,640	62	,000	13
Pair 4	P4A - P4B	,5397	,9474	,1194	4,521	62	,000	3
Pair 7	P7A - P7B	,5079	1,0453	,1317	3,857	62	,000	10



**Tab. 2.7.4.** Paired Sample Test for differences of mean between importance and achievement of practical competences according to Graduates – decreasing order of difference

Item		Mean	Std. dev.	Std. error mean	t	df	Sig. (2 tailed)	Rank of importance
Pair 8	P8A - P8B	,9184	1,0120	,1022	8,983	97	,000	11
Pair 2	P2A - P2B	,8571	,9082	9,174E-02	9,343	97	,000	7
Pair 11	P11A - P11B	,8571	1,0745	,1085	7,897	97	,000	10
Pair 10	P10A - P10B	,8163	1,0586	,1069	7,634	97	,000	6
Pair 3	P3A - P3B	,7857	1,0769	,1088	7,222	97	,000	9
Pair 6	P6A - P6B	,7245	1,0232	,1034	7,009	97	,000	5
Pair 12	P12A - P12B	,7143	1,0936	,1105	6,466	97	,000	3
Pair 1	P1A - P1B	,6633	,8609	8,696E-02	7,627	97	,000	1
Pair 9	P9A - P9B	,6633	,9733	9,832E-02	6,746	97	,000	12
Pair 13	P13A - P13B	,5306	,9328	9,423E-02	5,631	97	,000	2
Pair 5	P5A - P5B	,4490	,8630	8,718E-02	5,150	97	,000	13
Pair 4	P4A - P4B	,4082	,7843	7,923E-02	5,152	97	,000	8
Pair 7	P7A - P7B	,3776	,9580	9,678E-02	3,901	97	,000	4



**PRASKE – Intra-group differences for the answers at items 18-22****Tab. 2.8.1.** Age differences for the answers at items 18-22

Item	Age	N	Mean	Std. deviation	t	df	Sig. (2-tailed)	Mean diff.
P18	< 30 years	59	3,627	1,096	3,101	97	,003	,702
	> 30 years	40	2,925	1,118				
P19	< 30 years	59	3,491	1,040	3,532	79,6	,001	,773
	> 30 years	39	2,717	1,074				
P20	< 30 years	59	3,593	1,002	2,515	96	,014	,516
	> 30 years	39	3,076	,983				
P21	< 30 years	58	2,344	,828	1,260	95	,211	,216
	> 30 years	39	2,128	,832				
P22	< 30 years	59	2,559	,676	1,995	96	,049	,302
	> 30 years	39	2,256	,818				

**Tab. 2.8.2.** Differences according to year of graduation for the answers at items 18-22

Item	Graduation	N	Mean	Std. dev.	Std. Err. mean	t	df	Sig (2 tailed)	Mean diff.
P18	before 2002	41	2,926	1,058	,165	-3,049	95	,003	-,698
	after 2003	56	3,625	1,153	,154				
P19	before 2002	41	2,731	1,000	,156	-3,418	94	,001	-,741
	after 2003	55	3,472	1,086	,146				
P20	before 2002	41	3,097	,969	,151	-2,269	94	,026	-,466
	after 2003	55	3,563	1,014	,136				
P21	before 2002	41	2,097	,830	,129	-1,690	93	,094	-,291
	after 2003	54	2,388	,833	,113				
P22	before 2002	41	2,292	,782	,122	-1,645	94	,103	-,252
	after 2003	55	2,545	,715	,096				