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TUNING INDUSTRIAL EDUCATIONAL STRUCTURES IN EUROPE

Part I

Defining and Updating Generic and Specific Competences in Subjects Relevant for the Industrial Sector

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The EUI-Net Research team

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Part I

TUNING RESEARCH ON GENERIC AND SPECIFIC COMPETENCES FOR WORKING IN ENTERPRISES

Chapter 1

THE UNIVERSITIES AND THE SOCIAL AND ECONOMIC ENVIRONMENT: ADAPTING TO CHANGE

Marcela Rodica LUCA*

The last decades and the continuous integration of economies, the progressive enlargement of the European Union, as well as the rapid changes in the educational systems of different countries, have confronted universities, as producers and transmitters of knowledge, with some major challenges. The world of work is a dynamic space in which the quick pace of change regarding work content and requirements triggers the necessity to adapt employees and future candidates to this change. As an education provider, the university is called to produce competences at the highest level, to train students who will maintain and accelerate the pace of change; in other words, the university becomes a leader of change and of economic growth. This role in society involves a huge responsibility towards the educational process. The adaptation of the curricula in order to respond to these changes shows the flexible way in which the university responds to the demand of competences on the labour market.

The university focuses on generic competences and subject-specific competences that are the backbone of different professions. The quality of the education provided by the university is given, among other things, by the graduates' capacity to transfer and adapt these competences in order to meet the requirements of a particular job. Thus, the competences gained at university represent the ground of any future learning of new competences related to the profession. They enable graduates not only to adapt to work requirements, but also to involve in continuing training and life-long learning in a proactive way and to respond to the challenge of work changes.

The educational system is a very stable system and this is one of its main strengths. But when confronted to the changes in society, this stability could quickly become a weakness. Too much stability and inertia in the educational programs provided by the university could lead to teaching students already obsolete things. Opening a dialog with stakeholders such as graduates, employers, professional bodies and others in order to identify and anticipate the competences needed on the

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labour market provides feedback at the end of the educational process and indicates how adequate the education given by the university is. At the same time, the continuous adaptation of the curricula to the changes in the world of work is the only way to increase the employability of the graduates.

In Europe, there are several examples of the way universities are concerned with adapting to the dynamic changes in economy and society. The most important is the TUNING research, which is a landmark in the educational research for higher education. One major challenge was the fact that different countries had different configurations of the educational systems and especially of higher education. In this context, the TUNING project, started in 2001, intended to "tune" the educational structures in Europe in the frame of the Bologna process. The aim of the project was to make it possible for the compatibility, comparability and competitiveness in higher education and to respond to the increased students' mobility between the universities in EU. At the same time, the employers from inside and outside Europe were offered coherent and *"reliable information about what a qualification, a degree stands for in practice"* (Gonzales & Wagenaar, 2003, p. 21).

As stated in the introduction of the Final Report Phase I, *"The rationale behind Tuning is the implementation at the university level of the process following the Bologna Declaration of 1999, by making use of the experiences built up in the ERASMUS and SOCRATES programme since 1987. In this respect, the European Credit Transfer and Accumulation System (ECTS) is of particular importance. The project focuses on generic and subject-specific competences of first and second cycle graduates. In addition, it has a direct impact on academic recognition, quality assurance and control, compatibility of study programmes on European level, distance learning and lifelong learning"* (id., pp. 21-22). The research comprised four directions: to develop professional profiles in terms of generic and specific subject-related competences (directions 1 and 2), to design a new perspective on ECTS as a transfer and accumulation system (direction 3), and to create a common ground for the approaches to teaching and learning, assessment, performance, and quality (direction 4).

For direction 1, a generic competences profile was produced, which encompasses the competences considered important by three groups of stakeholders: academics, employers and graduates. For direction 2 of the research, seven subject-specific competences profiles were produced: Business Administration, Chemistry, Earth Sciences, Educational Sciences, History, Mathematics, and Physics. This initial stage was followed by phase 2, which developed another two subject-specific competences profile: European studies and Nursing (Gonzales, Wagenaar, 2005).

Other studies related to the correspondence between the university curricula and the requirements of the world of work extensively contributed to the adaptation of higher education to social changes. One example is the Henley Report which analyses the quality of the education provided to engineers in the United Kingdom, the expectancies towards them on the employment market and the prospective of engineering education (Spinks, Silburn & Birchal, 2006). Another interesting study to mention is the report provided by the European thematic network for doctoral education in computing that undertook a similar research for doctoral education in the above mentioned subject (ETN DEC Project, 2005).

The thematic network TREE – Teaching and Research in Engineering in Europe provided four lines of research: A – Tuning research, B – Education and research synergies, C – Enhancing the attractiveness of engineering education, and D – Sustainability. The outputs of the network present a comprehensive panorama of the engineering education in Europe and represent a notable development of knowledge and expertise in adapting higher education to the European common educational space and to the challenges of the future (TREE Project).

In Romania, several Tempus projects were aimed at the renewal of the curricula. In 1997, one of these projects, whose coordinator was Transilvania University (Chiriacescu, 1999), attempted to identify the competence requirements unfulfilled by universities and to offer complementary training within a summer school frame. At the time, research was conducted in three cities and the respondents were academics, graduates and employers who evaluated the level of achievement of the competences for work, at the level of the university. Amongst the training needs identified in the research, three categories were considered important: communication skills for work, competences in initiating and running small business and knowledge on legal issues related to work, employment, and unemployment.

Three 30-hour modules addressing the above mentioned training needs were designed and implemented in a 3-week summer school organized simultaneously at Transilvania University in Brasov, Lucian Blaga University in Sibiu, and Gheorghe Asachi Technical University in Iasi. The participants were very satisfied by the competences achieved, but a "side effect" was as well very important: academics in university became more aware of the importance of generic competences such as social skills, knowledge of organizations, or entrepreneurial skills. This led to redesigning some of the curricula in engineering faculties in order to include new disciplines such as "Communication skills", "Organizational behaviour", "Marketing management for small business".

The EUI-Net project was started in 2005.

Consulting stakeholders on the importance of different categories of competences required by the labour market becomes more important and must be done on a regular basis. The aim of our research in the EUI-Net project is to extend the initial TUNING Research to a new topic - the match between the competences given by universities and the general requirements of the work in enterprises - and to add a new category of competences - the practical ones.

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Chapter 2

METHODOLOGY OF THE RESEARCH

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Simona LACHE, Ioan Călin ROSCA, Eugen BUTILĂ*

2.1. Participants and procedure

The research investigated three groups, considered as being the most important stakeholders involved in the mission the university has, i.e. to educate students: the academics, the employers and the graduates themselves. Participants from each group were asked to fill in a questionnaire with three sections: generic competences (see Appendix 1), specific competences (see Appendix 2) and practical competences (see Appendix 3).

Participants from 20 countries answered the questionnaires. The participants were contacted by the local partners in each country and kindly asked to contribute in the research by filling in the questionnaires[1]. In the end, a total of 240 valid questionnaires were retained: 77 Academics, 64 Employers, and 99 Graduates (see Tab. 2.1).

Tab. 2.1. Valid questionnaires per country and groups of respondents

Countries	Academics	Employers	Graduates	Total
Austria	0	1	10	**11**
Belgium	1	1	2	**4**
Bulgaria	4	5	3	**12**
Cyprus	4	3	3	**10**
Estonia	0	1	1	**2**
Finland	3	0	0	**3**
France	2	5	14	**21**
Germany	8	4	5	**17**
Greece	2	4	1	**7**
Hungary	3(1)	2(2)	3(3)	**8**
Italy	1	1	4	**6**

* Transilvania University, Braşov, Romania.
[1] See the cover letter for the on-line and for the download format in Appendix 1.4.

Countries	Academics	Employers	Graduates	Total
Lithuania	5	11	0	**16**
Malta	4	5	8	**17**
Netherlands	0	2	1	**3**
Poland	3	0	2	**5**
Portugal	11	2	2	**15**
Romania	9	4	29	**42**
Slovakia	6	1	0	**7**
Spain	10	9	6	**25**
UK	1	3	5	**9**
Total	**77**	**64**	**99**	**240**

The selection of the participants was based only on goodwill and availability, no random sampling technique was used. Even if this fact could be a weak point of the research, we consider that, for an exploratory research, the procedure is acceptable. The expertise and the amount of work required by filling in the questionnaire being considerable, only motivated participants were expected to find the time and to accept to answer.

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).

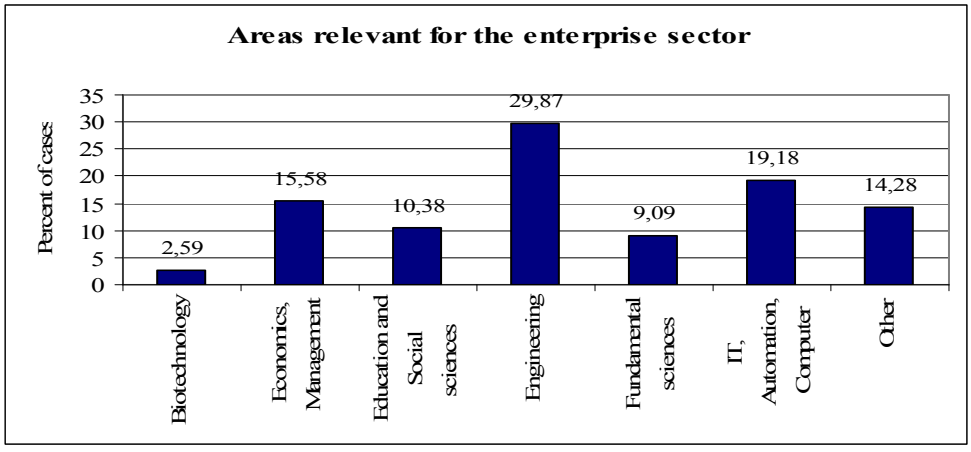

Fig. 2.1. Areas relevant for the enterprise sector Academics refer to

The relevant areas for the enterprises the Academics refer to were divided into six categories: biotechnology, economy and management, education and social sciences, technology & 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 Fig. 2.1).

As it is shown in the figure above, most of the Academics 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 into the following categories, according to their **position** in the enterprise: managers (for any managing position), experts (important positions) without managerial role, owners and others (such as consultant) see Fig. 2.2. The respondents were selected by the project partners out of the enterprise managers and owners, human resources managers, and other persons having contacts with graduates in their professional life - such as experts or trainers.

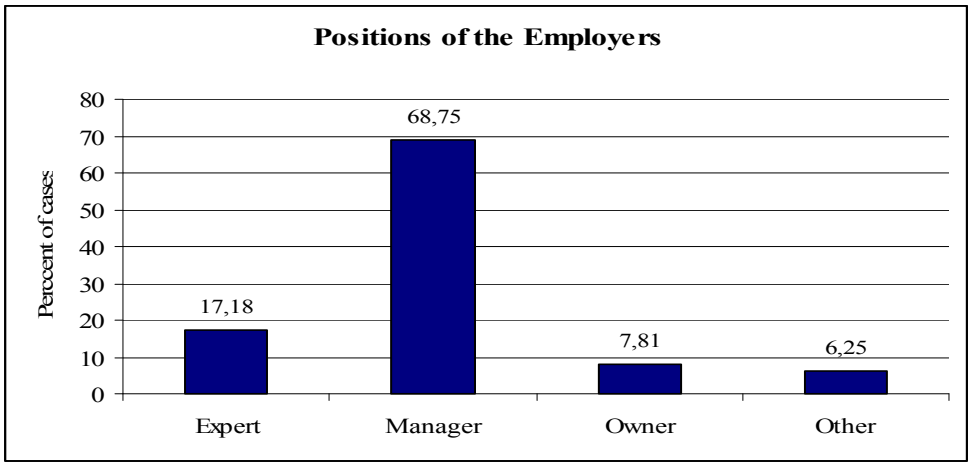

Fig. 2.2. Positions held in the organization by the respondents in the group of Employers

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 that IT and communication), continuing education (such as E-learning, human resource development) and others (see Fig. 2.3).

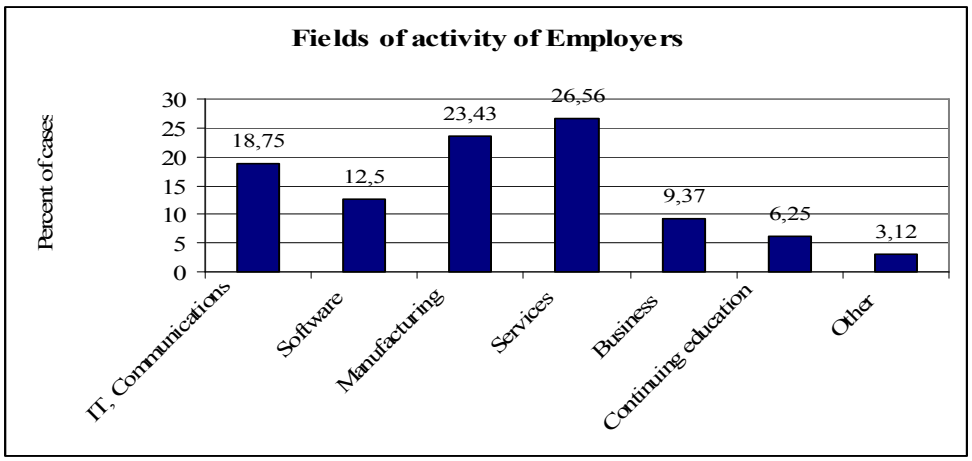

Fig. 2.3. Fields of activity for Employers

The enterprises the Employers came from were divided into the following categories, according to the **number of employees**: Very small (1-10 employees), Small (11-200 employees), Medium (201-1000 employees), and Big (more than 1001 employees) (see Fig. 2.4).

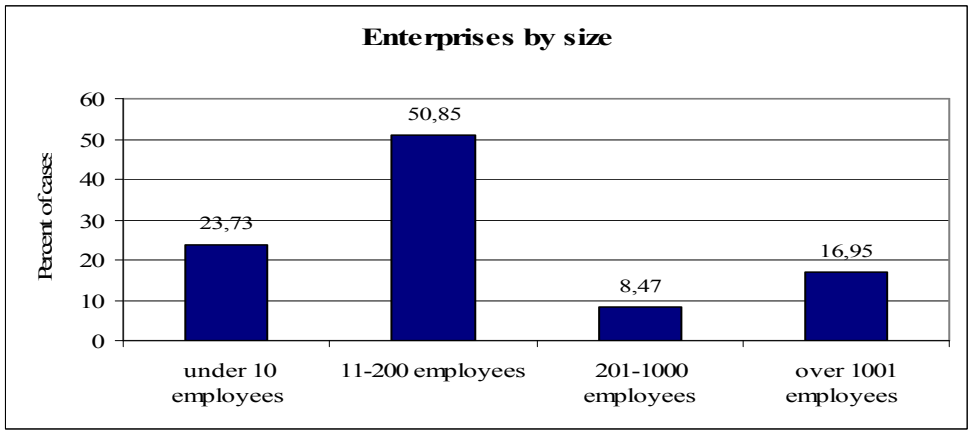

Fig. 2.4. Size of enterprise according to the number of employees

The presence in the group of Employers of representatives form very small, small and medium sized enterprises corresponds to the increasing importance of the enterprises of these types in employing graduates and their openness to dialogues with universities. For reasons of statistical comparisons the Employers were divided in two new categories, according to the value of median – 40 employees: under 40 and over 41 employees.

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) (see Tab. 2.1.). In order to have a larger range of respondents in terms of work experience, we included in the group respondents who graduated more than 5 years before.

Tab. 2.2. 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%

More than half of the respondents were under 27 years of age (see Tab. 2.2); 26,8% of the respondents graduated before 1999; from those recently graduated, the majority (57,7%) graduated after 2003. The percentages of Graduates according to the period of graduation are presented in Fig. 2.5.

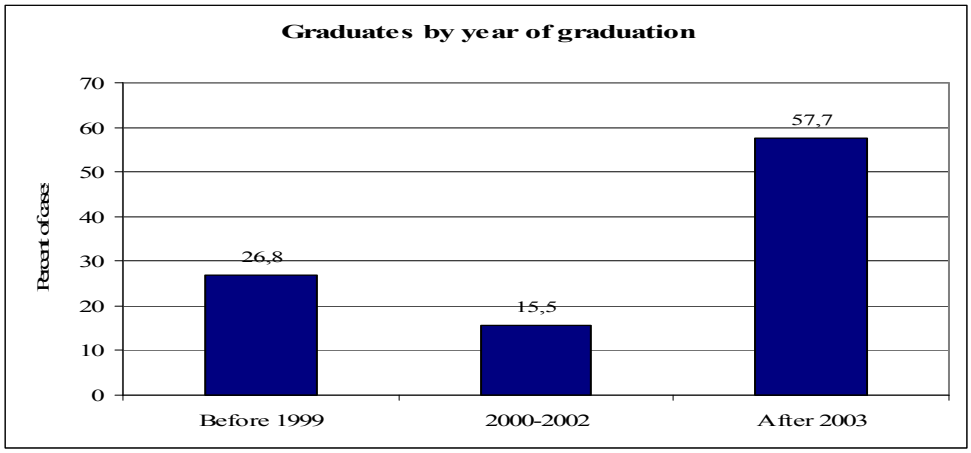

Fig. 2.5. The structure of the Graduates group according to year of graduation

Employment situation, diploma level and area of employment At the moment of answering 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 doing further study (9,08), and a small percent (2,02%) were looking for the first job (see Fig. 2.6.).

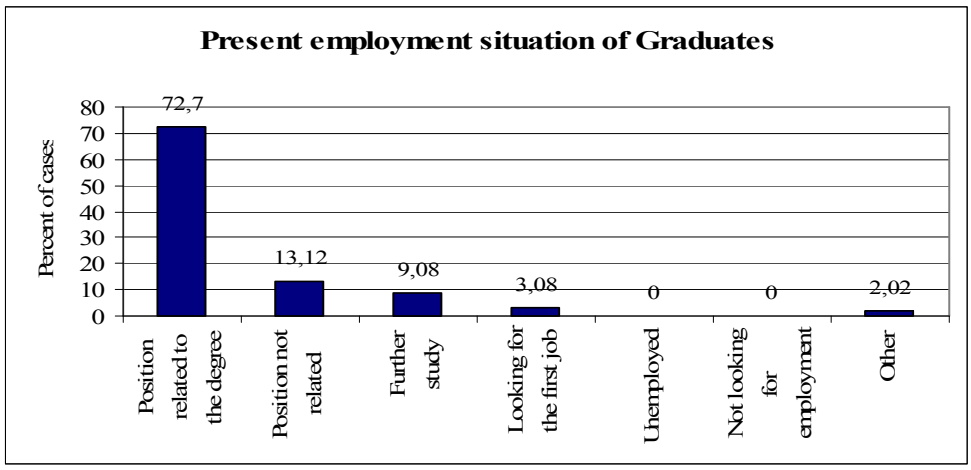

Fig. 2.6. Present employment situation of the respondents from the group of Graduates

It has to be mentioned that the first category of respondents (employed in a position related to the diploma degree) also comprises the Graduates who were employed, but who were also doing further studies at the same time, as for example most of the Romanian Graduates.

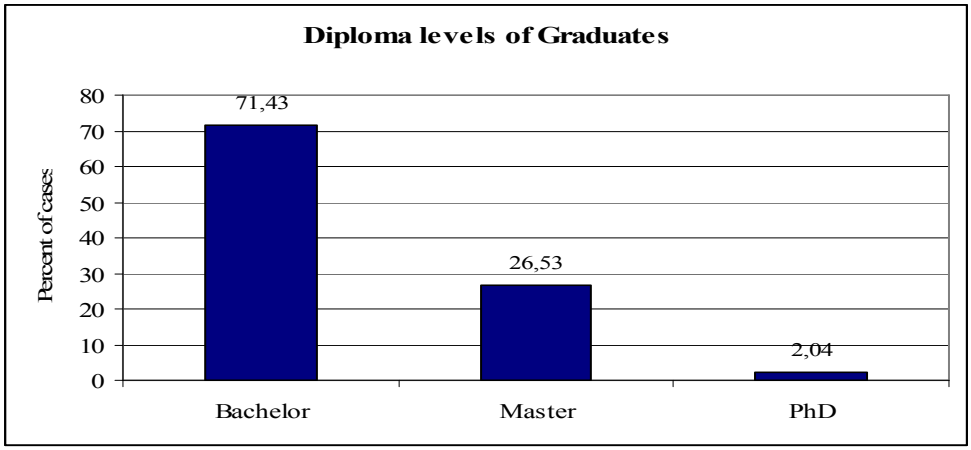

Fig. 2.7. Diploma level of the respondents in the group of Graduates

Most of the respondents in the group of Graduates (71,43%) had a diploma equivalent for the first cycle (see Fig. 2.7.).

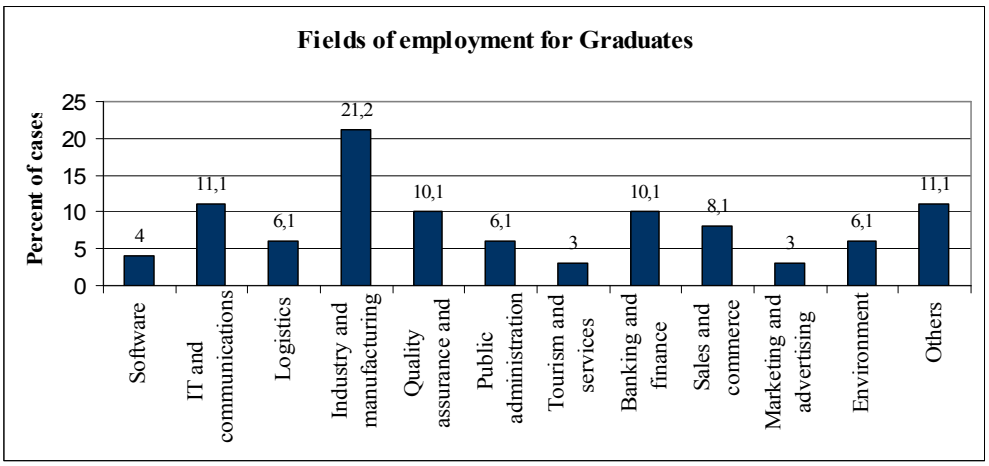

Fig. 2.8. Fields of employment for the Graduates

Almost a quarter of the respondents are working in industry and manufacturing (21,2%), but others are working 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 come from provides a large range of perspectives on the issues related to 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, but a new section for Practical competences was added (see Appendices 1).

The questionnaires, in English, were available in two formats: on-line and downloadable Word format. Each group had a set o three questionnaires organized in one folder (on-line version) or one paper form. Thus they were able to answer the three sections in one form. Only the group of Academics had a different task related to filling in the Generic competences questionnaire, all other questionnaires having similar requirements (see Tab. 2.3).

For the on-line format, it was possible to send the questionnaire only when all the fields were completed. The Word format questionnaire could be filled 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, it was possible that some relevant fields 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.

Table 2.3. Groups of participants and types of questionnaires

<table>
<tr><th></th><th>Generic competences[2]
GESKE</th><th>Specific competences[3]
SPECOE</th><th>Practical competences[4]
PRASKE</th></tr>
<tr><td>Academics</td><td>Ranking 17 competences according to importance
(The original Tuning Questionnaire was used for comparison reasons)</td><td rowspan="3">Comparing the importance of the skill for the 1st cycle (undergraduate) and for the 2nd cycle (postgraduate) diploma on a 4-step scale
(Specially designed questionnaire)</td><td rowspan="3">Comparing the importance of the skill for the work in enterprise and the extent to which it is developed at university on a 4-step scale
(Specially designed questionnaire)</td></tr>
<tr><td>Employers</td><td rowspan="2">Comparing the importance of the skill for the work in enterprises, and the extent to which it is developed at university
(The original Tuning Questionnaire was used for comparison reasons)</td></tr>
<tr><td>Graduates</td></tr>
</table>

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.

Questionnaires for Generic skills/ competences[5] (GESKE)

Content and structure of the questionnaires The first section, Generic competences, was kept from the original Tuning research, in two different versions: for the group of Academics, the assignment was to rank by importance 17 generic competences; for the Employers and Graduates, the assignment was to compare the importance of the skill for the work in enterprises and the extent to which it is developed at university on a 4-step scale: None – 1; Weak - 2; Considerable – 3; Strong – 4 (see Appendices 1.2. and 1.3., second sections – the GESKE questionnaires).

The reason behind keeping the original Tuning questionnaires for Generic competences was to allow a comparison of our research with the results of the

[2] For details, see Appendix 1.1.
[3] For details, see Appendix 1.2.
[4] For details, see Appendix 1.3.
[5] In this research we prefer to use the term "competence" instead of "skill", because "competence" has a larger meaning, which includes the meaning of "skill". Also, items like "Basic general knowledge in the field of study" and other similar cannot be considered "skills".

original research. There were two differences between the version for Academics and the version for Employers and Graduates: a) the last one included the 17 generic competences from the Academics questionnaire and 13 supplementary competences; b) to these 30 items of the scale, two others were added for our research:

- It 14 "Self-directed learning skills"
- It 15 "Interest in cross-functionality and additional qualifications for career self-management".

The reason for this was the increasing importance of self-directed learning and of career self-management skills. The inclusion of the items in the scale was proven to be beneficial, because the correlations of these items with the total scale are 0,54 and respectively 0,61.

The respondents were also invited to add other 2 competences and to rate them if they considered it necessary. As in the original Tuning research, at the end of the generic competences questionnaire, Graduates and Employers were invited to rank the "top 5" of the generic competences. Thus it becomes possible to compare the most important competences for all three groups.

Metric qualities of the scales used The metric qualities of the 32 item versions of generic competences questionnaire was confirmed on the population of respondents in our research. The Cronbach α value for the whole scale is 0,918. The correlation value by Spearman-Brown split-half method is extremely high (r = 0,86). The value of α for the two parts is 0,84 and 0,85 (see Appendix 1.5.).

The factor analysis performed on the data for the groups of Employers and Graduates also shows that the questionnaire is homogenous. For the answers regarding the level of importance of the competences, there resulted 8 factors that explain 60,77% of the variance. Out of these 8 factors, one is the most important, which encompasses 27 of 32 items, with 27,52% of the variance explained. The items that covariate separately from the majority are items: no 1 ("Capacity for analysis and synthesis"), 3 ("Planning and time management"), 5 ("Basic knowledge of the profession"), 6 ("Oral and written communication in your native language"), and 21 ("Leadership").

The same analysis performed on the answers concerning the level of achievement of the competences at university shows also the homogeneity of the scale used. There are 7 factors segregated, which explain 64,58% of the variance. The first and most important factor encompasses 28 out of 32 competences. The 4 items which covariate separately from the majority are items: 2 ("Capacity for applying knowledge in practice"), 4 ("Basic general knowledge in the field of study"), 5 ("Basic knowledge of the profession"), and 6 ("Oral and written communication in your native language").

Eliminating 9 of the items with α lesser than 0,40 leads to a scale with 23 items with an α = 0,90, very close to the initial value of α in the extended scale - 0,90. The correlation value by Spearman-Brown split-half method is extremely high: r = 0,84, very close to the value for the extensive scale (see Appendix 1.6.).

GESKE-2 - The new (simplified) scale of the Generic Competences Scale

1. Capacity for applying knowledge in practice (2)
2. Knowledge of a foreign language (7)
3. Elementary computing skills (8)
4. Capacity to learn (10)
5. Information management skills (ability to retrieve and analyse information from different sources) (11)
6. Critical and self-critical abilities (12)
7. Capacity to adapt to new situations (13)
8. Self directed learning skills (14)
9. Interest in cross-functionality and additional qualifications for career self management (15)
10. Capacity for generating new ideas (creativity) (16)
11. Problem solving 17)
12. Decision-making (18)
13. Teamwork (19)
14. Interpersonal skills (20)
15. Ability to work in an cross-functional team (22)
16. Appreciation of diversity and multiculturality (24)
17. Ability to work in an international context (25)
18. Understanding of cultures and customs of other countries (26)
19. Project design and management (28)
20. Initiative and entrepreneurial spirit (29)
21. Ethical commitment (30)
22. Concern for quality (31)
23. Will to succeed (32)

For the simplified scale of 23 items the value of $\alpha = 0,84$, and the Guttman's split-half coefficients are 0,87 for the first half, and 0,82 for the second. This reliability analysis of the scale applied to the population of our research shows one more time the internal consistency of the scale. The two additional items were included in the short version of the scale. Their correlations with the total of the short scale are 0,56 and 0,63 and they do not alter the homogeneity of the scale.

Questionnaire for specific competences (SPECOE)

Content and structure of the questionnaire The questionnaire for specific competences was the same for the three groups of respondents. The competences had to be rated by importance for the first cycle and for the second cycle, on a 4-step scale, as above. The competences were defined by a group of experts from the Romanian team[6] having in mind the requirements of different jobs in enterprises, either big industrial plants or small and medium sized enterprises in different sectors of activity, such as manufacturing and services.

[6] The most important contributors were: Elena Helerea, Doru Talaba, Simona Lache, Ioan Călin Roşca, the co-authors of this chapter.

In the first stage of the research, 53 specific competences related to working in enterprises – industrial or others – were defined by the group. After a multiphase process of defining and assessing the competences, eventually a total amount of 42 competences was retained. At the end of the scale, as in the generic competences questionnaire, two items were left for adding other competences considered necessary by the respondents. For the list of competences as it was presented in the questionnaire see Appendix 1.2. The specific competences were initially divided into the 5 sub-scales, as presented below:

- ***Basic knowledge for working in an enterprise:***
    - Ability to apply knowledge of mathematics, physics, chemistry and other sciences (1)
    - Systemic approach of specific problems (2)
    - Ability to identify, formulate, and solve specific problems (3)
    - Basic knowledge of the design of technical systems (e.g. to know functional principles, modelling methods, calculus methods, etc.) (8)
    - Basic knowledge of the main technologies in the field (e.g. conventional technologies, non conventional technologies, nanotechnologies, etc.) (12)
    - Basic knowledge of logistics in the field (e.g. row materials, equipment, energy required by the manufacturing process) (15)
    - Understand existent and new technology and its impact for new / future markets (16)
    - Basic knowledge about eco labelling and legislation (e.g. to know the national and international regulations and procedures on environmental requirements, etc.) (17)
    - Basic knowledge about recycling, disposal and impact on the environment (18)
    - Ability to apply the life cycle analysis for a product (e.g. environmental impact, life cycle evaluation) (19)
    - Knowledge of measurement methods (e.g. direct methods, indirect methods, procedures for data acquisition, processing, and storing, etc.) (24)
    - Knowledge of metrological standards in the field (25)
    - Ability to apply measurement knowledge for system operation monitoring (e.g. to build measurement schema, on-line monitoring, to control system functional parameters) (26)
    - Managing a technical system by planning and controlling by use of concepts, methods and tools (e.g. Strategy design and implementation, benchmarking, TQM, etc.) (32)
    - Ability to recognise and analyse novel problems and plan strategies for their solution (36)
    - Critically analyzing, synthesizing and summarizing information, including prior research (37)

- ***Technical competences related to the requirements of work in an enterprise:***
    - Analysis of requirements and establishment of technical specifications for project development (e.g. requirements for materials, energy, efficiency, functional characteristics, technologies, etc.) (4)
    - Ability to analyze and establish the project quality requirements (5)
    - Ability to analyze and establish the energy saving measures (6)
    - Ability to analyze and establish the health and safety measures (7)
    - Ability to carry out functional design tasks for technical systems (e.g. system structure, process modelling) (9)
    - Ability to carry out detailed conception tasks (e.g. for technical systems - detailed design of system components (10)
    - Ability to carry out operational tasks (e.g. for technical systems - to establish manufacturing methods, technologies, flow chart, tools and equipment, etc.) (11)
    - Ability to carry out process planning (e.g. to implement the manufacturing flowchart) (13)
    - Ability to design tools and quality control instruments suited to the project (14)
    - Knowledge and ability to carry out maintenance tasks after project completion (e.g. maintenance and reliability principles and methods, planning) (20)
    - Basic knowledge of modelling, simulation, and analysis tools of processes and systems (e.g. methods, software, procedures) (21)
    - Ability to carry out modelling, simulation, and analysis of technical systems (e.g. to simulate processes under different operating regimes, to model and analyse technical systems) (22)
    - Ability to create real prototypes and design experiments in a virtual environment using professional software (23)
    - Ability to design and implement maintenance schedules (27)
- ***Organization and management knowledge and skills:***
    - Knowledge of the major aspects of enterprise terminology - nomenclature, conventions and standards (28)
    - Understand the principles of management and link them with enterprise and business knowledge (e.g. operations management, project management, information technology) (33)
    - Knowledge of legislation in the field and ability to link to business / management / technical knowledge (34)
    - Understanding of and commitment to professional and ethical responsibility in enterprises (35)
    - Understand organisations and how they function (42)
- ***Communication skills for the workplace:***
    - Receiving and responding to a variety of information sources (e.g. textual, numerical, verbal, graphical) (38)
    - Skills in the evaluation, interpretation and synthesis of information and data (e.g. writing reports, making presentations) (40)

- Skills in presenting scientific material and arguments in writing and orally, to an informed audience (41)

- ***Information technology and software competences:***
  - Knowledge of specific programming languages or software (29)
  - Design and implement information systems for enterprises (30)
  - Information technology skills (e.g. word processing and spreadsheet use, data logging and storage, etc.) (31)
  - Preparing, processing, interpreting and presenting data, using appropriate qualitative and quantitative techniques and packages (e.g. statistics, Power Point) (39)

Metric qualities of the 42-item questionnaire The reliability analysis performed on 240 cases (Academics, Employers, and Graduates) for the 42 items scale shows a high internal consistency of the whole scale. The item-scale correlations are good for both parts – but for part A there are 9 items with correlation values under 0,5: items 1, 2, 3, 8, 29, 31, 40, 41, and 42. For in part B, the correlations of these items with the scale are constantly under the value 0,5 and the items could be excluded in case of a short version.

The values of Cronbach's alpha for each item are all over the value of 0,949 in part A – Level of importance for the 1st cycle, and over the value of 0,945 for part B – Level of importance for the 2nd cycle (for details, see Tabs. 1.7.1 and 1.7.3 in Appendix 1.7).

All reliability coefficients are of good level, proving the consistency of the scale (see Tab. 2.4). For details on the reliability analysis of the extended scale see Appendix 1.7, sections A and B.

Tab. 2.4. Reliability analysis for SPECOE extended scale (42 items)

Criterion		**Part A** Level of importance 1st cycle	**Part B** Level of importance 2nd cycle
Cronbach's alpha – 42 items		,951	,947
Split-half alpha	a. first half – 21 items	,919	,918
	b. second half – 21 items	,916	,905
Correlation between the first and the second half		,767	,753
Spearman-Brown coefficient – equal length		,869	,859
Guttman split-half coefficient		,868	,858

The structural unity of the questionnaire, tested by factor analysis is high: for the first cycle, the factor analysis shows the existence of a general factor that explains 33% of the total variance, and some other 7 less general factors; for the second cycle there is also a general factor that explains 34% of the total variance and other seven factors of lesser importance. However, the metric qualities of the questionnaires could be improved if the questionnaire is reorganised in a shorter form. The excluded items and the reorganisation of the subscales will be discussed further.

2.3. Reorganising the Questionnaire of Specific Competences for Enterprises for further research

For a shorter form, one can eliminate the items with correlations to the whole scale inferior to 0,50, thus obtaining a 33 items version, with an internal consistency better than the extended scale (see below). The numbers in brackets indicate the old number of the item on the extended scale.

SPECOE-2 – The short version of the Specific Competence Scale (33 items):

1. Analysis of requirements and establishment of technical specifications for project development (e.g. requirements for materials, energy, efficiency, functional characteristics, technologies, etc.) (4)
2. Ability to analyze and establish the project quality requirements (5)
3. Ability to analyze and establish the energy saving measures (6)
4. Ability to analyze and establish the health and safety measures (7)
5. Ability to carry out functional design tasks for technical systems (e.g. system structure, process modelling) (9)
6. Ability to carry out detailed conception tasks (e.g. for technical systems - detailed design of system components (10)
7. Ability to carry out operational tasks (e.g. for technical systems - to establish manufacturing methods, technologies, flow chart, tools and equipment, etc.) (11)
8. Basic knowledge of the main technologies in the field (e.g. conventional technologies, non conventional technologies, nanotechnologies, etc.) (12)
9. Ability to carry out process planning (e.g. to implement the manufacturing flowchart) (13)
10. Ability to design tools and quality control instruments suited to the project (14)
11. Basic knowledge of logistics in the field (e.g. row materials, equipment, energy required by the manufacturing process) (15)
12. Understand existent and new technology and its impact for new / future markets (16)
13. Basic knowledge about eco labelling and legislation (e.g. to know the national and international regulations and procedures on environmental requirements, etc.) (17)
14. Basic knowledge about recycling, disposal and impact on the environment) (18)
15. Ability to apply the life cycle analysis for a product (e.g. environmental impact, life cycle evaluation) (19)
16. Knowledge and ability to carry out maintenance tasks after project completion (e.g. maintenance and reliability principles and methods, planning) (20)
17. Basic knowledge about modelling, simulation, and analysis tools of processes and systems (e.g. methods, software, procedures) (21)

18. Ability to carry out modelling, simulation, and analysis of technical systems (e.g. to simulate processes under different operating regimes, to model and analyse technical systems) (22)
19. Ability to create real prototypes and design experiments in a virtual environment using professional software (23)
20. Knowledge of measurement methods (e.g. direct methods, indirect methods, procedures for data acquisition, processing, and storing, etc.) (24)
21. Knowledge of metrological standards in the field (25)
22. Ability to apply measurement knowledge for system operation monitoring (e.g. to build measurement schema, on-line monitoring, to control system functional parameters) (26)
23. Ability to design and implement maintenance schedules (27)
24. Knowledge of the major aspects of enterprise terminology - nomenclature, conventions and standards (28)
25. Design and implement information systems for enterprises (30)
26. Managing a technical system by planning and controlling by use of concepts, methods and tools (e.g. Strategy design and implementation, benchmarking, TQM, etc.) (32)
27. Understand the principles of management and link them with enterprise and business knowledge (e.g. operations management, project management, information technology) (33)
28. Knowledge of legislation in the field and ability to link to business / management / technical knowledge (34)
29. Understanding of and commitment to professional and ethical responsibility in enterprises (35)
30. Ability to recognise and analyse novel problems and plan strategies for their solution (36)
31. Critically analyzing, synthesizing and summarizing information, including prior research (37)
32. Receiving and responding to a variety of information sources (e.g. textual, numerical, verbal, graphical) (38)
33. Preparing, processing, interpreting and presenting data, using appropriate qualitative and quantitative techniques and packages (e.g. statistics, Power Point) (39).

The metric qualities of the short scale are very good. The internal consistency of the 33 item version is high, as the reliability analysis presented in Tab. 2.5 proves. Details on the reliability analysis of the SPECOE short scale are presented in Appendix 1.8. Section A.

The new version of the Specific competence scale, reduced to about 2/3 of its initial number of items, and reorganised in three sub-scales, is presented below. The old order number of the item is indicated between brackets.

Tab. 2.5. Reliability analysis for SPECOE – short version (33 items)

Criterion		Part A Level of importance 1st cycle	Part B Level of importance 2nd cycle
Cronbach's alpha – 33 items		,949	,946
Split-half alpha	a. first half – 17 items	,921	,921
	b. second half – 16 items	,901	,887
Correlation between the first and the second half		,797	,796
Spearman-Brown coefficient – unequal length		,887	,886
Guttman split-half coefficient		,884	,880

The structure of the SPECOE short version questionnaire, based on internal consistency, would be the following:

1. ***Sub-scale 1 – Basic competences for working in an enterprise (12 items):***
   - Basic knowledge of the main technologies in the field (e.g. conventional technologies, non conventional technologies, nanotechnologies, etc.) (12)
   - Basic knowledge of logistics in the field (e.g. row materials, equipment, energy required by the manufacturing process) (15)
   - Understand existent and new technology and its impact for new / future markets (16)
   - Basic knowledge about eco labelling and legislation (e.g. to know the national and international regulations and procedures on environmental requirements, etc.) (17)
   - Basic knowledge about recycling, disposal and impact on the environment (18)
   - Ability to apply the life cycle analysis for a product (e.g. environmental impact, life cycle evaluation) (19)
   - Knowledge of measurement methods (e.g. direct methods, indirect methods, procedures for data acquisition, processing, and storing, etc.) (24)
   - Knowledge of metrological standards in the field (25)
   - Ability to apply measurement knowledge for system operation monitoring (e.g. to build measurement schema, on-line monitoring, to control system functional parameters) (26)
   - Managing a technical system by planning and controlling by use of concepts, methods and tools (e.g. Strategy design and implementation, benchmarking, TQM, etc.) (32)
   - Ability to recognise and analyse novel problems and plan strategies for their solution (36)
   - Critically analyzing, synthesizing and summarizing information, including prior research (37)

The metric qualities of this subscale are very good for both parts: A – Level of importance for the first cycle, and B – Level of importance for the second cycle (see in Tab. 2.6). The Cronbach's alpha analysis for item-scale and the reliability

analysis for the level of importance of the items of the subscale 1 are presented in detail in section B of the Appendix 1.8.

Tab. 2.6. Reliability analysis for sub-scale 1 – Basic competences for working in an enterprise (12 items)

Criterion		**Part A** Level of importance 1st cycle	**Part B** Level of importance 2nd cycle
Cronbach's alpha – 12 items		,879	,877
Split-half alpha	a. first half – 6 items	,828	,831
	b. second half – 6 items	,784	,773
Correlation between the first and the second half		,687	,681
Spearman-Brown coefficient – equal length		,815	,810
Guttman split-half coefficient		,813	,806

2. ***Sub-scale 2 – Technical competences related to the requirements of work in an enterprise (14 items):***
   - Analysis of requirements and establishment of technical specifications for project development (e.g. requirements for materials, energy, efficiency, functional characteristics, technologies, etc.) (4)
   - Ability to analyze and establish the project quality requirements (5)
   - Ability to analyze and establish the energy saving measures (6)
   - Ability to analyze and establish the health and safety measures (7)
   - Ability to carry out functional design tasks for technical systems (e.g. system structure, process modelling) (9)
   - Ability to carry out detailed conception tasks (e.g. for technical systems - detailed design of system components (10)
   - Ability to carry out operational tasks (e.g. for technical systems - to establish manufacturing methods, technologies, flow chart, tools and equipment, etc.) (11)
   - Ability to carry out process planning (e.g. to implement the manufacturing flowchart) (13)
   - Ability to design tools and quality control instruments suited to the project (14)
   - Knowledge and ability to carry out maintenance tasks after project completion (e.g. maintenance and reliability principles and methods, planning) (20)
   - Basic knowledge about modelling, simulation, and analysis tools of processes and systems (e.g. methods, software, procedures) (21)
   - Ability to carry out modelling, simulation, and analysis of technical systems (e.g. to simulate processes under different operating regimes, to model and analyse technical systems) (22)
   - Ability to create real prototypes and design experiments in a virtual environment using professional software (23)

- Ability to design and implement maintenance schedules (27)

Tab. 2.7. Reliability analysis for sub-scale 2 – Technical competences related to the requirements of work in enterprises (14 items)

Criterion		**Part A** Level of importance 1st cycle	**Part B** Level of importance 2nd cycle
Cronbach's alpha – 14 items		,912	,902
Split-half alpha	a. first half – 7 items	,853	,856
	b. second half – 7 items	,862	,834
Correlation between the first and the second half		,726	,699
Spearman-Brown coefficient – equal length		,841	,823
Guttman split-half coefficient		,840	,844

The metric qualities of the sub-scale 1, as presented in Tab. 2.7, are good – the scale is consistent and has internal reliability. The values of Cronbach's alpha for the whole scale and for the two parts are very similar, and so are the values for the halves (split-half). The reliability coefficients are also very good, and the sub-scale can be considered as reliable. For details on the reliability analysis of the sub-scale, see section C of the Appendix 1.8.

3. ***Sub-scale 3 – Workplace communication and management competences (7 items):***
   - Knowledge of the major aspects of enterprise terminology - nomenclature, conventions and standards (28)
   - Understand the principles of management and link them with enterprise and business knowledge (e.g. operations management, project management, information technology) (33)
   - Knowledge of legislation in the field and ability to link to business / management / technical knowledge (34)
   - Understanding of and commitment to professional and ethical responsibility in enterprise (35)
   - Receiving and responding to a variety of information sources (e.g. textual, numerical, verbal, graphical) (38)
   - Design and implement information systems for enterprises (30)
   - Preparing, processing, interpreting and presenting data, using appropriate qualitative and quantitative techniques and packages (e.g. statistics, Power Point) (39)

Even if it has only 7 items, the metric qualities of this sub-scale are acceptable, the values for alpha are close for the two parts, A and B, and the values of alpha for the halves of the scale (split-half) are too. All the reliability coefficients are at an acceptable level and the sub-scale can be considered as having internal consistency (see Tab. 2.8). For details on the reliability analysis for the items of the sub-scale see section D of the Appendix 1.8.

Tab. 2.8. Reliability analysis for sub-scale 3 – Workplace communication and management competences (7 items)

Criterion		**Part A** Level of importance 1st cycle	**Part B** Level of importance 2nd cycle
Cronbach's alpha – 7 items		,810	,795
Split-half alpha	a. first half – 4 items	,756	,692
	b. second half – 3 items	,611	,688
Correlation between the first and the second half		,624	,604
Spearman-Brown coefficient – unequal length		,771	,756
Guttman split-half coefficient		,735	,728

The metric qualities of the short version of the Specific Competences Scale (SPECOE-2) are similar to the initial extended scale and could be used for further research on the specific competences for enterprise. As presented above, the 33 item short scale has better metric qualities. A synthesis of Tabs. 2.4. and 2.5. is presented for exemplification in Tab. 2.9.

Tab. 2.9. Comparing the reliability analysis for the two versions of SPECOE – the extended scale (42 items) and the short scale (33 items) – for part A – level of importance for the first cycle

Criterion		**Part A of the 42 item scale** Level of importance 1st cycle	**Part A of the 33 item scale** Level of importance 1st cycle
Cronbach's alpha		,951	,949
Split-half alpha	a. first half	,919	,921
	b. second half	,916	,901
Correlation between the first and the second half		,767	,797
Spearman-Brown coefficient		,868	,887
Guttman split-half coefficient		,868	,884

4. The excluded items

From the initial extended scale of 42 items, 9 items had item-scale correlation values inferior to 0,5 and were eliminated from the scale. However, analysing the importance given by the respondents to the items excluded as being inconsistent with the scale, one can find some striking facts: almost all the "inconsistent" items are in the first half of the importance top, for the first and for the second cycle, as well (see Tab 2.10).

The content of the items indicate competences more general than those of the shortened scale and could be either maintained in the questionnaire as a distinct sub-scale of "Generic competences for enterprise" or rather "Generic competences for work", or eliminated.

Tab. 2.10. Items excluded from SPECOE as inconsistent with the scale, in the rank order of their importance for the 1st vs. 2nd cycle, as resulted from the ratings of Academics, Employers and Graduates together

Excluded items	Rank of importance 1st cycle	Rank of importance 2nd cycle
Ability to apply knowledge of mathematics, physics, chemistry and other sciences (1)	1	27
Information technology skills (31)	2	15
Skills in the evaluation, interpretation and synthesis of information and data (40)	3	4
Basic knowledge of the design of technical systems (8)	4	18
Ability to identify, formulate, and solve specific problems (3)	7	1
Systemic approach of specific problems (2)	8	2
Skills in presenting scientific material and arguments in writing and orally, to an informed audience (41)	9	6
Understand organisations and how they function (42)	10	12
Knowledge of specific programming languages or software (29)	14	29

For the first cycle of studies, the importance of the "excluded" competences is in the first half of the ranking, but for the second cycle there are, however, two competences rated as much less important: "Ability to apply knowledge of mathematics etc…" (rank 27), and "Knowledge of specific programming languages…" (rank 29). The reliability analysis of the sub-scale 4 resulted from the eliminated items is presented in Tab. 2.11.

Tab. 2.11. Reliability analysis for sub-scale 4 – Items excluded from the extended scale (9 items)

Criterion		Part A Level of importance 1st cycle	Part B Level of importance 2nd cycle
Cronbach's alpha – 9 items		,733	,734
Split-half alpha	a. first half – 5 items	,619	,692
	b. second half – 4 items	,737	,688
Correlation between the first and the second half		,364	,604
Spearman-Brown coefficient – equal length		,536	,756
Guttman split-half coefficient		,534	,728

The values of Cronbach's alpha for the whole scale and the two halves are inferior to the other 3 sub-scales, but acceptable. The new version of SPECOE – the Questionnaire for Specific Competences for Enterprise will be used for further research having good metric qualities, similar to the extended questionnaire.

Questionnaire for practical competences (PRASKE)

The items of the questionnaire for practical competences and competences were formulated by the same team of experts as above. The skills and competences were defined as resulting from the practical placement during the university studies, but were not specific for the 1st or the 2nd cycle. The 13 competences retained after the process of defining and assessing were relevant for adapting to the organization and functioning of the enterprises. The main idea in asking the respondents to rate the importance of the competences and the level to which the competences 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 research report on the practical competences questionnaire is presented in Book 2.

Chapter 3

GENERIC COMPETENCES

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3.1. Generic competences– expanding the Tuning methodology to the general preparation for industry and enterprise

In the original Tuning research, competences were defined as *"a dynamic combination of attributes – with respect to knowledge and its application, to attitudes and responsibilities that describe the learning outcomes of an educational programme or how learners are able to perform at the end of the educational process"* (Gonzales & Wagenaar, 2003, p. 255). Though the terms "*competences*" and "*skills*" are used frequently as synonyms, there is a difference in their meaning, and the initial Tuning project emphasised this difference. Skills means "*being able to*", whereas the competence has a broader meaning, that includes knowledge, attitudes and values.

The generic competences are not subject-related and they can be divided into three categories: instrumental, interpersonal and systemic (Gonzales & Wagenaar, 2005, p. 32). Being learned in different disciplines, generic competences are transferable and a particular importance should be given to them because of their general character. *"This last component is becoming more and more relevant for preparing students for their future role in society in terms of employability and citizenship"* (Gonzales & Wagenaar, 2003, ibid.).

As stated in Chapter 2, the questionnaire on generic competences was presented in two different versions: a) for the group of Academics - ranking 17 generic competences; b) for the groups of Employers and Graduates - comparing the importance of 32 competences regarding the extent to which the competence is developed at university. For the last two groups there was also a second assignment: to rank the five most important generic competences. The results of this section will be compared with those of the initial Tuning research.

The categories of generic competences given in the initial version of the Tuning questionnaire for the groups of Employers and Graduates were the following:

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- Instrumental competences
    - Capacity for analysis and synthesis
    - Capacity for organisation and planning (planning and time management)
    - Basic general knowledge
    - Grounding in the basic knowledge of the profession
    - Oral and written communication in one's native language
    - Knowledge of a second language
    - Elementary computing skills
    - Information management skills
    - Problem solving
    - Decision making.
- Interpersonal competences
    - Critical and self-critical abilities
    - Teamwork
    - Interpersonal skills
    - Ability to work in an interdisciplinary team
    - Ability to communicate with experts in other fields
    - Appreciation of diversity and multiculturality
    - Ability to work in an international context
    - Ethical commitment.
- Systemic competences
    - Capacity to apply knowledge into practice
    - Research skills
    - Capacity to learn
    - Capacity to adapt to new situations
    - Capacity to generate new ideas
    - Leadership
    - Understanding of the culture and customs of other countries
    - Ability to work autonomously
    - Project design and management
    - Initiative and entrepreneurial spirit
    - Concern for quality
    - Will to succeed (Gonzales & Wagenaar, 2005, p. 32).

To these generic competences, two supplementary systemic competences were added: Item 14 "Self directed learning skills" and Item 15 "Interest in cross-functionality and additional qualifications for career self-management". We felt the need to include these generic competences on the list because such competences are crucial for succeeding in the world of work. Specific training on the job as well as continuous education and career progress rely not only on the opportunities offered by employers or other institutions involved in lifelong learning. A large amount of competence is expected to result from the efforts of the individuals to improve their skills, knowledge and ability by career self management, anticipation of the competence needed by the present or by the future job and self directed learning.

The efforts of continuous self improvement and personal development are made beyond any form of education, on a day by day basis, in conscientious,

purposed, punctual learning activities. The capacity of the individuals to act as proactive actors in the world of work should be not only a personal, innate personality feature, but an explicit outcome of university education.

3.2. The most important generic competences according to Academics, Employers, and Graduates

The evaluations by the group of Academics

The questionnaire for Academics consisted in ranking 17 competences by their importance. The five competences evaluated by the Academics as being the most important are the following, in descending order of their importance, by the average rank rating[7]/ group, the first 5 out of 17 given competences (see Tab. 3.1).

Tab.3.1. The 5 most important generic competences according to Academics – in order of average ranks/ item

Item – Generic competence		Average rank
g06	1. Capacity to apply knowledge into practice	6,0519
g01	2. Ability to work in an interdisciplinary team	6,7013
g03	3. Basic knowledge in the field of study	6,7273
g04	4. Basic knowledge of the profession	7,1818
g07	5. Capacity to adapt to new situations	7,3766

In the original Tuning research, the "top 5" of the competences for the group of Academics was the following:

- Basic general knowledge
- Capacity for analysis and synthesis
- Capacity to learn
- Capacity to generate new ideas (creativity)
- Capacity to apply knowledge into practice.

These results are different from the findings in our research, with one exception: "Capacity to apply knowledge into practice", which is common to both.

The evaluations by the groups of Employers vs. Graduates

After having rated the importance of the competences for working in their organization as compared to the extent to which the competences are developed by the university degree on a four-step scale, the groups of Employers and Graduates

[7] In the case of Academics, the smaller the rank value, the highest the importance of the item.

pointed to the following most important generic competences. The results of this "top 5" - in descending order of their importance by the weighted frequency[8] of the first five competences chosen on the separate ranking at the end of the list of 32 competences are presented in the Tab. 3.2. For statistic details see Appendix 2.1, Tabs. 2.1 to 2.4.

Tab.3.2. The 5 most important generic competences by Employers vs. Graduates – resulted from the "Top 5" separate ranking

Employers			**Graduates**		
Generic competences - item/ rank		**Weighted frequency**	**Generic competences - item/ rank**		**Weighted frequency**
G01A	1. Capacity for analysis and synthesis	108	G01A	1. Capacity for analysis and synthesis	166
G17A	2. Problem solving	104	G17A	2. Problem solving	143
G19A	3. Teamwork	59	G18A	3. Decision making	99
G02A	4. Capacity to apply knowledge into practice	54	G02A	4. Capacity to apply knowledge into practice	96
G03A	5. Planning and time management	47	G19A	5. Teamwork	93

Some similarities can be noticed between the most important competences rated by Graduates and Employers. Despite some differences in the rank of importance, the chosen competences are the same in 4 cases out of 5. The differences are given by the fact that Employers value "Planning and time management" more, and Graduates value "Decision making" more.

Tab. 3.3. The five most important competences ranked by descending value of mean – Employers vs. Graduates

Employers			**Graduates**		
Generic competences - item/ rank		**Mean value**	**Generic competences - item/ rank**		**Mean value**
G17A	1. Problem solving	3,7344	G17A	1. Problem solving	3,7172
G08A	2. Elementary computing skills	3,6719	G32A	2. Will to succeed	3,6737
G31A	3. Concern for quality	3,6719	G31A	3. Concern for quality	3,5859
G02A	4. Capacity to apply knowledge into practice	3,6094	G01A	4. Capacity for analysis and synthesis	3,5758
G19A	5. Teamwork	3,5938	G13A	5. Capacity to adapt to new situations	3,5758

[8] The weighted frequency was calculated with the following formula: ***5 points for the first choice/ 4 for the second/ 3 for the third/ 2 for the fourth/ 1 for the fifth x frequency for each rank*** separately in the groups of Employers and Graduates.

Another method for establishing the importance of the competences is ranking the items by descending order of the mean value of the evaluations given by the groups of Employers and Graduates for "Importance for work in your organisation", on a four-step scale. If compared to the previous "qualitative" ranking method, which is rather subjective, this second method is more objective, relying on numeric values obtained from the means/ group of each competence.

This method gives a slight difference in the hierarchy, maintaining only three of the items in the case of the Employers, in different positions: "Teamwork", "Problem solving" and "Capacity to apply knowledge into practice"; for the group of Graduates, the new ranking method preserves only two competences: "Problem solving" and "Capacity for analysis and synthesis" (see above Tab. 3.3).

Tab. 3.4a. Differences in the importance of items as resulted from the descending values of the means of the ratings/ group Employers vs. Graduates (Employers higher than Graduates)

Item		Mean Employers	Mean Graduates	Differences E-G	
G30A	Ethical commitment	3,4063	3,1354	0,2709	Employers higher than Graduates
G04A	Basic general knowledge in the field of study	3,4219	3,1818	0,2401	
G09A	Research skills	3,0313	2,8283	0,203	
G08A	Elementary computing skills	3,6719	3,4949	0,177	
G12A	Critical and self-critical abilities	3,1719	3,0404	0,1315	
G05A	Grounding in basic knowledge of the profession in practice	3,2581	3,1443	0,1138	
G20A	Interpersonal skills	3,4127	3,3093	0,1034	
G14A	Self-directed learning skills	3,3016	3,202	0,0996	
G10A	Capacity to learn	3,5625	3,4646	0,0979	
G28A	Project design and management	3,3281	3,2323	0,0958	
G25A	Ability to work in an international context	3,0625	2,9697	0,0928	
G26A	Understanding of the culture and customs of other countries	2,7344	2,6429	0,0915	
G31A	Concern for quality	3,6719	3,5859	0,086	
G16A	Capacity for generating new ideas (creativity)	3,4531	3,3939	0,0592	
G19A	Teamwork	3,5938	3,5354	0,0584	
G02A	Capacity for applying knowledge in practice	3,6094	3,5556	0,0538	
G22A	Ability to work in an cross-functional team	3,375	3,3434	0,0316	
G03A	Planning and time management	3,375	3,3535	0,0215	
G17A	Problem solving	3,7344	3,7172	0,0172	

For most of the competences (19 items), the Employers rated the importance at a higher level than the Graduates, meaning that they consider them more important. However, the t test for independent samples reveals that the only significant differences for the mean values are for items 4 "Basic general knowledge in the field of study", and 31 "Concern for quality".

The results and the kind of difference are presented in Tabs. 3.4.a and 3.4.b. For details concerning the values of the means for each item and group, see Tabs. 2.2.1, 2.2.2, and 2.2.3 in Appendix 2.2.

Tab. 3.4b. Differences in the importance of the items as resulted from the descending values of the means of the ratings/ group Employers vs. Graduates (Graduates higher than Employers)

Item		Mean Employers	Mean Graduates	Differences E-G	
G27A	Ability to work autonomously	3,2344	3,4141	-0,1797	Graduates higher than Employers
G32A	Will to succeed	3,5	3,6737	-0,1737	
G21A	Leadership	3,0625	3,202	-0,1395	
G07A	Knowledge of a foreign language	3,1875	3,303	-0,1155	
G29A	Initiative and entrepreneurial spirit	3,0794	3,1919	-0,1125	
G13A	Capacity to adapt to new situations	3,4688	3,5758	-0,107	
G11A	Information management skills (ability to retrieve and analyse information from different sources)	3,4531	3,5567	-0,1036	
G24A	Appreciation of diversity and multiculturality	2,7344	2,8081	-0,0737	
G23A	Ability to communicate with non-experts (in the field)	3,2063	3,2727	-0,0664	
G15A	Interest in cross-functionality and additional qualifications for career self management	3,0323	3,0947	-0,0624	
G18A	Decision-making	3,5156	3,5758	-0,0602	
G06A	Oral and written communication in one's native language	3,4063	3,4545	-0,0482	
G01A	Capacity for analysis and synthesis	3,5313	3,5758	-0,0445	

The results of the ratings of the importance of the generic competences by Employers and Graduates are somehow similar to those obtained in the initial Tuning research (Gonzales & Wagenaar, 2003, pp. 82-83). On that occasion, "Ethical commitment", "Ability to work in an interdisciplinary team", "Teamwork", "Concern for quality", for example, were found to be significantly higher rated by Employers than by Graduates. In our research, these competences were also higher

rated by the Employers, but the differences are not statistically significant. A similar situation can be encountered with two competences rated higher by Graduates in both studies, but other competences, such as "Research skills", "Elementary computing skills", "Grounding in basic knowledge of the profession" were rated oppositely in our research - higher by Employers.

The Academics tend to evaluate two instrumental competences as very important ("Basic knowledge in the field of study" and "Basic knowledge of the profession"), two systemic ("Capacity to apply knowledge into practice" and "Capacity to adapt to new situations"), and one interpersonal ("Ability to work in an interdisciplinary team"). In three of these competences, emphasis is put on "knowledge" – general and profession-specific, and on the capacity to apply the knowledge into practice.

The Employers and the Graduates seem to be more practice-oriented. The most important competences for them, based on the mean value ranking, are less knowledge focused. Employers value two instrumental competences on the first places, but other than the Academics ("Problem solving" and "Elementary computing skills"), two systemic competences ("Concern for quality" and Capacity to apply knowledge into practice"), and an interpersonal one ("Teamwork"). The Graduates value three systemic competences ("Will to succeed", "Concern for quality", and "Capacity to adapt to new situation"), two instrumental ("Problem solving" and "Capacity for analysis and synthesis"), and no interpersonal competence (!).

Tab. 3.5. Similarities and dissimilarities between the three groups concerning the choices for the most important generic competences

Generic competences	Group
• Capacity to apply knowledge into practice *(systemic)* • Capacity to adapt to new situations *(systemic)*	Academics, Employers & Graduates
• Capacity for analysis and synthesis *(instrumental)* • Problem solving *(instrumental)* • Teamwork *(interpersonal)* • Concern for quality *(systemic)*	Employers & Graduates
• Ability to work in an interdisciplinary team *(interpersonal)* • Basic knowledge in the field of study *(instrumental)* • Basic knowledge of the profession *(instrumental)*	Academics only
• Elementary computing skills *(instrumental)* • Planning and time management *(instrumental)*	Employers only
• Will to succeed *(systemic)* • Decision making *(instrumental)*	Graduates only

Two rather unexpected competences appear in their choices; "Concern for quality" and "Will to succeed". Also, the competence "Ethical commitment" appears in the first half of the ranking for Employers (rank 9/ 32) and Graduates (rank 2/32), but in the second half for Academics (rank 13/ 17).

The two new competences included in our research were rated on the importance scale on the 22nd (it 14) and 31st ranks (it 15) by the Employers and the 27th (it 14) and 31st ranks (it 15) by the Graduates, meaning that none of them consider these competences as being of prevalent importance (see Tab.2.2.3 in Appendix 2.2).

In the conclusion of these comparisons, 13 competences seem to represent the focus of the three groups, being indicated as most important either by ranking (the "top 5") or by rating the importance on a four-step scale. The way these evaluations overlap or differ is presented in Tab. 3.5. The generic competences Academics, Employers and Graduates agree upon are systemic competences.

Intra-group differences in rating the importance of the generic competences

Differences between Employers coming from small vs. large enterprises
In order to see if there is any difference between the importance given to competences according to the size of the enterprises, we divided the group of Employers in two sub-groups: coming from small enterprises (1-40 employees) and large enterprises (over 41 employees). The differences between small and large enterprises are significant only for two items (see Tab. 3.6).

Tab. 3.6. Differences between the levels of importance of the generic competences as rated by Employers coming from small vs. large enterprises

Item	Size	N	Mean	Std. deviation	Std. Error Mean	t	df	Sig. (2 tailed)
G02A	Small	30	3,7667	,43018	,07854	2,144	57	,036
	Large	29	3,4483	,68589	,12737			
G32A	Small	30	3,7000	,59596	,10881	2,407	57	,019
	Large	29	3,2759	,75103	,13946			

The Employers from small enterprises rated the following competences as more important, as compared to the answers belonging to those from large enterprises:

- 2 – Capacity to apply knowledge into practice
- 32 – Will to succeed.

Gender differences in the Graduates group In the group of Graduates, there are differences between men and women in rating some of the generic competences according to the level of their importance. Male respondents consider the competences G28 "Project design and management" as more important; G21

"Leadership", the differences are statistically significant at sig. ≤ .05, as presented in Tab. 3.7.

These differences correspond to a role differentiation between men and women: usually men are more involved in leadership and coordination activities than women, and maybe that is why these competences could be perceived as being more important for them.

Tab. 3.7. Gender differences in rating the level of importance for generic competences

Item	Sex	N	Mean	Std. deviation	Std error mean	t	df	Sig. (2 tailed)
G28A	Male	64	3,3906	,72631	,09079	2,776	97	,007
	Female	35	2,9429	,83817	,14168			
G21A	Male	64	3,3438	,69508	,08688	2,418	97	,017
	Female	35	2,9429	,93755	,15847			

However, the results have to be considered with caution because of the difference in point of size in the men's and women's groups.

Age differences in the Graduates group The group of Graduates was divided in two age sub-groups: under and above 30 years of age, the average age of the group being 29,57 years. There are significant differences due to age in rating the level of importance for 14 competences (see Tabs. 2.5.1 and 2.5.2 in Appendix 2.5 for the extended list of competences). For all the competences mentioned above, the younger Graduates rated the importance of the competences higher. The most significant differences in the ratings according to age (at p ≤ 0,01) are presented in Tab.3.8.

Tab. 3.8. Age differences in rating the importance of generic competences in Graduates

Item	Age	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2tailed)
G7A	< 30 years	59	3,5424	,77286	,10062	3,391	97	,001
	> 30 years	40	2,9500	,95943	,15170			
G15A	< 30 years	57	3,2632	,61314	,08121	2,919	93	,004
	> 30 years	38	2,8421	,78933	,12805			
G25A	< 30 years	59	3,2203	,76717	,09988	3,383	97	,001
	> 30 years	40	2,6000	1,05733	,16718			
G24A	< 30 years	59	3,0339	,80870	,10528	3,214	97	,002
	> 30 years	40	2,4750	,90547	,14317			
G29A	< 30 years	59	3,4746	,56800	,07395	4,977	97	,000
	> 30 years	40	2,7750	,83166	,13150			

The competences that are perceived as being more important for the workplace by the younger Graduates are the following:

- 7 – Knowledge of a foreign language
- 15 – Interest in cross-functionality and additional qualifications
- 25 – Ability to work in an international context
- 24 – Appreciation of diversity and multiculturality
- 29 – Initiative and entrepreneurial spirit.

Differences according to the year of graduation There are significant differences in rating the importance of the generic competences between those graduating before 2002 and those graduating after 2002, for 8 items (see Tab. 3.9).

Tab. 3.9. Differences in rating the importance of generic competences according to the year of graduation

Item	Year of graduation	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2talied)
G19A	Before 2002	41	3,3659	,66167	,10334	-2,209	95	,030
	After 2002	56	3,6607	,64036	,08557			
G27A	Before 2002	41	3,2439	,76748	,11986	-2,098	95	,039
	After 2003	56	3,5357	,60194	,08044			
G23A	Before 2002	41	3,0976	,80015	,12496	-2,332	95	,022
	After 2003	56	3,4286	,59870	,08000			
G7A	Before 2002	41	3,0244	,98711	,15416	-2,541	95	,013
	After 2003	56	3,4821	,78604	,10504			
G15A	Before 2002	40	2,8750	,75744	,11976	-2,759	75,164	,007
	After 2003	53	3,2830	,63177	,08678			
G29A	Before 2002	41	2,8537	,85326	,13326	-3,901	95	,000
	After 2003	56	3,4286	,59870	,08000			
G25A	Before 2002	41	2,6585	1,03947	,16234	-2,767	95	,007
	After 2003	56	3,1786	,81144	,10843			
G24A	Before 2002	41	2,5122	,89783	,14022	-3,089	95	,003
	After 2003	56	3,0536	,81842	,10937			

The respondents who graduated after 2003 (2003, 2004, 2005, and 2006) evaluated the following competences higher:

- 19 – Teamwork
- 27 – Ability to work autonomously
- 23 – Ability to communicate with non experts
- 7 – Knowledge of a foreign language
- 15 – Interest in cross-functionality
- 29 – Initiative and entrepreneurial spirit
- 25 – Ability to work in an international context

- 24 – Appreciation of diversity and multiculturality.

Comparing the ratings according to age and to the year of graduation, one can see that there is a sensible difference between the younger cohorts (according to age or graduation) and the older ones. This is explicable by the fact that most of the recent graduated are under the age of 30. The "young ones" evaluate at a higher level competences that are more related to a dynamic work environment.

3.3. The level of achievement of the generic competences at university

The evaluations of Employers vs. Graduates

The competences with the highest achievement level For the achievement of the competences at university, the Employers and the Graduates had to rate in the second column of the scale (B) their opinion on the extent to which the competence was developed. As one can see in Tab. 3.10, four of the competences evaluated as being the most achieved in university are common to the two groups, even if there are differences in ranks: "Capacity to learn", "Basic general knowledge in the field of study", "Ability to work autonomously", and "Will to succeed". For details concerning the evaluations of the two groups, see Tbs. 2.3.1 to 2.3.4 in Appendix 2.3).

Tab. 3.10. The five most achieved competences by descending order of means Employers vs. Graduates

Employers			**Graduates**		
Generic competences - item/ rank		**Mean value**	**Generic competences - item/ rank**		**Mean value**
G10B	1. Capacity to learn	3,0781	G10B	1. Capacity to learn	3,2525
G08B	2. Elementary computing skills	3,0000	G04B	2. Basic general knowledge in the field of study	3,1616
G04B	3. Basic general knowledge in the field of study	2,9219	G27B	3. Ability to work autonomously	3,0202
G32B	4. Will to succeed	2,8906	G32B	4. Will to succeed	2,9684
G27B	5. Ability to work autonomously	2,6979	G01B	5. Capacity for analysis and synthesis	2,9596

Levels of achievement of the competences scored higher by Employers There are only three competences for which the Employers scored the level of achievement higher than the Graduates, but the differences are not significant:

- Elementary computing skills

- Ability to communicate with non-experts
- Knowledge of a foreign language

Only the first competence from above is in the first half of the importance ranking for both groups.

Levels of achievement of the competences scored higher by Graduates For the other 29 generic competences, the Graduates scored higher than the Employers, but only for 5 competences the differences are significant (see Tab. 3.11). For details on the differences between the evaluations of two groups see Tabs. 2.3.5 and 2.3.6 in Appendix 2.3.

Tab. 3.11. Differences in evaluations of the levels of achievement of generic competences as rated by Employers vs. Graduates

Item	Group	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2tailed)
G1B	Employers	64	2,6563	,7605	9,506E-02	-2,748	161	,007
	Graduates	99	2,9596	,6376	6,408E-02			
G3B	Employers	64	2,1875	,7319	9,149E-02	-2,049	161	,042
	Graduates	99	2,4545	,8604	8,647E-02			
G4B	Employers	64	2,9219	,8224	,1028	-2,021	161	,045
	Graduates	99	3,1616	,6807	6,842E-02			
G5B	Employers	62	2,4032	,7566	9,609E-02	-2,163	157	,032
	Graduates	97	2,6701	,7600	7,716E-02			
G15B	Employers	61	2,1639	,7344	9,403E-02	-2,309	154	,022
	Graduates	95	2,4842	,9093	9,329E-02			

The achievement level was rated higher by Graduates than by Employers for the following generic competences:

- 1 – Capacity for analysis and synthesis
- 3 – Planning and time management
- 4 – Basic general knowledge in the field of study
- 5 – Grounding in basic knowledge of the profession in practice
- 15 – Interest in cross-functionality and additional qualifications for career self-management

Like in the previous case, only one competence is ranked as very important by both groups. The conclusion is that the competences evaluated differently for the level of achievement by the two groups are less important.

Intra-group differences

Differences of ratings between Employers coming from small vs. large enterprises The level of achievement of the generic competences is rated differently by the Employers from small/ large enterprises for five competences. For

each of the following five competences, the Employers coming from large enterprises rated higher than those from small enterprises. For the first ones the level of achievement is between 1,85 and 2,83 average points (see Tab. 3.12).

Tab. 3.12. Differences between the levels of achievement of the competences as rated by Employers coming from small vs. large enterprises

Item	Size	N	Mean	Std. deviation	Std. Error Mean	t	df	Sig. (2 tailed)
G10B	Small	30	2,8333	,79148	,14450	-2,592	57	,012
	Large	29	3,3448	,72091	,13387			
G32B	Small	30	2,6333	,96431	,17606	-2,102	57	,040
	Large	29	3,1379	,87522	,16252			
G31B	Small	29	2,4828	,87099	,16174	-2,543	56	,014
	Large	29	3,0345	,77840	,14455			
G3B	Small	30	1,9667	,71840	,13116	-2,367	57	,021
	Large	29	2,4138	,73277	,13607			
G15B	Small	28	1,8571	,70523	,13328	-3,778	53,454	,000
	Large	28	2,5357	,63725	,12043			

For three competences in the list below, the level is inferior to 3 ("considerable"), and for two of the competences even inferior to 2 ("weak"!).

- 10 – Capacity to learn
- 32 – Will to succeed
- 31- Concern for quality
- 3 – Planning and time management
- 15 – Interest in cross-functionality and additional qualifications for career management

The Employers from larger enterprises seem to be happier with the graduates' level of achievement as far as competences are concerned, than those from small enterprises, but one cannot say if the cause is in the quality of graduates they employ or in the difference of work requirements between small and large enterprises.

Gender differences in the group of Graduates As for the level of achievement, there are three competences for which there are significant differences between male and female respondents. For G03 "Planning and time management" and G26 "Understanding the cultures and customs of other countries" the female respondents scored higher than the male ones; for G08 "Elementary computing skills" male respondents rated higher than the female ones (see Tab. 3.13).

Tab. 3.13. Gender differences in rating the level of achievement for Generic competences

Item	Sex	N	Mean	Std. deviation	Std error mean	t	df	Sig. (2 tailed)
G08B	Male	64	3,0625	,88864	,11108	2,620	75,642	,011
	Female	35	2,6000	,81168	,13720			
G03B	Male	64	2,3281	,83675	,10459	-1,986	67,962	,051
	Female	35	2,6857	,86675	,14651			
G26B	Male	64	2,0000	,99203	,12400	-2,033	96	,045
	Female	34	2,4412	1,07847	,18496			

However, the results have to be considered cautiously because of the differences in point of the size of the men's and women's groups.

Age differences Graduates of different age had different opinions on the level of achievement of 12 competences out of 32. For 15 competences the younger Graduates rated higher than the older ones at $p \leq 0,05$, meaning that the differences are really significant. In Tab. 3.14, only the 5 most significant differences are presented in decreasing order of the mean value given by the Graduates younger than 30 (see also Tab. 2.5.2 in Appendix 2.5 for details).

Tab. 3.14. Age differences in rating the level of achievement for generic competences

Item	Age	N	Mean	Std. Dev.	Std. Error Mean	t	df	Sig. (2tailed)
G19B	< 30 years	59	3,0508	,81840	,10655	3,803	97	,000
	> 30 years	40	2,4250	,78078	,12345			
G13B	< 30 years	59	2,8475	,88695	,11547	3,230	97	,002
	> 30 years	40	2,2500	,92681	,14654			
G20B	< 30 years	57	2,8070	,71810	,09511	3,773	95	,000
	> 30 years	40	2,1750	,93060	,14714			
G15B	< 30 years	57	2,7018	,75510	,10002	2,972	93	,004
	> 30 years	38	2,1579	1,02736	,16666			
G29B	< 30 years	59	2,6780	,79742	,10382	3,654	97	,000
	> 30 years	40	2,0250	,97369	,15395			

Generic competences as "Teamwork", "Capacity to adapt to new situations", "Interpersonal skills", "Interest in cross-functionality and additional qualification", and "Initiative and entrepreneurial spirit", and other are considered to be better achieved by younger graduate than by the older ones. For all the competences above the mean value of the rating was over 2,67. Only in one case the older rated higher than the younger: "Basic general knowledge in the field of study" (at $p \leq 0,049$).

Differences by year of graduation Those who have graduated more recently rated the achievement of the generic competences significantly higher than those graduating before 2002 for 16 competences out of 32. For details concerning all the 16 items with significant differences ($p \leq 0,05$) between the ratings of Graduates by year of graduation see Tab. 2.6.2 in Appendix 2.6. In Tab. 3.15, 5 of the most significant differences are presented, with $p \leq 0,01$, in decreasing order of the mean value given by Graduates after 2003.

Tab. 3.15. Differences in rating the level of achievement of generic competences according to the year of graduation

Item	Year of graduation	N	Mean	Std. Dev.	Std. Error Mean	t	df	Sig. (2tailed)
G19B	Before 2002	41	2,4878	,81000	,12650	-2,948	95	,004
	After 2003	56	2,9821	,82000	,10958			
G20B	Before 2002	41	2,2439	,94288	,14725	-2,966	93	,004
	After 2003	54	2,7593	,75073	,10216			
G15B	Before 2002	40	2,2000	,96609	,15275	-2,682	91	,009
	After 2003	53	2,6981	,82240	,11297			
G29B	Before 2002	41	2,0732	1,00971	,15769	-3,315	95	,001
	After 2003	56	2,6786	,78872	,10540			
G7B	Before 2002	41	2,0488	,86462	,13503	-3,242	95	,002
	After 2003	56	2,6250	,86471	,11555			

The competences in the table above are almost the same as in the previous case – ratings by age groups, with one exception: item 7 – "Knowledge of a foreign language".

3.4. Differences between the level of importance of the generic competences for working in enterprises and the actual level of achievement

The Employers and the Graduates had to evaluate the importance of the 32 generic competences and the extent to which the competences were developed by the university degree (level of achievement). The level of importance of the generic competences is higher than the actual level of achievement, as evaluated by the Employers and Graduates together. The paired sample test shows that for all generic competences the differences are highly significant ($p \leq 0,01$), meaning that they consider that the level of achievement is sensibly under the importance of the generic competences. For the two groups taken together, there are 7 competences for

which the difference is larger than 1 point, out of the 4 points of the scale. For details, see Tabs. 2.4.5 and 2.4.6 in Appendix 2.4.

The Employers' opinion

In the case of Employers, the differences for all the 32 competences are positive and significant at p = ,001. This means that for all the competences evaluated, they consider that there is a significant difference between the importance of the competence and the level to which the competence is developed at university. The importance of the competences was rated higher than the actual level of achievement each time. In what follows, we will present the results for the 11 competences for which the differences are larger than 1 point, in decreasing order of the paired differences (see Tab. 3.16).

Tab. 3.16. Differences between the importance of the competence and the level of achievement as rated by Employers

Items		Paired differences			t	df	Sig. (2 tailed)
		Mean	Std. deviation	Std. error mean			
Pair 18	G18A - G18B	1,2344	1,0350	,1294	9,541	63	,000
Pair 03	G03A – G03B	1,1875	,9063	,1133	10,482	63	,000
Pair 02	G02A – G02B	1,1563	,8948	,1118	10,338	63	,000
Pair 22	G22A - G22B	1,1250	,9172	,1147	9,812	63	,000
Pair 17	G17A - G17B	1,1094	,8930	,1116	9,939	63	,000
Pair 21	G21A - G21B	1,1094	1,0253	,1282	8,656	63	,000
Pair 16	G16A - G16B	1,0625	,9900	,1238	8,586	63	,000
Pair 20	G20A - G20B	1,0476	1,0069	,1269	8,258	62	,000
Pair 13	G13A - G13B	1,0469	,9666	,1208	8,665	63	,000
Pair 25	G25A - G25B	1,0313	1,3448	,1681	6,135	63	,000
Pair 23	G23A - G23B	1,0159	1,0079	,1270	8,000	62	,000

For these competences, the average importance evaluated by mean value for the group of Employers is above 3 (considerable). This means that, since the importance of the competence is high, the level of achievement is lower. The competences are presented below, in decreasing order of the discrepancy between importance and achievement.

- 18 – Decision making *(instrumental)*
- 3 – Planning and time management *(instrumental)*
- 2 – Capacity to apply knowledge into practice *(systemic)*
- 22 – Ability to work in an interdisciplinary team *(interpersonal)*
- 17 – Problem solving *(instrumental)*
- 21 – Leadership *(interpersonal)*
- 16 – Capacity for generating new ideas (creativity) *(systemic)*
- 20 – Interpersonal skills *(interpersonal)*

- 13 – Capacity to adapt to new situation *(systemic)*
- 25 – Ability to work in an international context *(interpersonal)*
- 23 – Ability to communicate with non-experts *(interpersonal)*

High importance of competence/ low achievement - in the opinion of Employers Comparing this list of 11 competences in need to be improved with the list of the most important competences rated by the Academics, Employers and Graduates, it results that six of them belong to the most important competences by all ratings (see above Tab. 3.5): "Capacity to apply knowledge into practice" (4/32 in the ratings of Employers), "Capacity to adapt to new situations" (10/32), "Problem solving" (1/32!), "Ability to work in an interdisciplinary team" (18/32), "Planning and time management" (17/32), and "Decision making" (8/32). Two other competences are in the first half of the importance ratings: "Capacity to generate new ideas" (11/32), and "Interpersonal skills"(14/32).

Low importance / low achievement - in the opinion of Employers The other three competences are not present among the most important competences, and are rated by Employers as being less achieved at university (mean value of ratings /group) as following: "Leadership" (27/32 in the ratings of Employers), "Ability to work in a international context" (28/32), and "Ability to communicate with non-experts" (23/32). For details on the ranking of the level of achievement of the competences in the group of Employers see Appendix 2.3, Tabs 2.3.1 to 2.3.4.

The Graduates' opinion

The Graduates had to perform the same evaluation tasks as the Employers: they rated the importance of the competences and their level of achievement at university on separate columns. For 30 out of the 32 competences, the evaluations for the importance were superior to those for achievement, and the differences were positive and significant at $p \leq 0,02$. This means that they also consider that the level of achievement of the competences is inferior to their importance. For the detailed list of paired sample test for differences see Appendix 2.4, Tabs. 2.4.1 to 2.4.4.

Tab. 3.17. Differences between the importance of the competence and the level of achievement as rated by Graduates

Items		Paired differences			t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean			
Pair 23	G23A - G23B	1,1111	,9782	9,831E-02	11,302	98	,000
Pair 18	G18A - G18B	1,1010	1,0449	,1050	10,485	98	,000
Pair 21	G21A - G21B	1,0707	1,0026	,1008	10,626	98	,000
Pair 22	G22A - G22B	1,0101	,9845	9,895E-02	10,208	98	,000

As compared to the Employers, who had rated 11 competences with discrepancies larger than 1 average point between the importance of the competence and the level of achievement, the Graduates seem to be more satisfied with the competences developed at university. For the Graduates, only four discrepancies were larger that 1 point (see also Tab. 3.17).

- 23 – Ability to communicate with non-experts in the field *(interpersonal)* rated by Graduates group as 19/32
- 18 – Decision making *(instrumental)* rated as 6/32
- 21 – Leadership *(interpersonal)* rated as 22/32
- 22 – Ability to work in an interdisciplinary team *(interpersonal)* rated as 16/32.

Only the item 18 “Decision-making” and the item 22 “Ability to work in an interdisciplinary team” are listed among the most important competences by all ratings. What Graduates consider as being low-achieved competences are not actually important ones.

3.5. Employers: Are they satisfied with the graduates’ education level?

Apart from having to rate the competences on the list from the point of view of the importance and of the level of achievement, the Employers were asked to evaluate, at the beginning of the questionnaire, the general level of the preparation given at university. The question was ***"Do you consider that university has given the graduates you have employed the adequate level of preparation for working in your company?"***, with answers on a five-step scale "Very much", "Much", "Some", "Little", and "Very little". The question was the same as in the original Tuning research (Gonzales & Wagenaar, 2003, p. 275).

Most of the Employers considered that the level of preparation was adequate: 48,61% evaluated it as being over the average level, 38,09% average, and only 14,27% under the average level (see Fig. 3.1.). At first sight, it seemed that the Employers were happy with the graduates whom they employed, the mean value of their evaluation being 3,37 (superior to the average rating point of a five-steps scale – 3).

In order to compare this "synthetic evaluation" with the evaluation made through rating the level of achievement for the 32 generic competences, the following procedure was used: the mean of the evaluations according to the level of achievement was computed for each respondent, and then a group mean was computed. The value of the group mean was 2,48, slightly under the average rating point of a four- step scale – 2,5. Though the values of the two means are close, there is a difference between the "synthetic" evaluation made at the beginning and the "analytic" evaluation made by rating.

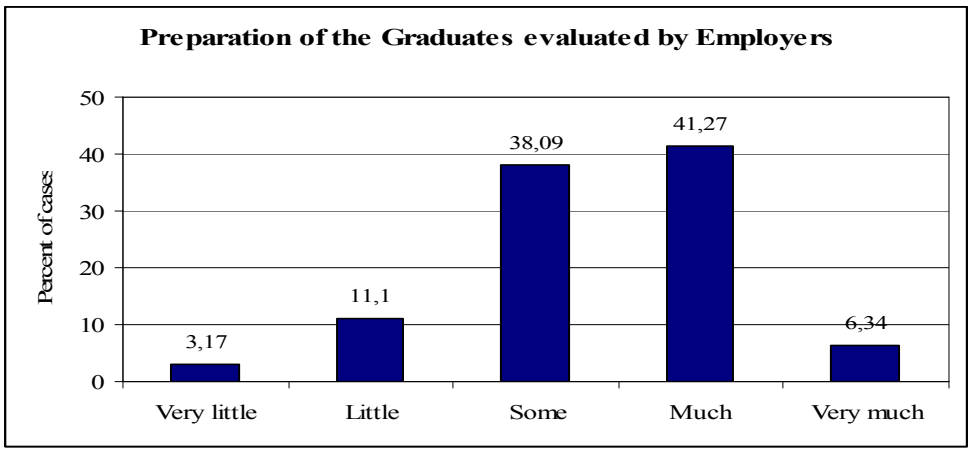

Fig. 3.1. Evaluation of the level of preparation of graduates for working in the company / enterprise made by the Employers

However, the Employers are not so happy with the level of preparation for the work: only 43,74% of the competences were rated over 2,5, the average point of a four-step scale (see also Tab. 2.3.1 in Appendix 2.3). Even if the Employers from small companies evaluated at a higher level the graduates' preparation for working in a company (mean value 2,66) than the Employers from larger companies (mean value 2,46), the difference according to the size of the company is not significant.

3.6. Graduates confronted with the requirements of the world of work

Are Graduates happy with the education received at university?

The answer seems to be a positive one. The preliminary item no 6 in the questionnaire on generic competences for Graduates questioned the general satisfaction concerning the appropriateness of the education received at the university: ***"Do you feel that the education you have received at university has been adequate?"*** The question was also present in the original Tuning research (Gonzales & Wagenaar, 2003, pp. 273-274).

The average point for the answers at this item was 3,56, which means that the majority of answers were between "Some" and "Much" and most of the respondents were happy with the education they received at university. The frequencies for the answers are shown in the Fig. 3.2.

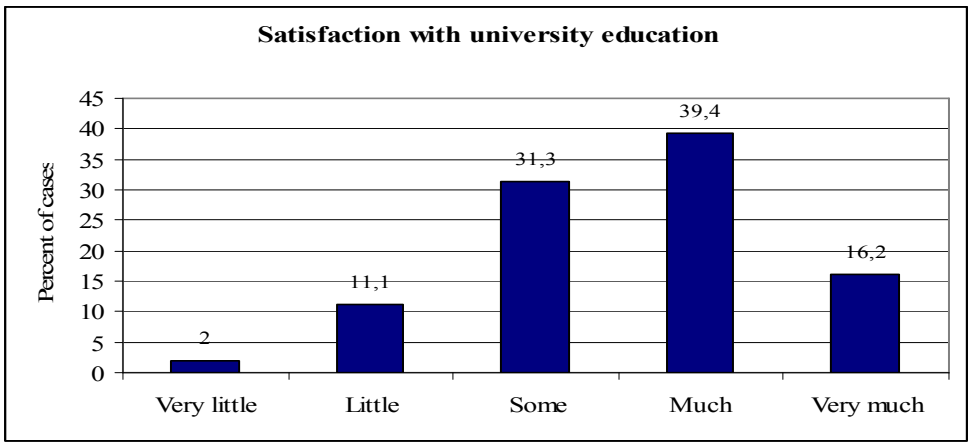

Fig. 3.2. Levels of satisfaction with the education received at university according to Graduates

For the respondents who graduated in different periods, there are some differences in the level of satisfaction. However, the t test for the significance of the mean differences shows that there is no significant difference between the levels of satisfaction of those who graduated before 2002 (average points – 3,73 from 41 respondents) as compared to those after 2003 (average points 3,46 from 56 respondents). The 35 female respondents are more satisfied with the education received at university (average points – 3,77) than the 64 male respondents (average points – 3,45), but the difference is not statistically significant.

In order to compare this "synthetic" evaluation of the education received at university with the "analytical" evaluation, based on the rating of the level of achievement of the competences, we proceeded in a similar way as in the case of Employers: a mean value for the whole evaluation according to the level of achievement of the generic competences was computed for the group – 2,63 average points on a four-step scale. The differences between the "analytical" evaluations of Graduates are the following: male respondents rated lower (average points – 2,58 on a four-step scale) than female (average points – 2,73 on a four-step scale), but this difference is not statistically significant. The rating competence by competence is consistent with the "synthetic" evaluation of the level of education for men and women.

The same comparison, made between those graduating before 2002 and those graduating after 2003 shows that, when rating the level of achievement, those graduating before 2002 rate lower (average points – 2,44 on a for-step scale) than those graduating after 2003 (average points – 2,75 on a four-step scale) and the difference is significant at $p \leq 0{,}006$. In this case, the rating by competence goes in the opposite direction than the "synthetic" evaluation – in other words, older Graduates are generally more satisfied with the education received, but consider that the competences on the list were achieved at university at a lower level than the younger Graduates do.

What is the employment potential of the university diploma?

The answer to this question is also positive. In the same questionnaire, the item 7, concerning this issue, was: ***"How would you rate the employment potential of your degree?"*** The average point for this item was 3,73 for the whole group. About half of the respondents (45,9%) evaluate the employment potential of their diploma as being "good" (see Fig. 3.3.).

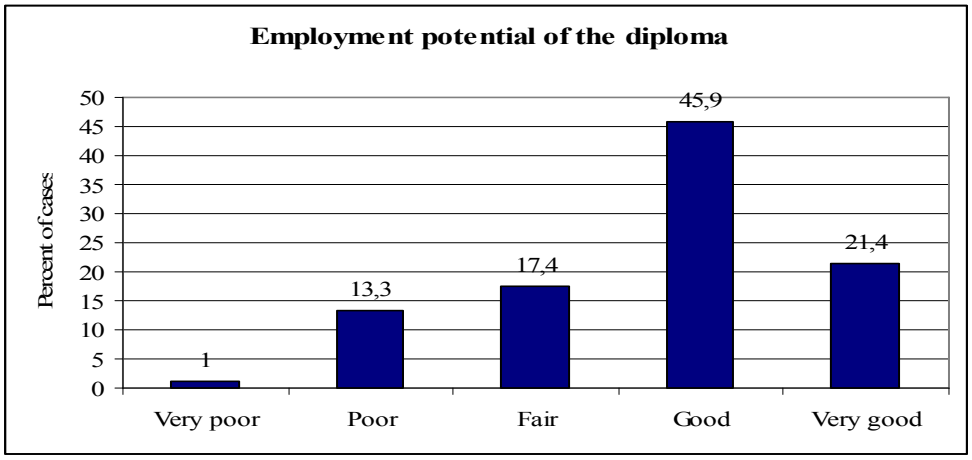

Fig. 3.3. The employment potential of the university diploma
as perceived by the group of Graduates

There are some differences between the respondents according to the year of graduation: those graduating before 2002 consider the employment potential of their diploma as being lower (average points – 3,68) than those graduating after 2003 (average points – 3,80), but the differences are not statistically significant. A larger difference is between the perceived levels of employability for male (average points – 3,68) and female respondents (average points – 3,47) and the difference is significant at $p = 0,05$. This means that women evaluate the probability to find a job related to their university degree as being lesser than for men.

3.7. Other generic competences considered important by the respondents

All three groups were asked to indicate other generic competences that are important but are not on the lists they had to rate or to rank. Some of the answers were somehow equivalent to the competences on the list, but there were also some new ones.

Supplementary generic competences suggested by Academics One of the respondents added the following competence to the list of 17: "Interpersonal - effective and non violent communication skills", will be placed in the first third in the ranking. It is hard to rank named competences, for different positions have different requirements = means priorities and ranking will also differ". This suggested competence is equivalent to "Interpersonal skills" on the Academics list. Other respondents added: "An open minded behaviour is important" and "The quoted fields (Geology, Mining...) also require the capacity of working for long-intervals outside office-comfort, in open-air conditions". These last two suggestions are very different from those on the list, and the question is if one can consider the capacity to work outdoor a generic competence or a specific one to the field of activity.

Supplementary generic competences suggested by Employers The answers given by Employers are more practice-oriented. They added the following to the list of 32 generic competences: "Ability to develop oneself without formal courses" – which is the equivalent of the item 14 – included in the list by our team – "Self-directed learning skills". Other competences added by the respondents were "Presentation skills, skill to 'sell' ideas" which is partially equivalent with item 23 "ability to communicate with non-experts", and "Ability to mentor and share knowledge" – which is totally new.

Supplementary generic competences suggested by Graduates Some of the respondents from this group suggested competences that were similar to the competences on the list of 32, such as "Learning methodologies to learn and auto-motivate to learn" and "Will to learn" which are equivalent to item 14 "Self-directed learning skills" and "Ability to adapt to new cultures" which is the equivalent of item 26 "Understanding of the culture and customs of other countries". Other respondents suggested new competences, such as: "To like the work", "Fidelity", "Ability to work under stress", "Ability to help other people", and "Flexibility".

References

1. Gonzalez, J., Wagenaar, R. eds. (2003). ***Tuning Educational Structures in Europe, Final Report Phase One***. Deusto, ES: Universidad de Deusto.
2. Gonzalez, J., Wagenaar, R. eds. (2005). ***Tuning Educational Structures in Europe I. The Universities' Contribution to the Bologna Process.*** Deusto, ES: Universidad de Deusto.

Chapter 4

SPECIFIC COMPETENCES FOR WORKING IN ENTERPRISES

Marcela Rodica LUCA*

4.1. The importance of specific competences for the 1st cycle – bachelor level and equivalents

The respondents from the three groups were asked to rate the importance of 42 competences specific for working in a company/ enterprise in two separate columns, on a 4-step scale, the first column corresponding to the first cycle (the equivalent of the bachelor level in the Bologna frame), and the second column to the second cycle (the equivalent of the master degree). The content and format of the questionnaire was the same for the three groups, so comparisons become possible between them.

The Academics' perspective

The most important specific competences for working in an enterprise, rated by the Academics over the level 3 – Considerable importance – are the following.

- 1 – Ability to apply knowledge of mathematics, physics, chemistry and other sciences
- 31 – Information technology skills (e.g. word processing, and spreadsheet use, data logging and storage)
- 40 – Skills in the evaluation, interpretation and synthesis of information and data (e.g. writing reports, making presentations)
- 2 – Systemic approach of specific problems
- 8 – Basic knowledge of the design of technical systems (e.g. to know functional principles, modelling methods, calculus methods).

In Tab. 4.1, the most important specific competences are presented for the group of Academics. The least important specific competences, rated by the Academics under the value of 2,5 are: "Knowledge of metrological standards" (25),

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"Ability to analyze and establish the energy saving measures" (6), "Basic knowledge about eco labelling and legislation" (17), "Ability to design and implement maintenance schedules" (27), and "Ability to create real prototypes and design experiments in a virtual environment using professional software" (23).

Tab. 4.1. The most important specific competences for the 1st cycle according to Academics

Item	N	Mean A	Std. Deviation	Rank A
S01A	77	3,2338	,64678	1
S31A	77	3,2237	,80992	2
S40A	77	3,0779	,77402	3
S02A	77	3,0519	,77623	4
S08A	77	3,0519	,80942	5

For details on descriptive statistics and particularly on the ranking of the specific competences according to the group of Academics, see Tab. 3.1.1 in Appendix 3.1.

The Employers' perspective

The top of the most important competences in the first cycle for the Employers has a slightly different configuration. There are 6 competences rated over the level 3 – which could be considered as being of high importance for the whole group (see Tab. 4.2).

Tab. 4.2. The most important specific competences for the 1st cycle according to Employers

Item	N	Mean E	Std. Deviation	Rank E
S38A	64	3,1875	,77408	1
S40A	64	3,1563	,78110	2
S39A	64	3,1250	,80672	3
S31A	64	3,0938	,90359	4
S08A	64	3,0625	,79433	5
S01A	64	3,0469	,86244	6

From these competences, 4 are common to the groups of Academics and Employers (40, 31, 8, and 1), but on different ranks. They are placed on different positions. Another two are peculiar to the group of Employers:

- 38 – Receiving and responding to a variety of information sources (e.g. textual, numerical, verbal, graphical)
- 39 – Preparing, processing, interpreting and presenting data, using appropriate qualitative and quantitative techniques and packages (e.g. statistics, Power Point)

The least important competences for Employers are the following: "Ability to apply measurement knowledge for system operation monitoring" (26), "Ability to apply life cycle analysis for a product" (19), "Knowledge and ability to carry out maintenance tasks after project completion" (20), "Basic knowledge about eco labeling and legislation" (17), and "Basic knowledge about recycling, disposal and impact on the environment" (18). For details on descriptive statistics and particularly on the ranking of the specific competences by the group of Employers, see Tab. 3.1.2 in Appendix 3.1.

The Graduates' perspective

The Graduates rated higher the importance of the specific competences for the first cycle, because 7 competences were rated over the level 3 – evaluating them as being of considerable importance. The most important competences are presented in Tab. 4.3. From these 7 competences, 5 are common either to Graduates and Academics, either to Graduates and Employers. Only one is particular to the group of Graduates: "Ability to identify, formulate and solve specific problems" (3).

Tab. 4.3. The most important specific competences for the 1st cycle according to Graduates

Item	N	Mean G	Std. Deviation	Rank G
S01A	99	3,2121	,79889	1
S39A	99	3,1212	,78601	2
S08A	99	3,1111	,80672	3
S38A	98	3,0714	,76320	4
S03A	99	3,0606	,73980	5
S40A	99	3,0505	,86158	6
S02A	99	3,0101	,70703	7

The least important competences for Graduates are considered the following: "Knowledge and ability to carry out maintenance tasks after project completion" (20), "Managing a technical system by planning and controlling by using of concepts, methods and tools (32), "Basic knowledge about eco labeling and legislation" (17), "Ability to design tool and quality control instruments suited to the project (14), "Ability to create real prototypes and design experiments in a virtual environment using professional software" (23). For details on descriptive statistics and particularly on the ranking of the specific competences by the group of Graduates, see Tab. 3.1.3 in Appendix 3.1.

The three groups together – specific competences in the 1st cycle

The "general top" of the most important specific competences for the first cycle results from ranking the competences in the decreasing order of mean values/ item for the three groups together.

Tab. 4.4. The most important specific competences for the 1st cycle for Academics, Employers, and Graduates together

Item	N	Mean A, E, G	Std. Deviation	Rank A, E, G
S01A	240	3,1750	,77257	1
S31A	240	3,0879	,89620	2
S40A	240	3,0875	,81092	3
S08A	240	3,0792	,80140	4
S39A	240	3,0750	,81474	5
S38A	240	3,0418	,75477	6
S03A	240	3,0083	,72604	7
S02A	240	2,9500	,76372	8

The competences from the previous paragraphs concerning the three groups (see Tabs. 4.1, 4.2, and 4.3) can be found in a slightly different order for the three groups together in Tab. 4.4. For details about the whole list of specific competences see Tab. 3.1.5 in Appendix 3.1.

Inter-group similarities for specific competences in the 1st cycle

The above analysis revealed similarities between the ratings of the importance of specific competences according to the three groups. A synthetic view of these similarities is presented in Tab. 4.5.

Tab. 4.5. Similarities and dissimilarities between the three groups concerning the choices for the most important specific competences for the 1st cycle

Specific competences	Group
• Skills in the evaluation, interpretation and synthesis of information and data (40) • Ability to apply knowledge of mathematics, physics, chemistry and other sciences (1) • Basic knowledge of design of technical systems (8)	Academics, Employers & Graduates
• Receiving and responding to a variety of information sources (38) • Preparing, processing and presenting data using appropriate qualitative and quantitative techniques and packages (39)	Employers & Graduates
• Systemic approach to specific problems (2)	Graduates & Academics
• Information technology skills (31)	Academics only
• Ability to identify, formulate and solve specific problems (3)	Graduates only

By including these important competences into the categories proposed in Chapter 2 (see paragraph on "Questionnaire for Specific competences – Content and

structure of the questionnaire") we have the following structure of the most important specific competences:

1. ***Basic knowledge for working in an enterprise:***
   - Ability to apply knowledge of mathematics, physics, chemistry and other sciences (1)
   - Basic knowledge of design of technical systems (8)
   - Systemic approach to specific problems (2)
   - Ability to identify, formulate and solve specific problems (3)
2. ***Communication skills for the workplace:***
   - Skills in the evaluation, interpretation and synthesis of information and data (40)
   - Receiving and responding to a variety of information sources (38)
3. ***Information technology and software skills:***
   - Preparing, processing and presenting data using appropriate qualitative and quantitative techniques and packages (39)
   - Information technology skills (31)

Another two categories from our classification in Chapter 2 are not represented in the top of the most important specific competences: "Technical competences related to the requirements of work in an enterprise" and "Organization and management knowledge and skills", but competences within these categories are yet present in the first half of the most important competences. For details see Tab. 3.1.5 in Appendix 3.1.

Inter-group differences for specific competences in the 1st cycle

The ANOVA analysis for differences between the three groups of respondents for the importance of specific competences are significant only for items 2 "Systemic approach of specific problems" (at $p \leq 0{,}028$), and 24 "Knowledge of measurement methods" (at $p \leq 0{,}043$). The two competences are ranked by importance for the 1st cycle by the three groups together as being the 8th (better evaluated by Academics) and the 19th (better evaluated by Graduates). For details on ANOVA analysis, see Tab. 3.6.1 in Appendix 3.6.

Intra-group differences for specific competences in the 1st cycle

Employers from small vs. large enterprises Employers from small vs. large enterprises do not have different expectations concerning the competences needed for the Graduates of the first cycle. The t test for the significance of the differences between means shows that there are no differences between them.

Gender differences The most important differences between male and female respondents are in point of the specific competences "Basic knowledge of the

design of technical systems" (8) and "Knowledge of metrological standards in the field" (25) for which the male respondents rated higher than the female ones, and "Understand organizations and how they function" (42), for which the female respondents rated higher than the male ones (see Tab. 4.6).

Tab. 4.6. Gender differences in rating the level of importance for specific competences

Item	Gender	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
S8A	male	64	3,2656	,6956	2,655	97	,009
	female	35	2,8286	,9231			
S25A	male	63	2,7302	,9871	3,658	83,030	,000
	female	35	2,0571	,8023			
S42A	male	63	2,6190	,9057	-2,909	95	,005
	female	34	3,1471	,7440			

For these competences, the value of t is significant at $p \leq 0,01$ meaning that the differences are highly significant. The details for the competences for which the differences are significant at $p \leq 0,05$ see Tab. 3.5.1 in Appendix 3.5 The total of 9 competences for which the differences between the ratings of male and female respondents are significant, are rated all over the mean value of the scale (i.e. 2,5) by one of the gender groups (see same table).

Age differences The age differences are less important than gender differences, as it is shown in Tab. 4.7, for only two competences "Skills in presenting scientific materials and arguments in writing and orally" (41) and "Design and implement information systems for enterprises" (30). The younger Graduates find these two skills as being more important than older Graduates.

Tab. 4.7. Age differences in rating the importance of specific competences according to Graduates

Item	Age	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
S41A	< 30 years	66	2,9697	,7640	9,404E-02	2,034	96	,045
	> 31 years	32	2,6250	,8328	,1472			
S30A	< 30 years	66	2,5606	,9467	,1165	2,106	97	,038
	> 31 years	33	2,1515	,8337	,1451			

For the Graduates' group, the competence 41 is ranked as being the 11th as importance, but the competence 30 is a less important competence (rank 36). For

details on the order of importance for this group, see also Tab. 3.1.3 in Appendix 3.1.

Differences according to year of graduation Highly significant differences between the Graduates before 2002 and those after 2003 can be found only for competence 30, but as presented above, it is not an important competence by rank.

Tab. 4.8. Differences in rating the importance of specific competences according to year of graduation

Item	Year of graduation	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2 tailed)
S30A	Before 2002	41	2,0732	,8182	,1278	-3,421	95	,001
	After 2003	56	2,6964	,9326	,1246			
S36A	Before 2002	40	2,5500	,7828	,1238	-2,104	94	,038
	After 2003	56	2,9107	,8587	,1147			

For competence 36 – "Ability to recognise and analyse novel problems and plan strategies for their solution" (rank 3 on Graduates' list), the difference is significant only at p = ,038. For both competences, those who have graduated more recently consider the competences as being more important than those graduating before 2002.

4.2. The importance of specific competences for the 2nd cycle – master level and equivalents

In the second column of the scale, the respondents were asked to rate the importance of the specific competence for the 2nd cycle for working in an enterprise/ company. The results of the ratings are presented below.

The Academics' perspective on the importance of the specific competences for the 2nd cycle

For Academics, the 5 most important specific competences for the second cycle are (see also Tab. 4.9):

- 3 – Ability to identify, formulate and solve specific problems
- 41 – Skills in presenting scientific materials and arguments in writing and orally to an informed audience

- 40 – Skills in the evaluation, interpretation and synthesis of information and data
- 2 – Systemic approach to specific problems
- 16 – Understand existent and new technology and its impact on new/ future markets.

Tab. 4.9. The most important specific competences for the 2nd cycle according to Academics

Item	N	Mean A	Std. Deviation	Rank A
S03B	77	3,6883	,5680	1
S41B	77	3,5714	,6372	2
S40B	77	3,5455	,6599	3
S02B	77	3,5455	,6599	4
S16B	77	3,4935	,6810	5

Two competences are maintained in the Academics' top as compared to the ratings for the 1st cycle: items 40 and 2. The others are "new entries" – specific competences that differentiate between the two cycles.

The least important specific competences, with mean values between 2,69 and 2,89, are the following: "Ability to apply measurement knowledge for system operation monitoring" (26), "Basic knowledge of the logistic in the field" (15), "Ability to analyze and establish the health and safety measures" (7), "Ability to design and implement maintenance schedules" (27), and "Knowledge of metrological standards in the field" (25). For details concerning the ratings and ranking of the specific competences by the group of Academics see Tab. 3.2.1 in Appendix 3.2.

The Employers' perspective

For the Employers, the most important specific competences for the second cycle are the following (see also Tab. 4.10):

- 3 – Ability to identify, formulate and solve specific problems
- 40 – Skills in the evaluation, interpretation and synthesis of information and data
- 37 – Critically analyzing, synthesizing and summarizing information, including prior research
- 2 – Systemic approach to specific problems
- 38 – Receiving and responding to a variety of information sources.

Comparing this hierarchy with the previous top of competences, one can identify two competences common to the rankings: "Receiving and responding to a variety of information sources" (38), and "Skills in the evaluation, interpretation and synthesis of information and data" (40).

Tab. 4.10. The most important specific competences for the 2nd cycle according to Employers

Item	N	Mean E	Std. Deviation	Rank E
S03B	64	3,4844	,7558	1
S40B	64	3,4375	,8141	2
S37B	64	3,4062	,8110	3
S02B	64	3,3750	,7664	4
S38B	64	3,3594	,8613	5

The least important specific competences, with mean values between 2,56 and 2,69 are considered: "Basic knowledge of logistics in the field" (15), "Ability to apply measurement knowledge for system operation monitoring" (26), "Basic knowledge about eco labeling and legislation" (17), "Knowledge of metrological standards in the field" (25), and "Basic knowledge about recycling, disposal and impact on the environment" (18). Items 17 and 25 are also found as not being important for the first cycle either. For details concerning the ratings and ranking of the specific competences according to the group of Employers see Tab. 3.2.2 in Appendix 3.2.

The Graduates' perspective on the priorities of the 2nd cycle

The most important specific competences for the group of Graduates are the following (see also Tab. 4.11):

- 3 – Ability to identify, formulate and solve specific problems
- 37 – Critically analyzing, synthesizing and summarizing information, including prior research
- 36 – Ability to recognize and analyze novel problems and plan strategies for their solution
- 2 – Systemic approach to specific problems
- 40 – Skills in the evaluation, interpretation and synthesis of information and data.

For the second cycle, only the competence 3 is maintained from the top of the specific competences important for the first cycle.

Tab. 4.11. The most important specific competences for the 2nd cycle according to Graduates

Item	N	Mean G	Std. Deviation	Rank G
S03B	98	3,6633	,5166	1
S37B	95	3,5368	,6492	2
S36B	97	3,5258	,6307	3
S02B	98	3,5204	,6458	4
S40B	98	3,4490	,7052	5

For details concerning the ratings and ranking of the specific competences according to the group of Graduates see Tab. 3.2.3 in Appendix 3.2.

For the group of Graduates, the least important specific competences, with mean values between 2,78 and 2,93 are the following: "Ability to apply knowledge of mathematics, physics, chemistry and other sciences" (1), "Ability to apply system measurement knowledge for system operation monitoring" (26), "Ability to design and implement maintenance schedules" (27), "Basic knowledge about recycling, disposal and impact on the environment" (18), and "Knowledge of metrological standards in the field" (25). The competence 1 was rated according to the group as being the most important for he first cycle (rank 1), but it came on the 38th place for the second cycle.

Common opinions for the three groups

The first 8 positions in the ranking of competences in decreasing order of the mean values as rated by the three groups together are presented in Tab. 4.12. In the top of the most important specific competences for the second cycle, items 2, 3, 38, 39, and 40 are common with the ratings for the first cycle. These competences are important regardless the level of the diploma (first or second cycle). For details on the rank of importance of the specific competences, see Tabs. 3.1.5 and 3.1.6 in Appendix 3.1.

Tab. 4.12. The most important specific competences for the 2nd cycle for Academics, Employers and Graduates together

Item	N	Mean	Std. Deviation	Rank A,E,G
S03B	239	3,6234	,6084	1
S02B	239	3,4895	,6851	2
S37B	236	3,4831	,7233	3
S40B	239	3,4770	,7207	4
S36B	238	3,4370	,7013	5
S41B	238	3,4034	,7555	6
S38B	238	3,3824	,7239	7
S39B	239	3,3640	,7814	8

Inter-group similarities

Synthesizing the most important competences for the three groups (see Tabs. 4.9, 4.10 and 4.11) the following similarities and dissimilarities can be found for the second cycle (see Tab. 4.13). The respondents from all three groups agree that the most important specific competences for the second cycle are included into the following categories:

- Basic knowledge for working in an enterprise: items 2, 3, 16, 36, 37.

- Communication skills for the workplace: items 38, 40, 41.

For the second cycle, the 8 of the 42 specific competences chosen as being the most important for the enterprise, as shown above, belong to only two categories – basic knowledge about enterprises and communication skills.

At the end of the second cycle, the work that the graduates can perform is expected to be more complex and autonomous. Under these circumstances, the competences related to problem solving, systemic approach and communicating with informed peers become prevalent.

Tab. 4.13. Similarities and dissimilarities between the three groups concerning the choices for the most important specific competences for the 2nd cycle

Specific competences	Group
• Ability to identify, formulate and solve specific problems (3) • Skills in the evaluation, interpretation and synthesis of information and data (40) • Systemic approach to specific problems (2)	Academics, Employers & Graduates
• Critically analyzing, synthesizing and summarizing information, including prior research (37)	Employers & Graduates
• Skills in presenting scientific materials and arguments in writing and orally to an informed audience (41) • Understand existent and new technology and its impact on new/ future markets (16)	Academics only
• Receiving and responding to a variety of information sources (38)	Employers only
• Ability to recognize and analyze novel problems and plan strategies for their solution (36)	Graduates only

Intra–group differences in rating the importance for the 2nd cycle

Employers from small vs. large enterprises In the group of Employers, there are no noticeable differences between the Employers coming from large vs. small enterprises concerning the importance of the specific competences for the second cycle. The only difference is for competence 17 "Basic knowledge about eco labeling", for which the Employers from large enterprises rated significantly higher than those from small enterprises, at $p \leq 0{,}041$. In the ranking of the competences based on mean values, this competence has the 40th rank, not being considered an important one (see also Tab. 3.4.1 in Appendix 3.4).

Gender differences The most significant differences between male and female respondents in the group of Graduates for rating the importance of specific competences are presented in Tab. 4.14. For the following competences, the male respondents rated higher than female respondents: "Basic knowledge of the main technologies in the field" (12), "Basic knowledge about modeling, simulation, and analysis tools of processes and systems" (21), and "Ability to carry out modeling, simulation, and analysis of technical systems" (22).

However, these three competences with highly significant differences are rated by the same group of respondents (Graduates) as not being of first hand importance: the ranks of importance for the second cycle are 23 (12), 19 (21), and 20 (22). For details concerning all the significant differences, see also Tab. 3.5.2 in Appendix 3.5.

Tab. 4.14. Gender differences in rating the level of importance of the specific competences for the second cycle

Item	Sex	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
S21B	Male	63	3,3651	,6550	3,186	96	,002
	Female	35	2,8571	,9121			
S22B	Male	63	3,3333	,7620	2,825	96	,006
	Female	35	2,8286	,9848			
S12B	Male	63	3,3333	,8032	3,015	96	,003
	Female	35	2,8000	,9010			

Age differences There are no significant differences between the Graduates' ratings according to age, with one exception, the item 21 - "Basic knowledge about modeling, simulation, and analysis tools of processes and systems". The older Graduates considered the competence as being more important than the younger did: they rated it significantly higher (3,50) than the younger ones (3,03), at $p \leq 0,005$. For details, see Tab. 3.5.4 in Appendix 3.6.

Differences according to the year of graduation The respondents who graduated before 2002 rated the item 14 - "Ability to design tools and quality control instruments suited to the project" - as being less important (2,80) for the second cycle than those who graduated after 2003 (3,17). The difference is significant at $p \leq 0,027$. For details, see Tab. 3.5.6 in Appendix 3.5.

Inter–group differences in rating the importance for the 2nd cycle

There are very significant differences between the three groups of respondents for only three competences, but their importance is not a first hand one for the second cycle (see Tab. 4.15).

- 1 – "Ability to apply knowledge of mathematics, physics, chemistry and other sciences" – rated higher by Academics (rank 11), but having the 27th rank of importance for the three groups
- 8 – "Basic knowledge of the design of technical systems" – also rated higher by the Academics (rank 8), but having only the 17th rank of importance for the three groups

- 19 – "Ability to apply life cycle analysis for a product" – rated higher by the Academics and Graduates, but lower by Employers, having the 30th rank of importance for the three groups together.

Tab. 4.15. Inter-group differences for the importance of specific competences for the 2nd cycle

Item		Sum of Squares	df	Mean Square	F	Sig.
S1B	Between Groups	11,223	2	5,612	7,300	,001
	Within Groups	181,421	236	,769		
	Total	192,644	238			
S8B	Between Groups	7,914	2	3,957	5,450	,005
	Within Groups	172,081	237	,726		
	Total	179,996	239			
S19B	Between Groups	7,607	2	3,803	5,243	,006
	Within Groups	171,188	236	,725		
	Total	178,795	238			

Other specific competences are also rated differently, but the level of significance of the differences is $p \leq 0, 05$. For details on the mean values and ranks see Tab. 3.2.4 in Appendix 3.2.

4.3. Differences between the levels of importance of specific competences for the 1st and the 2nd cycle of higher education

The paired sample test for the differences between the ratings of specific competences for the first vs. second cycle shows that for almost all the competences the ratings are higher for the second cycle. The t test for the significance of the differences shows that for the majority of the competences, the differences are highly significant (at levels of $p \leq 0,001$). This means that for Graduates with a second cycle diploma, the expectations in terms of specific competences for working in an enterprise is higher. For details on the significance of the differences for the three groups separately see also Tabs. 3.3.1, 3.3.2, and 3.3.3, and Tab. 3.3.4 for the groups of Academics, Employers and Graduates together, in Appendix 3.3.

The analysis performed on the three groups together shows that the competence 1 - "Ability to apply knowledge of mathematics, physics, chemistry and other sciences" is considered only by Academics to be more important for the first cycle than for the second cycle, but the difference is not statistically significant. The other two groups consider the competences as being less important in the second cycle. The rating for the three groups together is also inferior for the second cycle (see Tab. 4.16).

Tab. 4.16. Comparing the means and the ranks of item 1 for the first and the second cycle

Item	Mean A	Rank A	Mean E	Rank E	Mean G	Rank G	Mean A, E, G	Rank A, E, G
S01A 1st cycle	3,2338	1	3,0469	6	3,2121	1	3,1750	1
S01B 2nd cycle	3.3896	11	2,9219	31	2,9286	38	3,0753	27

For other competences there are no significant differences between the levels of importance for the 1st vs. 2nd cycle, as rated separately or together, even if the level of importance was rated higher for the second cycle.

Supplementary specific competences The respondents indicated some supplementary specific competences, but these are rather generic competences than specific, and have already equivalents on the list of generic competences: "Communication skills for the team work", "Ability to communicate", "Effective and non violent communication skills", "Giving and receiving feedback", "Informing others". Some could be however considered as being specific for working in an enterprise: "Ability to communicate at all levels within an organization", "Coaching and mentoring", "Motivating others". Comparing the answers at items 43 and 44 (Other competences…) from the SPECOE questionnaire, there are much fewer answers than for the generic competences.

Differences in level of importance between Specific competences and Generic competences Comparing the range of ratings between generic and specific competences, it results that the Employers and Graduates rated the generic competences in a wider range than the three groups did for the specific competences, for the 1st cycle and for the 2nd as well (see the minimum, maximum values, and the differences of the ratings in Tab. 4.17). We have to specify that, in the case of generic competences, the Academics did not rate the level of importance of the competences. Their task was only to rank the generic competences.

Tab. 4.17. Comparison between the ratings of the importance/ achievement of the generic competences and importance of the specific competences for the two cycles

Criterion	GESKE importance E+G	GESKE achievement E+G	SPECOE 1st cycle A+E+G	SPECOE 2nd cycle A+E+G
Maximum	3,7258	3,0781	3,1750	3,6234
Minimum	2,6886	1,9531	2,3138	2,6975
Difference Max. –Min.	1,0372	1,1250	0,8612	0,9259
Average	3,3502	2,5729	2,6100	3,1606

For the generic competences, the range of achievement (3,0781-1,9531) is situated under the range of importance (3,7258-2,6886); the average value of the

level of importance is superior with 0,77 points to the average value of the level of achievement. At the level of the entire research population, the level of achievement of the generic competences is obviously under the level of achievement.

The level of importance of the specific competences, both for the 1st (average value 2,61) and the 2nd cycle (average value 3,1606), was lower than the level of importance of generic competences (average value 3,3502). This indicates the fact that the generic competences, as measured in our research, play a key role in the structure of competences for working in enterprise.

Chapter 5

CONCLUSIONS OF THE RESEARCH ON GENERIC AND SPECIFIC COMPETENCES FOR ENTERPRISES

Marcela Rodica LUCA*

Our research was not focused on a specific subject-area, like the original Tuning research, but on any specialism that could be employed in an enterprise. From this point of view, the generic competences are the same, but the specific ones are rather "enterprise-specific". By the generic term of enterprise we understand any entity in the industrial and manufacturing sectors, but also in banking, finance, services of all kind. The common denominator is the achievement of a product, either material or immaterial, that is destined to clients. That is why the items in the SPECOE questionnaire are formulated as competences required by these kinds of activities. The respondents were also working in such sectors and were able to evaluate the importance of the generic and specific competences for the work.

From the level of importance of the generic and specific 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.

5.1. Methodological issues of the research

The EUI-Net research on generic and specific competences replicated the original Tuning research on Generic skills/ competences with quite similar results and designed a questionnaire for Specific competences for enterprises.

Generic competences In the Generic competences questionnaire, 2 new items were introduced "Self-directed learning skills" and "Interest in cross-

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functionality and additional qualifications for career management" which reflect, in our opinion, the necessity to include generic competences in the Graduates' competence profile, which should enable them to manage autonomously their life long learning and career in a knowledge and learning society. The two new items were rated by the respondents as being quite important, over the value of 3, and their item-scale correlation coefficients were 0,54 and 0,71, meaning a good match into the internal consistency of the total scale.

By eliminating the items with an α inferior to 0,40 from the scale, the 32 item questionnaire on generic competences could be reduced to a shorter scale, of 23 items, but all the 9 of the excluded items are rated by the Employers and Graduates over the value of 3 (corresponding to "considerable importance") and 3 of them are in the first half of the top of importance: capacity for analysis and synthesis, planning and time management, oral and written communication in native language. A shorter scale with the same internal consistency as the extended scale would be thus less relevant in its range of competences; therefore, using the short scale is not so recommendable if we aim at the completeness of the competence profile.

Specific competences for enterprises From the initial list of 53 specific competences, 42 were kept for the SPECOE questionnaire. Using a 4-step scale, the respondents evaluated the importance of the specific competences for the first and for the second cycle of higher education. In point of the content, the specific competences were initially categorized into the 5 sub-scales: "Basic knowledge for working in and enterprise", "Technical competences…", "Organization and management knowledge and skills", "Communication skills", and "IT and software competences".

The metric qualities of the 42-item questionnaire were tested and proven to be good. However, by eliminating the items with item-scale correlation coefficients inferior to 0,50, a second version resulted, SPECOE-2, with 33 items and similar internal consistency with the initial 42-item scale. This version of the questionnaire has only 3 sub-scales: "Basic competences for working in enterprises", "Technical competences…", and "Workplace communication and management competences", each with good internal consistency.

Although inconsistent with the 33-items scale, as in the case of the Generic competences questionnaire, the 9 excluded items were important; they had average ratings/ item over the value of 3, and were all classified according to the rank in the first half of the items for the first cycle. For the second cycle, the situation was similar for 6 items out of 9. By content, these competences are more general than the other 33 of the short scale. Under these circumstances, one solution could be to make of them a 4^{th} sub-scale: "Generic competences for work/ enterprise" – and to keep the items for further research.

Limits of the research Though the respondents were from 20 European countries, having very different professional backgrounds, workplaces, coming from different 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 Questionnaire on Specific Competences for Enterprise proved to have good metrical qualities and can be used either in its extended or short form. However, the findings of this research are limited in their interpretation by its exploratory character.

5.2. The level of importance of generic competences

The reflections of the stakeholders involved in the research were focused on the generic competences needed by the world of work, the enterprise being considered as a typical entity for working. The Academics, the Employers and the Graduates consulted worked in different areas of activity and had different professional backgrounds. They were all invited to reflect on the importance of generic competences, as defined in the two types of questionnaires administered:

- for Academics the task was only to rank the 17 competences according to their importance;
- for the Employers and the Graduates, the task consisted in evaluating the importance of 32 generic competences and the level to which the competence was developed at university, on a 4-step scale. A separate ranking was asked at the end of the questionnaire from the 5 most important competences (the "Top 5" of generic competences).

The aims of this approach were to compare the rankings of importance for the generic competences as well as to identify the possible discrepancies between the importance of the competences and their actual level of achievement.

The importance of the generic competences was compared then in two ways:

- by ranks resulted from the separate ranking at the end of the scale (for Employers and Graduates) and by the ranking of the 17 competences (for Academics);
- by average ratings + rankings based on ratings, made by Employers and Graduates on the 32 item scale.

There are some similarities between the two kinds of rankings of the three groups at both ends of the rankings: the respondents tend sometimes to choose similar competences as being important, especially the Employers and the Graduates, who had similar tasks of rating and ranking.

The most important generic competences

For the groups of Academics, Employers, and Graduates, the most important generic competences for working in an enterprise, chosen either by ranking at the end of the scale and weighted frequency, or by descending value of average ratings, were the following:

- Capacity to apply knowledge into practice *(systemic)*
- Capacity to adapt to new situations *(systemic)*
- Concern for quality *(systemic)*
- Will to succeed *(systemic)*
- Capacity for analysis and synthesis *(instrumental)*
- Problem solving *(instrumental)*
- Basic knowledge in the field of study *(instrumental)*
- Basic knowledge of the profession *(instrumental)*
- Elementary computing skills *(instrumental)*
- Planning and time management *(instrumental)*
- Decision making *(instrumental)*
- Teamwork *(interpersonal)*
- Ability to work in an interdisciplinary team *(interpersonal)*

Inter-group differences However, there are differences between the three groups: the Employers and the Graduates tend to evaluate in a similar manner, but differently from the Academics. For example, the Academics tend to give more importance to the knowledge than the Employers and Graduates do (see also Tab. 3.1 in Paragraph 3.2). This was also a finding in the original Tuning research. In their book, the Tuning team found that competences such as "Basic knowledge in the field of study" were chosen as being of first importance by the Academics, but only on the 12th place by the Employers and the Graduates (see Gonzales & Wagenaar, 2003, p. 87, and Chapter 3 of this book). In our research, this item was in the 3rd rank of importance for the group of Academics and only on the 25th rank with Employers vs. 20th rank with Graduates in the "Top 5".[9]

The Graduates and the Employers tend to valorise "practice-oriented" competences more, such as "Capacity for analysis and synthesis", "Problem solving", "Decision Making", "Will to succeed", "Concern for quality" which are not in the "top 5 of the Academics, but are in the "top 5" of the Employers and of the Graduates (see also Tabs. 3.1, 3.2, 3.3, and 3.5, in Paragraph 3.2).

For several competences, the Employers rated the importance higher than the Graduates, but only for one the difference is significant at $p \leq 0, 04$ - "Ethical commitment", for which the Employers rated 3,40 (rank 15 of 32), the Graduates rated 3,19 (rank 26 of 32), and the Academics ranked the same competences on the 13th place out of 17. This means that, for the Employers, the ethical commitment is important when evaluating the quality of an employee, but the other two groups do not give the same level of importance to this particular competence. Other differences are between the ratings of Employers and Graduates for the competences

[9] The rank of importance does not change very much when considering the ratings for the level of importance given by Employers and Graduates to "Basic knowledge in the field of study": 13th rank out of 32 (average rating 3,42 of 4) by Employers vs. 24th rank out of 32 (average rating 3,18 of 4) by Graduates.

"Research skills", "Elementary computing skills", "Critical and self-critical abilities", but the differences are not significant.

There were also competences for which the Graduates rated higher than the Employers, such as "Ability to work autonomously", "Will to succeed", "Leadership", "Knowledge of a foreign language", "Initiative and entrepreneurial spirit", but for the population of the research the differences are not statistically significant.

Intra-group differences Despite the existent similarities between the ratings of Employers and Graduates, there are some noticeable intra-group differences in evaluating the importance of the generic competences, such as:

- Differences between Employers according to the enterprise size for two competences – "Capacity to apply knowledge into practice" and "Will to succeed" for which the Employers coming from small enterprises rated higher the importance than those from large enterprises; it is possible that for small enterprises these competences give employees the capacity to be more flexible and dynamic.
- Differences between Graduates according to the gender for other two competences – "Project design and management" and "Leadership" for which male respondents rated the importance higher than female respondents. These differences could be related to gender role stereotypes – the males are rather expected to perform leading and managerial roles.
- Differences between Graduates according to the age – the younger Graduates rated higher than older Graduates, at highly significant level of differences, the importance of competences that are related to dynamism and internationalization – "Initiative and entrepreneurial spirit", "Interest in cross-functionality and additional qualifications", "Ability to work in an international context", "Appreciation of diversity and multiculturality", "Knowledge of a foreign language".
- Differences between Graduates according to the year of graduation – the respondents who graduated after 2003 rated several competences higher than those graduating before 2002, at highly significant differences, these competences being required by less "traditional" working conditions. Among them, one can find the above mentioned competences related to multiculturality and internationalization, but also to the flexible organization of work, autonomy and inter-disciplinarity. The competences rated higher by those who have graduated more recently are: "Teamwork", "Ability to work autonomously", and "Ability to communicate with non-experts".

The less important generic competences

For the three groups of respondents, the less important competences are different. For the group of Academics, the less important competences are: "Ethical commitment", "Interpersonal skills", "Knowledge of a foreign language", "Oral and

written communication in your native language", "Research skills". In this respect, the Academics value in the opposite direction some competences that the Employers, for example, rated much higher – the most important being… "Ethical commitment" (!).

For the group of Employers, the less important competences are "Research skills", "Interest in cross-functionality…", "Appreciation of diversity and multiculturality", "Ability to work in an international context", and "Understanding of cultures and customs of other countries". For the group of Graduates, the less important competences are "Research skills", "Critical and self-critical abilities", "Appreciation of diversity and multiculturality", "Ability to work in an international context", and "Understanding of cultures and customs of other countries".

The low evaluation of the research skills at the enterprise level is understandable, but, in the context of a common European market and of the globalization, this lack of interest in competences related to multiculturality and diversity is rather bizarre. Similar findings concerning the most important and the less important competences were found by the Tuning research.

5.3. The level of achievement of generic competences

Due to the structure of the questionnaire on generic competences, the Employers and the Graduates were also able to express their opinion upon the level of achievement of the generic competences at university. Thus, we had the possibility to compare the level of importance and the level of achievement for each competence, as viewed by the two groups.

The best achieved generic competences

The Academics were not consulted on the level of achievement of generic competences at university; therefore they will not be taken into account when establishing the inter-group similarities in this respect. The Employers and the Graduates, taken as a group, consider that the diploma of higher education ensures the best achievement of the following competences:

- Capacity to learn *(instrumental)*
- Basic general knowledge in the field of study *(instrumental)*
- Elementary computing skills *(instrumental)*
- Will to succeed *(systemic)*
- Ability to work autonomously *(systemic)*.

Taking the two groups separately, another generic competence is included by Graduates in this top of the best achievements:

- Capacity for analysis and synthesis *(instrumental)*.

The first three of these competences, cognitive by content, are included by the Tuning research in the category of instrumental competences. The higher education gives graduates other two generic competences that are more "action-related", included in the category of systemic competences: "Will to succeed" and "Ability to work autonomously", and another instrumental one – "Capacity for analysis and synthesis". The ranks of importance of the above mentioned generic competences are a bit different for Employers and Graduates taken separately. All these generic competences represent the very base for any future learning and professional development.

Inter-group differences When rating the levels of achievement of the competences, there are however differences between the two groups. For only 3 competences out of 32 the Employers scored higher than the Graduates, but the differences are not statistically significant. For the other 29 competences the Employers scored lower than the Graduates, but only for 5 competences the differences are statistically significant: "Capacity for analysis and synthesis", "Planning and time management", "Basic general knowledge in the field of study", "Grounding in basic knowledge of the profession", "Interest in cross-functionality and additional qualification". Two of these competences are ranked in the first half according to the mean value ("Planning…" – rank 3, and "Capacity for analysis…" – rank 10). The other three are ranked at lower levels.

Employers consider that the level of achievement for the above mentioned 5 competences is not as high as Graduates do. Even if the Graduates seem to be happier with the generic competences they acquired at university, the Employers, from a different perspective, evaluate that the situation is not so good. The Employers are more demanding towards the university concerning the preparation of the Graduates required by the enterprise.

Intra-group differences Generally, Employers from large enterprises seemed to be happier with the level of generic competences of the Graduates they employed. Significant differences were found between Employers from small vs. large enterprises: the last category rated the level of achievement significantly higher for five competences: "Capacity to learn", "Will to succeed", "Concern for quality", "Planning and time management", and "Interest in cross-functionality and additional qualifications".

As for the group of Graduates, relatively few important differences in evaluating the level of achievement of the generic competences were found according to gender, age, and year of graduation:

- Differences between male and female respondents for three competences – male respondents were happier with the level of achievement of "Elementary computing skills" – for which they scored higher than the female respondents; female respondents considered "Planning and time management", and "Understanding of cultures and customs of other countries" more achieved and they rated the competences higher than males did.

- Differences according to the respondents' age – differences between younger and older Graduates for the level of achievement for 15 out of 32 competences. For 14 competences, the younger Graduates rated significantly higher than the older ones. Younger Graduates consider that their education gave them competences such as "Teamwork", "Interpersonal skills", "Initiative and entrepreneurial skills" at a higher level than the older ones.
- Differences according to the year of graduation – Graduates after 2003 rated the level of achievement for 16 competences out of 32significantly higher than those before 2002, but the more significant differences are for competences such as "Knowledge of a foreign language", "Teamwork", "Interpersonal skills", and "Initiative and entrepreneurial skills".

The less achieved competences

At the other end of the ranking, the less achieved competences, for the two groups together, are "Appreciation of diversity and multiculturality", "Ability to communicate with non-experts", "Ability to work in an international context", "Understanding of cultures and customs of other countries", "Leadership". The groups taken separately have very similar rankings: the Graduates have the same competences on the last five ranks as the groups together, but the Employers have the last three and other two: "Interest in cross functionality and additional qualifications" and "Planning and time management". The above mentioned competences are almost all ranked by the two groups among the less important generic competences, with one exception: "Planning and time management", which is among the important ones (rank 14 for the two groups together).

Satisfaction with the education at the university

Even if in the synthetic evaluation made by the Employers at the end of the questionnaire 48,61% declared that the level of preparation of the graduates was "much" and "very much" adequate for working in their enterprise, the mean value of the ratings show that the Employers are not so satisfied with their new employees: only 43,74% of them rated the level of preparation over the mean value of the 4 steps scale – 2,5.

The Graduates are more satisfied with the education received at university: the average value of their synthetic evaluation on the 5 steps scale is 3,56, superior to the evaluation made by the Employers 3,37; 55,6% of the respondents declared that the education received at university was "much" and "very much" adequate for working in an enterprise. They are also satisfied with the employability of their degree: 67,3% of the Graduates considered that the employment potential of their diploma is "good" and "very good", but male respondents are significantly more satisfied than the female ones.

Differences between the importance and the level of achievement of the generic competences

Both for Employers and Graduates, there are differences between the "ideal" and the "actual" level of education given by the university. Rating separately the level of importance and the level to which each competence was developed at university gives an image of these differences. But the two groups have different opinions on the issue: the Employers are less pleased than the Graduates. For the group of Employers, all the 32 generic competences are highly significantly underachieved if one takes into account their importance! For the Graduates, for 30 out of 32 competences the difference between the importance and the achievement is highly significant. Comparing the number of items for which the difference is larger than 1 point, 11 competences result for the Employers and only 4 competences for the Graduates.

High importance/ low achievement In the evaluations of the Employers, six of the most important generic competences by all ratings[10] are underachieved with more than 1 point: "Problem solving", "Capacity to apply knowledge into practice", "Capacity to adapt to new situations", "Ability to work in an interdisciplinary team", "Planning and time management", and "Decision making". For the group of Graduates, 2 out of 4 competences significantly underachieved are from the list of the most important generic competences: "Decision making" and "Ability to work in an interdisciplinary team".

For these competences, of high importance and low achievement, something must be done with a view to adjusting the curricula. The university has to reconsider the contents and the teaching/ learning methods in order to enhance the achievement of these generic competences that are obviously and highly required by the world of work.

5.4. Discussion on the importance and the achievement of generic competences

Summarizing the results of our research on the importance and the achievement of generic competences at university some issues can be highlighted. There are differences in point of the perspective on the generic skills between the Academics on one side and Employers and Graduates on the other side, and these differences are related on their different positions with respect to the production and the use of competences.

[10] A synthesis of ratings and rankings of all three groups: Academics, Employers, and Graduates. See also paragraph 3.4, and Tab.3.5.

When designing the curricula, academics anticipate the competence needs of a hypothetic, theoretical employer in the future, because producing competence means identifying needs, planning the educational process, implementing it and delivering, at the end of a cycle, the competences on a dynamic labour market, which changes more rapidly than the educational system could adapt. Under these circumstances, generic competences have a paramount importance, because they are the very base for any future learning, but the other stakeholders, employers and graduates have to be consulted, since they are much closer to the actual competence requirements of the world of work.

Academics are focused rather on the knowledge-related competences, illustrating the philosophy that "the most practical thing is a good theory" and agree that the most important generic competences are basic knowledge in the field of study and in the profession, and the capacity to apply it into practice. Beside these competences, on of their top 5 of generic competences there are also the capacities to apply the theory into practice and to adapt to new situations.

On the other hand, the Employers and the Graduates think differently. For them, it is important that the competences gained by the graduates meet the job requirements at present, not in a hypothetic future. They are more focused on the concrete issues that have to be done, on the actual use of competences – at the level of capacities and skills – and not on the knowledge that lies behind those capacities. That is why their tops 5 appear to be important other sort of competences, such as problem solving, decision making, capacity for analysis and synthesis, teamwork, concern for quality, will to succeed. For them, these are the competences that ensure the good adapting of a graduate to the work requirements, and not necessarily the theoretical knowledge.

Even if the Employers and Graduates tend to prioritize the importance of generic competences in similar ways, there are however some inter-group and intra-group differences. Analysing the five competences for each group whose importance was rated higher than for the other group (Employers higher than Graduates, respectively Graduates higher than Employers), an interesting issue appears: the Employers value the "organization-centred" competences more, which enable employees to fit and perform well in the organisation, while the Graduates value more "individual-centred" competences, which enable a person to succeed in a "careerist" manner once employed in an organization.

Graduates are not perfectly homogenous in their opinions on the importance of generic competences: some gender differences were found in valuing the importance of some competences related to gender stereotypes, such as management and leadership. The age and the year of graduation also differentiate the rating of importance for competences related to dynamism and internationalization – younger and more recently graduated respondents value more competences such as interest in cross-functionality and additional qualifications, ability to work in an international context, ability to communicate with non-experts, teamwork, ability to work autonomously and so on.

Concerning the level of achievement of the generic competences at university, the Employers and the Graduates agree that the best developed generic competences are: capacity to learn, basic general knowledge in the field of study,

ability to work autonomously, will to succeed – but the Employers are less satisfied than the Graduates with the level of achievement of the generic competences.

As a general issue, the Employers and Graduates consider, at a statistically significant level that the achievement of the generic competences is under the level of their importance. For 7 competences out of 32, the two groups agree that there are differences bigger than 1 point, which means a huge difference on a scale of 4 points. As usual, the Employers are more severe than Graduates when pointing out discrepancies.

There are also some intra-group differences in evaluating the level of achievement of the generic competences. The prototype of the "employer" is the large enterprise, and when designing curricula, universities have in mind the competence requirements rather of this type of organizations. But with the growth of the small and medium sized enterprise sector, more and more graduates are employed by small enterprises. Employers from small enterprises are less pleased with the level of achievement of the generic competences, as the results of our research show, for competences such as capacity to learn, concern for quality, planning and time management, will to succeed, which enable graduates to be dynamic, autonomous and flexible. This could be a signal for universities, when redesigning and updating curricula to reconsider competence requirements that are specific to small enterprises.

Graduates who are younger and who have graduated more recently are happier with the level of achievement of competences such as teamwork, interpersonal skills, initiative and entrepreneurial skills, which could indicate that the universities already have done something in the last years in improving the acquirement of such competences.

5.5. The importance of specific competences for the 1st cycle of higher education

The competences required for the two cycles of studies are and have to be different in structure and level. It is expected for a diploma of Bachelor level that the Graduates achieve rather basic knowledge and skills and for a diploma of Master level they achieve more specialized and higher level competences. When asking the three groups of respondents to evaluate the importance of specific competences for working in an enterprise, they were invited to compare, for each competence, the level of importance for the first vs. second cycle of the higher education, on a scale of 4 steps. The answers they gave indicate that, for most of the specific competences, there are substantial differences in terms of the importance between the two cycles.

The most important specific competences

For the first cycle of higher education, 7 specific competences were found to be very important, being rated over the value of 3 (equivalent for "considerable importance" – on the 4-step scale) by all the participants in the research – Academics, Employers and Graduates together:

- Ability to apply knowledge of mathematics, physics, chemistry and other sciences *(basic knowledge for enterprise)*
- Information technology skills *(IT and software competences)*.
- Skills in the evaluation, interpretation and synthesis of information and data *(communication skills)*
- Basic knowledge of design of technical systems *(basic knowledge for enterprise)*
- Preparing, processing and presenting data using appropriate qualitative and quantitative techniques and packages *(IT and software competences)*
- Receiving and responding to a variety of information sources *(communication skills)*
- Ability to identify, formulate and solve specific problems *(basic knowledge for enterprise)*

Inter-group differences The three groups tend to rate the importance of the specific competences for the first cycle in a similar manner. The only significant differences are for "Systemic approach of specific problems" (rated higher by Academics) and "Knowledge of measurement methods" (rated higher by Graduates).

Intra-group differences The evaluation of the importance of the specific competences is influenced to a certain extent by demographic variables: gender, age, and year of graduation. In the group of Graduates, several significant differences were found:

- Gender differences: male respondents rated two competences significantly higher than the female ones: "Basic knowledge of the design of technical systems" and "Knowledge of metrological standards in the field"; female respondents rated only one competence significantly higher than the male ones did: "Understand organizations and how they function". From the competences above, "Knowledge of metrological standards…" is not an important one.
- Age differences: younger Graduates rated two competences significantly higher than the older ones: "Skills in presenting scientific materials and arguments…" and "Design and implement information systems for enterprise".
- Differences according to the year of graduation: Graduates who have finished school more recently (after 2003) value the following competences more than those who graduated before 2002– "Design and implement information systems for enterprise" and "Ability to recognise and analyse novel problems and plan strategies for their solution".

The less important specific competences for the first cycle

The last five positions in the hierarchy of the specific competences according to their importance for the first cycle are occupied by competences that are in the categories of "technical competences " and "basic competences":

- Ability to design tools and quality control instruments suited to the project *(technical competence)*
- Ability to design and implement maintenance schedules *(technical competence)*
- Ability to apply measurement knowledge for system operation monitoring *(basic knowledge for enterprise)*
- Ability to create real prototypes and design experiments in a virtual environment using professional software *(technical competence)*
- Basic knowledge about eco labelling *(basic knowledge for enterprise)*.

These competences do not have a strong influence on the graduates' adapting to the requirements of work and are considered by all three groups as the least important of all.

5.6. The importance of specific competences for the 2nd cycle of higher education

For the three groups – Academics, Employers and Graduates - together, the 34 specific competences were found to be very important for the 2nd cycle, being rated over the value of 3,4 (!). In this respect, the evaluations for the second cycle are much higher than those for the first cycle, the t test for mean differences shows that for 40 specific competences out of 42 the differences are significant at $p \leq 0{,}002$. For the competences "Ability to apply knowledge of mathematics, physics, chemistry, and other sciences" and "Basic knowledge of design of technical systems" there is no significant differences between the cycles, the level of importance is almost the same in the first and the second cycle. The seven most important specific competences are the following:

- Ability to identify, formulate, and solve specific problems *(basic knowledge for enterprise)*
- Systemic approach to specific problems *(basic knowledge for enterprise)*
- Critically analyzing, synthesizing and summarizing information, including prior research *(basic knowledge for enterprise)*
- Skills in the evaluation, interpretation and synthesis of information and data *(communication skills)*
- Ability to recognise and analyse novel problems and plan strategies for their solution *(basic knowledge for enterprise)*
- Skills in presenting scientific material and arguments in writing and orally *(communication skills)*

- Receiving and responding to a variety of information sources *(communication skills.*

Inter-group differences The opinions of the groups of Academics, Employers and Graduates are similar when evaluating the importance of the specific competences for the second cycle, with three exceptions: "Ability to apply knowledge of mathematics, physics, chemistry, and other sciences", "Basic knowledge of design of technical systems", and "Ability to apply the life cycle analysis for a product", for which the inter-group differences were statistically significant. For the first of the above mentioned competences, the Academics rated higher than the two other groups, and for the last two competences the Graduates rated higher. This demonstrate, one more time, the prevalent importance that Academics give to the knowledge in the hierarchy of competences, and the more practice-oriented perspective of the other two groups.

Intra-group differences Male respondents rated the following specific competences significantly higher regarding their importance for the second cycle: "Basic knowledge of the main technologies in the field", "Knowledge and ability to carry out maintenance tasks...", and "Basic knowledge about modelling, simulation and analysis tools of processes…" – competences that are mostly "technical" and traditionally more familiar to men.

Other intra-group differences are for the competence "Basic knowledge about modelling, simulation…" for which older Graduates rated higher, and "Ability to design tools and quality control instruments…" for which those graduating after 2003 rated the importance higher.

5.7. Discussion on the importance of specific competences for working in enterprises

The 42-item Questionnaire for Specific Competences for the Enterprise was initially structured on 5 sub-scales: Basic knowledge for working in enterprises, Technical competences, Organization and management knowledge and skills, Communication skills, and Information technologies and software skills. After excluding the items with item-scale correlation inferior to 0,5, the 33 item short scale was reorganized into 3 subscales: basic competences for working in enterprises, technical competences, and workplace communication and management competences. A separate subscale of 9 items was made with the excluded items.

When discussing the importance of specific competences for enterprises in the first and the second cycle, one important issue appears: the fourth scale, which contains the excluded items, has 8 out of 9 items among the most important for both cycles. By merging the lists of 10 most important specific competences for all three groups together – for the first and second cycle – the following list results:

- ***Basic competences for the enterprise***
  - Ability to recognize and analyze novel problems and plan strategies for their solution (36)
  - Critically analyzing, synthesizing and summarizing information, including prior research (37)
  - Understand existent and new technology and its' impact on for new/ future markets (16)
- ***Workplace communication and management competences***
  - Preparing, processing and presenting data using appropriate qualitative and quantitative techniques and packages (39)
  - Receiving and responding to a variety of information sources (38)
  - Understand the principles of management and link them with enterprise and business knowledge (33)
- ***Generic competences for work (excluded items)***
  - Ability to apply knowledge of mathematics, physics, chemistry and other sciences (1)
  - Ability to identify, formulate and solve specific problems (3)
  - Basic knowledge of design of technical systems (8)
  - Information technology skills (31)
  - Skills in presenting scientific material and arguments in writing and orally to an informed audience (41)
  - Skills in the evaluation, interpretation and synthesis of information and data (40)
  - Systemic approach to specific problems (2)
  - Understanding organizations and how they function (42)

Technical competences, such as modelling, simulation and analysis of technical systems, ability to carry out operational tasks etc. are not present among the most important specific competences and maybe they are closer to the subject-specific competences in each specialization, mainly in technical ones. For the assembly of the enterprise specific competences, the important ones, as presented above, should be present in the curricula at both higher education levels analyzed.

5.8. A competence profile for working in enterprises

Accordingly to the results of our research, Graduates with different specializations, holding subject-specific competences should have some common competences, generic and enterprise-specific. In terms of generic competences, apart from holding basic knowledge of the profession and solid subject-specific competences, a graduate should be able to apply that knowledge into practice, to use analysis and synthesis in solving particular problems and to adapt to new situations.

Most of the jobs require the capacity to work in teams, often interdisciplinary teams, which put the graduates into the position of having interpersonal and communication skills. As a team member, the graduate should however have competences that are related to individual efficiency, such as planning and time management, elementary computing skills, IT skills, decision making, concern for quality, and last but not least, will to succeed.

The small and medium sized enterprises become more and more present on the labour market as employers. Apart from the generic competences required by whatever job, these enterprises need employees with entrepreneurial spirit and increased capacity to apply knowledge into practice, autonomy and will to succeed.

Though the respondents in our research did not give much importance to competences related to international context, diversity and multiculturality, we think that these competences will play an important role in the future, in the context of the growing workforce mobility across the European Union and the increasing internationalization of companies.

The subject-specific competences, related to engineering, economics or other specializations can be translated into actual competences, responding to the particular requirements of a job in an enterprise, by the mediation of the enterprise-specific competences. Considering the most important enterprise-specific competences (as chosen by all respondents) in our analysis, it results that, for the first cycle, graduates should have some basic skills: to apply knowledge of mathematics, physics, chemistry and other sciences in their profession and basic knowledge of design of technical systems. Beside these competences, the graduates of the first cycle should be able to prepare, process and present data using appropriate qualitative and quantitative techniques and packages and to have IT skills.

For the second cycle (master level) the graduates should have the ability to recognize and analyze novel problems and plan strategies for their solution, to analyze, synthesize and summarize information, to present scientific material and arguments to an informed audience and to understand the impact of the present and future technologies on the markets.

The enterprise-specific competences that are constantly important across the higher education cycles are: systemic approach to specific problems, ability to identify, formulate and solve specific problems, skills in the evaluation, interpretation and synthesis of information and data, and receiving and responding to a variety of information sources. For all the other specific competences, the level of importance increases in the second cycle. As a general feature, from the four sub-categories of specific competences proposed by our research, the basic competences for working in an enterprise and the interpersonal and communication skills are more important than the "technical" competences, which are rather specific to engineering professions.

When designing the curricula for specialisms that could lead to an employment in an enterprise, academics should have in mind not only to update the contents that give subject-specific competences for a particular diploma, but also to reconsider teaching, learning and evaluation methods that could improve the achievement of the generic and specific competences required. Especially for the

generic competences, the competences identified as being of high importance and low achievement have to be in the focus of the curricula adjusting.

The perspective of the employers has to be taken into account as representing the expression of the way the agents on the labour marked see the competences required by the jobs. In our research, Employers were the most demanding group of respondents regarding the university education and the least contented about it. In our research they evaluated competences such as problem solving, decision making, planning and time management, capacity to adapt to new situations and ability to work in an interdisciplinary team, as being of high importance and low achievement. These discrepancies indicate that, in the preparation of graduates for the world of work, universities have not structured enough the learning experiences in ways that should facilitate their achievement.

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Part II

EUI-NET PROJECT ACTIVITIES
AND
BEST PRACTICES CASES

Chapter 6

UNIVERSITY–INDUSTRY TEACHING & RESEARCH SYNERGY

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6.1. Background

The knowledge society determines a complex role for modern universities: training mission, scientific research mission and cooperation with other institutions; in every case, the university is a dynamic and open system that influences other systems (the public role of the university). Traditionally, the university is a closed organization, focused on teaching and basic research. Industrial enterprises may be seen as organized structures in interdependence with the society, playing a role in obtaining technical performances of products or services. The traditional division of labor and functions between academic science, academic teaching and industry seems to be already obsolete at least from the university point of view.

The new role of the university is to establish connections with industrial enterprises and with the entire society: also, the scientific role is linked to the technological progress and to new products, to the the social, economic and technical environment.

According to Röpke (1998), the route for universities in the knowledge based society is networking. In this context, EUI-Net aims for cooperation are characterized by structured institutional arrangements and the emergence of new patterns of academia-business interactions.

- The first stage of the EUI-Net was to set up its structure, to carry out its debates on teaching and research synergy, to carry out the first pedagogical projects on Tuning curriculum.
- The second stage of the EUI-Net is to create the background and the tools for the real interaction between university and the enterprise sector. This interaction must be able to stimulate the entrepreneurial behavior of the university and the progress of industry (Talabă, 2006).

Hereby, the traditional closed university has to transform itself in an entrepreneurial university focused on the application of new knowledge, innovation. This mission can be approached in three scenarios: to transfer the knowledge to

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incumbent firms, to transfer the knowledge to individuals starting a new firm, to establish a new firm by itself.

This new roles of entrepreneurial university is an aspect of the impact of globalization (Mason, 1999), which regards the spread of the economic activity and services and of social and cultural issues, as well, through the multinational companies and the internet. Globalization also involves the existence of a global higher education market which generates a global competition for the students and eliminates any protection of these institutions against competition (Lache, 2006). The rapid changes due to globalization and the creation of a European space of knowledge impose great changes in higher education and enterprises: to increase their responsibility, to focus on their adaptability, to contribute to obtaining general prosperity (Chiriacescu, 2006). Simultaneously, the future of an enterprise in a globalized economy depends critically on innovation and its ability to increase productivity through process innovation, which depends on the creation, application and diffusion of new knowledge.

The 'entrepreneurial university' approach describes the new type of university, created as a response to the extra-academic environment changes. The features defining the roles of the university are the following:

- To perform an independent activity, based on its own risk;
- To be involved in the economic and social development of the surrounding region;
- To use the existing resources in a creative way;
- To work strictly within the parameters of costs and profit (Talabă, 2006).

These new connections between university and industrial sectors have been defined as a synergy, which may be seen as synergy process and synergetic effects. In this context, synergy is 'the interaction of two or more agents or forces so that their combined effects is greater than the sum of their individual effects' (Talaba, 2006). For a relevant synthesis of EUI-Net works, presented at the 2nd International Workshop, Tallinn 4-6 May 2006, the project members intended to analyze the synergy of the new connections between the university and the industrial sectors, focusing on the process and on the actors involved.

6.2. Actors

The actors of knowledge society are people; in the context of our areas, people include students, teachers, employers in the industrial sector, managers. Concerning teachers, a conflict of academic roles can be noticed: they have to be both good teachers and good researchers. The connection between "good teacher" and "good researcher" is sometimes considered as enduring myth. The discussion about the two roles can be organized according to two opposed theses:

- the compatibility thesis, which holds that teaching and research have a positive influence on each other;

- the incompatibility thesis, in which research and teaching are opposed to each other and time devoted to one implies less time for the other (Verburg et al., 2006).

Research on the beliefs or perceptions of academics or administrators about the relation between teaching and research indicates a strong perception of the positive effects of this relation. The empirical evidence on the correlation between the quality of teaching and of research, which would support the compatibility thesis, is limited. In a meta-analysis (Hattie and Marsh, 1996, ap. Verburgh *et al*., 2006, p. 105), a zero-correlation is found between the evaluation of teaching and the output of research at individual and department level, and they concluded that the common belief that teaching and research are entwined is an enduring myth'. Other studies identified the idea that <a good researcher makes a good teacher>, one of the five dysfunctional myths about higher education. In a follow-up study, Marsh and Hattie conducted a research in order to test a model on the relationship between teaching and research. They found a correlation close to zero and they were not able to identify possible mediators. Other authors disapprove the absence of any debate about what is 'research' and what is 'teaching' just because both concepts are difficult to define and to measure.

Many arguments in favour of a positive nexus between teaching and research are related to the expected benefits of research on teaching, and hence on students' learning. Therefore students' perceptions of the relationship between teaching and research, and their positive and negative experiences with the relationship, may complement our understanding of this complex relationship. These studies generally conclude that students know that research is performed at the university although they do not fully understand what it implies. The studies also report students to experience both positive and negative effects of their teachers' research involvement. This research is conducted with interviews, focus groups and questionnaires. The answers revealed that teachers-researcher have more authority, are more enthusiastic, use more up-to-date content and less second hand material, a fact that is accompanied by an increased credibility of those institutions where great researchers teach. Among the possible negative effects we can mention the unbalanced curriculum, less time for exploring pedagogical approaches and less time for students. Unfortunately, students do not see themselves as stakeholders in the research process of their teachers.

The relationship between teaching and research is mediated by student's motivation, discipline, type and purpose of the course, and the possibility to interact with the teacher. While most of these studies concentrate on senior students, not much is known about the perceptions of junior students.

In the last years, the incompatibility thesis which sustains that research and teaching are opposed, is invalidated. All the papers presented at The 2nd EUI-Net International Workshop showed more examples of the compatibility between university and industry, and their positive and synergetic effects.

The students

Söder (2006) describes the Bavarian model behavior of students, teachers and assistants. The students are obliged to make 2 practical placements (1 semester each) in industry and optionally, in addition, they may work in industry during holidays but also during a semester. Most of the students make their diploma thesis at industry enterprises; usually, they perform a small project at the company. On the one hand, these points increase practical experience but, on the other hand, they reduce, sometimes dramatically, time for study. The visits of students at their practical placement are usually not very efficient, because they do not know the application, the environment and all the other prerequisites and preconditions (Söder, 2006).
Concerning students, Borza (2006) presents a relevant diagram of activities and actors, starting from the relationship between Transylvania University and Siemens PSE. The author observes that a special attention is given to stimulating students' creativity, who is encouraged to try new solutions and to evaluate them. In the case of new ideas, the students are helped to valorize and to patent their ideas for the benefit of both parts.

The teachers

For technical disciplines, each professor at the University of Applied Sciences must have 3 to 5 years of practical experience in industry. Optionally, he/ she:

- may visit students at their practical placements;
- may supervise a diploma thesis of the student in industry and work in a common project between university and industry;
- has a „side-job" – the most efficient way to get contacts and budget, the experience and results obtained can be used in teaching at university.

Lache's paper (2006) presents the aspects of student mobility in Transilvania University of Braşov as part of the complex situation regarding new cooperation with the industrial sector. The results have already appeared in training students for promoting and implementing renewable energy sources and they are under development in training students for promoting and implementing energy efficiency in industry (see Fig. 1). This year, another proposal has been submitted and the evaluation results are expected. It is related to training students for working in intensive technical engineering applications (Lache, 2006).

The paper of March (2006) concentrates on the aspects of the development of student mobility, benefits of partners, networking as it is at present in Germany, the role of incoming students (incomings) for the success of the partnership, and the different types of networks. The author synthetically describes (see Tab. 1) the general goals of student placements and the benefits of students participating in mobility projects.

The university is a main actor, with the two principal facets of education: teachers and students - the instructors and future practitioners of engineering (Fratu,

2006). By identifying specific skills required for career success, universities can provide an improved service for their graduates and the engineering industry.

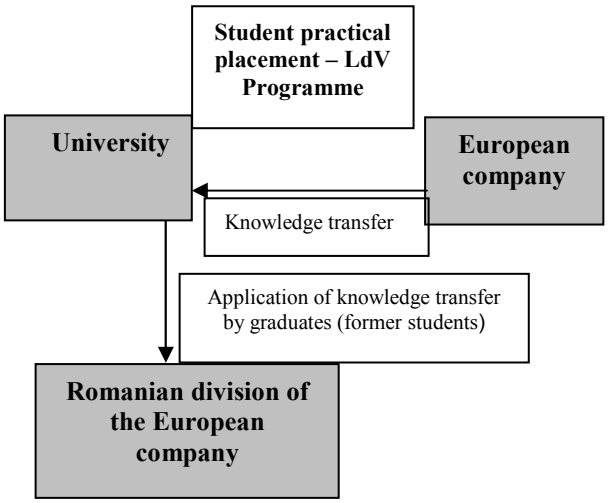

Fig. 1. Model for Leonardo da Vinci student mobility (ap. Lache, 2006, p. 89).

The paper focuses on the role played by the Automatics Department of Transylvania University of Brasov, Romania, in increasing the quality of the work with foreign students and in strengthening the co-operation with the industry, in the country and abroad.

Tab. 1. Goals and benefits for the students participating in mobility projects

General goals of student placements	Benefits for the students participating in mobility projects
- New learning and working methods and a transnational way of thinking - Stimulation of competitiveness of small and medium sized enterprises - Technology transfer between participating partners - The transnational exchange of people helps to built-up a network	- Curiosity to international experience, extension of the individual cultural horizon - Extension of language competence - Challenging working tasks - Development of a „career brick" - Lower-cost stay abroad - Search for a potential prospective employer - Closing the gap between theoretical training and the „real" professional life

The foreign students from the Institute of Technology of Toulouse and the Institute of Technology of Valenciennes – FRANCE, studied for two months at the Automatics Department of Transylvania University of Brasov. The Automatics Department followed the example of universities in France and proposed a practical

project for foreign students because the quality of future engineers depends on the quality of engineering education. The practical project is an essential element within an applied course of study and it needs to be in an area related to the students' school and professional interests.

The practical placement is a student-friendly learning approach designed to stimulate student activities through solving complex problems related to robotics. The combination of group work and self-study develop the students' skills for a higher-level understanding. The main objective of the collaborative activity in multidisciplinary teams is to ensure effective collaboration between sectors involved in engineering and technology education in order to enhance educational opportunities for students. Sometimes, the practical placement of the foreign students helps them to know the academic and Romanian industrial environment in which they can study and work, and also familiarize them with Romanian life. Students will be guided by professional engineers from industry and faculty members from Transylvania University of Brasov. During the placement period, the students write their practical project in a report. At the end of the placement, students are required to present a practical project report in writing and orally.

The students exchange will encourage and facilitate strong industrial interactions. The co-operation is ever –growing: universities are invited to present their work together - professors and students - at some national and international meetings in the field and it also encourages future industrial engineers to continue this kind of work after graduation. The collaboration is dedicated to the cause of international co-operation and collaboration in enhancing engineering education; all are meant for the co-operation between academia and industry.

By receiving foreign students, the university has improved the curricula, starting from European policies, optional courses have been diversified by introducing new curricula, including the course of robotics, as well as by intensifying the staff mobility and by entering new European co-operation programs: Leonardo da Vinci, Socrates, AUF.

The employees of the university (assistants)

In some cases, former students start their professional life as assistants in a „competence center"; their salaries are paid by industry and they work in different projects in industry. This sounds very promising, but it is still at the beginning (Söder, 2006).

Best practice and case studies for European student mobility

The paper of March (2006) concentrates on aspects linked to the development of student mobility, the benefits for the partners, networking as it is at present in Germany, and the role of incoming students (incomings) for the success of the partnership and the different types of networks (see Tab. 2).

Tab. 2. Benefits for companies and universities

Benefits for companies acting as hosts for the students	Benefits for universities
- Gain in the experience with international project work; increase in the motivation of internal staff by new experience. - Acquisition of language competence for all people involved. - Technology transfer between universities and enterprises by applying the latest scientific knowledge - Solution of internal problems - Placement students can contribute to the entrepreneurial success of a region. Placements can be part of staff development strategy and contribute to the internationalization of business.	- The appeal of a university increases by international co-operations and transnational exchange of experience. - Increase in the graduates' motivation to become self- employed, as well. - Influence on the curricula and the quality of education. - Additional financial means for mobility actions. - Participation in network activities - Technology transfer opportunities.

Finally, some recommendations are given to optimize the efforts of strengthening the university-enterprise co-operation.

6.3. Processes

Teaching and research, two different types of activities, opposite sometimes, have conducted to the dual nature of the academic work. This dual nature has generated the dramatic dilemma: "Teaching and research or research and teaching" and several other questions. For the first question "Why is teaching in higher education accompanied by research?" the answer shows that teaching and research are both related to knowledge. Research generates new knowledge, teaching valorizes and disseminates knowledge in the social environment; also, knowledge is the university's product and research is the production process of knowledge. But the two activities - teaching and research – can be performed by different persons and institutions or by the same person and institution. Balancing teaching and research is a challenging task, but the benefit triggered is two-fold: research adds value to teaching and teaching adds value to research, too.

The research added value in teaching

The new knowledge is introduced into the curriculum; the students can develop their skills and understanding of the information. Moreover, the learning process is connected to research. On the other hand, for postgraduate students and especially for PhD students, teaching is alternated with research. Equipment and

other infrastructure elements that were developed for research purposes are transferred to the teaching process after the research objectives have been reached or sometimes even before. The main advantages of integrating research into teaching are:

- the teacher is able to give accurate and up-to-date information to students, with relevant examples;
- the teacher's research is beneficial when presented and opened to challenges from students;
- teaching could be a recruitment platform for attracting students with a passion for research (Talaba, 2006).

The teaching added value in research

The training of master and PhD students in different research field is not an easy task. For this goal, a learning environment is necessary, which valuates research. At the postgraduate level, the synergy is very rich, as the learner is in a transition towards the status of a qualified researcher, but at the undergraduate level, the student's participation in research is much more reduced and therefore, the synergy is at a lower level. The most often used forms of involvement are represented by the students' participation in seminars, lectures, conferences and colloquia, in staff research.

6.4. Case studies

Because all the papers analyzed present cooperation models between university and industry in which teaching, learning and research are presented as interrelated, in what follows we will describe the three processes simultaneously.

Comments about the University-Industry relationship: the case of Operations Management

The paper of Ochoa Laburu and Otaegi (2006) presents the current state of the controversy related to the field of Industrial Engineering and particularly to Operations Management, introduces some comments based on their own experience of it and raises some questions about the feasibility of introducing changes in the current requirements for the development of academic careers. The core of this controversy is that the results from university research seem to be of little relevance for industry and that they are actually becoming two different worlds, more divergent each time. The author describes the evolution of Operations Management with its milestones, its incorporation in teaching and debates, the research agendas in Operations Management and its relevance to industry and to the education process.

The education programs developed by business corporations focus on the divergence present in the professional and academic fields, because of the little relevance of university training in professional postgraduate education, triggering increase of "business universities".

Estonian cooperation

The paper of Metusala and Valtin (2006) presents the general characteristics of the Estonian curriculum, the structure of the program (CP's) and elective subjects for students in the curricula (CP's) for engineers (5 – years program) and Bachelor (4 - years program). The Estonian curriculum is mandatory and also has elective subjects: students have to choose about 50…70 % of them for most of the studies.

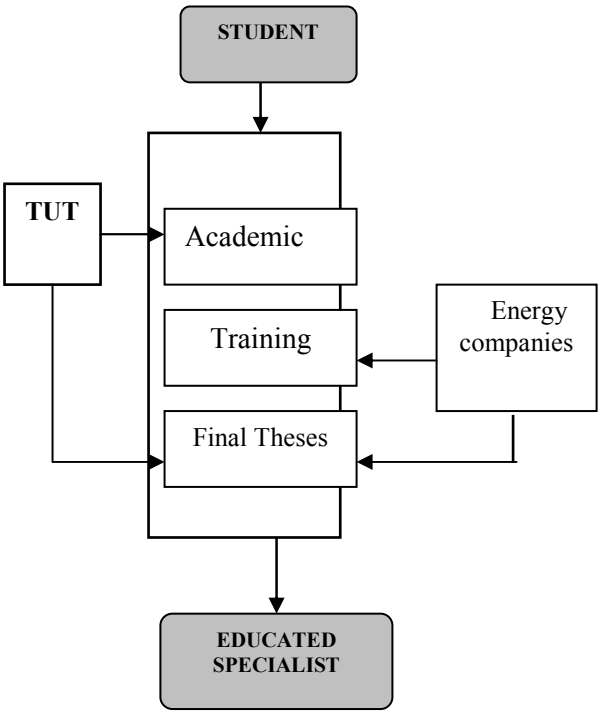

Fig. 2. From student to educated person (ap. Metusala, Valtin, 2006, p. 23)

The curriculum in the area of Electrical Power Engineering should be created by Tallinn University of Technology (TUT) and other companies and approved by main energy companies and by the Society for Electrical Power engineering (ESEPE).

ESEPE is a non-governmental organization of engineers and enterprises, which act in the field of electrical power engineering, and has 160 members at present. The main objectives of ESEPE are relevant in the work of devising the curriculum for training specialists in the field of power engineering, management and marketing, and assessing professional qualification of power engineers.

The Department of Electrical Power Engineering is responsible for the main subjects of basic and special studies in the field and for implementing the curricula system based on the Bologna declaration. The cooperation between the University of Technology and energy companies continues during the study process. Because students' training is organized in domestic and foreign energy companies, the problems regarding the final projects come mainly from industry. For a well educated specialist in the field of Electrical Power Engineering, a Professional

standard has been created by leading power companies (see Fig. 2). By the year 2007, the Estonians are planning to introduce a new curriculum. The aim of the new curriculum is to increase the graduates' competition spirit and their competence to work on the labor market through the collaboration of university, industry and other parties developing study activities. The conclusion of the papers is that 'University and companies complete each other' for the prosperity of the entire society.

Model of Collaboration in the Czech Republic

Within the context of collaboration with industrial manufacturing enterprises, the individual departments of the Faculty of Management and Economics will develop economic research activities:

- Marketing research of selected commodities.
- Evaluations of macro-economic policy and stability.
- Analysis of the intercultural aspects of an entity asserting its position on the rapidly developing Asiatic markets.
- Research into the competitive ability of Czech production manufacturing enterprises.
- Research into the field of establishing clusters and the methodology of evaluating their effective performance.
- Research into the fields of information and knowledge support of business activities.
- Research into the field of logistical problems.
- Research into the innovative aspects of entrepreneurship.
- Coordination with the university research activities (Bobak, Zimola, 2006).

In the conditions of a globalising economy, the research activities of the faculty, together with its collaborative ventures with local enterprises will be oriented in the long-term towards the Program for Increasing the Competitive Abilities of Czech Plastics and Rubbers Processing Industries as a part of the European Union. Other forms of cooperation and collaboration between the university and the surrounding industrial and entrepreneurial environments are:

- The elaboration of diplomas and dissertations, work placements and excursions. In enterprises, the staff may serve as mentors/leaders or even opponents of such works.
- Organising Jobs Fairs and work placements for students in collaboration with student organisations.
- Inviting external tutors to lecture.
- Representation of experienced people in the Scientific Boards of the Faculty and the University – which discuss and agree the long-term aims and objectives of the faculty.
- The organisation and holding of scientific and professional conferences with the participation of collaborative universities as well as representatives of the everyday world.
- Collaboration on research grant projects, offering the projects and services of

the faculty to the world of praxis as an integral component of pan-university offers.

The authors' conclusion is that the Faculty of Management and Economics of Tomas Bata University in Zlín is an educational and research development institution that develops on the basis of the 'Entrepreneurial University'.

University-Industry Cooperation in South-Transdanubia

During the socialist era, co-operations were more static, but now the fields of cooperation became wider than before and they are getting even wider (Elmer, 2006). The main cooperation fields are as follows:

- regular financial support for joint research, on an event basis that is given, especially from the part of the two main partners (E.ON and ELCOTEQ);
- joint education, equipped laboratories (by LEGRAND, CISCO, FESTO, SIEMENS etc.);
- practical study of students at the company;
- diploma work themes;
- project works;
- organization of extra courses;
- employment of the graduated engineers.

The author describes two short case studies: one about the successful co-operation between the university and industrial companies, *Gas Engine Based Power Plant* and the other about the enrolled interview, by ELCOTEQ THE NEW INDUSTRY. The second case study presents the necessary skills/competences: elementary computing skills, command of a second language, ability to work in an international context, basic general knowledge in the field of study, and capacity for applying knowledge into practice, capacity to learn etc. The university analyzed the findings and discovered the weak points (foreign language knowledge, practical knowledge and the knowledge about the latest technologies).

Business School-Industry Cooperation: Good Practice Cases

The paper of Birchall and Chanaron (2006) restricts its scope to three questions:

- How could long-term sustainable relationships between business schools and enterprises be created and developed to their mutual benefit?
- What lessons can be learnt from case studies of current practices?
- What are the critical success factors to build sustainable collaborative activities?

This project was organized around four topical work packages – e-learning, coaching, knowledge management and university-business relationships – selected for their importance and relevance to the core partners. It is based on project ELAN2, carried out between 2001 and 2004 by a consortium of European vehicle

manufacturers and business schools, standing for European Learning Automobile Network, funded under the European Leonardo da Vinci programme.

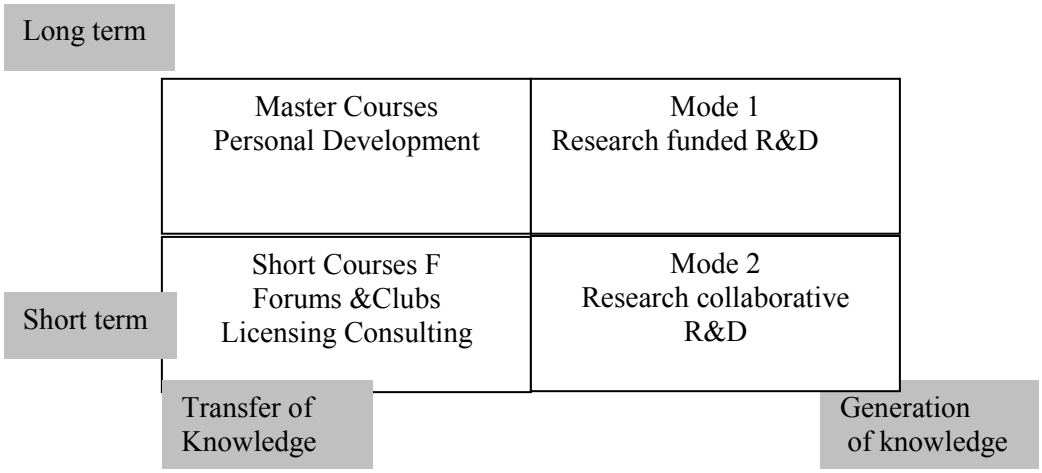

Fig. 3. Co-operations matrix (ap.Birchall, Chanaron, 2006, p. 46)

Each work package was responsible for identifying good practice, for organizing a series of workshops, including guest speakers from other industries, and for delivering a final report on the key findings and issues to be dealt with in the future.

The paper reports the study of university-business relationships, based on an analysis of four case studies selected from those presented. The cases reported here were selected as representing successful practice in relationships, as in each case they had been in existence for some considerable time and had secured major resource investment from the parties involved. They also represented different approaches to building university-business relations. The cases were initially presented by the academic institution leading the work, but were then subject to cross examination by members of the project team and invited guests.

The authors presents the matrix with four “boxes” (see Fig. 3), which can be derived inter-relating the time span of the cooperation between university and business with the nature of such relationships, as far as knowledge is concerned (Birchall & Chanaron 2006). Acquiring-transferring knowledge in the short term is oriented to problem-solving and includes short courses, discussion forums and clubs, licensing and consulting. On the longer term, it is aimed more at personal and organisational development. But the production of knowledge has mainly an academic origin. This is, in broad lines, a one-way learning process. This one-way transfer is also valid for producing new knowledge within a long-term perspective that is clearly Mode 1 research. On the other hand, Mode 2 research tends to be confined in the short-term partnerships for generating new knowledge through a shared learning process as well as shared ownership. It is dedicated to practical

application. In constructing the framework, two dimensions were considered – the nature of the knowledge to be transferred and the intended time span of the relationship.

Practical experiences – a Bavarian model

The author presents the German (Bavarian) model of 'University of Applied Science' that has offered several cooperation schemes with industry for more than 20 years (Söder, 2006). The actors of the cooperation field are presented: students, teachers, the employees of the university (assistants). After the preliminary information about actors, the author describes three cases.

- *The first case: employees from a company work at university on a project for the company (part time).*

Positive effects: relations between one professor and the company, the professors had assistants whom they could use for teaching and in labs at university: the results of the project could partly be used in courses and labs, and the company needs an add-on for one of their products. The results:

- the company had cheap workers with a limited contract, there was no investment for working place and working equipment;
- the professors had some additional support for their courses (UNIX sockets), which has not really been honored.

- *The second case: employees from university work for an industrial project* **(**2-4 assistants and some students come in the frame of SOCRATES and other EU-projects, and work partly at the company and partly in a lab at university**)**

Positive effects: to prepare a student to reach a leading position in the industrial sector, the company needed the results of the project in a short time and did not want to invest much budget, the professors had some assistants and students, which they could use (part time) also for their university work. Negative effects: the project risks are lying upon the shoulders of the professors. The company received the expected results with good quality and small costs. The professors got a lot of experience with project management and with modern development environment; the results of the project could partly be used in courses and labs, and the graduates and students learn quite a lot for their future professional life.

- *The third case: the industry has a project, and they are looking for subcontractors, and the graduates are looking for work.*

The students were just finishing their studies and working on the diploma project. Simultaneously, they were looking for a job, but they could find only small companies and had some occasional jobs. A company has a project in warehouse logistics, with a very small budget. The Professor decides to make that project with these students in a loose cooperation. The first project was hard, but finally it was successful, because they decided to found a common company G.A.S.S. GmbH. Positive effects: The industry has a project, and they are looking for subcontractors.

The graduates are looking for work. The professor helps them both. Results: The graduates found work, and they had a good start for their career. One product of the company is used for teaching (without costs for the university). If there are some small projects for university to be performed, the company makes them immediately with "friendly" prices. The company was also satisfied for making some successful projects.

The author's conclusions are:

1. There must be a visible and a measurable benefit for the industry, the professor and the university. The key role of successful university/industry - cooperation is given to the professor, because the professor is a real expert in the cooperation area, just having a title is not sufficient.
2. Money, that is a gift and not result of own work, is not worthy.
3. Do not spend money, which you have not earned before.
4. The project risk is to be covered by the professors.
5. Professors at the University of Applied Sciences should be obliged to do industrial cooperation. Today, a lot of course books suffer on practical irrelevance, and, with a view to the quality of teaching, it is necessary to update the knowledge not only from books or some trivial exercises, but also with experience from practical life.

The relationship between Transylvania University and Siemens PSE

The special status of the author (professor and technology manager) assures good knowledge of both organizations: University Transylvania and Siemens (Borza, 2006). Siemens has facilitated the updating and development of the material base of the University, through didactic and research laboratories, materials and programs. This collaboration stimulates the synergies in the research and development fields by common collaborations, using specialized teams. Siemens policy regarding grants comes to stimulate students, graduates, masters of sciences and PhD students to finalize their diplomas or thesis, and encourages the mobility of professors in order to ensure their participation in conferences, congresses, workshops and experience exchanges.

The collaboration with the university has the following benefits:

- it ensures the work force needed for the development;
- it influences the curricula, brings it closer to the company's needs;
- the common cooper-ration in the field of research and development activities;
- it assures the training on specific technologies and procedures used by the company and it reduces the time university graduates need for the integration as new employees. Thus, the two partners become more competitive on the market and the access to the money for the research projects from national and European institutions is easier.

The author analyses synergies and the synergetic effects offered by collaboration, concerning student practice, common research and endowment actions for university. Concerning student practice, a relevant diagram of activities is presented (see Fig. 4).

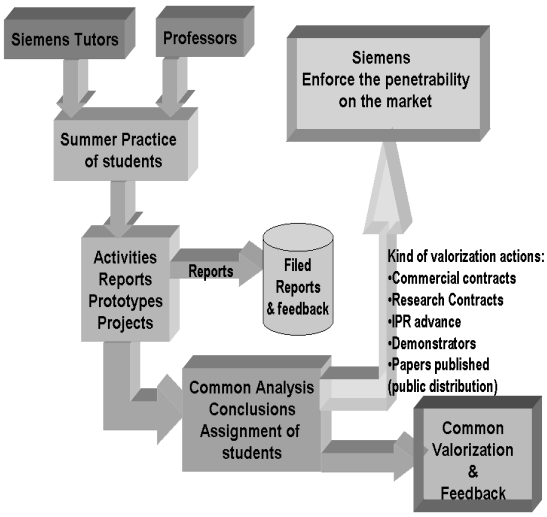

Fig. 4. Diagram of actions for valorization and feedback (ap. Borza, 2006, p. 59)

An important aspect underlined is the way in which the balance between expectations and results prospected by both the universities and companies has been obtained. The paper proposes a metrics that takes into account several features: the level and opportunity of the know-how generated by the university, the material investments made by the industry and their short, medium or long term returns, the common interest for research activities that involve high risk factors, and the social effects as a result of common activities, illustrated by the structure and occupation degree of the work force.

Concerning student' practice**,** the metrics introduced in order to measure the efficiency of this activity includes:

- the number of students who participated in practice and the number of graduates hired by Siemens after graduation;
- the financial effort made to implement the practice for each student reported at the average cost of the training period for a new employee who is integrated in the same job.
- the financial efficiency.

The economic force and competence of Siemens combined with the creativity and high level competence of the University, ensure higher chances for gaining new contracts on the research market. A common effort is dedicated to the common participation in the calls proposed in the frame of the European Research Area (ERA) or by the Romanian Research Institutions. Starting from the needs of industry and the human resources trained by the university, the developed frame generates a mechanism that regulates the requests and expectations, ensuring in this way the settled personnel growth for industry, on one hand, and the stimulation of the continuously perfecting and adapting process of the educational system, on the other hand.

The collaboration can be systematically encouraged by minimizing the distance between the current and optimal trajectory, with a view to obtaining beneficial results on every level.

Technical Aspects of Professional Insertion

Wolfenburg's paper (2006) is a very technical article, based on the work of the SIG-5 group within the project EUI-Net dealing with Professional Insertion. Its purposes are to create two Internet accessible databases:

- the first contains graduates seeking employment; it is filled in on line by the graduates and searched by the companies;
- the second contains companies seeking graduates for their vacancies.

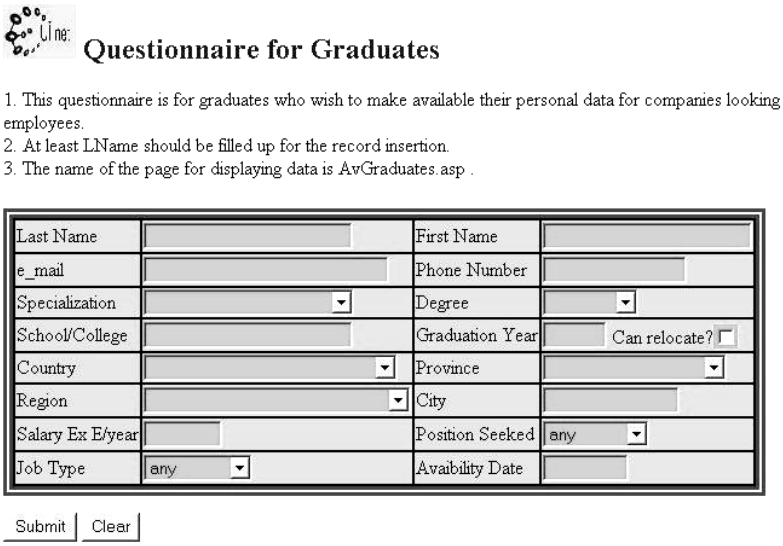

Fig. 5. Questionnaire for graduates (ap. Wolfenburg, 2006, p. 31)

For each database three Web pages will be created. The author describes the page and the program GradQuest.asp for the graduates seeking employment and inserting their personal data in a database on the Internet, which can be searched by companies on-line (see Fig.5). These e-pages are a form of collaboration between universities and companies.

A Case-study of interdisciplinary research

The aim of all activities should be the strengthening of the knowledge triangle formed by: research, education and innovation – and this should be assured

by the academic staff, the best working practice experts, students who have focused on their diploma papers and dissertations, young doctoral students.

The results and outcomes of the project resolution were: the diploma papers and dissertations, the articles published in professional magazines, conference proceedings, and a monograph which summarized and acquainted the professional public with these outcomes and results, a seminar, in which representatives of the plastics-processing industries of the region, the academic community the regional self-government organs and Czech Invest took part (Pavelkova & Knapkova, 2006**).**

This case-study shows the possibilities for mutual cooperation and ways in which the research results can be transferred into working practice, by means of the creation of a world-class model for education and research, which involves a partnership between the academic community and local entrepreneurs.

A variety of possible ways of interlinking university-level education with entrepreneurial working practice is presented: to create the conditions for the transfer of the results of academic research activities into working practice – through the creation of communication paths, mutual information-sharing regarding results and needs, and the establishment of appropriate mechanisms for such forms of collaboration.

The Entrepreneurial University of Brasov

The major trends the universities are facing nowadays are as follows: the mass higher education system, the public financing decline, the increase of the demographic, social and economic diversity, the request for adult education, the information technologies amazing and continuous development, the higher education market globalization.

In the development of entrepreneurial culture, the university encounters several obstacles, especially, their conservative structure. This structure is, partly, the effect of the selecting lead of academic staff from inside and not by specialized manager staff, the lack of real stimulation for cooperation, and the lack of cooperation abilities at individual level. These obstacles make the entrepreneurial centres to develop, in the first place, at the periphery of the traditional institutional structure. They start by being fragile, risking to remain without financing, which determines them to activate themselves, to adapt to the market in order to survive.

Lache (2006) presents a case study about University Transilvania of Brasov that has adopted the entrepreneurial concept and has developed the infrastructure to implement it (see Fig. 2). The Department of Links between the University and the Economic, Social and Cultural Environment is the interface between university and the extra-academic environment.

Cooperation concerns on the following directions: student's education and training (graduation / dissertation thesis with themes proposed by the economic environment, curricula changed according to industry's needs), research and development (research support, cooperative research, knowledge transfer and technology transfer), training in alternative systems (long-life education, ODL, low frequency, by tuning to the university offer and the needs of the extra-academic

environment). University – industry cooperation in the research field takes several forms:

1. Research support.
- The university provides spaces for more companies to organize laboratories equipped with means and at standards according to their requirements,
- The university provides following services for companies: 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.

2. Cooperative research consortium (research contract financed by the company, cooperation in the framework of national and international research or education projects)
3. Knowledge transfer (cooperative education programs, internship and job placement for students and recent graduates)
4. Technology transfer (business incubators, science parks, technology parks).

Many mutual benefits are identified to a close relationship between the university and an industrial company: the company gains access to leading edge technologies, to highly trained students, professors and university facilities, can gain prestige and acceptance in its stakeholder community through its association with a prestigious university. The concept of entrepreneurial university gains more supporters nowadays, more academics agree with an already well known prediction saying that in the XXI century the universities will be entrepreneurial or they won't be at all.

Study Discipline "Industrial Engineering"

The authors present the study discipline "Industrial Engineering", which is the follow-on Master's Degree study programme "Economics and Management" at Tomas Bata University in Zlín, at the Faculty of Management and Economics. The programme was created in collaboration with Industrial Engineering departments of industrial manufacturing enterprises and professional organisations which implement industrial engineering methods in industrial enterprises as well as commercial and service (Bobak, Cerny & Zimola, 2006). Tuition in this discipline is realised in close collaboration with the faculty's Department of Industrial Engineering Production Management, and with staff working in the industrial engineering departments of manufacturing enterprises, and scientific research and educational organisation.

The development of this study discipline is assured through scientific research carried out within the context of faculty projects and doctoral degree study programmes. The university will exploit progressive trends in tuition oriented on the reduction of classical direct tuition duties through the preparation of distance-learning aids which can also be used in the full-time form of tuition (e.g. the Eden LMS, multi-media aids for local work, work-sheets and logs, etc.). Collaboration

with enterprises will also continue in exchanges for the assigning of topics for diploma thesis and dissertations for students of this field.

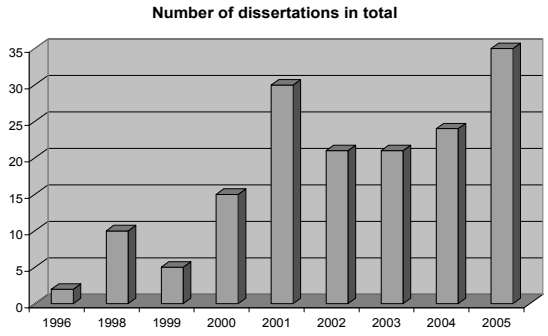

Fig. 6. Number of dissertations
(ap. Bobak, 2006, p. 89)

The positive results of endeavors and efforts to-date are recognizable in the development in the numbers of diploma theses (see Fig. 6) and dissertations oriented on the fields of logistics, industrial engineering and production manufacturing management.

Innovative programmes in Belgium

Knowledge transfer between Universities and Industry, in both directions, could be done in different ways: academic programs, common research projects, internships, seminars, etc. Traditionally, the common meeting place ('knowledge market place') is the university campus, but a new ways of communicating have become virtual communities.

In their paper, Bijnens and Petegem (2006) describe several initiatives taken in the Leuven region to accommodate the constant demand for innovative ways of knowledge creation and sharing between the Katholieke Universiteit Leuven (Belgium) and its industrial partners. Leuven research and development (LRD) (founded in ’72) is a mission to promote and support the transfer of knowledge and technology from the university to the business world. Its areas of expertise lie in contract research, intellectual property management and the founding of spin-offs. LRD has found several forms of cooperation with the industry: ranging from the execution of tests and feasibility studies, over advisory tasks and building prototypes to actual research projects and consortiums, spanning several years and involving various partners, and help in the set-up of spin-offs as a direct link between university research and the business world.

Examples range from support for individual spin-off companies, over strategic collaboration with well-known research institutes, to (virtual) networking in Leuven.Inc. The other large knowledge institute in Leuven is IMEC, (the Interuniversity MicroElectronics Centre) with the objectives: to be an “international

centre of excellence", to reinforce the local industry, to cooperate intensely with Flemish universities, and to provide industrial training.

Via networking, policy support and overall communication, IMEC raises the Flemish companies' awareness of the potential of its technology. In this way, it is explained how a university could play an important role in regional development and how industry could participate in knowledge creation in the university, to the benefit of both.

The situation in Ukraine

In their article, Sidorenko, Gerasymchuk, Shukayev, Zakhovayko (2006) illustrate the ways of development of international activity management in higher education establishments of Ukraine (country with transitive unstable economy). Here, the intentions to start training of specialists in international project management for industry and high education system of Ukraine on the base of NTUU «KPI», were supported by the UNESCO. The project purpose and idea lie in establishing training of highly skilled specialists for industry, able to assess the importance, future prospects and efficiency of international projects. Today common structures with educational and scientific establishments of other countries are being actively established and developed (Germany, China, and Japan). One of the main obstacles in this way is the lack of skilled specialists in the international sphere of the university. For solving the problems, the Faculty of Management and Marketing has organized the Training Programme for International Project Management on the base of the UNESCO Chair, with the general mission to produce a positive business image of the higher education establishments' academicians in the sphere of international cooperation.

The first results of the training programme activity have been already achieved: thus some of the students are already applying the acquired knowledge when preparing project propositions for participation in the international contests (such as the 6th Framework Programme, TEMPUS-TACIS), a part of the students is involved in the organization and holding of the international conference (under the aegis of ICDE "International conference on capacity building in Europe for distance and ICT based education", September 2007). The final authors' conclusions stipulate that the international component of the modern university's activity is becoming decisive in terms of growing integration processes and globalization.

The relation between teaching and research seen by the students

This paper reports on a small-scale study at the University of Leuven by Verburgh, Elen, & Clays (2006), on first year students' perceptions of the relationship between teaching and research. Thirty eight students of a chemistry course answered a questionnaire concerning their awareness of the research activities of their teachers and about their appreciation of the research involvement of their teachers (response rate 95%).

In line with previous research, the results indicate that students are not fully aware of the research activities of their teachers. Students are aware that research is conducted at the university, they know about the existence of research institutes and centres (mean: 4.49), and about the organisation of research seminars (mean: 4.29), that scientific publications are prepared at the university (mean: 4.20) and that the university has a national and international reputation in specific research areas (mean: 4.16), but they are less aware of the production of research reports or posters (mean respectively 3.50 and 2.97).

Although research is an essential part of the duties of all teachers at the K.U. Leuven, the respondents clearly underestimate the percentage of research active teachers. Junior students seem not to be fully informed about the variety of research activities. After one semester at the university, students report as the most manifest contact with research the discussion of research results by the teacher during classes; they report having hardly or no experience with attending seminars or research days, with conducting a research project as part of a course, or with preparing research papers or projects.

Despite that laboratory sessions are fully part of the curriculum, none of the students report to have developed research skills, and the enthusiasm to be actively involved in the research of their teachers is a little bit less pronounced. Most students know that at the university scientific books and articles are prepared, but they think that not all their teachers are actively involved in research. This might indicate that students think that most research is conducted by other staff than their teachers. Another surprising finding is that although students report to have little experience with research or research activities, they report to learn most when conducting research themselves.

In contrast to previous research, students do not mention many positive or negative experiences with the research involvement of their teachers. As conclusion, the authors notice that the students' limited awareness of their teachers' research activities is in accordance with previous research.

Trends and features of cooperation in Italy

Avveduto and Luzi (2006) present an overview of modalities of recent industry-university collaboration in Italy. The cooperation activities have expanded and diversified over the last decade and many universities have set up specific services to implement closer links with enterprises. Universities are increasingly engaged in commercializing their principal product – knowledge - and firms are interested in using this resource in order to raise their economic returns. The two aims are not conflicting, affirm the authors, and both universities and industry can benefit from mutual co-operation to improve their capacity to influence the social, cultural and economic development.

The experiences in university-industry relationships by the means of cooperative agreements generally follow three main directions:

- Develop education for innovation, by either joint or separate but shared activities, all directed to create a specific education background and skills

for graduates to allow them entering entrepreneurial activities.

- Develop research procedures that engage industry and push university towards the application of results.

Integrate the education/knowledge/research elements in key structures either physically or virtually set together.

At present, cooperation schemes between university and industry are supported in Italy by a network of formal agreements that links directly the different partners or create a common framework programme. The main one is managed by the Italian Industrials association and the Conference of Italian Rectors (CRUI).

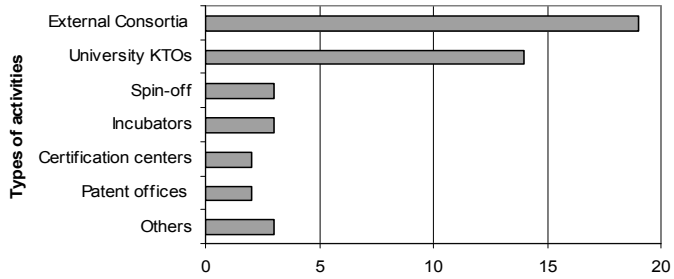

Fig. 7. Knowledge Transfer offices (ap. Avveduto, Luzi, 2006, p. 114.)

The important form of collaboration is represented by:

- the development of students' skills which is generally the first and more common ground of university industry collaboration.
- increasingly placement through the institution of new universities courses and degrees with the aim of creating professional profiles needed in a specific local environment or in a specialised field;
- offering training in industries during universities courses, these carried out in enterprises seminars carried out both by entrepreneurs and university teachers etc.;
- offering students services, which can facilitate their entrance in the labor market;
- the 31/47 universities have organized services, that aim to integrate theoretical with the practical education, facilitating training and apprenticeship in enterprises;
- developing databases on curricula of students who have obtained the degree; but a smaller number of universities have developed their own database (8/47 universities).

Ways for knowledge transfer activities through university services: 14 universities on the 46 described in the report have organized their own offices to foster technological transfer (see Fig. 7).

A larger number of universities (19 out of 46) participate to consortia and innovation relay centers which carry out common research projects, universities are

undertaken to promote a closer connection to the local environment to foster innovation and technological transfer. The enterprises create a high need for new, diversified and often targeted knowledge that it was impossible for the universities to meet this need. The universities too, but specially the research institutes are more business oriented, "producing" knowledge for direct marketing.

International Collaboration for Higher Education

The main task of the paper of Rutkauskiene, Kubiliunas & Butkeviciene (2006) is to review the distance education and international online higher education development in Lithuania. Author presents a pilot study "Supply and demand for distance education courses" investigating the opinion of both sides – educators and students – about the distance education courses in Lithuania. According to the interview data, majority of educators (23 out of 44) had an experience of more than 2 years in organizing distance education courses, majority of educators (64%) received the information about the opportunities to organize distance education courses from their colleagues, and the majority of educators (93%) consider that distance education has a future in Lithuania. Therefore, author discusses the existing medium in Lithuania for distance education after the analysis of international experience. They show that distance education effectiveness uses video conferences and network joins at almost all universities and colleges, and several vocational schools, as well. The network is used to broadcast different events for society: lectures, seminars, conferences and meetings, learning materials delivery, etc. Through the network, higher education schools in Lithuania exchange learning courses and share their experience in whole world very well, the web pages became the most used method to deliver the e-learning material.

The e-learning material and preparation of it is one of the most important aspects for asynchronous distance learning and virtual learning environments. Synchronous Learning has an integration of streaming video, synchronized slides demonstration, as well as recording and editing of presentations or lectures. Author describes the "Online International Master in Multimedia", a project witch was proposed by "Politehnica" University of Timisoara in Romania and has developed analytical research to establish the training needs. Other form described is the E-learning platform, developed by Mimoza and adopted for this project together with e-Collegium Foundation (Hungary). The COEDU is capable of the simulation of complex educational processes thus it is ideal for the mapping of processes within IMM study program.

The links between the community and the researchers

Public discussion about the formulation of a policy in research is a priority for the function of democratic institutions (Sotiropoulos & Mertzios, 2006). Their objective is to support ordinary people to understand technical and scientific terms, the research methodology used and the social and statutory organization of the

scientific procedure, as well as to clarify the attitudes adopted by the public concerning the social repercussions of and technology (see Fig.8).

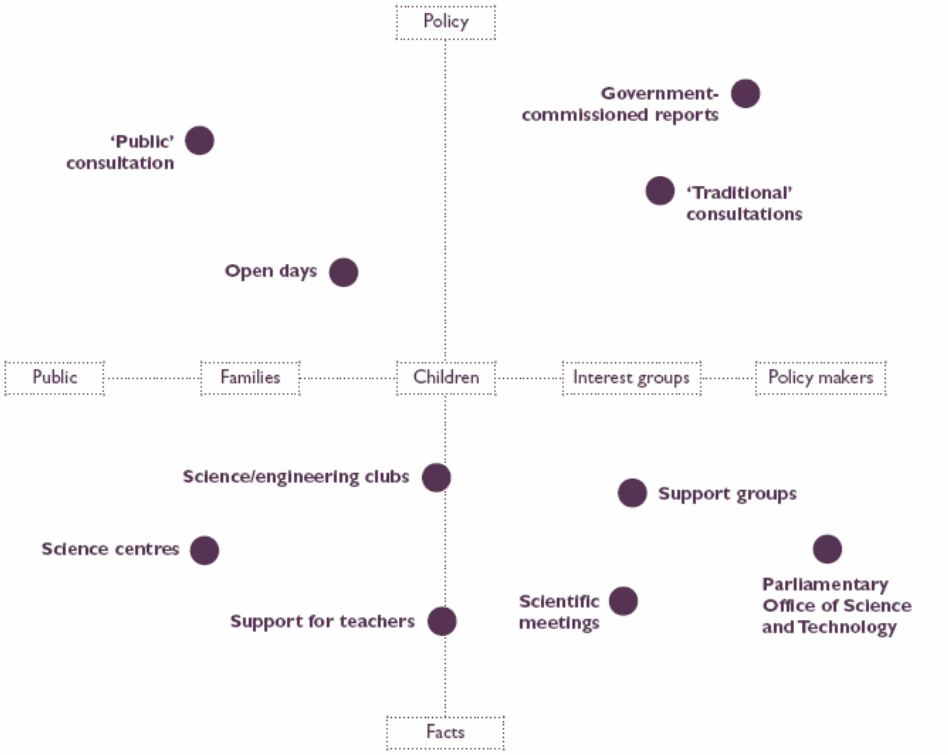

Fig. 8. Science and the public (ap. Sotiropoulos, Mertizios, 2006, p. 124)

The links between the community and the researchers designate new roles for the operation of research foundations, constituting what is called in the USA "Community based research", a tool for the development and acceptance of research work by society, because, moreover, Technology and Science are often associated with disasters or teratogenesis. Also, an apparent aversion to science noted, as a result of ignorance. In a report to Directorate XII of the European Commission (1999) entitled "The communication of scientific and technical knowledge", it was noted that the fundamental problem regarding the diffusion of scientific and technical knowledge paradoxically consists in the lack of knowledge about this matter, as well as the lack of diffusion in the various factors.

It is necessary to encourage and finance the research that analyzes quantitative, empirical, technical and learning data in order to achieve communicative goals. Actions that could formulate an efficient policy would be:

- determination of technology and means of communication for the promotion and understanding of techno-science;
- presentation of practical innovative approaches;
- creation of an on-line journal, the determination of the audience before every event, since often there is a diffusion of complex knowledge in an unsuitable environment.

An integral 3-layer technological model for Education and Labor

This paper of Mylonas (2006) introduces an integral 3-layer roadmap for implementing an effective and pragmatic delivery of a technological model able to interleave and render an individual's employment and academic profile, as inter-nested to his/her life-through education. The technological and operational infrastructure for its implementation may foster a complete framework for hosting State-supported initiatives towards LLL.

The e-Learning initiative proposed by the Commission in order to attain the goals set by the Lisbon European Council, is designed to mobilize the education and training communities, along with the economic, social and cultural players concerned to build the knowledge-based society. Although the e-Learning initiative may have defined the main modalities for allowing technological accession in education, there are several milestones of operational and technological nature that will need to be developed as to enable this, as well as to connect it to a 'roadmap' leading to a commensurate labor reformation. This paper introduces an integral 3-layer roadmap for implementing a technological model able to interleave and render an individual's employment and academic profile, as inter-nested to his or her LLL through education. Effectively, this model is realized as a set of next-generation distributed applications for:

- audited database classification and maintenance of an individual's integral and dynamic profile of dexterities and qualifications acquired along carrier path, as an intermediate link between industry and academy, as well as provision of automated employment profile correlation and matching. In this respect, the traditionally rigid relation between supply and demand in conventional labor models is converted to an adaptive process customized as to suit the individual's potential.
- distributed Information Repository Servers as a mediation and engagement environment for project collaboration and management between industry and graduate or post-graduate academic layers.
- thematic Knowledge Repositories as an accompanying asset to an individual's academic and employment capacity. Primary infrastructure for delivering an aggregative model of distributed knowledge and distributed services, as a fore step for implementing the virtual enterprise of knowledge workers.

The vision behind the general rational for implementing such a Repository Service stands on the realization that management only cannot promote a culture of change, but leadership can. An urgent need for university leadership should attend to a three-fold strategy:

- Preserve, manage, circulate and systematize the created Intellectual Capital.
- Commercially promote this Knowledge as an enabling commodity in the form of combined Know-How and academic high intensity services.
- Render these Services under an advanced, project-centric collaborative environment, offering a fully monitored and result focused process. This is the process that engages the students as the implementing research force, whilst also providing the route to gaining their competency without sacrificing financial compensation.

The assembly of the described rigid requirements can be optimally met under the proposed DRPMS (Document Repository & Project Management Server) environment. European Universities, progressively lacking the critical mass required to compete with leading universities in the United States, could optimally deploy such a collaborative project management environment, as an endorsement of their own efforts to put technology transfer on an equal footing with research and teaching. Equally important, a motivation for leveraging and sharing resources between privileged and less privileged European Institutions is also favored in a directly applicable mode, offering a more viable incentive for promotion of a virtual trans-European Institution.

Mylonas' paper demonstrated that such a framework is fully feasible now and may be assessed via a modest, technological infrastructure, under an open architecture. A combination of statutory and institutional control, may apply such a scheme, as to facilitate and to promote it to a full accreditation-enabling process as well. The engagement process demonstrated, via the Dynamic Project Management Repository Environment between industry and university is the leverage mechanism to steer long-standing problems in redefining a labor model and assessing LLL.

6.5. Conclusions

From the early 80's the European Community encouraged the establishment of University-Industry partnerships and networks, which proved to build a clear European context. The aims were Technology Transfer and Training, cohesion between societies, development of human potential etc. One way was to switch the University management with the socio-economic and regional development and the strategy has two big components: to meet the market needs to satisfy students, parents, staff and consequently all stakeholders (Kaplanis, 2006). Works, experiences, and results above described form the ways for achieving the three major goals by 2010 for the benefit of the citizens and the EU as a whole: to improve the quality and effectiveness of EU education and training systems, to

ensure that they are accessible to all, and to open up education and training to the wider world (Programme "Education and Training 2010").

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Chapter 7

TRENDS AND PERSPECTIVES IN EUROPEAN HIGHER EDUCATION

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7.1. Some considerations about the facets of integration

Any type of development is the result of two complementary mechanisms: differentiation and integration. The former is a process through which a system passes from a homogenous initial state to a heterogeneous one. Passing from an undifferentiated unity to a differentiated one allows the system to have more complex and refined behaviours. For Wallon (1959), the differentiation process intervenes in the preparation of passing from a stage of evolution to another one: a new dominant function which integrates itself in the old one, differentiating and subordinating it. Thus, each evolution stage consists of a hierarchy of overstepped functions. The result of differentiation is the appearance of new territories able to sustain new more elaborated functions.

Correlated with the differentiation process, integration is the latter pole of development, through which a part of the lost unity can be regained, but at a superior functional level. It moves the development from the horizontal level to the vertical one. Integration is a "principle of organization applying to structures with elements which are hierarchically ordered, the superior levels exercising control over the inferior ones" (Prévost & Richelle, 1999).

In the context of the present paper, the most often used concept for the European higher education is the one of integration, having strong contextual connotations. On the one hand, we speak about the integration of the newly joined countries, Romania and Bulgaria, in the European Union. On the other hand, the post-Bologna period supposes large coordination of all the European countries curricula for a unified European labour market. The third facet of integration is the progressive process of higher education becoming closer to the real needs of society through its integration with research. These are the premises from which we start the synthesis of directions and trends presented in this research report, because each paper involves another side of the integration process.

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7.2. Education or research?

In their paper "Correlation between Education and Scientific Research", Matlac, Tudor & Matlac (2006) present the main requirements of correlating didactic and scientific research and the relationships between them. Advocacies of the traditional dichotomy of the Romanian higher education system, the authors point out the correlations and the contradictions existing at this level between the two main dimensions of teaching, which are didactic and research activity. "*It is obvious that, by increasing the research work through contracts, the time needed to prepare the lectures, seminars and practical works decreases*". On the other hand, the process of didactic activity determines decreasing probability of scientific creation.

The key problem is to find an optimum range which separates fundamental research – pointing to the future – and applied research – pointing to nowadays trends and problems. The authors we discuss about herein consider that it is a waste of time to fulfil research work through researchers from fields other than their specific one. The work division supposes to assign tasks to members of the research team in connection with their specialization. Unlike the didactic activity, the research work supposes concentration upon a theme until solving it. It means that an individual research has to pass through all the stages of the process, e.g. documentation, data analysis and synthesis, model designing, experimentation and so on. In a research team, some researchers are charged with tasks from areas other than their specialization and thus, there appears the necessity of working, bringing ideas from other areas of knowledge. If the teaching staff cyclically crosses beyond the area of specialization to bring novelty elements of knowledge, the researchers are concentrated upon this theme till solving it. So it is a different approach of the same issue.

The three authors mentioned above think that the solution of this contradiction between didactic and scientific research is creating research units. This means to create, besides the higher education institutions, branches of departmental research institutes and designing units within enterprises. The teaching staff fulfils the research work without interrupting the didactic activity because they have to honour the research contracts with applicative character. Fundamental research comes only in the next step. Within this topic, there are few fundamental problems to solve: harmoniously mixing didactic and scientific research through a good correlation between individual and collective research; managing the complex problems of personality features in science and technique; finding important research issues and so on.

We could name the perspective discussed above to be a classic one or maybe a traditionalistic one because, essentially, research and didactic activities are seen as separate. An up-to-date, modern and promising view can be found in the paper of Helerea, Popescu and Coman (2006) "Enhancing Academic Research & Education Synergy – Transilvania University Case Study". The key concept of this paper is synergy, borrowed from the systems theory: "*The synergy appears as a*

multiplication of a system's properties, so that the outputs of the system where synergy is developed are bigger than the sum of outcomes of its parts" (p. 173). Synergy is another side of the integration process because it means coordinated actions in a powerful integrated system, by powerful coordinated programmes. The work involved in this paper is supported by the European Commission by means of the Erasmus Programme EUI-Net – European University Industry Network. The paper is focused on the development of coherent actions in order to ensure simultaneous rising of academic research and education seen in an integrated manner.

In order to clarify their own point of view, the authors present it in contrast with the opposite one, mentioned at the beginning of this article:

- the teaching-learning activity has no interaction with research;
- the research is not denied because of its beneficial effects on the university education;
- there is no scientific proof to demonstrate a strong connection between research and education;
- the focus on the efforts of the research could lead to depreciation of the teaching process and the decrease of the course quality;
- the difference between the features of two domains triggers the difficulty of the investigation.

The arguments of the opposite approach became hypothesis of a small sociological study carried out on 120 students, investigated with an eight-item questionnaire and with a Group Delphi Technique which was applied to ten teachers-researchers, responsible for the specific research directions in Transilvania University of Brasov. The convergence of the results from the two-way investigation supports the second approach:

- students appreciate the results of the academic research and the enthusiastic presentation of the new knowledge by the teachers-researchers;
- research enhances the teaching-learning process, stimulating learning, promoting new information and developing important skills;
- the research education models are more efficient if teachers-researchers have the appropriate didactic competences.

The authors establish strong relationships between academic research and education by means of simple and inspired graphic representations of the two models, one in which research and education are independent domains, each of them with its own strategy, culture, objectives, structures, resources, specific outcomes, and another one integrated. So, research and education are interconnected processes involving common structures, strategies and actions with synergic effects.

The sociological study underlines a positive perception of students and academic staff regarding the benefits of research in education. The relationship is a reciprocal one: research stimulates the learning process and educational performance contributes to the increase of the research quality. The conclusion of this interesting study is that universities need to develop appropriate tools for a systematic analysis of the research-education synergy effect. They also have to promote actions for

human resource recruitment and management (recruitment, research training, promoting the new interactive methods for teaching, learning and evaluation).

7.3. Education or e-Ducation?

Could the university "actors" - teachers and students mainly – be members of a virtual university system? Have we already entered a Pithagoreic world of digits and computers in which the real world becomes a "second-hand" one, because of the fact that the virtual world is much more interesting, challenging, fascinating and full of promising possibilities? Even now it is still very difficult to know the impact of technology on our life style. The paper of Ilavska, Babiak, Petrus, Vollmann & Timková (2006) regards information society as the best possibility to connect university research and practice. In an e-World, in which e-Europe is just a small e-branch (near e-Learning, e-Business, e-Health, e-City, e-Region or even e-Country) we witness " *things which, within this trend development, cannot be ignored*" (p. 71). It seems to be obvious that "*teachers, whose knowledge and skills are obtained in the past, do not suffice anymore and call for new modern methodology*" (ibid.). The authors anticipate the fact that information technologies will influence all areas of teaching, and also the relationship between teacher-student-knowledge. They are advocacies of the Distance learning system, with students of no age limits, no restrictions for other activities, no obstacles in education, even for disabled people, and a much better matching with students' real needs.

The new concept announcing a big change in the educational field is e-Learning, which presents a wide range of acquired knowledge via electronic media, modern information from telecommunications technologies. The authors sustain that "e-Learning makes this form of education more interesting and effective than other forms of education" (p. 71). A new form of education has appeared, LMS (from Learning Management System), i.e. e-Ducation, which is an Internet application created on the basis of distance education methodology. This system offers not only a valuable education, with modern interactive features, but also a feedback via communications and electronic tests. Students can study anywhere and anytime, if an Internet connection is possible… These arguments support the idea that electronic systems of communications make education more effective, more interesting, reducing its costs. The paper analyses two forms which provide e-Ducation, ASP (Application Service Providing) and open source, detailing the basic principles of the way the system works. ASP consists in an Administrator, a Teacher (tutor), and Student(s). The first (Teacher) makes the system access possible, for both the teacher and the student; the teacher develops and distributes electronic courses, manages learning and teaching, analyses and gives feedback, checking students' knowledge by specially created tests; the third (Student) studies electronic material and courses, communicates with schoolmates, participates in discussions forums and takes electronic tests to be assessed by the teacher.

E-Ducation could be a major dimension of an information era, without any doubt, but this system has its own costs and limits. The possibility of cheating, the problem of developing appropriate courses, through the selection of the most suitable information, the construction of the evaluation test with taking into account psychometric principles and basic rules of assessment – all these are very important issues to be investigated. To what extent can the teacher/student relationship vanish? How can we be sure that the students' feedback represents their work or their own thinking? How can we know that they have acquired real competences and skills? Will you agree to be cured by a virtual surgeon, graduating a virtual university?

Some answers to these questions result from a similar presentation of Hamburg, Cernian and ten Thij (2006) in their paper "An Attempt of Merging in a Synergetic Way Research Work and Higher Education Activities…". They appreciate that e-Learning is "*one of the fastest moving trends in higher education*", "*a major mean of organization education training*" (p. 135). We can already talk about an academic on-line market, which continues to expand its supply because "*no education/ instruction/ professor can afford to ignore this objective trend in the market*" (ibid.).This on-line market has matured to the point that there is sufficient software available so that e-learning packages incorporate data-base-cantered syllabus, on-line time-monitored testing, discussion groups and e-mail. Of a special interest are the conclusions of a comparison between on-line and conventional (on-campus) classrooms. Despite the fact that the grades are very similar, despite the fact that the on-line learning "*adds some value to education, it cannot replace life on real campus with face-to-face education*". There are also discussions regarding the time spent to elaborate web-based courses and to teach them as well. It seems that the most realistic solution to this problem is to combine the two systems in such a way that on-campus, the undergraduate courses should include some e-Learning components. This fact could contribute to improve the interaction between a teacher and his students as well as between students themselves. An important gain is also the fact that the use of web-tools forces professors to rethink their courses "so that old on-campus style method could be improved significantly".

The costs of the on-line education system are not negligible, because the teacher has to be paid also for developing e-courses and for teaching them, because it is necessary that the administrative and technical staff should run the web-learning programmes during the entire day. Training, software licences, e-commerce applications, web-design tools and the entire maintenance of computers and telecommunications infrastructure increase costs at millions of dollars. Additional problems are linked to the intellectual property of the e-learning courses. A conclusive opinion seems to be a very realistic one: "*at present, it is a generally accepted opinion that certain types of instruction will never go entirely on-line, as, for example, laboratory courses that require immediate access to as well expensive and also specialized equipment*" (p. 136). To force the limits of their own conclusion, the three authors of this paper make a brief presentation of "ViReC e-Initiative Project which has as objective to create such a virtual laboratory allowing students to easily interact with physical processes through Internet.

A special project in which the technology implications on education can be seen is Eboueya, Lillis, Jo, Cranitch and Martin's MAPLE Project (2006). The objective of this project is to design, implement, test and evaluate an active-participative learning environment for teachers and learners, using mobile devices and wireless/ GSM devices. Although this project is applicable in the educational context, the target group for MAPLE is represented by learners from higher education. The project outstands by the creative use of mobile and portable technologies in providing immediate feedback and social inclusion in the traditional face-to-face delivery. There is a large range of devices and technologies involved to create a framework in a real classroom environment, like wireless network, GSM MicroCell which supports on-campus communications, mobile phones, Tablet PCs and Personal Digital Assistants. MAPLE classrooms can be used in a variety of settings with different disciplines, cultural contexts and learner profiles. The pedagogical MAPLE approaches take into account some specific aspects:

- the teacher asks multiple choice questions to the class and he or she obtains an immediate feedback about their understanding the discussed topic, via the learners' mobile devices;
- the feedback allows the teacher to gain a deeper insight from all the learners about the extent to which they have understood the topic delivered;
- the face-to-face contact is maximized, because he or she can adjust the teaching methods in real-time.

The MAPLE project destination takes into account a diversity of disciplines (Computing, Business Studies, Engineering, Mathematics and so on), different nationalities and cultures, a wide range of educational levels, from undergraduate to master level, learners with special needs. Preliminary research demonstrates that the project has a significant potential, because it can be extended to a live teaching environment. Through specific applications, its use in an organizational context could increase the teachers' work performance. Last but not least, MAPLE project is a proof of the possibilities to integrate technologies within the teaching process. It also stimulates the pedagogical research, determining the curriculum design to include much more contents for mobile and portable technologies.

7.4. Distributed knowledge and inter-university cooperation

In their article "Research collaboration between universities", Uden, Salmenjoki, Hericko & Arumugam (2006) develop a particularly important concept named KMO, meaning Knowledge Management Organization. Their basic assumption is that effective research is a very intensive process and, in order to maximize the effectiveness of their research, the researchers – geographically highly dispersed – have to collaborate. They often have very similar interests in knowledge, but have different level of expertise. The paper describes how distributed knowledge management system can be used to facilitate research collaboration between universities, by means of modern communication technologies.

Knowledge management systems are tools for carrying out the management of knowledge using a wide range of implementations: document repositories, expertise data bases, discussion lists, retrieval systems of information.

The future trends for the knowledge management are web services, semantic web or data mining. The most important questions for a virtual team working together are:

- How can the geographically dispersed, cross cultural teams engage in sharing knowledge?
- What is the role and how do we use the available technologies in such engagement?

Taking into account the Leontiev's Activity Theory, the authors develop a model of basic structure of an activity that they connect with the distributed knowledge management. Firstly, they believe that the engine of all knowledge creation is represented by the communities of practice, which give technical advice on problems being used like a brainstorming platform for new ideas. Through them, knowledge creation is continuous and expanding and once the community matures, the result is internal learning.

7.5. Re-designing curricula: education and work requirements

The most dynamic dimension of the 20th century is linked to technical intelligence. As a consequence of the technical progress, universities are facing new problems: the continuous change in the content of the job requirements permanently imposes updating and re-designing curricula. This necessity is much more imperative for the new members of the European Union, which have to tune their educational structures to make them fit to those of European universities. In her paper "Tuning Engineering Education with Work Requirements", Luca (2006) analyses the changes in higher education in order to tune engineering education with work requirements.

Ten years ago Transilvania University coordinated a Tempus CME project aimed at designing complementary training for university students. During 1997-1998, some questionnaires were developed in order to identify the unfulfilled competency requirements at the university educational level. Academics and employers rated the level to which some competences required on the labour market were achieved by their universities. A general conclusion of the research was that universities provided good theoretical knowledge but not enough practical skills required by jobs in the real world of work. The output of this research was a three-module summer school implemented in 1998 in three Romanian partner universities. Its aim was to complete some competences such as communication, entrepreneurship and work-related legislation, which were the three dimensions identified as being unfulfilled by higher education. One of these disciplines, communication, was included in the curricula of several engineering faculties.

A model of educational research for higher education was the TUNING project adopted in 2000 as a coherent approach in Europe. The philosophy of this project is that integrated economy needs an integrated higher education in engineering. The TUNING project aimed to develop professional profiles in seven areas such as Business, Chemistry, Geology, History, Mathematics, Physics and Education Sciences. Several other projects followed in different areas in European higher education.

Luca's paper presents a research of the EUI-Net project coordinated by Transilvania University of Brasov. In order to better tune the industrial and higher education structures in Europe, two special interest groups were developed in the project. The former group deals with the generic and specific competences for industrial sector, the latter group deals with the generic and specific competences for the students' practical stages. The design of the research follows the TUNING methodology. The EUI-Net project aims to contribute to the expanding TUNING research in the field of industrial engineering education by two books. This will become a reference point in the curriculum design for the partner universities.

The objective of the EUI-Net project research is to identify the basic engineering competences required by the industrial sector. Their importance had to be analysed for the graduate and the master cycle of higher education, as defined by the Bologna process. The distant aim of this research is to offer the candidate countries for European integration a feedback about the competence requirements in a unified economy, in order to modernize their curricula.

Luca's article presents the three instruments Geske, Specoe and Praske, addressed to three target groups of respondents, academic, graduates and employers. Thus, Geske is a questionnaire on generic skills and competences in the perspective of life-long learning, involved in personal development after entering the world of work. Specoe is a questionnaire of specific competences, being the same for all the three groups. Unlike Geske, which is the original TUNING questionnaire, Specoe was constructed by the research team after an analysis of the engineering work in industrial settings. Specific items are meant to define the competences that are common for all the industrial topics, being considered the basics of the profession. Using a four-step scale, the respondents were asked to evaluate the importance of each of the 53 chosen competences, for the first and second cycle as defined in the Bologna process.

The aim of the Praske questionnaire is the assessment of practical skills and competences, organized in two parts of a 21-item questionnaire. Some items describe practical skills and two additional positions were designated to be filled by the respondent himself/ herself.

The project attempts to contribute to the integration of the research results into the permanent re-adjusting of curricula so that they could match the present needs of education for working in enterprise. The research aim is to answer the questions and to identify the trends in the education for industrial sector at European level. This could be the general research objective. Some more specific research objectives are the following:

- to identify the most important present requirements of the industrial professions;

- to build up a competence profile for the industrial field;
- to differentiate the competence requirements for the first and second cycles of higher education;
- to identify common problems that universities encounter in adapting their curricula to the requirements of the labour market;
- to offer partners some clues for changing the curricula.

In order to answer these questions and demands, the most important groups are the employers (directly connected to the reality of the professions in industrial sectors) and the graduates (the most competent to indicate which training needs are important now or in the future on the labour market).

Luca considers that "this customer-orientated approach to higher education is vital for the survival of the universities in a rapidly changing world of work" (p. 149). The competence profile resulted could be used by partner universities as a frame of evaluation of their current curricula in preparing graduates for the world of work, as a reference point in restructuring their curricula.

Millevolte and Mustica's article (2006) tries to build "a bridge between research and production, universities and enterprises", their linking element being ergonomics. The importance of the discussed subject of ergonomics consists in the complex relations involving human being – machine – product – environment – process with their dynamic interactions, and many different additional factors as dependable variables. Ergonomics matches design in providing products which are functional, useful, attractive and able to raise the life quality standards. The most relevant factors interfering in an ergonomic project are the design, the marketing and the human factor. Ergonomics is in charge of problem solving from a theoretical point of view and design is in charge of achieving the project and of the concrete adaptation process – human – machine – product – environment.

From this short presentation, there results that ergonomics is a boundary discipline. Born in the seventh decade of the 20th century, ergonomics and design are in a close interaction, characterized by a strong synergy of different scientific contributions, so that the final result is an interdisciplinary approach.

The most interesting part of this paper is the paragraph in which the dialogue between production and research world is analysed. A new amazing trend is emerging: professional offices and institutions ask ergonomics to provide them services, research and projects, which have been arising thanks to the enterprises' consortia belonging to various disciplinary fields. According to some examples analysed in this article, ergonomics seems to be a very promising field of cooperation for research and production.

Two complementary trends evolve simultaneously: on the one hand, universities must spread and disseminate the outcomes of their research in a more popular way, cooperating more widely in the territory; on the other hand, entrepreneurs and their associations must consider the necessity to support research from an economic point of view, in a systematic way, by considering ergonomics as an investment for the competitiveness of their enterprises.

7.6. Psychological basis of top learning: motivation and initiatives

Another face of the integration process refers to the teaching research at the student's level. Research is and has to be an important part in the students' university education, especially before graduation, when they have to complete a final year project or dissertation as part of their degree. In her article "How to motivate research in students", Uden (2006) finds ways to help students overcome their difficulties associated with conducting their own research. A good way to help students acquire the necessary research skills is Problem-Based Learning (PBL). The paper describes the authors' experiences of using PBL to help students develop their research skills.

Students need to develop generic skills necessary for completing their research, but also transferable skills necessary for their future employability. Uden sees this process as a problem solving one, in which graduates must take control of their own learning by adapting testing and evaluating solutions to a variety of problems. They also have to possess skills such as critical thinking and learning to learn and the ability to integrate and apply research into analyses and design as well. "*To promote a research culture among students, it is important that we help them develop research skills."* Because the research is a complex process, having these skills means defining the frame of research, finding information, summarizing and organizing sources of documentation.

The author finds that the main problem students face is their lack of problem solving, critical thinking, meta-cognitive skills and self-directed learning skills. The solution to all these is Problem-Based Learning which means to develop strategies of teaching contents in ways that also develop problem solving skills. These higher level skills are called meta-cognitive skills. It means knowledge and awareness of one's own cognitive processes and the ability to control and manage these processes.

The purpose of PBL is to produce students who: will take a challenge with initiative and enthusiasm, will reason effectively, accurately and creatively, will monitor and assess their own adequacy to achieve a desirable outcome, will effectively collaborate as members of a team working to achieve a common goal. The key ingredients of PBL are the fact that the problem is the integrator of concepts and skills, its solving supposing commitment and individual study. Uden suggests that PBL is typically used in team work and small group situations because it encourages reflective abilities. She analyses the four phases of PBL taking into account the activities carried out and the individuals who control them.

Evaluating the benefits of PBL, the author shows that PBL provides an equal and exciting opportunity for all students' learning. It also enables teachers to add many things to their traditional manner of teaching: problem solving activities, critical thinking exercises, collaborative learning and independent study. PBL offers many benefits to learning, so the learning environment is more stimulating and human; learning and teaching is more enjoyable; PBL promotes interaction between students; PBL fosters self-directed learning skills; PBL also promotes interaction between different disciplines, collaboration between students, active use of more

resources of information. In conclusion, the author's belief is that PBL really helps students develop the necessary research skills they need.

Another facet of integration is analysed in Cristea and Tuduce (2006) - "From Competences to Initiatives." The authors try to find a balance between the current and future needs and requests and the new approach that implies developing industrial initiatives in universities. This is based on students' creativity and requires both technical and business-like skills.

The EUI-Net thematic network aims at identifying points of reference for generic and specific competences in higher technical education. As we have already shown before in Luca's paper, university staff, students and employers have been consulted on the competences they expect from graduates. Cristea and Tuduce show that competences alone are not enough when it comes to convert knowledge into initiatives able to change world and society. This fact makes it necessary to extend the EUI-Net project in the direction of developing technical entrepreneurship, which implies joint activities of universities and enterprises to create a real entrepreneurial attitude among engineering students. Such a spirit can be sustained not only by specialized knowledge but also by direct and early involvement in the current trends of the industrial fields. A lot of commissions have been created to cultivate a more entrepreneurial spirit among school children and students. Education in entrepreneurship increases the chances of start-ups and self-employment and this is why curricula at all levels should explicitly include entrepreneurship as an objective of education.

7.7. Conclusions about the facets of integration

As we have already seen, all the topics analysed in the present paper gravitate around the key concept of integration. Although in higher education there are a lot of different faces, the process is unique and of large dimensions. We mainly speak about the status of the university teacher who in not only a teacher or a researcher but a teacher-researcher. The educational and research dimensions lose the outlines that used to keep them apart. Putting together all the objectives, structures, resources and organization culture, a new type of functional unity appears, with strong synergic effects (Helerea, Popescu & Coman).

Another major direction is outlined as a consequence of the means of communication and of the technological revolution, especially in the computer science. The globalization generated by the information technology proposes developments and extensions to the traditional educational systems. Thus, besides the conventional classroom, the on-line classroom appears, which brings about massive changes in the teaching-learning-evaluation styles (Hamburg, Cernian and ten Thij in their paper about ViReC e-Initiative Project).

A new concept has been developed (Uden, Salmenjoki, Hericko and Arumugam) in connection with effective research. Thus, universities strongly dispersed from the geographical point of view, with very different levels of

expertise, are connected by Knowledge Management Organization (KMO), through which they share the distributed knowledge. Now, synergy appears as a consequence of building the working group while keeping the autonomy of each university which becomes a node in a vast network. It shares the knowledge and expertise with other similar teams whenever it is necessary.

The use of mobile and portable technologies, as they are defined by the MAPLE Project (Eboueya and colab.), sketches another type of classroom which takes into account the immediate feedback. The teacher can adjust his methods in real time in order to maximize the face-to-face contact. This new technological methodology offers the opportunity for socialization, the classrooms becoming more active working environments. This time, integration appears between the old educational models and the ones which are favoured by the new mobile and portable technologies, among which mobile telephony has to be mentioned.

A special form of integration is the fact that education should meet the needs of the labour market. Following the already established TUNING methodology, expression of the synergy between pedagogical research and actual teaching, university education has to answer the changes in society as soon as possible. The basic principle is that the European integrated economy area needs an integrated higher education area.

Integration brings the world of education near the requirements of the market, especially in the fields of industry and high technologies, by creating some disciplines of synthesis. Thus, Millevolte and Mustica enumerate ergonomics, which they consider "a bridge between research and production, universities and enterprises."

On the other hand, Fat & Oprea propose an integrative concept called action-research in order to design a type of curriculum that introduces innovation in teaching and learning. The methodology they propose is an integrative one:

- conduct action-research to discover recent resources and best practices;
- formulate an application proposal for integration;
- implement and observe the pilot programme;
- adopt a programme and continue to assess.

Integration gets a subjective dimension as well in Uden's paper, which focuses on how to motivate research with students, where she proposes a valuable integrative concept: Problem-Based Learning (PBL). The problem becomes the purpose of learning, being an integrator of concepts and skills. It allows learning in groups and that is why it is the element which integrates the group around the task which is to be solved, promoting the interaction between students and between various disciplines: "When students have acquired the PBL skills they find learning fun and change their whole perspective about their learning."

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APPENDICES

APPENDIX 1

QUESTIONNAIRES USED

Appendix 1.1

QUESTIONNAIRE ON GENERIC COMPETENCES FOR ENTERPRISE

Appendix 1.1.1.

GESKE - A – for Academics

Please specify the country: _____
Please specify the area relevant to the enterprise sector you are referring: _____
In a previous research, conducted by the TUNING team, the 17 competences and skills listed below have been considered as most important for the professional development of university graduates, both by graduates and by the companies that employ them.
Our team intends to expand the research to the fields relevant for enterprises, in order to obtain a panoramic view of the way that European higher education prepares graduates in these fields for the world of work. This questionnaire was constructed, following the TUNING methodology, in order to allow some comparisons with and other fields.
Please rank these 17 competences in order of importance according to your opinion (1 being the most important and 17 the least important).

It is vital that you rank ALL 17 and that you **do not give any competences equal ranking.**

Generic competences	Ranking
1. Ability to work in an interdisciplinary team	
2. Appreciation of diversity and multiculturality	
3. Basic knowledge of the field of study	
4. Basic knowledge of the profession	
5. Capacity for analysis and synthesis	
6. Capacity for applying knowledge in practice	
7. Capacity for generating new ideas (creativity)	
8. Capacity to adapt to new situations	
9. Capacity to learn	
10. Critical and self-critical abilities	
11. Decision-making	
12. Elementary computing skills (word processing, database, other utilities)	
13. Ethical commitment	
14. Interpersonal skills	
15. Knowledge of a foreign language	
16. Oral and written communication in your native language	
17. Research skills	

Add here any comment you consider useful for the research:
_____

Please check the ranking for all 17 items
Please go to the second questionnaire

Appendix 1.1.2.

GESKE - E – for Employers

Please specify the country: _____
Please specify the area relevant to the enterprise sector you are referring: _____

In a previous research, conducted by the TUNING team, some of the competences and skills listed below have been considered important for the professional development of university graduates, both by graduates and by the companies that employ them.

Our team intends to expand the research to the fields relevant for enterprises, in order to obtain a panoramic view of the way that European higher education prepares graduates in these fields for the world of work. This questionnaire was constructed, following the TUNING methodology, in order to allow some comparisons with and other fields.

The questionnaire presents a series of questions related to the skills and competences that may be important for success in the career of a graduate in _____(**include here the company's field of operations**). Please answer all the questions. The answers will be very valuable in improving the planning of courses for future students of this subject.

1. Name of the organisation: _____
2. Position of the person answering: _____.
3. Number of employees: _____
4. Do you consider that university has given the graduates you have employed adequate preparation for working in your company?
    1. Very much
    2. Much
    3. Some
    4. Little
    5. Very little

For each of the skills listed below, please estimate:

- the **importance** of the skill or competence, in your opinion, for work in your organisation;
- the **level** to which each skill or competence is developed by degree programs at university in (include name of geographic area) _____.

The blank space may be used to indicate any other skills that you consider important but which do not appear on the list.

Please use the following scale:
1 = none; 2 = weak; 3 = considerable; 4 = strong.

Generic skills / competences	**Importance for work in your organisation** None-1; Weak-2; Considerable-3; Strong-4	**Level to which developed by university degree** None-1; Weak-2; Considerable-3; Strong-4
1. Capacity for analysis and synthesis		
2. Capacity for applying knowledge in practice		
3. Planning and time management		
4. Basic general knowledge in the field of study		
5. Grounding in basic knowledge of the profession in practice		
6. Oral and written communication in your native language		
7. Knowledge of a foreign language		
8. Elementary computing skills		
9. Research skills		
10. Capacity to learn		
11. Information management skills (ability to retrieve and analyse information from different sources)		
12. Critical and self-critical abilities		
13. Capacity to adapt to new situations		
14. Self directed learning skills		
15. Interest in cross-functionality and additional qualifications for career self management		
16. Capacity for generating new ideas (creativity)		
17. Problem solving		
18. Decision-making		
19. Teamwork		
20. Interpersonal skills		
21. Leadership		
22. Ability to work in an cross-functional team		
23. Ability to communicate with non-experts (in the field)		
24. Appreciation of diversity and multiculturality		
25. Ability to work in an international context		
26. Understanding of cultures and customs of other countries		
27. Ability to work autonomously		
28. Project design and management		
29. Initiative and entrepreneurial spirit		
30. Ethical commitment		
31. Concern for quality		
32. Will to succeed		
33. Other - specify ... (feel free to add new competences)		

34. Other - specify ... (feel free to add new competences		

Please rank below **the five most important competences** according to your opinion. Please write the number of the item from the list above. Mark on the first row the most important, on the second row the second most important and so on.

1. Item number_____
2. Item number_____
3. Item number_____
4. Item number_____
5. Item number_____

Please check if you answered all the questions and go to the second questionnaire

Appendix 1.1.3.

GESKE – G – for Graduates

Please specify the country: _____
Please specify the area relevant to the enterprise sector you are referring: _____
In a previous research, conducted by the TUNING team, some of the competences and skills listed below have been considered important for the professional development of university graduates, both by graduates and by the companies that employ them.
Our team intends to expand the research to the fields relevant for enterprises, in order to obtain a panoramic view of the way that European higher education prepares graduates in these fields for the world of work. This questionnaire was constructed, following the TUNING methodology, in order to allow some comparisons with and other fields.
The questionnaire presents a series of questions related to the skills and competences that may be important for success in the career of a graduate in _____(**include here the company's field of operations**).
Please answer all the questions. The answers will be very valuable in improving the planning of courses for future students of this subject.

1. Age in years: _____
2. Sex (mark the appropriate answer with an *x*):
    1. Male
    2. Female
3. Year in which you graduated: _____
4. Title of your first degree (in English and your national language):
_____
5. Present employment situation (mark the appropriate answer with an *x*):
    1. Working in a position related to your degree
    2. Working in a position not related to your degree
    3. Further study
    4. Looking for your first job
    5. Unemployed, but have previously been employed
    6. Neither employed nor looking for employment
    7. Other (please specify): _____

6. Do you feel that the education you have received at the university has been adequate?
(mark with x the appropriate answer)
    1. Very much
    2. Much
    3. Some
    4. Little
    5. Very little

7. How would you rate the employment potential of your degree? (mark with x the appropriate answer)

1. Very poor
2. Poor
3. Fair
4. Good
5. Very Good

For each of the skills listed below, please estimate:

- the **importance** of the skill or competence, in your opinion, for work in your profession;
- the **level** to which each skill or competence is developed by degree programs at university in (include name of geographic area) _____.

The blank space may be used to indicate any other skills that you consider important but which do not appear on the list.

Please use the following scale:
1 = none; 2 = weak; 3 = considerable; 4 = strong.

Generic skills and competences	**Importance for work in your organisation** None-1; Weak-2; Considerable-3; Strong-4	**Level to which developed by university** None-1; Weak-2; Considerable-3; Strong-4
1. Capacity for analysis and synthesis		
2. Capacity for applying knowledge in practice		
3. Planning and time management		
4. Basic general knowledge in the field of study		
5. Grounding in basic knowledge of the profession in practice		
6. Oral and written communication in your native language		
7. Knowledge of a foreign language		
8. Elementary computing skills		
9. Research skills		
10. Capacity to learn		
11. Information management skills (ability to retrieve and analyse information from different sources)		
12. Critical and self-critical abilities		
13. Capacity to adapt to new situations		
14. Self directed learning skills		
15. Interest in cross-functionality and additional qualifications for career self management		
16. Capacity for generating new ideas (creativity)		

Generic skills and competences	**Importance for work in your organisation** None-1; Weak-2; Considerable-3; Strong-4	**Level to which developed by university** None-1; Weak-2; Considerable-3; Strong-4
17. Problem solving		
18. Decision-making		
19. Teamwork		
20. Interpersonal skills		
21. Leadership		
22. Ability to work in an cross-functional team		
23. Ability to communicate with non-experts (in the field)		
24. Appreciation of diversity and multiculturality		
25. Ability to work in an international context		
26. Understanding of cultures and customs of other countries		
27. Ability to work autonomously		
28. Project design and management		
29. Initiative and entrepreneurial spirit		
30. Ethical commitment		
31. Concern for quality		
32. Will to succeed		
33. Other - specify ... (feel free to add new competences)		
34. Other - specify ... (feel free to add new competences		

Please rank below **the five most important competences** according to your opinion. Please write the number of the item from the list above. Mark on the first row the most important, on the second row the second most important and so on.

1. Item number_____
2. Item number_____
3. Item number_____
4. Item number_____
5. Item number_____

Please check if you answered all the questions and go to the second questionnaire

Appendix 1.2.

QUESTIONNAIRE ON SPECIFIC COMPETENCES FOR ENTERPRISE

Academics, Employers and Graduates
SPECOE – A, E, G

Below are presented a series of competences specific to your area. For each of them we would ask you to do two things:

a) Indicate how important you think it is that a student should acquire the competence in his/her education **for the First Cycle (undergraduate) as defined in the Bologna process**. Please use the values 1 to 4 according to the following key:
   1 = None,
   2 = Weak,
   3 = Considerable,
   4 = Strong.

b) Indicate how important you think it is that a student should acquire the competence in his/her education **for the Second Cycle (postgraduate) as defined in the Bologna process**. Please use the values 1 to 4 according to the following key:
   1 = None,
   2 = Weak,
   3 = Considerable,
   4 = Strong.

Specific competences	**Importance for First Cycle (undergraduate)** None-1; Weak-2; Considerable-3; Strong-4	**Importance for Second Cycle (postgraduate)** None-1; Weak-2; Considerable-3; Strong-4
1. Ability to apply knowledge of mathematics, physics, chemistry and other sciences		
2. Systemic approach of specific problems		
3. Ability to identify, formulate, and solve specific problems		
4. Analysis of requirements and establishment of technical specifications for project development (e.g. requirements for materials, energy, efficiency, functional characteristics, technologies, etc.)		
5. Ability to analyze and establish the project quality requirements		
6. Ability to analyze and establish the energy saving measures		
7. Ability to analyze and establish the health and safety measures		

Specific competences	Importance for First Cycle (undergraduate) None-1; Weak-2; Considerable-3; Strong-4	Importance for Second Cycle (postgraduate) None-1; Weak-2; Considerable-3; Strong-4
8. Basic knowledge of the design of technical systems (e.g. to know functional principles, modelling methods, calculus methods, etc.)		
9. Ability to carry out functional design tasks for technical systems (e.g. system structure, process modelling)		
10. Ability to carry out detailed conception tasks (e.g. for technical systems - detailed design of system components.		
11. Ability to carry out operational tasks (e.g.for technical systems - to establish manufacturing methods, technologies, flow chart, tools and equipment, etc.)		
12. Basic knowledge of the main technologies in the field (e.g. conventional technologies, non conventional technologies, nanotechnologies, etc.)		
13. Ability to carry out process planning (e.g. to implement the manufacturing flowchart)		
14. Ability to design tools and quality control instruments suited to the project		
15. Basic knowledge of logistics in the field (e.g. row materials, equipment, energy required by the manufacturing process)		
16. Understand existent and new technology and its impact for new / future markets.		
17. Basic knowledge about eco labelling and legislation (e.g. to know the national and international regulations and procedures on environmental requirements, etc.)		
18. Basic knowledge about recycling, disposal and impact on the environment)		
19. Ability to apply the life cycle analysis for a product (e.g. environmental impact, life cycle evaluation).		
20. Knowledge and ability to carry out maintenance tasks after project completion (e.g. maintenance and reliability principles and methods, planning)		
21. Basic knowledge about modelling, simulation, and analysis tools of processes and systems (e.g. methods, software, procedures).		
22. Ability to carry out modelling, simulation, and analysis of technical systems (e.g. to simulate		

Specific competences	Importance for First Cycle (undergraduate) None-1; Weak-2; Considerable-3; Strong-4	Importance for Second Cycle (postgraduate) None-1; Weak-2; Considerable-3; Strong-4
processes under different operating regimes, to model and analyse technical systems)		
23. Ability to create real prototypes and design experiments in a virtual environment using professional software		
24. Knowledge of measurement methods (e.g. direct methods, indirect methods, procedures for data acquisition, processing, and storing, etc.)		
25. Knowledge of metrological standards in the field		
26. Ability to apply measurement knowledge for system operation monitoring (e.g. to build measurement schema, on-line monitoring, to control system functional parameters)		
27. Ability to design and implement maintenance schedules		
28. Knowledge of the major aspects of enterprise terminology - nomenclature, conventions and standards		
29. Knowledge of specific programming languages or software		
30. Design and implement information systems for enterprises		
31. Information technology skills (e.g. word processing and spreadsheet use, data logging and storage, etc.)		
32. Managing a technical system by planning and controlling by use of concepts, methods and tools (e.g. Strategy design and implementation, benchmarking, TQM, etc.)		
33. Understand the principles of management and link them with enterprise and business knowledge (e.g. operations management, project management, information technology)		
34. Knowledge of legislation in the field and ability to link to business / management / technical knowledge		
35. Understanding of and commitment to professional and ethical responsibility in enterprise		
36. Ability to recognise and analyse novel problems and plan strategies for their solution		
37. Critically analyzing, synthesizing and		

Specific competences	Importance for First Cycle (undergraduate) None-1; Weak-2; Considerable-3; Strong-4	Importance for Second Cycle (postgraduate) None-1; Weak-2; Considerable-3; Strong-4
summarizing information, including prior research		
38. Receiving and responding to a variety of information sources (e.g. textual, numerical, verbal, graphical)		
39. Preparing, processing, interpreting and presenting data, using appropriate qualitative and quantitative techniques and packages (e.g. statistics, Power Point)		
40. Skills in the evaluation, interpretation and synthesis of information and data (e.g. writing reports, making presentations)		
41. Skills in presenting scientific material and arguments in writing and orally, to an informed audience		
42. Understand organisations and how they function		
43. Other - specify ... (feel free to add new competencies)		
44. Other - specify ... (feel free to add new competencies)		

Please check if you answered all the questions and go to the third questionnaire

Appendix 1.3.

QUESTIONNAIRE ON PRACTICAL COMPETENCES FOR ENTERPRISE

for Academics, Employers and Graduates
PRASKE - 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.

Skills and competences	**Importance** None-1; Weak-2; Considerable-3; Strong-4	**Level to which developed by university degree** 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		

Skills and competences	**Importance** None-1; Weak-2; Considerable-3; Strong-4	**Level to which developed by university degree** None-1; Weak-2; Considerable-3; Strong-4
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!

Appendix 1.4.

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[11] [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

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[11] Gonzalez, J., Wagenaar, R. eds. (2003). ***Tuning Educational Structures in Europe***. Final Report. Phase One. University of Deusto & University of Groningen.

Appendix 1.5.

Reliability analysis of GESKE - level of importance – according to Employers and Graduates

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	G1A	3,5894	,5689	151,0
2.	G2A	3,5894	,5919	151,0
3.	G3A	3,4172	,6568	151,0
4.	G4A	3,2715	,6422	151,0
5.	G5A	3,1921	,6188	151,0
6.	G6A	3,4570	,7093	151,0
7.	G7A	3,3444	,8567	151,0
8.	G8A	3,5828	,6256	151,0
9.	G9A	2,9603	,8397	151,0
10.	G10A	3,5099	,6096	151,0
11.	G11A	3,5232	,6515	151,0
12.	G12A	3,1126	,7075	151,0
13.	G13A	3,5894	,5689	151,0
14.	G14A	3,2914	,6692	151,0
15.	G15A	3,0795	,7351	151,0
16.	G16A	3,4768	,6200	151,0
17.	G17A	3,7351	,4994	151,0
18.	G18A	3,5894	,6457	151,0
19.	G19A	3,6159	,5399	151,0
20.	G20A	3,3510	,6240	151,0
21.	G21A	3,2185	,7108	151,0
22.	G22A	3,3709	,6389	151,0
23.	G23A	3,2649	,7090	151,0
24.	G24A	2,8411	,8173	151,0
25.	G25A	3,0993	,8622	151,0
26.	G26A	2,6954	,8793	151,0
27.	G27A	3,3377	,7013	151,0
28,	G28A	3,3377	,7201	151,0
29.	G29A	3,1854	,7694	151,0
30.	G30A	3,2914	,7797	151,0
31.	G31A	3,6556	,5543	151,0
32.	G32A	3,6291	,6068	151,0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	107,2053	124,9509	11,1781	32

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
G1A	103,6159	120,8381	,3030	,9073
G2A	103,6159	118,0248	,5114	,9045
G3A	103,7881	119,5548	,3456	,9069
G4A	103,9338	119,1956	,3810	,9063
G5A	104,0132	120,6798	,2860	,9077
G6A	103,7483	120,3496	,2633	,9083
G7A	103,8609	115,7472	,4595	,9054
G8A	103,6225	118,4232	,4506	,9053
G9A	104,2450	116,2529	,4414	,9057
G10A	103,6954	118,6132	,4493	,9054
G11A	103,6821	116,4183	,5767	,9034
G12A	104,0927	116,5780	,5153	,9043
G13A	103,6159	117,7315	,5586	,9040
G14A	103,9139	116,7059	,5393	,9039
G15A	104,1258	114,7241	,6152	,9025
G16A	103,7285	116,2658	,6208	,9029
G17A	103,4702	118,7441	,5474	,9044
G18A	103,6159	117,0248	,5375	,9040
G19A	103,5894	119,3770	,4478	,9055
G20A	103,8543	117,8586	,4948	,9047
G21A	103,9868	118,5065	,3838	,9064
G22A	103,8344	117,5524	,5046	,9045
G23A	103,9404	119,5764	,3142	,9075
G24A	104,3642	113,8198	,6000	,9027
G25A	104,1060	114,3754	,5331	,9040
G26A	104,5099	115,1182	,4801	,9051
G27A	103,8675	119,4890	,3242	,9073
G28A	103,8675	117,6223	,4360	,9056
G29A	104,0199	115,3796	,5432	,9038
G30A	103,9139	116,0925	,4911	,9047
G31A	103,5497	118,4492	,5134	,9046
G32A	103,5762	118,4992	,4605	,9052

Reliability Coefficients

N of Cases = 151,0 N of Items = 32

Alpha = ,9078

R E L I A B I L I T Y A N A L Y S I S - S C A L E (S P L I T)

Reliability Coefficients

N of Cases = 151,0 N of Items = 32

Correlation between forms = ,7546 Equal-length Spearman-Brown = ,8601

Guttman Split-half = ,8591 Unequal-length Spearman-Brown = ,8601

16 Items in part 1 16 Items in part 2

Alpha for part 1 = ,8354 Alpha for part 2 = ,8465

Appendix 1.6.

Reliability analysis of GESKE – level of importance – short scale

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	G2A	3,5921	,5908	152,0
2.	G7A	3,3421	,8543	152,0
3.	G8A	3,5855	,6245	152,0
4.	G10A	3,5132	,6088	152,0
5.	G11A	3,5263	,6505	152,0
6.	G12A	3,1118	,7052	152,0
7.	G13A	3,5855	,5690	152,0
8.	G14A	3,2961	,6695	152,0
9.	G15A	3,0789	,7326	152,0
10.	G16A	3,4803	,6194	152,0
11.	G17A	3,7368	,4982	152,0
12.	G18A	3,5921	,6444	152,0
13.	G19A	3,6184	,5390	152,0
14.	G20A	3,3553	,6241	152,0
15.	G22A	3,3750	,6388	152,0
16.	G24A	2,8487	,8199	152,0
17.	G25A	3,1053	,8624	152,0
18.	G26A	2,7039	,8828	152,0
19.	G28A	3,3421	,7197	152,0
20.	G29A	3,1842	,7670	152,0
21.	G30A	3,2961	,7792	152,0
22.	G31A	3,6579	,5532	152,0
23.	G32A	3,6250	,6069	152,0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	77,5526	79,6131	8,9226	23

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
G2A	73,9605	74,1971	,4978	,9002
G7A	74,2105	72,1806	,4617	,9016
G8A	73,9671	74,2837	,4589	,9010
G10A	74,0395	74,1441	,4862	,9004
G11A	74,0263	72,9794	,5588	,8988
G12A	74,4408	73,1488	,4946	,9002
G13A	73,9671	73,8333	,5580	,8991
G14A	74,2566	72,8013	,5570	,8988
G15A	74,4737	71,3238	,6265	,8971
G16A	74,0724	72,5576	,6322	,8974
G17A	73,8158	74,5619	,5583	,8995
G18A	73,9605	73,3229	,5323	,8994
G19A	73,9342	75,1347	,4482	,9013
G20A	74,1974	73,9475	,4915	,9003
G22A	74,1776	73,5643	,5147	,8998
G24A	74,7039	70,8720	,5845	,8981
G25A	74,4474	70,9244	,5469	,8993
G26A	74,8487	71,4538	,4945	,9009
G28A	74,2105	73,8494	,4241	,9019
G29A	74,3684	72,2740	,5176	,8998
G30A	74,2566	72,6423	,4791	,9008
G31A	73,8947	74,3597	,5186	,9000
G32A	73,9276	74,3060	,4720	,9007

Reliability Coefficients

N of Cases = 152,0 N of Items = 23

Alpha = ,9038

R E L I A B I L I T Y A N A L Y S I S - S C A L E (S P L I T)

Reliability Coefficients

N of Cases = 152,0 N of Items = 23

Correlation between forms = ,7196 Equal-length Spearman-Brown = ,8369

Guttman Split-half = ,8367 Unequal-length Spearman-Brown =,8372

12 Items in part 1 11 Items in part 2

Alpha for part 1 = ,8576 Alpha for part 2 = ,8214

Appendix 1.7.

Reliability analysis of SPECOE – Specific Competences for Enterprise – initial extended version

A. Part A of the scale – Level of importance for the first cycle

Tab. 1.7.1. Item -Total Statistics for Level of importance for the 1st cycle (42 items)

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S1A	109,0386	433,761	,289	,951
S2A	109,2876	430,223	,396	,951
S3A	109,2318	431,420	,377	,951
S4A	109,5193	425,759	,501	,950
S5A	109,5665	423,083	,593	,950
S6A	109,7639	423,319	,544	,950
S7A	109,6524	424,504	,500	,950
S8A	109,1459	428,073	,451	,950
S9A	109,5236	423,207	,573	,950
S10A	109,7039	423,071	,576	,950
S11A	109,6309	418,294	,651	,949
S12A	109,4120	421,166	,572	,950
S13A	109,6438	418,851	,634	,949
S14A	109,8197	418,838	,656	,949
S15A	109,7253	418,735	,596	,950
S16A	109,5579	422,567	,606	,950
S17A	109,9142	424,113	,523	,950
S18A	109,7811	420,353	,561	,950
S19A	109,7811	418,861	,649	,949
S20A	109,8197	418,286	,664	,949
S21A	109,5021	420,553	,610	,949
S22A	109,7639	421,914	,570	,950
S23A	109,9056	422,103	,562	,950
S24A	109,5408	422,611	,565	,950
S25A	109,8112	419,757	,560	,950
S26A	109,8369	419,491	,628	,949
S27A	109,8412	416,358	,689	,949
S28A	109,6223	419,960	,613	,949
S29A	109,5021	425,544	,456	,950

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S30A	109,8069	422,596	,546	,950
S31A	109,1288	424,811	,486	,950
S32A	109,7983	421,084	,602	,950
S33A	109,6094	420,118	,603	,950
S34A	109,7682	424,981	,506	,950
S35A	109,4249	423,220	,525	,950
S36A	109,5365	422,267	,579	,950
S37A	109,4378	422,670	,550	,950
S38A	109,1845	426,548	,521	,950
S39A	109,1674	425,657	,508	,950
S40A	109,1416	426,838	,471	,950
S41A	109,4034	426,768	,465	,950
S42A	109,4249	427,366	,423	,951

Tab. 1.7.2. Reliability Statistics for Level of importance for the 1st cycle (42 items)

Cronbach's Alpha	Part 1	Value	,919
		N of Items	21(a)
	Part 2	Value	,916
		N of Items	21(b)
	Total N of Items		42
Correlation Between Forms			,767
Spearman-Brown Coefficient	Equal Length		,868
	Unequal Length		,868
Guttman Split-Half Coefficient			,868

a. The items are: S1A, S2A, S3A, S4A, S5A, S6A, S7A, S8A, S9A, S10A, S11A, S12A, S13A, S14A, S15A, S16A, S17A, S18A, S19A, S20A, S21A.
b. The items are: S22A, S23A, S24A, S25A, S26A, S27A, S28A, S29A, S30A, S31A, S32A, S33A, S34A, S35A, S36A, S37A, S38A, S39A, S40A, S41A, S42A.

B. Part B of the scale – Level of importance for the second cycle

Tab. 1.7.3. Item -Total Statistics for Level of importance for the 2nd cycle (42 items)

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S1B	129,6494	374,863	,351	,948
S2B	129,2468	377,013	,388	,947
S3B	129,1082	379,740	,332	,947
S4B	129,4026	372,711	,496	,946
S5B	129,4459	371,944	,548	,946
S6B	129,8268	368,544	,538	,946
S7B	129,8182	367,906	,577	,946
S8B	129,5541	371,709	,461	,947
S9B	129,4805	371,320	,555	,946
S10B	129,6190	369,367	,569	,946
S11B	129,6147	364,360	,695	,945
S12B	129,5714	368,489	,547	,946
S13B	129,5628	365,543	,674	,945
S14B	129,7186	367,777	,574	,946
S15B	129,8658	364,499	,657	,945
S16B	129,3983	367,980	,621	,946
S17B	129,9091	369,448	,502	,946
S18B	129,9610	364,890	,607	,946
S19B	129,7186	367,134	,601	,946
S20B	129,7359	366,186	,615	,946
S21B	129,5238	368,868	,597	,946
S22B	129,5974	368,572	,541	,946
S23B	129,7013	366,906	,570	,946
S24B	129,6364	369,580	,542	,946
S25B	130,0433	367,285	,529	,946
S26B	129,8788	364,785	,617	,946
S27B	129,9481	365,963	,619	,946
S28B	129,7403	368,367	,554	,946
S29B	129,6883	371,729	,435	,947
S30B	129,6753	369,733	,504	,946
S31B	129,4632	371,006	,484	,947
S32B	129,5758	368,993	,605	,946
S33B	129,3983	371,154	,563	,946

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S34B	129,6494	371,585	,483	,947
S35B	129,4589	373,458	,483	,947
S36B	129,2944	374,069	,492	,947
S37B	129,2511	372,441	,537	,946
S38B	129,3636	374,224	,466	,947
S39B	129,3896	372,369	,490	,947
S40B	129,2684	373,954	,477	,947
S41B	129,3377	373,772	,463	,947
S42B	129,4372	375,056	,423	,947

Tab. 1.7.4. Reliability Statistics for Level of importance for the 2nd cycle (42 items)

Cronbach's Alpha	Part 1	Value	,918
		N of Items	21(a)
	Part 2	Value	,905
		N of Items	21(b)
	Total N of Items		42
Correlation Between Forms			,753
Spearman-Brown Coefficient	Equal Length		,859
	Unequal Length		,859
Guttman Split-Half Coefficient			,858

a. The items are: S1B, S2B, S3B, S4B, S5B, S6B, S7B, S8B, S9B, S10B, S11B, S12B, S13B, S14B, S15B, S16B, S17B, S18B, S19B, S20B, S21B.
b. The items are: S22B, S23B, S24B, S25B, S26B, S27B, S28B, S29B, S30B, S31B, S32B, S33B, S34B, S35B, S36B, S37B, S38B, S39B, S40B, S41B, S42B.

Appendix 1.8.

Reliability analysis of SPECOE – Specific Competences for Enterprise – reorganised version

A. Short version of the SPECOE scale (33 items)

Tab. 1.8.1. Item -Total Statistics for Level of importance for the 1st cycle (33 items)

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S4A	82,5277	309,096	,504	,948
S5A	82,5745	306,519	,607	,947
S6A	82,7745	306,184	,571	,948
S7A	82,6681	307,411	,523	,948
S9A	82,5362	307,036	,568	,948
S10A	82,7191	306,793	,580	,948
S11A	82,6426	302,111	,671	,947
S12A	82,4255	304,656	,588	,948
S13A	82,6638	302,575	,658	,947
S14A	82,8383	302,469	,685	,947
S15A	82,7447	302,336	,623	,947
S16A	82,5745	306,459	,605	,947
S17A	82,9319	306,961	,552	,948
S18A	82,8000	303,879	,583	,948
S19A	82,8000	302,973	,661	,947
S20A	82,8340	302,353	,680	,947
S21A	82,5234	304,977	,600	,947
S22A	82,7830	306,171	,562	,948
S23A	82,9234	305,900	,569	,948
S24A	82,5532	306,419	,565	,948
S25A	82,8170	303,851	,567	,948
S26A	82,8511	303,153	,651	,947
S27A	82,8553	300,338	,717	,946
S28A	82,6426	304,137	,616	,947
S30A	82,8255	306,230	,555	,948
S32A	82,8170	304,919	,612	,947
S33A	82,6298	304,696	,592	,948
S34A	82,7915	308,679	,498	,948
S35A	82,4383	307,401	,515	,948

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S36A	82,5532	306,966	,557	,948
S37A	82,4511	307,813	,511	,948
S38A	82,2043	310,864	,483	,948
S39A	82,1830	310,458	,462	,949

Tab. 1.8.2. Reliability Statistics for Level of importance for the 1st cycle (33 items)

Cronbach's Alpha	Part 1	Value	,921
		N of Items	17(a)
	Part 2	Value	,901
		N of Items	16(b)
	Total N of Items		33
Correlation Between Forms			,797
Spearman-Brown Coefficient	Equal Length		,887
	Unequal Length		,887
Guttman Split-Half Coefficient			,884

a. The items are: S4A, S5A, S6A, S7A, S9A, S10A, S11A, S12A, S13A, S14A, S15A, S16A, S17A, S18A, S19A, S20A, S21A.
b. The items are: S22A, S23A, S24A, S25A, S26A, S27A, S28A, S30A, S32A, S33A, S34A, S35A, S36A, S37A, S38A, S39A.

Tab. 1.8.3. Item -Total Statistics for Level of importance for the 2nd cycle (33 items)

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S4B	99,3562	273,567	,479	,945
S5B	99,3948	272,654	,541	,944
S6B	99,7811	268,654	,563	,944
S7B	99,7725	268,064	,604	,944
S9B	99,4378	271,230	,573	,944
S10B	99,5708	269,660	,590	,944
S11B	99,5751	265,832	,697	,943
S12B	99,5279	268,768	,565	,944
S13B	99,5150	266,475	,691	,943
S14B	99,6738	267,643	,611	,944
S15B	99,8155	265,194	,687	,943
S16B	99,3519	269,108	,617	,944
S17B	99,8627	269,067	,539	,944
S18B	99,9142	265,648	,627	,944
S19B	99,6652	267,793	,621	,944
S20B	99,6867	267,009	,632	,944
S21B	99,4807	269,216	,611	,944
S22B	99,5536	268,714	,564	,944
S23B	99,6567	266,856	,608	,944
S24B	99,5923	270,656	,526	,944
S25B	99,9914	268,474	,527	,945
S26B	99,8326	265,485	,639	,943
S27B	99,9013	266,477	,643	,943
S28B	99,6953	269,092	,558	,944
S30B	99,6309	269,760	,525	,945
S32B	99,5322	269,267	,622	,944
S33B	99,3519	272,014	,550	,944
S34B	99,6052	272,559	,467	,945
S35B	99,4163	273,960	,473	,945
S36B	99,2489	273,834	,507	,945
S37B	99,2060	272,802	,536	,944
S38B	99,3133	275,509	,420	,945
S39B	99,3391	274,501	,425	,945

Tab. 1.8.4. Reliability Statistics for Level of importance for the 2nd cycle (33 items)

Cronbach's Alpha	Part 1	Value	,921
		N of Items	17(a)
	Part 2	Value	,887
		N of Items	16(b)
	Total N of Items		33
Correlation Between Forms			,796
Spearman-Brown Coefficient	Equal Length		,886
	Unequal Length		,886
Guttman Split-Half Coefficient			,880

a. The items are: S4B, S5B, S6B, S7B, S9B, S10B, S11B, S12B, S13B, S14B, S15B, S16B, S17B, S18B, S19B, S20B, S21B.
b. The items are: S22B, S23B, S24B, S25B, S26B, S27B, S28B, S30B, S32B, S33B, S34B, S35B, S36B, S37B, S38B, S39B.

B. Sub-scale 1 – Basic knowledge for working in enterprise

Tab. 1.8.5. Item -Total Statistics for Sub-scale 1 – Basic knowledge for working in enterprise – Part A – Level of importance for the 1st cycle (12 items)

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S12A	27,7839	42,987	,546	,871
S15A	28,1059	41,891	,598	,868
S16A	27,9322	43,638	,569	,870
S17A	28,2881	42,980	,593	,868
S18A	28,1568	41,690	,627	,866
S19A	28,1610	41,914	,661	,864
S24A	27,9153	43,116	,568	,870
S25A	28,1737	42,119	,571	,870
S26A	28,2119	42,321	,620	,867
S32A	28,1780	43,330	,546	,871
S36A	27,9068	43,932	,508	,873
S37A	27,8051	44,158	,470	,875

Tab. 1.8.6. Reliability Statistics for Sub-scale 1 – Basic knowledge for working in enterprise – Part A (12 items)

Cronbach's Alpha	Part 1	Value	,828
		N of Items	6(a)
	Part 2	Value	,784
		N of Items	6(b)
	Total N of Items		12
Correlation Between Forms			,687
Spearman-Brown Coefficient	Equal Length		,815
	Unequal Length		,815
Guttman Split-Half Coefficient			,813

a. The items are: S12A, S15A, S16A, S17A, S18A, S19A.
b. The items are: S24A, S25A, S26A, S32A, S36A, S37A.

Tab. 1.8.7. Item - Total Statistics for Sub-scale 1 – Basic knowledge for working in enterprise – Part B – Level of importance for the 2nd cycle (12 items)

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S12B	33,5745	40,049	,478	,873
S15B	33,8681	37,893	,676	,860
S16B	33,4000	39,788	,570	,867
S17B	33,9106	38,723	,585	,866
S18B	33,9532	37,498	,667	,861
S19B	33,7191	38,587	,640	,863
S24B	33,6511	39,493	,553	,868
S25B	34,0383	38,456	,572	,867
S26B	33,8936	37,822	,634	,863
S32B	33,5830	40,424	,503	,871
S36B	33,2979	41,766	,439	,874
S37B	33,2553	41,105	,498	,871

Tab. 1.8.8. Reliability Statistics for Sub-scale 1 – Basic knowledge for working in enterprise – Part B (12 items)

Cronbach's Alpha	Part 1	Value	,831
		N of Items	6(a)
	Part 2	Value	,773
		N of Items	6(b)
	Total N of Items		12
Correlation Between Forms			,681
Spearman-Brown Coefficient	Equal Length		,810
	Unequal Length		,810
Guttman Split-Half Coefficient			,806

a. The items are: S12B, S15B, S16B, S17B, S18B, S19B.
b. The items are: S24B, S25B, S26B, S32B, S36B, S37B.

C. Sub-scale 2 – Technical competences related to the requirements of work in enterprise (14 items)

Tab. 1.8.9. Item - Total Statistics for Sub-scale 2 - Technical competences related to the requirements of work in enterprise – Part A – Level of importance for the 1st cycle (14 items)

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S4A	32,9160	61,942	,578	,907
S5A	32,9538	61,690	,609	,906
S6A	33,1555	61,440	,575	,907
S7A	33,0546	62,280	,506	,910
S9A	32,9244	60,762	,664	,904
S10A	33,1092	61,051	,644	,905
S11A	33,0210	59,143	,715	,902
S13A	33,0504	59,668	,680	,903
S14A	33,2311	60,415	,648	,904
S20A	33,2143	60,085	,660	,904
S21A	32,9076	61,223	,581	,907
S22A	33,1681	61,195	,587	,907
S23A	33,3067	61,277	,579	,907
S27A	33,2353	59,759	,659	,904

Tab. 1.8.10. Reliability Statistics for Sub-scale 2 - Technical competences related to the requirements of work in enterprise – Part A (14 items)

Cronbach's Alpha	Part 1	Value	,853
		N of Items	7(a)
	Part 2	Value	,862
		N of Items	7(b)
	Total N of Items		14
Correlation Between Forms			,726
Spearman-Brown Coefficient	Equal Length		,841
	Unequal Length		,841
Guttman Split-Half Coefficient			,840

a. The items are: S4A, S5A, S6A, S7A, S9A, S10A, S11A.
b. The items are: S13A, S14A, S20A, S21A, S22A, S23A, S27A.

Tab. 1.8.11. Item - Total Statistics for Sub-scale 2 - Technical competences related to the requirements of work in enterprise – Part B – Level of importance for the 2nd cycle 14 items)

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S4B	39,6017	55,585	,540	,897
S5B	39,6314	56,166	,510	,898
S6B	40,0169	53,506	,600	,895
S7B	40,0169	53,932	,588	,895
S9B	39,6864	54,140	,672	,892
S10B	39,8263	53,429	,677	,892
S11B	39,8178	52,933	,683	,891
S13B	39,7585	53,035	,698	,891
S14B	39,9195	53,742	,595	,895
S20B	39,9322	53,732	,594	,895
S21B	39,7203	54,313	,610	,894
S22B	39,7966	53,363	,618	,894
S23B	39,9025	52,463	,665	,892
S27A	40,5466	56,751	,332	,906

Tab. 1.8.12. Reliability Statistics for Sub-scale 2 - Technical competences related to the requirements of work in enterprise – Part B (14 items)

Cronbach's Alpha	Part 1	Value	,856
		N of Items	7(a)
	Part 2	Value	,834
		N of Items	7(b)
	Total N of Items		14
Correlation Between Forms			,699
Spearman-Brown Coefficient	Equal Length		,823
	Unequal Length		,823
Guttman Split-Half Coefficient			,822

a. The items are: S4B, S5B, S6B, S7B, S9B, S10B, S11B.
b. The items are: S13B, S14B, S20B, S21B, S22B, S23B, S27A.

D. Sub-scale 3 – Workplace communication and management competences (7 items)

Tab. 1.8.13. Item -Total Statistics for Sub-scale 3 – Workplace communication and management competences – Part A – Level of importance for the 1st cycle (7 items)

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S28A	16,4226	12,783	,540	,786
S33A	16,4017	12,241	,622	,770
S34A	16,5565	12,693	,596	,776
S35A	16,2176	12,776	,549	,784
S30A	16,6025	13,358	,447	,802
S38A	15,9791	13,441	,555	,784
S39A	15,9456	13,329	,517	,790

Tab. 1.8.14. Reliability Statistics for Sub-scale 3 – Workplace communication and management competences – Part A (7 items)

Cronbach's Alpha	Part 1	Value	,756
		N of Items	4(a)
	Part 2	Value	,611
		N of Items	3(b)
	Total N of Items		7
Correlation Between Forms			,624
Spearman-Brown Coefficient	Equal Length		,768
	Unequal Length		,771
Guttman Split-Half Coefficient			,735

a. The items are: S28A, S33A, S34A, S35A.
b. The items are: S30A, S38A, S39A.

Tab. 1.8.15. Item -Total Statistics for Sub-scale 3 – Workplace communication and management competences – Part B – Level of importance for the 2nd cycle (7 items)

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S28B	19,5168	10,521	,525	,769
S30B	19,4664	11,204	,374	,800
S33B	19,1807	10,874	,574	,760
S34B	19,4202	10,329	,611	,751
S35B	19,2437	10,826	,603	,755
S38B	19,1387	11,259	,520	,770
S39B	19,1597	11,097	,499	,773

Tab. 1.8.16. Reliability Statistics for Sub-scale 3 – Workplace communication and management competences – Part B (7 items)

Cronbach's Alpha	Part 1	Value	,692
		N of Items	4(a)
	Part 2	Value	,688
		N of Items	3(b)
	Total N of Items		7
Correlation Between Forms			,604
Spearman-Brown Coefficient	Equal Length		,753
	Unequal Length		,756
Guttman Split-Half Coefficient			,728

a. The items are: S28B, S30B, S33B, S34B.
b. The items are: S35B, S38B, S39B.

E. Sub-scale 4 – Generic competences for work

Tab. 1.8.17. Item -Total Statistics for Sub-scale 4 – Generic competences for work – Part A - Level of importance for the 1st cycle (9 items)

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S1A	23,6076	15,282	,246	,735
S2A	23,8481	14,324	,415	,708
S3A	23,7890	14,455	,421	,708
S8A	23,7046	14,446	,374	,715
S29A	24,0591	14,183	,341	,722
S31A	23,6962	13,348	,485	,695
S40A	23,7004	13,406	,546	,685
S41A	23,9620	13,545	,508	,691
S42A	23,9789	14,267	,347	,720

Tab. 1.8.18. Reliability Statistics for Sub-scale 4 – Generic competences for work – Part A (9 items)

Cronbach's Alpha	Part 1	Value	,619
		N of Items	5(a)
	Part 2	Value	,737
		N of Items	4(b)
	Total N of Items		9
Correlation Between Forms			,364
Spearman-Brown Coefficient	Equal Length		,534
	Unequal Length		,536
Guttman Split-Half Coefficient			,534

a. The items are: S1A, S2A, S3A, S8A, S29A.
b. The items are: S31A, S40A, S41A, S42A.

Tab. 1.8.19. Item -Total Statistics for Sub-scale 4 – Generic competences for work – Part B - Level of importance for the 2nd cycle (9 items)

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S1B	26,8128	13,119	,356	,721
S2B	26,4000	13,626	,423	,709
S3B	26,2681	14,112	,385	,715
S8B	26,7106	12,822	,429	,707
S29B	26,8383	13,350	,314	,730
S31B	26,6255	12,175	,544	,684
S40B	26,4170	12,962	,530	,691
S41B	26,4936	13,208	,448	,704
S42B	26,5830	14,022	,299	,728

Tab. 1.8.20. Reliability Statistics for Sub-scale 4 – Generic competences for work – Part B (9 items)

Cronbach's Alpha	Part 1	Value	,609
		N of Items	5(a)
	Part 2	Value	,702
		N of Items	4(b)
	Total N of Items		9
Correlation Between Forms			,426
Spearman-Brown Coefficient	Equal Length		,598
	Unequal Length		,600
Guttman Split-Half Coefficient			,596

a. The items are: S1B, S2B, S3B, S8B, S29B.
b. The items are: S31B, S40B, S41B, S42B.

APPENDIX 2

STATISTICS FOR GENERIC COMPETENCES – GESKE

Appendix 2.1.

Ranking GESKE according to Academics, Employers, and Graduates

Tab. 2.1.1.a. The ranking of 17 generic competences according to the group of Academics in order of the items

Item	N	Minimum	Maximum	Mean	Std. Deviation	Rank according to importance
G01	77	1,00	17,00	6,7013	4,48408	2
G10	77	1,00	17,00	9,7532	4,36841	11
G11	77	1,00	16,00	9,3117	4,15255	10
G12	77	1,00	17,00	10,0649	4,54028	12
G13	77	2,00	17,00	10,9610	4,86243	13
G14	77	1,00	17,00	11,4675	4,30295	15
G15	77	1,00	17,00	11,6234	4,11684	16
G16	77	1,00	17,00	11,4416	5,01181	14
G17	77	1,00	17,00	11,9351	5,79323	17
G02	77	1,00	17,00	9,0779	5,52689	9
G03	77	1,00	17,00	6,7273	4,33358	3
G04	77	1,00	17,00	7,1818	4,38516	4
G05	77	1,00	17,00	7,3896	3,68195	6
G06	77	1,00	17,00	6,0519	4,07785	1
G07	77	1,00	17,00	8,1688	4,31156	8
G08	77	1,00	17,00	7,3766	4,07831	5
G09	77	1,00	17,00	7,7922	4,55475	7

Tab. 2.1.1.b. The ranking of 17 generic competences according to the group of Academics in order of the ranks

Item	N	Minimum	Maximum	Mean	Std. Deviation	Rank according to importance
G06	**77**	1,00	17,00	6,0519	4,07785	1
G01	**77**	1,00	17,00	6,7013	4,48408	2
G03	**77**	1,00	17,00	6,7273	4,33358	3
G04	**77**	1,00	17,00	7,1818	4,38516	4
G08	**77**	1,00	17,00	7,3766	4,07831	5
G05	77	1,00	17,00	7,3896	3,68195	6

Item	N	Minimum	Maximum	Mean	Std. Deviation	Rank according to importance
G09	77	1,00	17,00	7,7922	4,55475	7
G07	77	1,00	17,00	8,1688	4,31156	8
G02	77	1,00	17,00	9,0779	5,52689	9
G11	77	1,00	16,00	9,3117	4,15255	10
G10	77	1,00	17,00	9,7532	4,36841	11
G12	77	1,00	17,00	10,0649	4,54028	12
G13	**77**	2,00	17,00	10,9610	4,86243	13
G16	**77**	1,00	17,00	11,4416	5,01181	14
G14	**77**	1,00	17,00	11,4675	4,30295	15
G15	**77**	1,00	17,00	11,6234	4,11684	16
G17	**77**	1,00	17,00	11,9351	5,79323	17

Tab. 2.1.2. The ranking of 32 competences according to the group of Employers (the 5 choices at the end of Generic competences questionnaire) – in order of the items

Item	Weighted frequency	Weighted percents	Rank according to importance E
G01	108	169,1	1
G02	54	84,7	4
G03	47	73,4	5
G04	11	17,6	25
G05	31	48,7	12
G06	20	31,5	17
G07	43	67,3	8
G08	26	41	15
G09	16	25,4	21
G10	44	69	7
G11	22	34,5	16
G12	9	14,3	28
G13	20	31,6	18
G14	14	22	22
G15	2	3,2	31
G16	37	57,8	9
G17	104	162,3	2
G18	45	70,1	6
G19	59	92,2	3
G20	20	31,5	19

Item	Weighted frequency	Weighted percents	Rank according to importance E
G21	18	28,4	20
G22	12	19	23
G23	12	19,1	24
G24	3	4,8	30
G25	11	17,5	26
G26	2	3,1	32
G27	11	17,4	27
G28	30	47,4	14
G29	31	48,8	13
G30	8	12,7	29
G31	37	58,1	10
G32	36	56,5	11

Tab. 2.1.3. The ranking of 32 competences according to the group of Graduates (the 5 choices at the end of Generic competences questionnaire) – in order of the items

Item	Weighted frequency	Weighted percents	Rank according to importance G
G01	166	167,6	1
G02	96	97,2	4
G03	57	57,4	8
G04	26	26	20
G05	22	22	22
G06	34	34	17
G07	31	31,1	19
G08	8	8	30
G09	16	16	26
G10	77	77,7	6
G11	46	46,3	12
G12	17	17	25
G13	63	63,4	7
G14	15	15	27
G15	5	5	31
G16	51	51,3	10
G17	143	144,7	2
G18	99	99,9	3
G19	93	94	5
G20	42	42,1	13

Item	Weighted frequency	Weighted percents	Rank according to importance G
G21	53	53,8	9
G22	37	37	16
G23	21	21,2	23
G24	0	0	32
G25	13	13	28
G26	11	11	29
G27	48	48,5	11
G28	41	41,5	14
G29	21	21,1	24
G30	26	26	21
G31	38	38,2	15
G32	34	34	18

Tab. 2.1.4. Comparative ranking of the 32 generic competences according to the two groups: Employers and Graduates – in order of items

Item	Rank according to importance Employers	Rank according to importance Graduates
G01	1	1
G02	4	4
G03	5	8
G04	25	20
G05	12	22
G06	17	17
G07	8	19
G08	15	30
G09	21	26
G10	7	6
G11	16	12
G12	28	25
G13	18	7
G14	22	27
G15	31	31
G16	9	10
G17	2	2
G18	6	3
G19	3	5
G20	19	13
G21	20	9
G22	23	16
G23	24	23
G24	30	32

G25	26	28
G26	32	29
G27	27	11
G28	14	14
G29	13	24
G30	29	21
G31	10	15
G32	11	18

Appendix 2.2.

Ranking GESKE – level of importance – by means

Tab. 2.2.1. The ranking of the IMPORTANCE of the 32 Generic competences – for the group of Employers – in descending order of means

Item	N	Minimum	Maximum	Mean	Std. Deviation	Rank
G17A	64	2,00	4,00	3,7344	,51152	1
G08A	64	2,00	4,00	3,6719	,59240	2
G31A	64	1,00	4,00	3,6719	,56497	3
G02A	64	2,00	4,00	3,6094	,58056	4
G19A	64	2,00	4,00	3,5938	,55546	5
G10A	64	2,00	4,00	3,5625	,63932	6
G01A	64	1,00	4,00	3,5313	,61641	7
G18A	64	1,00	4,00	3,5156	,66648	8
G32A	64	2,00	4,00	3,5000	,71270	9
G13A	64	2,00	4,00	3,4688	,61641	10
G16A	64	2,00	4,00	3,4531	,66499	11
G11A	64	2,00	4,00	3,4531	,64068	12
G04A	64	1,00	4,00	3,4219	,66200	13
G20A	63	2,00	4,00	3,4127	,61263	14
G30A	64	1,00	4,00	3,4063	,72853	15
G06A	64	2,00	4,00	3,4063	,65994	16
G03A	64	2,00	4,00	3,3750	,65465	17
G22A	64	2,00	4,00	3,3750	,51946	18
G28A	64	1,00	4,00	3,3281	,77776	19
G14A	63	2,00	4,00	3,3016	,68709	20
G05A	62	2,00	4,00	3,2581	,59878	21
G27A	64	2,00	4,00	3,2344	,72904	22
G23A	63	1,00	4,00	3,2063	,76535	23
G07A	64	1,00	4,00	3,1875	,94070	24
G12A	64	2,00	4,00	3,1719	,65598	25
G29A	63	1,00	4,00	3,0794	,78907	26
G21A	64	1,00	4,00	3,0625	,77408	27
G25A	64	1,00	4,00	3,0625	,92367	28
G15A	62	1,00	4,00	3,0323	,76753	29
G09A	64	1,00	4,00	3,0313	,85391	30
G26A	64	1,00	4,00	2,7344	,91274	31
G24A	64	1,00	4,00	2,7344	,82119	32

Tab. 2.2.2. The ranking of the IMPORTANCE of the 32 Generic competences – for the group of Graduates – in descending order of means

Graduates	N	Minimum	Maximum	Mean	Std. Deviation	Rank
G17A	99	2,00	4,00	3,7172	,49570	1
G32A	95	2,00	4,00	3,6737	,55433	2
G31A	99	2,00	4,00	3,5859	,62287	3
G01A	99	1,00	4,00	3,5758	,62419	4
G13A	99	1,00	4,00	3,5758	,64033	5
G18A	99	2,00	4,00	3,5758	,67144	6
G11A	97	1,00	4,00	3,5567	,69175	7
G02A	99	1,00	4,00	3,5556	,65811	8
G19A	99	1,00	4,00	3,5354	,65952	9
G08A	99	1,00	4,00	3,4949	,66045	10
G10A	99	2,00	4,00	3,4646	,59442	11
G06A	99	1,00	4,00	3,4545	,77292	12
g27a	99	2,00	4,00	3,4141	,68527	13
G16A	99	1,00	4,00	3,3939	,68241	14
G03A	99	2,00	4,00	3,3535	,71875	15
G22A	99	1,00	4,00	3,3434	,71659	16
G20A	97	2,00	4,00	3,3093	,63510	17
G07A	99	1,00	4,00	3,3030	,89733	18
G23A	99	1,00	4,00	3,2727	,71168	19
G28A	99	1,00	4,00	3,2323	,79319	20
G14A	99	1,00	4,00	3,2020	,72815	21
G21A	99	1,00	4,00	3,2020	,80787	22
G29A	99	1,00	4,00	3,1919	,76501	23
G04A	99	1,00	4,00	3,1818	,66030	24
G05A	97	1,00	4,00	3,1443	,67684	25
G30A	96	1,00	4,00	3,1354	,87803	26
G15A	95	1,00	4,00	3,0947	,71569	27
G12A	99	1,00	4,00	3,0404	,79436	28
G25A	99	1,00	4,00	2,9697	,94172	29
G09A	99	1,00	4,00	2,8283	,88110	30
G24A	99	1,00	4,00	2,8081	,88844	31
G26A	98	1,00	4,00	2,6429	,86454	32

Tab. 2.2.3. Comparative ranking of the Generic competences according to Employers and Graduates – in order of the items

Item		Employers		Graduates		Together	
		Mean E	Rank E	Mean G	Rank G	Mean E+G	Rank E+G
G01A	Capacity for analysis and synthesis	3,5313	7	3,5758	4	3,5583	6
G02A	Capacity for applying knowledge in practice	3,6094	4	3,5556	8	3,5767	4
G03A	Planning and time management	3,3750	17	3,3535	15	3,3620	14
G04A	Basic general knowledge in the field of study	3,4219	13	3,1818	24	3,2761	18
G05A	Grounding in basic knowledge of the profession in practice	3,2581	21	3,1443	25	3,1887	24
G06A	Oral and written communication in your native language	3,4063	16	3,4545	12	3,4356	12
G07A	Knowledge of a foreign language	3,1875	24	3,3030	18	3,2577	20
G08A	Elementary computing skills	3,6719	2	3,4949	10	3,5644	5
G09A	Research skills	3,0313	30	2,8283	30	2,9080	30
G10A	Capacity to learn	3,5625	6	3,4646	11	3,5031	11
G11A	Information management skills (ability to retrieve and analyse information from different sources)	3,4531	12	3,5567	7	3,5155	10
G12A	Critical and self-critical abilities	3,1719	25	3,0404	28	3,0920	27
G13A	Capacity to adapt to new situations	3,4688	10	3,5758	5	3,5337	9
G14A	Self directed learning skills	3,3016	20	3,2020	21	3,2407	23
G15A	Interest in cross-functionality and additional qualifications for career self management	3,0323	29	3,0947	27	3,0701	28
G16A	Capacity for generating new ideas (creativity)	3,4531	11	3,3939	14	3,4172	13
G17A	Problem solving	3,7344	1	3,7172	1	3,7239	1
G18A	Decision-making	3,5156	8	3,5758	6	3,5521	8
G19A	Teamwork	3,5938	5	3,5354	9	3,5583	7
G20A	Interpersonal skills	3,4127	14	3,3093	17	3,3500	16
G21A	Leadership	3,0625	27	3,2020	22	3,1472	26
G22A	Ability to work in an cross-functional team	3,3750	18	3,3434	16	3,3558	15
G23A	Ability to communicate with non-experts (in the field)	3,2063	23	3,2727	19	3,2469	21
G24A	Appreciation of diversity and multiculturality	2,7344	32	2,8081	31	2,7791	31
G25A	Ability to work in an international context	3,0625	28	2,9697	29	3,0061	29
G26A	Understanding of cultures and customs of other countries	2,7344	31	2,6429	32	2,6790	32

Item		Employers		Graduates		Together	
		Mean E	Rank E	Mean G	Rank G	Mean E+G	Rank E+G
G27A	Ability to work autonomously	3,2344	22	3,4141	13	3,3436	17
G28A	Project design and management	3,3281	19	3,2323	20	3,2699	19
G29A	Initiative and entrepreneurial spirit	3,0794	26	3,1919	23	3,1481	25
G30A	Ethical commitment	3,4063	15	3,1354	26	3,2438	22
G31A	Concern for quality	3,6719	3	3,5859	3	3,6196	2
G32A	Will to succeed	3,5000	9	3,6737	2	3,6038	3

Appendix 2.3.

Ranking GESKE – level of achievement – by means

Tab. 2.3.1. Descriptive Statistics - Ranking GESKE according to level of achievement according to Employers - in descending order of means

Item	N	Minimum	Maximum	Mean	Std. Deviation	Rank E
G10B	64	1,00	4,00	3,0781	,78285	1
G08B	64	1,00	4,00	3,0000	,92582	2
G04B	64	1,00	4,00	2,9219	,82240	3
G32B	64	1,00	4,00	2,8906	,92783	4
G27B	64	1,00	4,00	2,7969	,83912	5
G31B	63	1,00	4,00	2,7619	,85599	6
G11B	64	1,00	4,00	2,7344	,82119	7
G06B	64	1,00	4,00	2,7344	,87726	8
G19B	64	1,00	4,00	2,6875	,90633	9
G01B	64	1,00	4,00	2,6563	,76051	10
G17B	64	1,00	4,00	2,6250	,84515	11
G30B	63	1,00	4,00	2,5714	,83694	12
G14B	63	1,00	4,00	2,5556	,81869	13
G09B	64	1,00	4,00	2,5469	,90728	14
G02B	64	1,00	4,00	2,4531	,73311	15
G28B	64	1,00	4,00	2,4375	,90633	16
G07B	64	1,00	4,00	2,4219	,92247	17
G13B	64	1,00	4,00	2,4219	,83199	18
G05B	62	1,00	4,00	2,4032	,75660	19
G16B	64	1,00	4,00	2,3906	,80902	20
G12B	64	1,00	4,00	2,3906	,70412	21
G20B	63	1,00	4,00	2,3651	,84818	22
G18B	64	1,00	4,00	2,2813	,82556	23
G22B	64	1,00	4,00	2,2500	,85449	24
G29B	63	1,00	4,00	2,2222	,83172	25
G24B	64	1,00	4,00	2,2188	,84457	26
G23B	63	1,00	4,00	2,1905	,73741	27
G03B	64	1,00	4,00	2,1875	,73193	28
G15B	61	1,00	4,00	2,1639	,73440	29
G25B	64	1,00	4,00	2,0313	,83512	30
G26B	64	1,00	4,00	1,9531	,80533	31
G21B	64	1,00	4,00	1,9531	,74386	32

Tab. 2.3.2. Descriptive Statistics - Ranking GESKE according to level of achievement according to Employers - in order of the items

Item	N	Minimum	Maximum	Mean	Std. Deviation	Rank E
G01B	64	1,00	4,00	2,6563	,76051	10
G02B	64	1,00	4,00	2,4531	,73311	15
G03B	64	1,00	4,00	2,1875	,73193	28
G04B	64	1,00	4,00	2,9219	,82240	3
G05B	62	1,00	4,00	2,4032	,75660	19
G06B	64	1,00	4,00	2,7344	,87726	8
G07B	64	1,00	4,00	2,4219	,92247	17
G08B	64	1,00	4,00	3,0000	,92582	2
G09B	64	1,00	4,00	2,5469	,90728	14
G10B	64	1,00	4,00	3,0781	,78285	1
G11B	64	1,00	4,00	2,7344	,82119	7
G12B	64	1,00	4,00	2,3906	,70412	21
G13B	64	1,00	4,00	2,4219	,83199	18
G14B	63	1,00	4,00	2,5556	,81869	13
G15B	61	1,00	4,00	2,1639	,73440	29
G16B	64	1,00	4,00	2,3906	,80902	20
G17B	64	1,00	4,00	2,6250	,84515	11
G18B	64	1,00	4,00	2,2813	,82556	23
G19B	64	1,00	4,00	2,6875	,90633	9
G20B	63	1,00	4,00	2,3651	,84818	22
G21B	64	1,00	4,00	1,9531	,74386	32
G22B	64	1,00	4,00	2,2500	,85449	24
G23B	63	1,00	4,00	2,1905	,73741	27
G24B	64	1,00	4,00	2,2188	,84457	26
G25B	64	1,00	4,00	2,0313	,83512	30
G26B	64	1,00	4,00	1,9531	,80533	31
G27B	64	1,00	4,00	2,7969	,83912	5
G28B	64	1,00	4,00	2,4375	,90633	16
G29B	63	1,00	4,00	2,2222	,83172	25
G30B	63	1,00	4,00	2,5714	,83694	12
G31B	63	1,00	4,00	2,7619	,85599	6
G32B	64	1,00	4,00	2,8906	,92783	4

Tab. 2.3.3. Descriptive Statistics - Ranking GESKE according to level of achievement according to Graduates - in descending order of means

Item	N	Minimum	Maximum	Mean	Std. Deviation	Rank G
G10B	99	1,00	4,00	3,2525	,77385	1
G04B	99	1,00	4,00	3,1616	,68074	2
G27B	99	1,00	4,00	3,0202	,83275	3
G32B	95	1,00	4,00	2,9684	,88067	4
G01B	99	1,00	4,00	2,9596	,63758	5
G31B	99	1,00	4,00	2,9293	,83608	6
G08B	99	1,00	4,00	2,8990	,88635	7
G17B	99	1,00	4,00	2,8586	,80825	8
G11B	97	1,00	4,00	2,8351	,88601	9
G09B	99	1,00	4,00	2,7980	,82040	10
G19B	99	1,00	4,00	2,7980	,85690	11
G06B	99	1,00	4,00	2,7475	,89606	12
G14B	99	1,00	4,00	2,6869	,86480	13
G05B	97	1,00	4,00	2,6701	,75996	14
G02B	99	1,00	4,00	2,6566	,75811	15
G30B	96	1,00	4,00	2,6563	,99290	16
G13B	99	1,00	4,00	2,6061	,94565	17
G20B	97	1,00	4,00	2,5464	,86627	18
G28B	99	1,00	4,00	2,5455	,87216	19
G12B	99	1,00	4,00	2,5152	,91878	20
G16B	99	1,00	4,00	2,4949	,84965	21
G15B	95	1,00	4,00	2,4842	,90933	22
G18B	99	1,00	4,00	2,4747	,88460	23
G03B	99	1,00	4,00	2,4545	,86038	24
G29B	99	1,00	4,00	2,4141	,92593	25
G07B	99	1,00	4,00	2,3939	,91270	26
G22B	99	1,00	4,00	2,3333	,90351	27
G24B	99	1,00	4,00	2,3333	1,03016	28
G25B	99	1,00	4,00	2,2222	1,05517	29
G23B	99	1,00	4,00	2,1616	,92259	30
G26B	98	1,00	4,00	2,1531	1,03895	31
G21B	99	1,00	4,00	2,1313	,96517	32

Tab. 2.3.4. Descriptive Statistics - Ranking GESKE according to level of achievement according to Graduates - in order of items

Item	N	Minimum	Maximum	Mean	Std. Deviation	Rank G
G01B	99	1,00	4,00	2,9596	,63758	5
G02B	99	1,00	4,00	2,6566	,75811	15
G03B	99	1,00	4,00	2,4545	,86038	24
G04B	99	1,00	4,00	3,1616	,68074	2
G05B	97	1,00	4,00	2,6701	,75996	14
G06B	99	1,00	4,00	2,7475	,89606	12
G07B	99	1,00	4,00	2,3939	,91270	26
G08B	99	1,00	4,00	2,8990	,88635	7
G09B	99	1,00	4,00	2,7980	,82040	10
G10B	99	1,00	4,00	3,2525	,77385	1
G11B	97	1,00	4,00	2,8351	,88601	9
G12B	99	1,00	4,00	2,5152	,91878	20
G13B	99	1,00	4,00	2,6061	,94565	17
G14B	99	1,00	4,00	2,6869	,86480	13
G15B	95	1,00	4,00	2,4842	,90933	22
G16B	99	1,00	4,00	2,4949	,84965	21
G17B	99	1,00	4,00	2,8586	,80825	8
G18B	99	1,00	4,00	2,4747	,88460	23
G19B	99	1,00	4,00	2,7980	,85690	11
G20B	97	1,00	4,00	2,5464	,86627	18
G21B	99	1,00	4,00	2,1313	,96517	32
G22B	99	1,00	4,00	2,3333	,90351	27
G23B	99	1,00	4,00	2,1616	,92259	30
G24B	99	1,00	4,00	2,3333	1,03016	28
G25B	99	1,00	4,00	2,2222	1,05517	29
G26B	98	1,00	4,00	2,1531	1,03895	31
G27B	99	1,00	4,00	3,0202	,83275	3
G28B	99	1,00	4,00	2,5455	,87216	19
G29B	99	1,00	4,00	2,4141	,92593	25
G30B	96	1,00	4,00	2,6563	,99290	16
G31B	99	1,00	4,00	2,9293	,83608	6
G32B	95	1,00	4,00	2,9684	,88067	4

Tab. 2.3.5. Employers scoring higher than Graduates the level of achievement of generic competences

Item		Mean E	Mean G	E-G
G08B	Elementary computing skills	3	2,899	0,101
G23B	Ability to communicate with non-experts (in the field)	2,1905	2,1616	0,0289
G07B	Knowledge of a foreign language	2,4219	2,3939	0,028

Tab. 2.3.6. Graduates scoring higher than Employers the level of achievement

Item		Mean E	Mean G	E-G
G15B	Interest in cross-functionality and additional qualifications for career self management	2,1639	2,4842	-0,3203
G01B	Capacity for analysis and synthesis	2,6563	2,9596	-0,3033
G03B	Planning and time management	2,1875	2,4545	-0,267
G05B	Grounding in basic knowledge of the profession in practice	2,4032	2,6701	-0,2669
G09B	Research skills	2,5469	2,798	-0,2511
G04B	Basic general knowledge in the field of study	2,9219	3,1616	-0,2397
G17B	Problem solving	2,625	2,8586	-0,2336
G27B	Ability to work autonomously	2,7969	3,0202	-0,2233
G02B	Capacity for applying knowledge in practice	2,4531	2,6566	-0,2035
G26B	Understanding of cultures and customs of other countries	1,9531	2,1531	-0,2
G18B	Decision-making	2,2813	2,4747	-0,1934
G29B	Initiative and entrepreneurial spirit	2,2222	2,4141	-0,1919
G25B	Ability to work in an international context	2,0313	2,2222	-0,1909
G13B	Capacity to adapt to new situations	2,4219	2,6061	-0,1842
G20B	Interpersonal skills	2,3651	2,5464	-0,1813
G21B	Leadership	1,9531	2,1313	-0,1782
G10B	Capacity to learn	3,0781	3,2525	-0,1744
G31B	Concern for quality	2,7619	2,9293	-0,1674
G14B	Self directed learning skills	2,5556	2,6869	-0,1313
G12B	Critical and self-critical abilities	2,3906	2,5152	-0,1246
G24B	Appreciation of diversity and multiculturality	2,2188	2,3333	-0,1145
G19B	Teamwork	2,6875	2,798	-0,1105
G28B	Project design and management	2,4375	2,5455	-0,108
G16B	Capacity for generating new ideas (creativity)	2,3906	2,4949	-0,1043

Item		Mean E	Mean G	E-G
G11B	Information management skills (ability to retrieve and analyse information from different sources)	2,7344	2,8351	-0,1007
G30B	Ethical commitment	2,5714	2,6563	-0,0849
G22B	Ability to work in an cross-functional team	2,25	2,3333	-0,0833
G32B	Will to succeed	2,8906	2,9684	-0,0778
G06B	Oral and written communication in your native language	2,7344	2,7475	-0,0131

Tab. 2.3.7. Comparative rankings for the level of achievement of Generic competences according to Employers, Graduates and Employers and Graduates together – in order of ranks for Employers and Graduates together

Item	Rank E	Rank G	Rank E + G
G10B	1	1	1
G04B	3	2	2
G08B	2	7	3
G32B	4	4	4
G27B	5	3	5
G31B	6	6	6
G01B	10	5	7
G11B	7	9	8
G17B	11	8	9
G19B	9	11	10
G06B	8	12	11
G09B	14	10	12
G14B	13	13	13
G30B	12	16	14
G02B	15	15	15
G05B	19	14	16
G13B	18	17	17

Item	Rank E	Rank G	Rank E + G
G28B	16	19	18
G20B	22	18	19
G12B	21	20	20
G16B	20	21	21
G07B	17	26	22
G18B	23	23	23
G15B	29	22	24
G03B	28	24	25
G29B	25	25	26
G22B	24	27	27
G24B	26	28	28
G23B	27	30	29
G25B	30	29	30
G26B	31	31	31
G21B	32	32	32

Appendix 2.4.

GESKE – differences between levels of importance and achievement according to Academics, Employers, and Graduates

Tab. 2.4.1. Paired Sample Test for differences of mean between importance and achievement of generic competences according to Employers – decreasing order of differences

Item		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2 tailed)
Pair 18	G18A - G18B	1,2344	1,0350	,1294	9,541	63	,000
Pair 03	G03A – G03B	1,1875	,9063	,1133	10,482	63	,000
Pair 02	G02A – G02B	1,1563	,8948	,1118	10,338	63	,000
Pair 22	G22A - G22B	1,1250	,9172	,1147	9,812	63	,000
Pair 17	G17A - G17B	1,1094	,8930	,1116	9,939	63	,000
Pair 21	G21A - G21B	1,1094	1,0253	,1282	8,656	63	,000
Pair 16	G16A - G16B	1,0625	,9900	,1238	8,586	63	,000
Pair 20	G20A - G20B	1,0476	1,0069	,1269	8,258	62	,000
Pair 13	G13A - G13B	1,0469	,9666	,1208	8,665	63	,000
Pair 25	G25A - G25B	1,0313	1,3448	,1681	6,135	63	,000
Pair 23	G23A - G23B	1,0159	1,0079	,1270	8,000	62	,000
Pair 19	G19A - G19B	,9063	,9036	,1129	8,024	63	,000
Pair 31	G31A - G31B	,9048	,9455	,1191	7,595	62	,000
Pair 28	G28A - G28B	,8906	1,0559	,1320	6,748	63	,000
Pair 01	G01A – G01B	,8750	,8262	,1033	8,473	63	,000
Pair 29	G29A - G29B	,8571	1,0755	,1355	6,326	62	,000
Pair 05	G05A – G05B	,8548	,8842	,1123	7,612	61	,000
Pair 15	G15A - G15B	,8525	1,0776	,1380	6,179	60	,000
Pair 30	G30A - G30B	,8254	1,0245	,1291	6,395	62	,000
Pair 12	G12A - G12B	,7813	,8632	,1079	7,241	63	,000
Pair 26	G26A - G26B	,7813	1,0906	,1363	5,731	63	,000
Pair 07	G7A - G7B	,7656	1,2940	,1617	4,733	63	,000
Pair 14	G14A - G14B	,7460	,9995	,1259	5,924	62	,000
Pair 11	G11A - G11B	,7188	1,0461	,1308	5,497	63	,000
Pair 06	G06A – G06B	,6719	1,0549	,1319	5,095	63	,000
Pair 08	G08A – G08B	,6719	,9268	,1158	5,800	63	,000
Pair 32	G32A - G32B	,6094	1,0483	,1310	4,650	63	,000
Pair 24	G24A - G24B	,5156	1,0689	,1336	3,859	63	,000
Pair 04	G04A – G04B	,5000	,8545	,1068	4,681	63	,000
Pair 09	G09A – G09B	,4844	1,1126	,1391	3,483	63	,001
Pair 10	G10A - G10B	,4844	,9084	,1135	4,266	63	,000
Pair 27	G27A - G27B	,4375	1,0216	,1277	3,426	63	,001

Tab. 2.4.2. Paired Sample Test for differences of mean between importance and achievement of generic competences according to Employers – order of items

Item		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2 tailed)
Pair 01	G01A – G01B	,8750	,8262	,1033	8,473	63	,000
Pair 02	G02A – G02B	1,1563	,8948	,1118	10,338	63	,000
Pair 03	G03A – G03B	1,1875	,9063	,1133	10,482	63	,000
Pair 04	G04A – G04B	,5000	,8545	,1068	4,681	63	,000
Pair 05	G05A – G05B	,8548	,8842	,1123	7,612	61	,000
Pair 06	G06A – G06B	,6719	1,0549	,1319	5,095	63	,000
Pair 07	G07A – G07B	,7656	1,2940	,1617	4,733	63	,000
Pair 08	G08A – G08B	,6719	,9268	,1158	5,800	63	,000
Pair 09	G09A – G09B	,4844	1,1126	,1391	3,483	63	,001
Pair 10	G10A - G10B	,4844	,9084	,1135	4,266	63	,000
Pair 11	G11A - G11B	,7188	1,0461	,1308	5,497	63	,000
Pair 12	G12A - G12B	,7813	,8632	,1079	7,241	63	,000
Pair 13	G13A - G13B	1,0469	,9666	,1208	8,665	63	,000
Pair 14	G14A - G14B	,7460	,9995	,1259	5,924	62	,000
Pair 15	G15A - G15B	,8525	1,0776	,1380	6,179	60	,000
Pair 16	G16A - G16B	1,0625	,9900	,1238	8,586	63	,000
Pair 17	G17A - G17B	1,1094	,8930	,1116	9,939	63	,000
Pair 18	G18A - G18B	1,2344	1,0350	,1294	9,541	63	,000
Pair 19	G19A - G19B	,9063	,9036	,1129	8,024	63	,000
Pair 20	G20A - G20B	1,0476	1,0069	,1269	8,258	62	,000
Pair 21	G21A - G21B	1,1094	1,0253	,1282	8,656	63	,000
Pair 22	G22A - G22B	1,1250	,9172	,1147	9,812	63	,000
Pair 23	G23A - G23B	1,0159	1,0079	,1270	8,000	62	,000
Pair 24	G24A - G24B	,5156	1,0689	,1336	3,859	63	,000
Pair 25	G25A - G25B	1,0313	1,3448	,1681	6,135	63	,000
Pair 26	G26A - G26B	,7813	1,0906	,1363	5,731	63	,000
Pair 27	G27A - G27B	,4375	1,0216	,1277	3,426	63	,001
Pair 28	G28A - G28B	,8906	1,0559	,1320	6,748	63	,000
Pair 29	G29A - G29B	,8571	1,0755	,1355	6,326	62	,000
Pair 30	G30A - G30B	,8254	1,0245	,1291	6,395	62	,000
Pair 31	G31A - G31B	,9048	,9455	,1191	7,595	62	,000
Pair 32	G32A - G32B	,6094	1,0483	,1310	4,650	63	,000

Tab. 2.4.3. Paired Sample Test for differences of mean between importance and achievement of generic competences according to Graduates – decreasing order of differences

Item		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 23	G23A - G23B	1.1111	,9782	9,831E-02	11,302	98	,000
Pair 18	G18A - G18B	1,1010	1,0449	,1050	10,485	98	,000
Pair 21	G21A - G21B	1,0707	1,0026	,1008	10,626	98	,000
Pair 22	G22A - G22B	1,0101	,9845	9,895E-02	10,208	98	,000
Pair 13	G13A - G13B	,9697	1,0638	,1069	9,069	98	,000
Pair 07	G07A – G07B	,9091	,9803	9,853E-02	9,227	98	,000
Pair 02	G02A – G02B	,8990	1,0050	,1010	8,900	98	,000
Pair 03	G03A – G03B	,8990	,9741	9,790E-02	9,183	98	,000
Pair 16	G16A - G16B	,8990	1,0251	,1030	8,725	98	,000
Pair 17	G17A - G17B	,8586	,9148	9,195E-02	9,338	98	,000
Pair 29	G29A - G29B	,7778	,9642	9,691E-02	8,026	98	,000
Pair 20	G20A - G20B	,7629	,8871	9,007E-02	8,470	96	,000
Pair 25	G25A - G25B	,7475	1,0723	,1078	6,936	98	,000
Pair 19	G19A - G19B	,7374	1,0555	,1061	6,951	98	,000
Pair 11	G11A - G11B	,7216	,9546	9,693E-02	7,445	96	,000
Pair 06	G06A – G06B	,7071	1,0327	,1038	6,813	98	,000
Pair 32	G32A - G32B	,7053	,8363	8,581E-02	8,219	94	,000
Pair 28	G28A - G28B	,6869	1,0066	,1012	6,790	98	,000
Pair 31	G31A - G31B	,6566	,8591	8,634E-02	7,604	98	,000
Pair 01	G01A – G01B	,6162	,7520	7,558E-02	8,153	98	,000
Pair 15	G15A - G15B	,6105	,8788	9,016E-02	6,772	94	,000
Pair 08	G08A – G08B	,5960	,8797	8,841E-02	6,741	98	,000
Pair 12	G12A - G12B	,5253	,9405	9,452E-02	5,557	98	,000
Pair 14	G14A - G14B	,5152	,9622	9,670E-02	5,327	98	,000
Pair 26	G26A - G26B	,4898	1,0576	,1068	4,585	97	,000
Pair 30	G30A - G30B	,4792	1,0561	,1078	4,445	95	,000
Pair 24	G24A - G24B	,4747	1,0035	,1009	4,707	98	,000
Pair 05	G05A – G05B	,4742	,8671	8,804E-02	5,386	96	,000
Pair 27	G27A - G27B	,3939	,8901	8,945E-02	4,404	98	,000
Pair 10	G10A - G10B	,2121	,8953	8,998E-02	2,358	98	,020
Pair 09	G09A – G09B	3,030E-02	1,0638	,1069	,283	98	,777
Pair 04	G04A – G04B	2,020E-02	,9033	9,078E-02	,223	98	,824

Tab. 2.4.4. Paired Sample Test for differences of mean between importance and achievement of generic competences according to Graduates – order of items

Item		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 01	G01A – G01B	,6162	,7520	7,558E-02	8,153	98	,000
Pair 02	G02A – G02B	,8990	1,0050	,1010	8,900	98	,000
Pair 03	G03A – G03B	,8990	,9741	9,790E-02	9,183	98	,000
Pair 04	**G04A – G04B**	**2,020E-02**	**,9033**	**9,078E-02**	**,223**	**98**	**,824**
Pair 05	G05A – G05B	,4742	,8671	8,804E-02	5,386	96	,000
Pair 06	G06A – G06B	,7071	1,0327	,1038	6,813	98	,000
Pair 07	G07A – G07B	,9091	,9803	9,853E-02	9,227	98	,000
Pair 08	G08A – G08B	,5960	,8797	8,841E-02	6,741	98	,000
Pair 09	**G09A – G09B**	**3,030E-02**	**1,0638**	**,1069**	**,283**	**98**	**,777**
Pair 10	G10A - G10B	,2121	,8953	8,998E-02	2,358	98	,020
Pair 11	G11A - G11B	,7216	,9546	9,693E-02	7,445	96	,000
Pair 12	G12A - G12B	,5253	,9405	9,452E-02	5,557	98	,000
Pair 13	G13A - G13B	,9697	1,0638	,1069	9,069	98	,000
Pair 14	G14A - G14B	,5152	,9622	9,670E-02	5,327	98	,000
Pair 15	G15A - G15B	,6105	,8788	9,016E-02	6,772	94	,000
Pair 16	G16A - G16B	,8990	1,0251	,1030	8,725	98	,000
Pair 17	G17A - G17B	,8586	,9148	9,195E-02	9,338	98	,000
Pair 18	G18A - G18B	1,1010	1,0449	,1050	10,485	98	,000
Pair 19	G19A - G19B	,7374	1,0555	,1061	6,951	98	,000
Pair 20	G20A - G20B	,7629	,8871	9,007E-02	8,470	96	,000
Pair 21	G21A - G21B	1,0707	1,0026	,1008	10,626	98	,000
Pair 22	G22A - G22B	1,0101	,9845	9,895E-02	10,208	98	,000
Pair 23	G23A - G23B	1,1111	,9782	9,831E-02	11,302	98	,000
Pair 24	G24A - G24B	,4747	1,0035	,1009	4,707	98	,000
Pair 25	G25A - G25B	,7475	1,0723	,1078	6,936	98	,000
Pair 26	G26A - G26B	,4898	1,0576	,1068	4,585	97	,000
Pair 27	G27A - G27B	,3939	,8901	8,945E-02	4,404	98	,000
Pair 28	G28A - G28B	,6869	1,0066	,1012	6,790	98	,000
Pair 29	G29A - G29B	,7778	,9642	9,691E-02	8,026	98	,000
Pair 30	G30A - G30B	,4792	1,0561	,1078	4,445	95	,000
Pair 31	G31A - G31B	,6566	,8591	8,634E-02	7,604	98	,000
Pair 32	G32A - G32B	,7053	,8363	8,581E-02	8,219	94	,000

Tab. 2.4.5. Paired Sample Test for differences of mean between importance and achievement of generic competences according to Employers and Graduates together – decreasing order of differences

Paired items		Paired differences			t	df	Sig. (2-tailed)
		Mean	Std. Dev.	Std. Error Mean			
Pair 18	G18A - G18B	1,15337	1,03984	,08145	14,161	162	,000
Pair 21	G21A - G21B	1,08589	1,00860	,07900	13,746	162	,000
Pair 23	G23A - G23B	1,07407	,98785	,07761	13,839	161	,000
Pair 22	G22A - G22B	1,05521	,95744	,07499	14,071	162	,000
Pair 3	G3A - G3B	1,01227	,95573	,07486	13,522	162	,000
Pair 2	G2A - G2B	1,00000	,96864	,07587	13,180	162	,000
Pair 13	G13A - G13B	1,00000	1,02439	,08024	12,463	162	,000
Pair 16	G16A - G16B	,96319	1,01160	,07923	12,156	162	,000
Pair 17	G17A - G17B	,95706	,91185	,07142	13,400	162	,000
Pair 20	G20A - G20B	,87500	,94336	,07458	11,732	159	,000
Pair 25	G25A - G25B	,85890	1,19090	,09328	9,208	162	,000
Pair 7	G7A - G7B	,85276	1,11241	,08713	9,787	162	,000
Pair 29	G29A - G29B	,80864	1,00640	,07907	10,227	161	,000
Pair 19	G19A - G19B	,80368	,99913	,07826	10,270	162	,000
Pair 28	G28A - G28B	,76687	1,02783	,08051	9,526	162	,000
Pair 31	G31A - G31B	,75309	,89901	,07063	10,662	161	,000
Pair 11	G11A - G11B	,72050	,98876	,07792	9,246	160	,000
Pair 1	G1A - G1B	,71779	,78966	,06185	11,605	162	,000
Pair 15	G15A - G15B	,70513	,96532	,07729	9,123	155	,000
Pair 6	G6A - G6B	,69325	1,03835	,08133	8,524	162	,000
Pair 32	G32A - G32B	,66667	,92549	,07340	9,083	158	,000
Pair 8	G8A - G8B	,62577	,89640	,07021	8,913	162	,000
Pair 12	G12A - G12B	,62577	,91682	,07181	8,714	162	,000
Pair 5	G5A - G5B	,62264	,89073	,07064	8,814	158	,000
Pair 30	G30A - G30B	,61635	1,05422	,08360	7,372	158	,000
Pair 14	G14A - G14B	,60494	,98029	,07702	7,854	161	,000
Pair 26	G26A - G26B	,60494	1,07691	,08461	7,150	161	,000
Pair 24	G24A - G24B	,49080	1,02661	,08041	6,104	162	,000
Pair 27	G27A - G27B	,41104	,94104	,07371	5,577	162	,000
Pair 10	G10A - G10B	,31902	,90748	,07108	4,488	162	,000
Pair 4	G4A - G4B	,20859	,91256	,07148	2,918	162	,004
Pair 9	G9A - G9B	,20859	1,10249	,08635	2,416	162	,017

Tab. 2.4.6. Paired Sample Test for differences of mean between importance and achievement of generic competences according to Employers and Graduates together – order of items

Paired items		Paired differences			t	df	Sig. (2-tailed)
		Mean	Std. Dev.	Std. Error Mean			
Pair 1	G1A - G1B	,71779	,78966	,06185	11,605	162	,000
Pair 2	G2A - G2B	1,00000	,96864	,07587	13,180	162	,000
Pair 3	G3A - G3B	1,01227	,95573	,07486	13,522	162	,000
Pair 4	G4A - G4B	,20859	,91256	,07148	2,918	162	,004
Pair 5	G5A - G5B	,62264	,89073	,07064	8,814	158	,000
Pair 6	G6A - G6B	,69325	1,03835	,08133	8,524	162	,000
Pair 7	G7A - G7B	,85276	1,11241	,08713	9,787	162	,000
Pair 8	G8A - G8B	,62577	,89640	,07021	8,913	162	,000
Pair 9	G9A - G9B	,20859	1,10249	,08635	2,416	162	,017
Pair 10	G10A - G10B	,31902	,90748	,07108	4,488	162	,000
Pair 11	G11A - G11B	,72050	,98876	,07792	9,246	160	,000
Pair 12	G12A - G12B	,62577	,91682	,07181	8,714	162	,000
Pair 13	G13A - G13B	1,00000	1,02439	,08024	12,463	162	,000
Pair 14	G14A - G14B	,60494	,98029	,07702	7,854	161	,000
Pair 15	G15A - G15B	,70513	,96532	,07729	9,123	155	,000
Pair 16	G16A - G16B	,96319	1,01160	,07923	12,156	162	,000
Pair 17	G17A - G17B	,95706	,91185	,07142	13,400	162	,000
Pair 18	G18A - G18B	1,15337	1,03984	,08145	14,161	162	,000
Pair 19	G19A - G19B	,80368	,99913	,07826	10,270	162	,000
Pair 20	G20A - G20B	,87500	,94336	,07458	11,732	159	,000
Pair 21	G21A - G21B	1,08589	1,00860	,07900	13,746	162	,000
Pair 22	G22A - G22B	1,05521	,95744	,07499	14,071	162	,000
Pair 23	G23A - G23B	1,07407	,98785	,07761	13,839	161	,000
Pair 24	G24A - G24B	,49080	1,02661	,08041	6,104	162	,000
Pair 25	G25A - G25B	,85890	1,19090	,09328	9,208	162	,000
Pair 26	G26A - G26B	,60494	1,07691	,08461	7,150	161	,000
Pair 27	G27A - G27B	,41104	,94104	,07371	5,577	162	,000
Pair 28	G28A - G28B	,76687	1,02783	,08051	9,526	162	,000
Pair 29	G29A - G29B	,80864	1,00640	,07907	10,227	161	,000
Pair 30	G30A - G30B	,61635	1,05422	,08360	7,372	158	,000
Pair 31	G31A - G31B	,75309	,89901	,07063	10,662	161	,000
Pair 32	G32A - G32B	,66667	,92549	,07340	9,083	158	,000

Appendix 2.5.

GESKE – differences according to age of Graduates

Tab. 2.5.1. Age differences in rating the importance of generic skills in Graduates

Item	Age	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
G31A	< 30 years	59	3,7119	,52689	,06860	2,510	97	,014
	> 30 years	40	3,4000	,70892	,11209			
G19A	< 30 years	59	3,6610	,54489	,07094	2,355	97	,021
	> 30 years	40	3,3500	,76962	,12169			
G7A	< 30 years	59	3,5424	,77286	,10062	3,391	97	,001
	> 30 years	40	2,9500	,95943	,15170			
G16A	< 30 years	59	3,5085	,56851	,07401	2,062	97	,042
	> 30 years	40	3,2250	,80024	,12653			
G23A	< 30 years	59	3,3898	,61636	,08024	2,019	97	,046
	> 30 years	40	3,1000	,81019	,12810			
G14A	< 30 years	59	3,3390	,57566	,07494	2,323	97	,022
	> 30 years	40	3,0000	,87706	,13868			
G30A	< 30 years	59	3,3051	,77135	,10042	2,453	94	,016
	> 30 years	37	2,8649	,97645	,16053			
G5A	< 30 years	57	3,2632	,58329	,07726	2,100	95	,038
	> 30 years	40	2,9750	,76753	,12136			
G15A	< 30 years	57	3,2632	,61314	,08121	2,919	93	,004
	> 30 years	38	2,8421	,78933	,12805			
G25A	< 30 years	59	3,2203	,76717	,09988	3,383	97	,001
	> 30 years	40	2,6000	1,05733	,16718			
G24A	< 30 years	59	3,0339	,80870	,10528	3,214	97	,002
	> 30 years	40	2,4750	,90547	,14317			
G9A	< 30 years	59	2,9831	,81983	,10673	2,162	97	,033
	> 30 years	40	2,6000	,92819	,14676			
G26A	< 30 years	59	2,8136	,86052	,11203	2,494	84,568	,015
	> 30 years	39	2,3846	,81484	,13048			
G29A	< 30 years	59	3,4746	,56800	,07395	4,977	97	,000
	> 30 years	40	2,7750	,83166	,13150			

Tab. 2.5.2. Age differences in rating the achievement of generic skills in Graduates

Item	Age	N	Mean	Std. Dev.	Std. Error Mean	t	df	Sig. (2tailed)
G4B	< 30 years	59	3,0508	,65453	,08521	-1,996	97	,049
	> 30 years	40	3,3250	,69384	,10971			
G7B	< 30 years	59	2,6102	,91004	,11848	2,975	97	,004
	> 30 years	40	2,0750	,82858	,13101			
G11B	< 30 years	57	3,0175	,66792	,08847	2,486	95	,015
	> 30 years	40	2,5750	1,08338	,17130			
G13B	< 30 years	59	2,8475	,88695	,11547	3,230	97	,002
	> 30 years	40	2,2500	,92681	,14654			
G15B	< 30 years	57	2,7018	,75510	,10002	2,972	93	,004
	> 30 years	38	2,1579	1,02736	,16666			
G18B	< 30 years	59	2,6271	,86897	,11313	2,118	97	,037
	> 30 years	40	2,2500	,86972	,13751			
G19B	< 30 years	59	3,0508	,81840	,10655	3,803	97	,000
	> 30 years	40	2,4250	,78078	,12345			
G20B	< 30 years	57	2,8070	,71810	,09511	3,773	95	,000
	> 30 years	40	2,1750	,93060	,14714			
G21B	< 30 years	59	2,3390	,97574	,12703	2,681	97	,009
	> 30 years	40	1,8250	,87376	,13815			
G22B	< 30 years	59	2,5424	,83711	,10898	2,900	97	,005
	> 30 years	40	2,0250	,91952	,14539			
G24B	< 30 years	59	2,6102	,98290	,12796	3,420	97	,001
	> 30 years	40	1,9250	,97106	,15354			
G25B	< 30 years	59	2,4746	1,00612	,13099	2,994	82,740	,004
	> 30 years	40	1,8500	1,02657	,16231			
G26B	< 30 years	59	2,3729	1,06509	,13866	2,655	96	,009
	> 30 years	39	1,8205	,91398	,14635			
G29B	< 30 years	59	2,6780	,79742	,10382	3,654	97	,000
	> 30 years	40	2,0250	,97369	,15395			
G32B	< 30 years	58	3,1379	,80455	,10564	2,408	93	,018
	> 30 years	37	2,7027	,93882	,15434			

Appendix 2.6.

GESKE – differences according to year of graduation

Tab. 2.6.1. Differences in rating the level of importance for generic competences according to year of graduation

Item	Year of graduation	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2 talied)
G7A	Before 2002	41	3,0244	,98711	,15416	-2,541	95	,013
	After 2003	56	3,4821	,78604	,10504			
G15A	Before 2002	40	2,8750	,75744	,11976	-2,759	75,164	,007
	After 2003	53	3,2830	,63177	,08678			
G19A	Before 2002	41	3,3659	,66167	,10334	-2,209	95	,030
	After 2003	56	3,6607	,64036	,08557			
G23A	Before 2002	41	3,0976	,80015	,12496	-2,332	95	,022
	After 2003	56	3,4286	,59870	,08000			
G24A	Before 2002	41	2,5122	,89783	,14022	-3,089	95	,003
	After 2003	56	3,0536	,81842	,10937			
G25A	Before 2002	41	2,6585	1,03947	,16234	-2,767	95	,007
	After 2003	56	3,1786	,81144	,10843			
G27A	Before 2002	41	3,2439	,76748	,11986	-2,098	95	,039
	After 2003	56	3,5357	,60194	,08044			
G29A	Before 2002	41	2,8537	,85326	,13326	-3,901	95	,000
	After 2003	56	3,4286	,59870	,08000			

Tab. 2.6.2. Differences in rating the level of achievement for generic competences according to year of graduation

Item	Year of graduation	N	Mean	Std. Dev.	Std. Error Mean	t	df	Sig. (2tailed)
G2B	Before 2002	41	2,4878	,63726	,09952	-2,055	95	,043
	After 2003	56	2,8036	,81842	,10937			
G7B	Before 2002	41	2,0488	,86462	,13503	-3,242	95	,002
	After 2003	56	2,6250	,86471	,11555			
G9B	Before 2002	41	2,6098	,89101	,13915	-2,018	95	,046
	After 2003	56	2,9464	,74881	,10006			
G12B	Before 2002	41	2,2927	,87304	,13635	-1,988	95	,050
	After 2003	56	2,6607	,92002	,12294			
G13B	Before 2002	41	2,3171	,90662	,14159	-2,410	86,764	,018
	After 2003	56	2,7679	,91435	,12219			
G15B	Before 2002	40	2,2000	,96609	,15275	-2,682	91	,009
	After 2003	53	2,6981	,82240	,11297			
G19B	Before 2002	41	2,4878	,81000	,12650	-2,948	95	,004
	After 2003	56	2,9821	,82000	,10958			
G20B	Before 2002	41	2,2439	,94288	,14725	-2,966	93	,004
	After 2003	54	2,7593	,75073	,10216			
G21B	Before 2002	41	1,9024	,94353	,14735	-2,145	95	,035
	After 2003	56	2,3214	,95550	,12768			
G22B	Before 2002	41	2,0488	,89306	,13947	-2,624	95	,010
	After 2003	56	2,5179	,85261	,11394			
G23B	Before 2002	41	1,8537	,88207	,13776	-2,966	86,670	,004
	After 2003	56	2,3929	,88787	,11865			
G24B	Before 2002	41	2,0000	,97468	,15222	-2,710	95	,008
	After 2003	56	2,5536	1,00760	,13465			
G25B	Before 2002	41	1,9268	1,03417	,16151	-2,456	95	,016
	After 2003	56	2,4464	1,02549	,13704			
G26B	Before 2002	40	1,8750	,91111	,14406	-2,046	94	,044
	After 2003	56	2,3036	1,07736	,14397			
G29B	Before 2002	41	2,0732	1,00971	,15769	-3,315	95	,001
	After 2003	56	2,6786	,78872	,10540			
G32B	Before 2002	38	2,7368	,94966	,15405	-2,118	91	,037
	After 2003	55	3,1273	,81773	,11026			

APPENDIX 3

STATISTICS FOR SPECIFIC COMPETENCES – SPECOE

Appendix 3.1.

Rankings SPECOE according to level of importance for the 1st cycle

Tab. 3.1.1. Level of importance of SPECOE in the 1st cycle according to Academics in order of ranks

Item	N	Mean A	Std. Deviation	Rank A
S01A	77	3,2338	,64678	1
S31A	76	3,2237	,80992	2
S40A	77	3,0779	,77402	3
S02A	77	3,0519	,77623	4
S08A	77	3,0519	,80942	5
S03A	77	2,9870	,65882	6
S39A	77	2,9740	,85800	7
S38A	77	2,8831	,70662	8
S12A	77	2,8701	,95077	9
S41A	77	2,8442	,76201	10
S35A	77	2,7922	,86356	11
S42A	77	2,7922	,81657	12
S04A	77	2,7532	,81363	13
S16A	77	2,7143	,72288	14
S09A	77	2,7013	,77908	15
S37A	77	2,7013	,77908	16
S24A	77	2,6623	,85240	17
S21A	77	2,6494	,73924	18
S29A	77	2,6494	,88505	19
S36A	77	2,6364	,87222	20
S33A	77	2,6104	,87593	21

Item	N	Mean A	Std. Deviation	Rank A
S11A	77	2,5974	,96327	22
S05A	77	2,5844	,76693	23
S28A	77	2,5584	,83498	24
S13A	77	2,5325	,98120	25
S18A	77	2,5195	,92637	26
S20A	77	2,5065	,86790	27
S10A	77	2,4935	,83703	28
S19A	77	2,4935	,86790	29
S15A	77	2,4805	,95436	30
S22A	77	2,4675	,83641	31
S32A	77	2,4675	,88235	32
S14A	77	2,4545	,95346	33
S07A	77	2,4416	,83498	34
S34A	77	2,3896	,72830	35
S26A	77	2,3766	,94645	36
S30A	77	2,3636	,80963	37
S25A	77	2,3506	,95650	38
S06A	77	2,3247	,81824	39
S17A	77	2,2987	,79579	40
S27A	77	2,2727	,96840	41
S23A	77	2,2208	,83703	42

Tab. 3.1.2. Level of importance of SPECOE in the 1st cycle according to Employers in order of ranks

Item	N	Mean E	Std. Deviation	Rank E
S38A	64	3,1875	,77408	1
S40A	64	3,1563	,78110	2
S39A	64	3,1250	,80672	3
S31A	64	3,0938	,90359	4
S08A	64	3,0625	,79433	5
S01A	64	3,0469	,86244	6
S03A	64	2,9531	,78538	7
S42A	64	2,8594	,92354	8
S05A	64	2,8125	,81406	9
S12A	64	2,7813	,95067	10
S41A	64	2,7813	,93382	11
S35A	64	2,7656	,88627	12
S07A	64	2,7500	,90851	13
S02A	64	2,7344	,80163	14
S04A	64	2,7188	,86316	15
S37A	64	2,7188	,95067	16
S16A	64	2,7031	,95418	17
S36A	64	2,7031	,88515	18
S09A	64	2,6875	,85217	19
S13A	64	2,6563	,83986	20
S21A	64	2,6563	,99553	21
S33A	64	2,6250	,96773	22
S06A	64	2,6094	,93634	23
S29A	64	2,6094	,98589	24
S10A	64	2,5781	,83199	25
S11A	64	2,5313	,87230	26
S28A	64	2,5156	,97577	27
S24A	64	2,5000	,85449	28
S30A	64	2,4688	,94228	29
S23A	64	2,4375	1,00593	30
S27A	63	2,4127	,90936	31
S25A	64	2,4063	1,03462	32
S32A	64	2,4063	,88585	33
S34A	64	2,4063	,95483	34
S14A	64	2,3906	,84735	35
S15A	64	2,3906	1,01758	36
S22A	64	2,3750	,93435	37
S26A	64	2,3750	,95119	38
S19A	64	2,3281	,90947	39
S20A	64	2,3125	1,00593	40
S17A	64	2,2031	,87613	41
S18A	64	2,2031	,96247	42

Tab. 3.1.3. Level of importance of SPECOE in the 1st cycle according to Graduates in order of ranks

Item	N	Mean G	Std. Deviation	Rank G
S01A	99	3,2121	,79889	1
S39A	99	3,1212	,78601	2
S08A	99	3,1111	,80672	3
S38A	99	3,0714	,76320	4
S03A	99	3,0606	,73980	5
S40A	99	3,0505	,86158	6
S02A	99	3,0101	,70703	7
S31A	99	2,9798	,94739	8
S37A	99	2,9271	,89730	9
S29A	99	2,8687	,85292	10
S41A	99	2,8571	,79948	11
S24A	99	2,8485	,89629	12
S35A	99	2,8283	,92627	13
S21A	99	2,8182	,92982	14
S42A	99	2,8041	,88552	15
S12A	99	2,7879	,87216	16
S36A	99	2,7653	,83482	17
S09A	99	2,7273	,86683	18
S04A	99	2,7071	,81130	19
S05A	99	2,6869	,84087	20
S28A	99	2,6837	,90357	21
S11A	99	2,6566	,92760	22
S16A	99	2,6465	,79940	23
S33A	99	2,6224	,92519	24
S07A	99	2,5859	,88075	25
S13A	99	2,5859	,90362	26
S15A	99	2,5758	,95928	27
S34A	99	2,5657	,88250	28
S18A	99	2,5455	,96121	29
S06A	99	2,5152	,86146	30
S10A	99	2,5152	,82516	31
S19A	99	2,5051	,91889	32
S22A	99	2,5051	,89641	33
S25A	99	2,4898	,97647	34
S27A	99	2,4898	,91093	35
S30A	99	2,4242	,92682	36
S26A	99	2,4184	,83633	37
S20A	99	2,4141	,85726	38
S32A	99	2,4082	,87150	39
S17A	99	2,3980	,89373	40
S14A	99	2,3939	,86683	41
S23A	99	2,3232	,84308	42

Tab. 3.1.4. Comparative rankings of SPECOE in the 1st cycle for the three groups - Academics, Employers and Graduates – in order of items

Item	Mean A	Rank A	Mean E	Rank E	Mean G	Rank G	Mean A, E, G	Rank A, E, G
S01A	3,2338	1	3,0469	6	3,2121	1	3,1750	1
S02A	3,0519	4	2,7344	14	3,0101	7	2,9500	8
S03A	2,9870	6	2,9531	7	3,0606	5	3,0083	7
S04A	2,7532	13	2,7188	15	2,7071	19	2,7250	15
S05A	2,5844	23	2,8125	9	2,6869	20	2,6875	20
S06A	2,3247	39	2,6094	23	2,5152	30	2,4792	29
S07A	2,4416	34	2,7500	13	2,5859	25	2,5833	26
S08A	3,0519	5	3,0625	5	3,1111	3	3,0792	4
S09A	2,7013	15	2,6875	19	2,7273	18	2,7083	17
S10A	2,4935	28	2,5781	25	2,5152	31	2,5250	27
S11A	2,5974	22	2,5313	26	2,6566	22	2,6042	23
S12A	2,8701	9	2,7813	10	2,7879	16	2,8125	11
S13A	2,5325	25	2,6563	20	2,5859	26	2,5875	25
S14A	2,4545	33	2,3906	35	2,3939	41	2,4125	38
S15A	2,4805	30	2,3906	36	2,5758	27	2,4958	28
S16A	2,7143	14	2,7031	17	2,6465	23	2,6833	21
S17A	2,2987	40	2,2031	41	2,3980	40	2,3138	42
S18A	2,5195	26	2,2031	42	2,5455	29	2,4458	33
S19A	2,4935	29	2,3281	39	2,5051	32	2,4542	32
S20A	2,5065	27	2,3125	40	2,4141	38	2,4167	36
S21A	2,6494	18	2,6563	21	2,8182	14	2,7208	16
S22A	2,4675	31	2,3750	37	2,5051	33	2,4583	31
S23A	2,2208	42	2,4375	30	2,3232	42	2,3208	41
S24A	2,6623	17	2,5000	28	2,8485	12	2,6958	19
S25A	2,3506	38	2,4063	32	2,4898	34	2,4226	35
S26A	2,3766	36	2,3750	38	2,4184	37	2,3933	40
S27A	2,2727	41	2,4127	31	2,4898	35	2,3992	39
S28A	2,5584	24	2,5156	27	2,6837	21	2,5983	24
S29A	2,6494	19	2,6094	24	2,8687	10	2,7292	14
S30A	2,3636	37	2,4688	29	2,4242	36	2,4167	37
S31A	3,2237	2	3,0938	4	2,9798	8	3,0879	2
S32A	2,4675	32	2,4063	33	2,4082	39	2,4268	34
S33A	2,6104	21	2,6250	22	2,6224	24	2,6192	22
S34A	2,3896	35	2,4063	34	2,5657	28	2,4667	30
S35A	2,7922	11	2,7656	12	2,8283	13	2,8000	12
S36A	2,6364	20	2,7031	18	2,7653	17	2,7071	18
S37A	2,7013	16	2,7188	16	2,9271	9	2,7975	13
S38A	2,8831	8	3,1875	1	3,0714	4	3,0418	6
S39A	2,9740	7	3,1250	3	3,1212	2	3,0750	5
S40A	3,0779	3	3,1563	2	3,0505	6	3,0875	3
S41A	2,8442	10	2,7813	11	2,8571	11	2,8326	9
S42A	2,7922	12	2,8594	8	2,8041	15	2,8151	10

Tab. 3.1.5. Level of importance of SPECOE in the 1st cycle for the three groups together – Academics, Employers, and Graduates in order of ranks

Item	N	Mean A, E, G	Std. Deviation	Rank A, E, G
S01A	240	3,1750	,77257	1
S31A	240	3,0879	,89620	2
S40A	240	3,0875	,81092	3
S08A	240	3,0792	,80140	4
S39A	240	3,0750	,81474	5
S38A	240	3,0418	,75477	6
S03A	240	3,0083	,72604	7
S02A	240	2,9500	,76372	8
S41A	240	2,8326	,82326	9
S42A	240	2,8151	,87116	10
S12A	240	2,8125	,91606	11
S35A	240	2,8000	,89255	12
S37A	240	2,7975	,87884	13
S29A	240	2,7292	,90419	14
S04A	240	2,7250	,82292	15
S21A	240	2,7208	,89231	16
S09A	240	2,7083	,83236	17
S36A	240	2,7071	,85871	18
S24A	240	2,6958	,87932	19
S05A	240	2,6875	,81195	20
S16A	240	2,6833	,81803	21
S33A	240	2,6192	,91750	22
S11A	240	2,6042	,92251	23
S28A	240	2,5983	,90154	24
S13A	240	2,5875	,91057	25
S07A	240	2,5833	,87822	26
S10A	240	2,5250	,82799	27
S15A	240	2,4958	,97241	28
S06A	240	2,4792	,87239	29
S34A	240	2,4667	,85749	30
S22A	240	2,4583	,88593	31
S19A	240	2,4542	,89978	32
S18A	240	2,4458	,95789	33
S32A	240	2,4268	,87560	34
S25A	240	2,4226	,98373	35
S20A	240	2,4167	,90173	36
S30A	240	2,4167	,89240	37
S14A	240	2,4125	,88729	38
S27A	240	2,3992	,93022	39
S26A	240	2,3933	,90058	40
S23A	240	2,3208	,88761	41
S17A	240	2,3138	,85863	42

Tab. 3.1.6. Level of importance of SPECOE in the 1st cycle for the three groups together – Academics, Employers, and Graduates in order of items

Item	N	Mean A, E, G	Std. Deviation	Rank A, E, G
S01A	240	3,1750	,77257	1
S02A	240	2,9500	,76372	8
S03A	240	3,0083	,72604	7
S04A	240	2,7250	,82292	15
S05A	240	2,6875	,81195	20
S06A	240	2,4792	,87239	29
S07A	240	2,5833	,87822	26
S08A	240	3,0792	,80140	4
S09A	240	2,7083	,83236	17
S10A	240	2,5250	,82799	27
S11A	240	2,6042	,92251	23
S12A	240	2,8125	,91606	11
S13A	240	2,5875	,91057	25
S14A	240	2,4125	,88729	38
S15A	240	2,4958	,97241	28
S16A	240	2,6833	,81803	21
S17A	240	2,3138	,85863	42
S18A	240	2,4458	,95789	33
S19A	240	2,4542	,89978	32
S20A	240	2,4167	,90173	36
S21A	240	2,7208	,89231	16
S22A	240	2,4583	,88593	31
S23A	240	2,3208	,88761	41
S24A	240	2,6958	,87932	19
S25A	240	2,4226	,98373	35
S26A	240	2,3933	,90058	40
S27A	240	2,3992	,93022	39
S28A	240	2,5983	,90154	24
S29A	240	2,7292	,90419	14
S30A	240	2,4167	,89240	37
S31A	240	3,0879	,89620	2
S32A	240	2,4268	,87560	34
S33A	240	2,6192	,91750	22
S34A	240	2,4667	,85749	30
S35A	240	2,8000	,89255	12
S36A	240	2,7071	,85871	18
S37A	240	2,7975	,87884	13
S38A	240	3,0418	,75477	6
S39A	240	3,0750	,81474	5
S40A	240	3,0875	,81092	3
S41A	240	2,8326	,82326	9
S42A	240	2,8151	,87116	10

Appendix 3.2.

Ranking SPECOE according to level of importance for the 2nd cycle

Tab. 3.2.1. Level of importance of SPECOE in the 2nd cycle according to Academics - in order of ranks

Item	N	Mean A	Std. Deviation	Rank A
S03B	77	3,6883	,5680	1
S41B	77	3,5714	,6372	2
S40B	77	3,5455	,6599	3
S02B	77	3,5455	,6599	4
S16B	77	3,4935	,6810	5
S37B	77	3,4805	,7365	6
S31B	76	3,4737	,8079	7
S08B	77	3,4286	,6964	8
S36B	77	3,4156	,6949	9
S33B	77	3,4026	,7302	10
S01B	77	3,3896	,6912	11
S04B	77	3,3896	,7973	12
S39B	77	3,3766	,7616	13
S09B	77	3,3377	,6998	14
S38B	77	3,3377	,6611	15
S21B	77	3,3377	,6998	16
S05B	77	3,3247	,7334	17
S42B	77	3,2857	,7044	18
S35B	77	3,2468	,7461	19
S32B	77	3,1688	,8335	20
S13B	77	3,1558	,9186	21
S22B	77	3,1558	,8895	22
S19B	77	3,1429	,8540	23
S24B	77	3,1299	,8168	24
S12B	77	3,1299	,9645	25
S11B	77	3,0779	,8998	26
S14B	77	3,0649	,8787	27
S30B	77	3,0390	,8498	28
S34B	77	3,0390	,8020	29
S29B	77	3,0260	,9028	30
S10B	77	3,0130	,8659	31
S20B	77	3,0000	,7947	32
S23B	77	3,0000	,9733	33
S28B	77	2,9870	,8028	34

Item	N	Mean A	Std. Deviation	Rank A
S06B	77	2,9481	,8094	35
S18B	77	2,8961	,9260	36
S17B	77	2,8961	,8673	37
S26B	77	2,8831	,9594	38
S15B	77	2,8182	,8845	39
S07B	77	2,7922	,8325	40
S27B	77	2,7662	,8255	41
S25B	77	2,6883	,9356	42

Tab. 3.2.2. Level of importance of SPECOE in the 2nd cycle according to Employers - in order of ranks

Item	N	Mean E	Std. Deviation	Rank E
S03B	64	3,4844	,7558	1
S40B	64	3,4375	,8141	2
S37B	64	3,4062	,8110	3
S02B	64	3,3750	,7664	4
S38B	64	3,3594	,8613	5
S36B	64	3,3281	,7979	6
S39B	64	3,3281	,8739	7
S33B	64	3,3125	,7741	8
S31B	64	3,2656	,8952	9
S04B	64	3,2500	,8357	10
S05B	64	3,2500	,7968	11
S42B	64	3,2344	,8682	12
S09B	64	3,2344	,8497	13
S41B	64	3,2188	,8992	14
S10B	64	3,2187	,8446	15
S12B	64	3,2187	,8446	16
S35B	64	3,2031	,8391	17
S16B	64	3,2031	,9116	18
S13B	64	3,1563	,8399	19
S21B	64	3,1094	,9778	20
S08B	64	3,1094	1,0253	21
S11B	64	3,0781	,8601	22
S30B	64	3,0625	,9900	23
S22B	64	3,0469	,9666	24
S32B	64	3,0156	,8260	25
S29B	64	3,0156	1,0464	26

Item	N	Mean E	Std. Deviation	Rank E
S23B	64	3,0000	,9428	27
S24B	64	3,0000	,8909	28
S34B	64	2,9844	1,0311	29
S14B	64	2,9375	,9739	30
S01B	64	2,9219	1,0127	31
S07B	64	2,8750	,9344	32
S28B	64	2,8750	,9512	33
S20B	64	2,8438	,9631	34
S06B	64	2,7656	1,0038	35
S19B	64	2,7344	,9127	36
S27B	63	2,7143	,9907	37
S15B	64	2,6875	,9407	38
S26B	64	2,6719	,9929	39
S17B	64	2,5781	,9563	40
S25B	64	2,5781	1,0511	41
S18B	64	2,5625	,9900	42

Tab. 3.2.3. Level of importance of SPECOE in the 2nd cycle according to Graduates - in order of ranks

Item	N	Mean G	Std. Deviation	Rank G
S03B	98	3,6633	,5166	1
S37B	95	3,5368	,6492	2
S36B	97	3,5258	,6307	3
S02B	98	3,5204	,6458	4
S40B	98	3,4490	,7052	5
S38B	97	3,4330	,6756	6
S42B	96	3,3958	,6879	7
S41B	97	3,3918	,7153	8
S39B	98	3,3776	,7394	9
S35B	98	3,3469	,6596	10
S04B	98	3,3367	,6726	11
S05B	98	3,3265	,6853	12
S16B	98	3,3265	,8094	13
S33B	97	3,3093	,7687	14
S32B	97	3,2371	,7607	15
S34B	98	3,2347	,7005	16
S13B	98	3,2143	,7632	17
S09B	98	3,2143	,7496	18
S21B	98	3,1837	,7910	19

Item	N	Mean G	Std. Deviation	Rank G
S22B	98	3,1531	,8776	20
S11B	98	3,1429	,8615	21
S24B	98	3,1429	,8852	22
S12B	98	3,1429	,8734	23
S10B	98	3,1327	,7684	24
S19B	98	3,1327	,8077	25
S31B	98	3,1122	,8720	26
S28B	97	3,1031	,8954	27
S20B	98	3,1020	,9137	28
S29B	98	3,0918	,8383	29
S30B	98	3,0612	,9061	30
S23B	98	3,0612	,8830	31
S15B	98	3,0510	,8660	32
S07B	98	3,0510	,8540	33
S14B	98	3,0408	,8363	34
S08B	99	3,0101	,8390	35
S06B	98	3,0000	,8967	36
S17B	97	2,9485	,8941	37
S01B	98	2,9286	,9110	38
S26B	97	2,9278	,9270	39
S27B	97	2,8763	,8928	40
S18B	98	2,8673	,9376	41
S25B	97	2,7835	,9268	42

Tab. 3.2.4. Comparative rankings of SPECOE in the 2nd cycle for the three groups - Academics, Employers, Graduates and the three groups together – in order of items

Item	Mean A	Rank A	Mean E	Rank E	Mean G	Rank G	Mean A,E,G	Rank A,E,G
S01B	3,3896	11	2,9219	31	2,9286	38	3,0753	27
S02B	3,5455	4	3,3750	4	3,5204	4	3,4895	2
S03B	3,6883	1	3,4844	1	3,6633	1	3,6234	1
S04B	3,3896	12	3,2500	10	3,3367	11	3,3305	11
S05B	3,3247	17	3,2500	11	3,3265	12	3,3054	13
S06B	2,9481	35	2,7656	35	3,0000	36	2,9205	35
S07B	2,7922	40	2,8750	32	3,0510	33	2,9205	36
S08B	3,4286	8	3,1094	21	3,0101	35	3,1708	19
S09B	3,3377	14	3,2344	13	3,2143	18	3,2594	16
S10B	3,0130	31	3,2187	15	3,1327	24	3,1172	23
S11B	3,0779	26	3,0781	22	3,1429	21	3,1046	25

Item	Mean A	Rank A	Mean E	Rank E	Mean G	Rank G	Mean A,E,G	Rank A,E,G
S12B	3,1299	25	3,2187	16	3,1429	23	3,1590	20
S13B	3,1558	21	3,1563	19	3,2143	17	3,1799	18
S14B	3,0649	27	2,9375	30	3,0408	34	3,0209	32
S15B	2,8182	39	2,6875	38	3,0510	32	2,8787	37
S16B	3,4935	5	3,2031	18	3,3265	13	3,3473	9
S17B	2,8961	37	2,5781	40	2,9485	37	2,8319	39
S18B	2,8961	36	2,5625	42	2,8673	41	2,7950	41
S19B	3,1429	23	2,7344	36	3,1327	25	3,0293	30
S20B	3,0000	32	2,8438	34	3,1020	28	3,0000	34
S21B	3,3377	16	3,1094	20	3,1837	19	3,2134	17
S22B	3,1558	22	3,0469	24	3,1531	20	3,1255	22
S23B	3,0000	33	3,0000	27	3,0612	31	3,0251	31
S24B	3,1299	24	3,0000	28	3,1429	22	3,1004	26
S25B	2,6883	42	2,5781	41	2,7835	42	2,6975	42
S26B	2,8831	38	2,6719	39	2,9278	39	2,8445	38
S27B	2,7662	41	2,7143	37	2,8763	40	2,7975	40
S28B	2,9870	34	2,8750	33	3,1031	27	3,0042	33
S29B	3,0260	30	3,0156	26	3,0918	29	3,0502	29
S30B	3,0390	28	3,0625	23	3,0612	30	3,0544	28
S31B	3,4737	7	3,2656	9	3,1122	26	3,2689	15
S32B	3,1688	20	3,0156	25	3,2371	15	3,1555	21
S33B	3,4026	10	3,3125	8	3,3093	14	3,3403	10
S34B	3,0390	29	2,9844	29	3,2347	16	3,1046	24
S35B	3,2468	19	3,2031	17	3,3469	10	3,2762	14
S36B	3,4156	9	3,3281	6	3,5258	3	3,4370	5
S37B	3,4805	6	3,4062	3	3,5368	2	3,4831	3
S38B	3,3377	15	3,3594	5	3,4330	6	3,3824	7
S39B	3,3766	13	3,3281	7	3,3776	9	3,3640	8
S40B	3,5455	3	3,4375	2	3,4490	5	3,4770	4
S41B	3,5714	2	3,2188	14	3,3918	8	3,4034	6
S42B	3,2857	18	3,2344	12	3,3958	7	3,3165	12

Tab. 3.2.5. Level of importance of SPECOE in the 2nd cycle for the three groups together – Academics, Employers, and Graduates in order of ranks

Item	N	Mean	Std. Deviation	Rank A,E,G
S03B	239	3,6234	,6084	1
S02B	239	3,4895	,6851	2
S37B	236	3,4831	,7233	3
S40B	239	3,4770	,7207	4
S36B	238	3,4370	,7013	5
S41B	238	3,4034	,7555	6
S38B	238	3,3824	,7239	7
S39B	239	3,3640	,7814	8
S16B	239	3,3473	,8049	9
S33B	238	3,3403	,7559	10
S04B	239	3,3305	,7584	11
S42B	237	3,3165	,7458	12
S05B	239	3,3054	,7296	13
S35B	239	3,2762	,7384	14
S31B	238	3,2689	,8686	15
S09B	239	3,2594	,7612	16
S21B	239	3,2134	,8202	17
S13B	239	3,1799	,8333	18
S08B	240	3,1708	,8678	19
S12B	239	3,1590	,8934	20
S32B	238	3,1555	,8041	21
S22B	239	3,1255	,9034	22
S10B	239	3,1172	,8218	23
S34B	239	3,1046	,8361	24
S11B	239	3,1046	,8706	25
S24B	239	3,1004	,8638	26
S01B	239	3,0753	,8997	27
S30B	239	3,0544	,9082	28
S29B	239	3,0502	,9153	29
S19B	239	3,0293	,8667	30
S23B	239	3,0251	,9255	31
S14B	239	3,0209	,8862	32
S28B	238	3,0042	,8835	33
S20B	239	3,0000	,8935	34
S06B	239	2,9205	,9017	35
S07B	239	2,9205	,8732	36
S15B	239	2,8787	,9016	37
S26B	238	2,8445	,9574	38
S17B	238	2,8319	,9124	39

Item	N	Mean	Std. Deviation	Rank A,E,G
S27B	237	2,7975	,8979	40
S18B	239	2,7950	,9548	41
S25B	238	2,6975	,9639	42

Tab. 3.2.6. Level of importance of SPECOE in the 2nd cycle for the three groups together – Academics, Employers, and Graduates in order of items

Item	N	Mean	Std. Deviation	Rank A,E,G
S01B	239	3,0753	,8997	27
S02B	239	3,4895	,6851	2
S03B	239	3,6234	,6084	1
S04B	239	3,3305	,7584	11
S05B	239	3,3054	,7296	13
S06B	239	2,9205	,9017	35
S07B	239	2,9205	,8732	36
S08B	240	3,1708	,8678	19
S09B	239	3,2594	,7612	16
S10B	239	3,1172	,8218	23
S11B	239	3,1046	,8706	25
S12B	239	3,1590	,8934	20
S13B	239	3,1799	,8333	18
S14B	239	3,0209	,8862	32
S15B	239	2,8787	,9016	37
S16B	239	3,3473	,8049	9
S17B	238	2,8319	,9124	39
S18B	239	2,7950	,9548	41
S19B	239	3,0293	,8667	30
S20B	239	3,0000	,8935	34
S21B	239	3,2134	,8202	17
S22B	239	3,1255	,9034	22
S23B	239	3,0251	,9255	31
S24B	239	3,1004	,8638	26
S25B	238	2,6975	,9639	42
S26B	238	2,8445	,9574	38
S27B	237	2,7975	,8979	40
S28B	238	3,0042	,8835	33
S29B	239	3,0502	,9153	29
S30B	239	3,0544	,9082	28
S31B	238	3,2689	,8686	15
S32B	238	3,1555	,8041	21
S33B	238	3,3403	,7559	10

Item	N	Mean	Std. Deviation	Rank A,E,G
S34B	239	3,1046	,8361	24
S35B	239	3,2762	,7384	14
S36B	238	3,4370	,7013	5
S37B	236	3,4831	,7233	3
S38B	238	3,3824	,7239	7
S39B	239	3,3640	,7814	8
S40B	239	3,4770	,7207	4
S41B	238	3,4034	,7555	6
S42B	237	3,3165	,7458	12

Appendix 3.3.

SPECOE - differences between 1st and 2nd cycle

Tab. 3.3.1. Paired Samples Test - SPECOE – importance for 1st and 2nd cycle – Academics – in decreasing order of mean differences

Item		Mean	Std. Dev.	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 23	S23A - S23B	-,8261	,8036	9,674E-02	-8,539	68	,000
Pair 33	S33A - S33B	-,8261	,8904	,1072	-7,707	68	,000
Pair 16	S16A - S16B	-,8116	,7722	9,297E-02	-8,730	68	,000
Pair 36	S36A - S36B	-,7971	,7780	9,366E-02	-8,511	68	,000
Pair 37	S37A - S37B	-,7971	,7780	9,366E-02	-8,511	68	,000
Pair 5	S5A - S5B	-,7536	,7358	8,858E-02	-8,508	68	,000
Pair 3	S3A - S3B	-,7246	,7837	9,435E-02	-7,680	68	,000
Pair 22	S22A - S22B	-,7246	,7453	8,972E-02	-8,077	68	,000
Pair 41	S41A - S41B	-,7246	,8555	,1030	-7,036	68	,000
Pair 21	S21A - S21B	-,7101	,7878	9,484E-02	-7,488	68	,000
Pair 30	S30A - S30B	-,6957	,7134	8,588E-02	-8,100	68	,000
Pair 32	S32A - S32B	-,6812	,7951	9,572E-02	-7,117	68	,000
Pair 4	S4A - S4B	-,6667	,9021	,1086	-6,139	68	,000
Pair 19	S19A - S19B	-,6667	,8518	,1025	-6,502	68	,000
Pair 13	S13A - S13B	-,6377	1,0568	,1272	-5,012	68	,000
Pair 14	S14A - S14B	-,6377	,9231	,1111	-5,738	68	,000
Pair 34	S34A - S34B	-,6377	,8039	9,677E-02	-6,589	68	,000
Pair 6	S6A - S6B	-,6232	,7297	8,784E-02	-7,095	68	,000
Pair 9	S9A - S9B	-,6232	,7878	9,484E-02	-6,571	68	,000
Pair 17	S17A - S17B	-,6232	,7495	9,023E-02	-6,906	68	,000
Pair 10	S10A - S10B	-,5362	,8842	,1064	-5,038	68	,000
Pair 2	S2A - S2B	-,5217	,9488	,1142	-4,568	68	,000
Pair 26	S26A - S26B	-,5072	,8681	,1045	-4,854	68	,000
Pair 27	S27A - S27B	-,5072	,7597	9,146E-02	-5,546	68	,000
Pair 42	S42A - S42B	-,4928	,6093	7,335E-02	-6,718	68	,000
Pair 20	S20A - S20B	-,4783	,9488	,1142	-4,187	68	,000
Pair 24	S24A - S24B	-,4783	,7594	9,142E-02	-5,231	68	,000
Pair 11	S11A - S11B	-,4638	,9638	,1160	-3,997	68	,000
Pair 40	S40A - S40B	-,4638	,7589	9,136E-02	-5,076	68	,000
Pair 38	S38A - S38B	-,4493	,6072	7,310E-02	-6,146	68	,000
Pair 35	S35A - S35B	-,4203	,6040	7,272E-02	-5,780	68	,000
Pair 7	S7A - S7B	-,3913	,5994	7,216E-02	-5,422	68	,000

Item		Mean	Std. Dev.	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 28	S28A - S28B	-,3913	,7711	9,283E-02	-4,215	68	,000
Pair 39	S39A - S39B	-,3913	,7320	8,812E-02	-4,441	68	,000
Pair 8	S8A - S8B	-,3768	,8928	,1075	-3,506	68	,001
Pair 29	S29A - S29B	-,3623	,6177	7,436E-02	-4,873	68	,000
Pair 15	S15A - S15B	-,3478	,8715	,1049	-3,315	68	,001
Pair 18	S18A - S18B	-,3478	,7441	8,958E-02	-3,883	68	,000
Pair 25	S25A - S25B	-,3188	,8134	9,792E-02	-3,256	68	,002
Pair 12	S12A - S12B	-,2754	,9217	,1110	-2,482	68	,016
Pair 31	S31A - S31B	-,2353	,6936	8,412E-02	-2,797	67	,007
Pair 1	S1A - S1B	-,1594	,8681	,1045	-1,525	68	,132

Tab. 3.3.2. Paired Samples Test - SPECOE – importance for 1st and 2nd cycle – Employers – in decreasing order of mean differences

Item		Mean	Std. Dev.	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 33	S33A - S33B	-,6875	,9574	,1197	-5,745	63	,000
Pair 37	S37A - S37B	-,6875	,9900	,1238	-5,555	63	,000
Pair 22	S22A - S22B	-,6719	,9437	,1180	-5,695	63	,000
Pair 2	S2A - S2B	-,6406	1,1460	,1432	-4,472	63	,000
Pair 10	S10A - S10B	-,6406	,7841	9,801E-02	-6,536	63	,000
Pair 36	S36A - S36B	-,6250	1,0000	,1250	-5,000	63	,000
Pair 32	S32A - S32B	-,6094	,9363	,1170	-5,206	63	,000
Pair 30	S30A - S30B	-,5938	,8858	,1107	-5,362	63	,000
Pair 34	S34A - S34B	-,5781	,9889	,1236	-4,677	63	,000
Pair 23	S23A - S23B	-,5625	,9407	,1176	-4,784	63	,000
Pair 9	S9A - S9B	-,5469	,9073	,1134	-4,822	63	,000
Pair 11	S11A - S11B	-,5469	,9073	,1134	-4,822	63	,000
Pair 14	S14A - S14B	-,5469	1,0224	,1278	-4,279	63	,000
Pair 3	S3A - S3B	-,5313	1,1679	,1460	-3,639	63	,001
Pair 4	S4A - S4B	-,5313	1,0833	,1354	-3,923	63	,000
Pair 20	S20A - S20B	-,5313	,8723	,1090	-4,872	63	,000
Pair 13	S13A - S13B	-,5000	,7968	9,960E-02	-5,020	63	,000
Pair 16	S16A - S16B	-,5000	,8165	,1021	-4,899	63	,000
Pair 24	S24A - S24B	-,5000	,8357	,1045	-4,786	63	,000
Pair 21	S21A - S21B	-,4531	,9416	,1177	-3,850	63	,000
Pair 5	S5A - S5B	-,4375	1,0522	,1315	-3,326	63	,001
Pair 12	S12A - S12B	-,4375	,9407	,1176	-3,721	63	,000
Pair 35	S35A - S35B	-,4375	,9574	,1197	-3,656	63	,001

Item		Mean	Std. Dev.	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 41	S41A - S41B	-,4375	1,0370	,1296	-3,375	63	,001
Pair 19	S19A - S19B	-,4063	,9210	,1151	-3,529	63	,001
Pair 29	S29A - S29B	-,4063	,8493	,1062	-3,827	63	,000
Pair 17	S17A - S17B	-,3750	,7664	9,579E-02	-3,915	63	,000
Pair 42	S42A - S42B	-,3750	,9344	,1168	-3,211	63	,002
Pair 18	S18A - S18B	-,3594	,8974	,1122	-3,204	63	,002
Pair 28	S28A - S28B	-,3594	,9656	,1207	-2,978	63	,004
Pair 27	S27A - S27B	-,3016	,8732	,1100	-2,741	62	,008
Pair 15	S15A - S15B	-,2969	,9869	,1234	-2,407	63	,019
Pair 26	S26A - S26B	-,2969	,8485	,1061	-2,799	63	,007
Pair 40	S40A - S40B	-,2813	1,0308	,1288	-2,183	63	,033
Pair 39	S39A - S39B	-,2031	,9788	,1224	-1,660	63	,102
Pair 25	S25A - S25B	-,1719	,9182	,1148	-1,498	63	,139
Pair 31	S31A - S31B	-,1719	,9182	,1148	-1,498	63	,139
Pair 38	S38A - S38B	-,1719	1,0474	,1309	-1,313	63	,194
Pair 6	S6A - S6B	-,1563	,9296	,1162	-1,345	63	,184
Pair 7	S7A - S7B	-,1250	,7868	9,835E-02	-1,271	63	,208
Pair 8	S8A - S8B	-,0469	1,0901	,1363	-,344	63	,732
Pair 1	S1A - S1B	,1250	1,0764	,1346	,929	63	,356

Tab. 3.3.3. Paired Samples Test - SPECOE – importance for 1st and 2nd cycle – Graduates – in decreasing order of mean differences

Item		Mean	Std. Dev.	Std. Error Mean	t	df	Sig. (2tailed)
Pair 32	S32A - S32B	-,8351	,9318	9,461E-02	-8,826	96	,000
Pair 36	S36A - S36B	-,7629	,8633	8,765E-02	-8,703	96	,000
Pair 23	S23A - S23B	-,7347	,9256	9,350E-02	-7,858	97	,000
Pair 20	S20A - S20B	-,6939	,9240	9,334E-02	-7,434	97	,000
Pair 33	S33A - S33B	-,6907	,9721	9,870E-02	-6,998	96	,000
Pair 16	S16A - S16B	-,6735	,7430	7,506E-02	-8,973	97	,000
Pair 34	S34A - S34B	-,6735	,8221	8,304E-02	-8,110	97	,000
Pair 5	S5A - S5B	-,6531	,8507	8,594E-02	-7,599	97	,000
Pair 14	S14A - S14B	-,6429	,9110	9,202E-02	-6,986	97	,000
Pair 22	S22A - S22B	-,6429	,8645	8,733E-02	-7,361	97	,000
Pair 30	S30A - S30B	-,6327	,9567	9,664E-02	-6,547	97	,000
Pair 4	S4A - S4B	-,6224	,8677	8,765E-02	-7,102	97	,000
Pair 10	S10A - S10B	-,6224	1,0206	,1031	-6,038	97	,000
Pair 13	S13A - S13B	-,6224	,9687	9,786E-02	-6,361	97	,000

Item		Mean	Std. Dev.	Std. Error Mean	t	df	Sig. (2tailed)
Pair 19	S19A - S19B	-,6224	,8911	9,002E-02	-6,915	97	,000
Pair 37	S37A - S37B	-,6105	,8666	8,891E-02	-6,867	94	,000
Pair 3	S3A - S3B	-,6020	,8341	8,425E-02	-7,146	97	,000
Pair 42	S42A - S42B	-,5938	,8023	8,189E-02	-7,251	95	,000
Pair 17	S17A - S17B	-,5464	,9792	9,942E-02	-5,496	96	,000
Pair 41	S41A - S41B	-,5258	,8791	8,926E-02	-5,891	96	,000
Pair 35	S35A - S35B	-,5204	,8152	8,235E-02	-6,320	97	,000
Pair 26	S26A - S26B	-,5155	,8674	8,807E-02	-5,853	96	,000
Pair 2	S2A - S2B	-,5102	,8525	8,611E-02	-5,925	97	,000
Pair 6	S6A - S6B	-,5000	,8881	8,971E-02	-5,574	97	,000
Pair 7	S7A - S7B	-,4796	,8761	8,850E-02	-5,419	97	,000
Pair 9	S9A - S9B	-,4796	,9331	9,426E-02	-5,088	97	,000
Pair 11	S11A - S11B	-,4796	1,0476	,1058	-4,532	97	,000
Pair 15	S15A - S15B	-,4694	,9438	9,534E-02	-4,923	97	,000
Pair 28	S28A - S28B	-,4227	1,0785	,1095	-3,860	96	,000
Pair 40	S40A - S40B	-,4082	,8949	9,039E-02	-4,515	97	,000
Pair 27	S27A - S27B	-,3918	1,0161	,1032	-3,797	96	,000
Pair 12	S12A - S12B	-,3673	,9012	9,103E-02	-4,035	97	,000
Pair 38	S38A - S38B	-,3608	,9150	9,290E-02	-3,884	96	,000
Pair 21	S21A - S21B	-,3571	,9110	9,202E-02	-3,881	97	,000
Pair 18	S18A - S18B	-,3265	,9500	9,597E-02	-3,402	97	,001
Pair 25	S25A - S25B	-,2887	1,0202	,1036	-2,787	96	,006
Pair 24	S24A - S24B	-,2857	,9525	9,621E-02	-2,970	97	,004
Pair 39	S39A - S39B	-,2551	,7906	7,986E-02	-3,194	97	,002
Pair 29	S29A - S29B	-,2245	,9474	9,570E-02	-2,346	97	,021
Pair 31	S31A - S31B	-,1327	1,0516	,1062	-1,249	97	,215
Pair 8	S8A - S8B	,1010	1,0050	,1010	1,000	98	,320
Pair 1	S1A - S1B	,2857	1,0552	,1066	2,681	97	,009

Tab. 3.3.4. Paired Samples Test - SPECOE – importance for 1st and 2nd cycle – Academics, Employers and Graduates together – in item order

Item		Mean	Std. dev.	Std. error mean	t	df	Sig. (2tailed)
Pair 1	S1A - S1B	,10042	1,01995	,06597	1,522	238	,129
Pair 2	S2A - S2B	-,53975	,95568	,06182	-8,731	238	,000
Pair 3	S3A - S3B	-,61506	,91345	,05909	-10,410	238	,000
Pair 4	S4A - S4B	-,60251	,93763	,06065	-9,934	238	,000
Pair 5	S5A - S5B	-,62343	,87953	,05689	-10,958	238	,000
Pair 6	S6A - S6B	-,44770	,86261	,05580	-8,024	238	,000

Item		Mean	Std. dev.	Std. error mean	t	df	Sig. (2tailed)
Pair 7	S7A - S7B	-,34310	,78822	,05099	-6,729	238	,000
Pair 8	S8A - S8B	-,09167	1,00622	,06495	-1,411	239	,159
Pair 9	S9A - S9B	-,54812	,87254	,05644	-9,711	238	,000
Pair 10	S10A - S10B	-,59414	,91126	,05894	-10,080	238	,000
Pair 11	S11A - S11B	-,49791	,97392	,06300	-7,904	238	,000
Pair 12	S12A - S12B	-,35146	,90859	,05877	-5,980	238	,000
Pair 13	S13A - S13B	-,58996	,94339	,06102	-9,668	238	,000
Pair 14	S14A - S14B	-,60669	,93267	,06033	-10,056	238	,000
Pair 15	S15A - S15B	-,38075	,92662	,05994	-6,352	238	,000
Pair 16	S16A - S16B	-,66109	,77119	,04988	-13,252	238	,000
Pair 17	S17A - S17B	-,51681	,85544	,05545	-9,320	237	,000
Pair 18	S18A - S18B	-,35146	,87081	,05633	-6,240	238	,000
Pair 19	S19A - S19B	-,57322	,88988	,05756	-9,958	238	,000
Pair 20	S20A - S20B	-,58577	,90747	,05870	-9,979	238	,000
Pair 21	S21A - S21B	-,48954	,88338	,05714	-8,567	238	,000
Pair 22	S22A - S22B	-,66527	,84322	,05454	-12,197	238	,000
Pair 23	S23A - S23B	-,70293	,88855	,05748	-12,230	238	,000
Pair 24	S24A - S24B	-,40167	,85857	,05554	-7,233	238	,000
Pair 25	S25A - S25B	-,27311	,92149	,05973	-4,572	237	,000
Pair 26	S26A - S26B	-,45378	,85435	,05538	-8,194	237	,000
Pair 27	S27A - S27B	-,40084	,89471	,05812	-6,897	236	,000
Pair 28	S28A - S28B	-,40756	,95349	,06181	-6,594	237	,000
Pair 29	S29A - S29B	-,32218	,82552	,05340	-6,033	238	,000
Pair 30	S30A - S30B	-,63598	,85830	,05552	-11,455	238	,000
Pair 31	S31A - S31B	-,18067	,90761	,05883	-3,071	237	,002
Pair 32	S32A - S32B	-,73109	,89251	,05785	-12,637	237	,000
Pair 33	S33A - S33B	-,72269	,93162	,06039	-11,967	237	,000
Pair 34	S34A - S34B	-,64017	,85271	,05516	-11,606	238	,000
Pair 35	S35A - S35B	-,47699	,79817	,05163	-9,239	238	,000
Pair 36	S36A - S36B	-,73109	,87340	,05661	-12,914	237	,000
Pair 37	S37A - S37B	-,68644	,87226	,05678	-12,090	235	,000
Pair 38	S38A - S38B	-,34034	,87012	,05640	-6,034	237	,000
Pair 39	S39A - S39B	-,28870	,82268	,05321	-5,425	238	,000
Pair 40	S40A - S40B	-,39331	,88647	,05734	-6,859	238	,000
Pair 41	S41A - S41B	-,56723	,91500	,05931	-9,564	237	,000
Pair 42	S42A - S42B	-,50211	,78451	,05096	-9,853	236	,000

Appendix 3.4.

SPECOE – intra-group differences for Employers

***Differences in rating the importance of specific competences according to enterprise size of Employers**
For the 1st cycle there are no significant differences

Tab. 3.4.1. Differences in rating the level of importance for specific competences according to enterprise size in the 2nd cycle

Item	Enterprise size	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2 talied)
S17B	under 40 employees	30	2,3333	,9589	,1751	-2,094	57	,041
	over 41 employees	29	2,8276	,8481	,1575			

Appendix 3.5.

SPECOE – intra-group differences for Graduates

A. Gender differences in rating the specific competences for the group of Graduates

Tab. 3.5.1. Gender differences in rating the importance of specific competences in the 1st cycle

Item	Gender	N	Mean	Std. Deviation	t	Df	Sig. (2-tailed)
S1A	male	64	3,3438	,6951	2,263	97	,026
	female	35	2,9714	,9231			
S8A	male	64	3,2656	,6956	2,655	97	,009
	female	35	2,8286	,9231			
S12A	male	64	2,9219	,7623	1,939	55,572	,058
	female	35	2,5429	1,0100			
S4A	male	64	2,8281	,8462	2,040	97	,044
	female	35	2,4857	,7017			
S11A	male	64	2,7969	,9116	2,069	97	,041
	female	35	2,4000	,9139			
S25A	male	63	2,7302	,9871	3,658	83,030	,000
	female	35	2,0571	,8023			
S22A	male	64	2,6563	,8768	2,320	97	,022
	female	35	2,2286	,8774			
S42A	male	63	2,6190	,9057	-2,909	95	,005
	female	34	3,1471	,7440			
S36A	male	63	2,6190	,8314	-2,382	96	,019
	female	35	3,0286	,7854			

Tab. 3.5.2. Gender differences in rating the importance of specific competences in the 2nd cycle

Item	Sex	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
S4B	male	63	3,4444	,5896	2,167	96	,033
	female	35	3,1429	,7724			
S21B	male	63	3,3651	,6550	3,186	96	,002
	female	35	2,8571	,9121			
S22B	male	63	3,3333	,7620	2,825	96	,006
	female	35	2,8286	,9848			
S12B	male	63	3,3333	,8032	3,015	96	,003
	female	35	2,8000	,9010			
S23B	male	63	3,2063	,8064	2,227	96	,028
	female	35	2,8000	,9641			
S8B	male	64	3,1406	,8139	2,131	97	,036
	female	35	2,7714	,8432			
S1B	male	63	3,0952	,9108	2,494	96	,014
	female	35	2,6286	,8432			

B. Age differences in rating the importance of specific competences for the group of Graduates

Tab. 3.5.3. Age differences in rating the importance of specific competences in Graduates in the 1st cycle

Item	Age	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
S41A	< 30 years	66	2,9697	,7640	9,404E-02	2,034	96	,045
	> 31 years	32	2,6250	,8328	,1472			
S30A	< 30 years	66	2,5606	,9467	,1165	2,106	97	,038
	> 31 years	33	2,1515	,8337	,1451			

Tab. 3.5.4. Age differences in rating the importance of specific competences in Graduates in the 2nd cycle

Item	Age	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
S21B	< 30 years	66	3,0303	,7640	9,404E-02	-2,856	96	,005
	> 31 years	32	3,5000	,7620	,1347			

C. Differences in rating the importance of specific competences according to year of graduation of Graduates

Tab. 3.5.5. Differences in rating the level of importance for specific competences according to year of graduation in the 1st cycle

Item	Year of graduation	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2 tailed)
S30A	Before 2002	41	2,0732	,8182	,1278	-3,421	95	,001
	After 2003	56	2,6964	,9326	,1246			
S32A	Before 2002	40	2,2000	,8228	,1301	-1,976	94	,051
	After 2003	56	2,5536	,8928	,1193			
S34A	Before 2002	41	2,3659	,7986	,1247	-1,935	95	,056
	After 2003	56	2,7143	,9286	,1241			
S36A	Before 2002	40	2,5500	,7828	,1238	-2,104	94	,038
	After 2003	56	2,9107	,8587	,1147			

Tab. 3.5.6. Differences in rating the level of importance for specific competences according to year of graduation in the 2nd cycle

Item	Year of graduation	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2 tailed)
S14B	Before 2002	40	2,8000	,9392	,1485	-2,241	94	,027
	After 2003	56	3,1786	,7162	9,571E-02			

Appendix 3.6.

SPECOE – Inter-groups differences – Academics, Employers, and Graduates

Tab. 3.6.1. ANOVA analysis – differences between the three groups of respondents for the importance of specific competences – 1st cycle

Item		Sum of Squares	df	Mean Square	F	Sig.
S2A	Between Groups	4,134	2	2,067	3,621	,028
	Within Groups	135,266	237	,571		
	Total	139,400	239			
S24A	Between Groups	4,848	2	2,424	3,192	,043
	Within Groups	179,948	237	,759		
	Total	184,796	239			
S38A	Between Groups	3,384	2	1,692	3,020	,051
	Within Groups	132,198	236	,560		
	Total	135,582	238			

Tab. 3.6.2. ANOVA analysis – differences between the three groups of respondents for the importance of specific competences – 2nd cycle

Item		Sum of Squares	df	Mean Square	F	Sig.
S1B	Between Groups	11,223	2	5,612	7,300	,001
	Within Groups	181,421	236	,769		
	Total	192,644	238			
S8B	Between Groups	7,914	2	3,957	5,450	,005
	Within Groups	172,081	237	,726		
	Total	179,996	239			
S15B	Between Groups	5,532	2	2,766	3,473	,033
	Within Groups	187,949	236	,796		
	Total	193,481	238			
S17B	Between Groups	5,757	2	2,878	3,532	,031
	Within Groups	191,520	235	,815		
	Total	197,277	237			
S19B	Between Groups	7,607	2	3,803	5,243	,006
	Within Groups	171,188	236	,725		
	Total	178,795	238			
S41B	Between Groups	4,369	2	2,185	3,922	,021
	Within Groups	130,908	235	,557		
	Total	135,277	237			

Appendix 3.7.

Difference between levels of importance of Generic competences and Specific competences

Tab, 3.7.1. Means and ranks for levels of importance of Generic competences, as rated by Employers, Graduates, and Employers and Graduates together

Item	Mean E	Rank E	Mean G	Rank G	Mean E+G	Rank E+G
G17A	3,7344	1	3,7172	1	3,7258	1
G31A	3,6719	3	3,5859	3	3,6289	2
G32A	3,5	9	3,6737	2	3,58685	3
G08A	3,6719	2	3,4949	10	3,5834	4
G02A	3,6094	4	3,5556	8	3,5825	5
G19A	3,5938	5	3,5354	9	3,5646	6
G01A	3,5313	7	3,5758	4	3,55355	7
G18A	3,5156	8	3,5758	6	3,5457	8
G13A	3,4688	10	3,5758	5	3,5223	9
G10A	3,5625	6	3,4646	11	3,51355	10
G11A	3,4531	12	3,5567	7	3,5049	11
G06A	3,4063	16	3,4545	12	3,4304	12
G16A	3,4531	11	3,3939	14	3,4235	13
G03A	3,375	17	3,3535	15	3,36425	14
G20A	3,4127	14	3,3093	17	3,361	15
G22A	3,375	18	3,3434	16	3,3592	16
G27A	3,2344	22	3,4141	13	3,32425	17
G04A	3,4219	13	3,1818	24	3,30185	18
G28A	3,3281	19	3,2323	20	3,2802	19
G30A	3,4063	15	3,1354	26	3,27085	20
G14A	3,3016	20	3,202	21	3,2518	21
G07A	3,1875	24	3,303	18	3,24525	22
G23A	3,2063	23	3,2727	19	3,2395	23
G05A	3,2581	21	3,1443	25	3,2012	24
G29A	3,0794	26	3,1919	23	3,13565	25
G21A	3,0625	27	3,202	22	3,13225	26
G12A	3,1719	25	3,0404	28	3,10615	27
G15A	3,0323	29	3,0947	27	3,0635	28
G25A	3,0625	28	2,9697	29	3,0161	29
G09A	3,0313	30	2,8283	30	2,9298	30
G24A	2,7344	32	2,8081	31	2,77125	31
G26A	2,7344	31	2,6429	32	2,68865	32
Sum	**106,5877**		**105,8296**		**106,209**	
Average Value	**3,3308**		**3,3071**		**3,3190**	

Tab. 3.7.2. Means and ranks for levels of importance of Specific competences, for the first (A) and second cycle (B), as rated by Academics, Employers and Graduates together

1st cycle		
Item	**Mean A, E, G**	**Rank A, E, G**
S01A	3,1750	1
S31A	3,0879	2
S40A	3,0875	3
S08A	3,0792	4
S39A	3,0750	5
S38A	3,0418	6
S03A	3,0083	7
S02A	2,9500	8
S41A	2,8326	9
S42A	2,8151	10
S12A	2,8125	11
S35A	2,8000	12
S37A	2,7975	13
S29A	2,7292	14
S04A	2,7250	15
S21A	2,7208	16
S09A	2,7083	17
S36A	2,7071	18
S24A	2,6958	19
S05A	2,6875	20
S16A	2,6833	21
S33A	2,6192	22
S11A	2,6042	23
S28A	2,5983	24
S13A	2,5875	25
S07A	2,5833	26
S10A	2,5250	27
S15A	2,4958	28
S06A	2,4792	29
S34A	2,4667	30
S22A	2,4583	31
S19A	2,4542	32
S18A	2,4458	33
S32A	2,4268	34
S25A	2,4226	35
S20A	2,4167	36
S30A	2,4167	37

2nd cycle		
Item	**Mean A, E, G**	**Rank A, E, G**
S03B	3,6234	1
S02B	3,4895	2
S37B	3,4831	3
S40B	3,4770	4
S36B	3,4370	5
S41B	3,4034	6
S38B	3,3824	7
S39B	3,3640	8
S16B	3,3473	9
S33B	3,3403	10
S04B	3,3305	11
S42B	3,3165	12
S05B	3,3054	13
S35B	3,2762	14
S31B	3,2689	15
S09B	3,2594	16
S21B	3,2134	17
S13B	3,1799	18
S08B	3,1708	19
S12B	3,1590	20
S32B	3,1555	21
S22B	3,1255	22
S10B	3,1172	23
S11B	3,1046	25
S34B	3,1046	24
S24B	3,1004	26
S01B	3,0753	27
S30B	3,0544	28
S29B	3,0502	29
S19B	3,0293	30
S23B	3,0251	31
S14B	3,0209	32
S28B	3,0042	33
S20B	3,0000	34
S06B	2,9205	35
S07B	2,9205	36
S15B	2,8787	37

1st cycle		
Item	**Mean A, E, G**	**Rank A, E, G**
S14A	2,4125	38
S27A	2,3992	39
S26A	2,3933	40
S23A	2,3208	41
S17A	2,3138	42
Sum	**112,0593**	
Average value	**2,6680**	

2nd cycle		
Item	**Mean A, E, G**	**Rank A, E, G**
S26B	2,8445	38
S17B	2,8319	39
S27B	2,7975	40
S18B	2,7950	41
S25B	2,6975	42
Sum	**132,4807**	
Average value	**3,1543**	