

European Education in Geodetic Engineering, Cartography and Surveying – Skills of graduates required by European enterprises

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Key words: European surveying education, Bologna Process, thematic network, skills of graduates

SUMMARY

In 1999 the European ministers of education started the Bologna Process with the idea to build up a European Area of Higher Education until 2010. In 2002 the project “European Education in Geodetic Engineering, Cartography and Surveying (EEGECS)” started in answer to these plans. The project aims to facilitate trans-national access to educational resources in Europe and to enable graduates in Geodetic Engineering, Cartography and Surveying (GECS) to work all over Europe. Partners of this project are higher education institutions, professional associations and research centres from 18 European countries.

The presented paper gives an overview on the situation on the profession of GECS in Europe under the following aspects:

- graduates (Bachelor, MSc, PhD) within the companies
- expected skills of graduates
- continuous lifelong learning
- mobility across Europe

1. INTRODUCTION

For many years every country in Europe just followed its own way in professional training and education. Maybe some of the countries risked little side views to neighbours, but that was not really relevant. The European Union brought new impacts to the whole field of education. The trend towards greater compatibility and mutual recognition got stronger and stronger and first ideas of a European knowledge-pool were created. In 1999 the European ministers of education started the Bologna Process with a joint declaration. The big goal of this process is to establish a European Area of Higher Education until 2010. This vision builds up the background of the project “European Education in Geodetic Engineering, Cartography and Surveying” (EEGECS), a thematic network for higher education, which started in the year 2002. Six working groups with members all over Europe are working together focusing on the formation of a European network in surveying education.

2. BOLOGNA PROCESS

In 1998 the general principles for the process were laid down in the Sorbonne Declaration. It highlights the key role of universities in developing European cultural dimensions. That fits the context of mobility and employability of European citizens. On 19 June 1999 the European ministers of education signed the Bologna Declaration to establish the European area of higher education. Every two years the ministers meet to revise the process and set priorities. In the Prague Communiqué (2001) they especially appreciated the ongoing work on quality assurance and also recognized the need for lifelong learning and education.

In the Berlin Communiqué (2003) ministers responsible for higher education from 33 countries reconfirmed the social dimension of the Bologna Process and constituted as priorities for the next two years the efforts for effective quality assurance systems and to improve the recognition system of degrees and periods of studies [Steinkellner and Heine, 2005].

2.1 Bergen Communiqué (2005)

In 2005 Ministers from participating countries of the Bologna Process have met in Norway for a mid-term review and for setting goals and priorities towards 2010. They took note of the significant process made towards the goals in the last years and highlighted the following items:

- **Taking stock**

It was noted with satisfaction, that the two-cycle degree system is implemented in most countries with more than half of students in it. But there is a need for a greater dialogue, especially with public service, for the employability of graduates with bachelor qualification.

Based on the criteria exposed in the Berlin Communiqué most of the countries have made provision for a quality assurance system. But there is a strong need for student's involvement and international cooperation.

36 of the 45 participating countries have ratified the Lisbon Recognition Convention. All countries will prepare national action plans to enhance the process associated with the recognition of foreign qualifications.

- **Further challenges and priorities**

There is a need for structured doctoral programmes with transparent supervision and assessment. These programmes must promote interdisciplinary training and transferable skills for a wider employment market. A Follow-Up Group will prepare a report about the basic principles for doctoral programmes to be presented in 2007 in London.

The social dimension includes measures taken by governments to help students, especially from socially disadvantaged groups.

Mobility of students is one of the key objectives of the Bologna Process. Therefore it is necessary to intensify the efforts for mobility programmes – especially an easy delivery of visa and work permits.

The European Higher education Area must be open and attractive as a partner for higher education systems in other regions of the world.

3. THE PROJECT “EEGECS”

The EEGECS project aims to facilitate trans-national access to educational resources in Europe and to enable graduates in Geodetic Engineering, Cartography and Surveying (GECS) to work all over Europe. Partners of this project are higher education institutions, professional associations and research centres from 18 European countries. The activities planned to cover these EU-objectives are organised in six working groups:

- Undergraduate Education
- Research
- Continuous Education
- Public / Private Enterprises
- Mobility, Languages; Culture
- Quality Assurance

3.1 EEGECS – Working Group 4

Working Group 4 is mainly dealing with the expectations of public and private enterprises. For more than three years an active group of about ten members was working on the following topics:

1. Surveying of skills of GECS graduates demanded by the public and private enterprises
2. Analysis of branches of industry in which GECS graduates are needed
3. Promotion of graduates' mobility, of technology transfer, and of research co-operation
4. Implementation of a network of enterprises disposed to employ GECS students for practical training
5. Enhancement of co-operation between Universities and the private/public sector

Primary questionnaires were used to gather the necessary information from private and public surveying institutions to fulfil the work plan. The questionnaire has been distributed by the members of the working group to more than 200 companies and institutions in 18 European countries. Finally 104 questionnaires were completed by the enterprises (Fig.1).

4. THE PROFESSION OF “GECS” IN EUROPE – REQUESTED SKILLS

In order to gather information referring the topics mentioned above, a four page questionnaire has been developed and distributed to public institutions (governmental, regional and municipal sector) and private enterprises via internet, e-mail, regular mail, fax or personally. All information of the completed questionnaires had been digitized and stored in a common database.

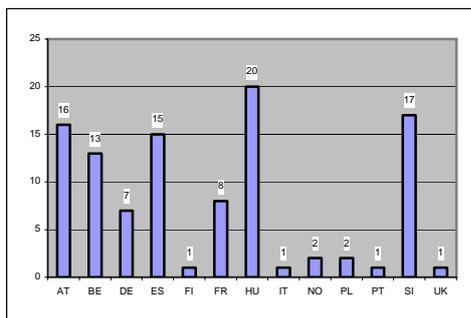
The analysis of these data was carried out by three project members from three different countries – Slovenia, Austria and Spain - to assure unbiased results.

The achieved results give an overview of the actual situation of the profession of GECS in Europe under the following main aspects:

- Segmentation and main fields of activities of private/public enterprises
- Number of graduates within the company

- Main fields of activities of graduates within the companies
- Skills of GECS staff expected by the enterprises
- Continuous Lifelong Learning
- Mobility across Europe

It is an interesting fact, that the response rate from the “new” EU – member countries (i.e. from Central Europe) was higher than the rate from the “old” members. Hungary had the biggest response rate to the questionnaires over all (Fig.1). From the three “new” members of the E.U. Hungary, Poland, Slovenia 39 questionnaires were completed whereas the nine “old” E.U. members Austria, Belgium, Spain, France, Germany, Norway, Finland, Portugal and Italy delivered together only 65 questionnaires (Fig.2).



AT Austria
 BE Belgium
 DE Germany
 ES Spain
 FI Finland
 FR France
 HU Hungary
 IT Italy
 NO Norway
 PL Poland
 PT Portugal
 SI Slovenia
 UK United Kingdom

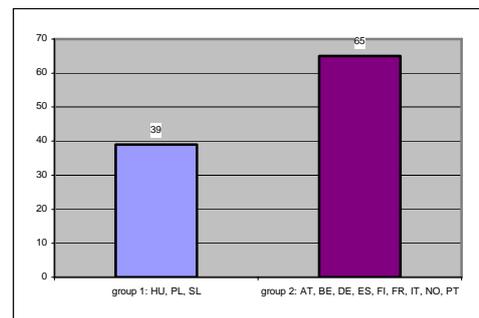


Fig.1: Response rate of questionnaires

Fig.2: Grouped response rate

4.1 Segmentation private/public companies

The main focus of working group 4 is on the private sector and its expectations from the graduates. According to the objective about 75 % of the questionnaires included in the analysis are from private companies' and about 25 % from public institutions (Fig.3).

4.2 Number of graduates/Segmentation within the company

As a matter of fact, the number of graduates working in companies/institutions is almost as high as the number of non graduated employees. Figure 4 shows the segmentation of graduates (BSc, MSc, PhD) and non graduates (others) of 85 companies/institutions.

It has to be remarked, that the definition of the different exams in many cases differentiates from country to country. In this analysis the following graduation had been used:

- Bachelor Degree (3-4 years of education)
- Masters Degree (5-6 years of education)
- PhD Degree (> 8 years of education)

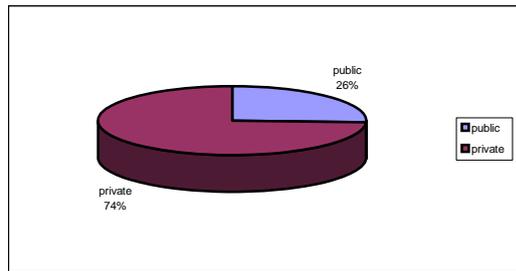


Fig.3: Distribution of sectors (public/private) in the analysis

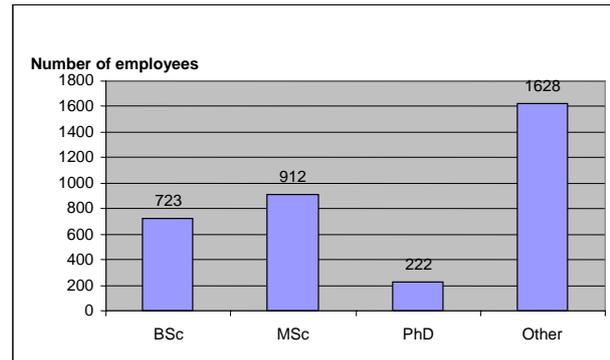


Fig.4: Segmentation between graduates and non-graduates in the companies

4.3 Main fields of activities of graduates within the companies

It has to be remarked, that in smaller companies employees with higher education such as PHD are also partly active in the area of production (Fig.5), whereas in big companies they are only active in the management sector. The major part of non-graduated employees is working in the administrative sector of the company/institution.

4.4 Main fields of activities of the companies

The results of the study show that the major part of the company's activities today is focused on technical land surveying, which takes in average more than one third of the companies recourses.

Another 27% flows into other activities, mainly administration, marketing and promotion and management. Land management covers 15% of the company's activities, software development 13% and real estate economics and land valuation and construction are of minor relevance.

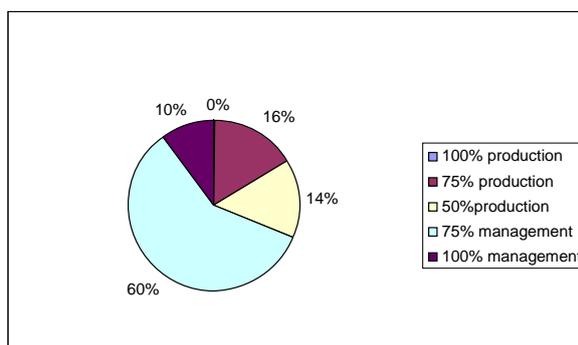


Fig.5: Share of activities of the MSc

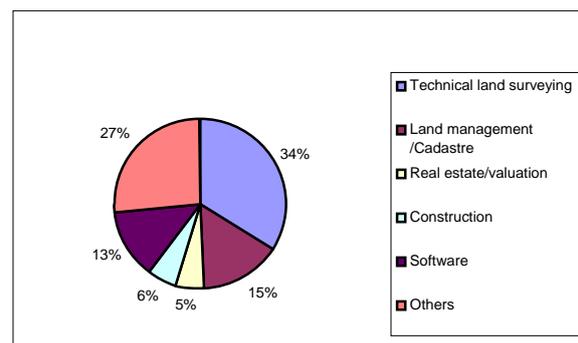


Fig.6: Companies main activities

4.5 Skills of GECS staff now and in the future

The companies have been asked about the importance of different skills in their daily business and their opinion about the trend for the future business. On that score the skills of GECS staff were examined considering the following aspects:

Geodesy, land surveying, mining/engineering surveying, photogrammetry, laser scanning, GIS development, GIS support, Digital Terrain Modelling, cartography, law, planning, urban development, rural development, valuation, finance and taxation, building economics, marketing, land and farm management, building design, construction technology, building quantities, cost control, basic competencies (i.e. mathematics) and soft skills (i.e. presentation skills).

The results of the analysis show, that traditional geodetic skills are very important for the involved companies at the moment and are anticipated as very important also for the future. But other skills which are not really traditional for surveying companies are gaining of importance very fast. These skills are for example GIS support (Fig.7), information technology, foreign language, presentation techniques and project management (Fig.8). The most of companies realized that traditional skill will not be enough for successful management in the future. The detailed results regarding the skills of graduates are available online at the project website (www.top.upv.es/eegecs/main.asp) at the section of working group 4 as well as in the Annual Report 2004/2005 of the project [EEGECS, 2005].

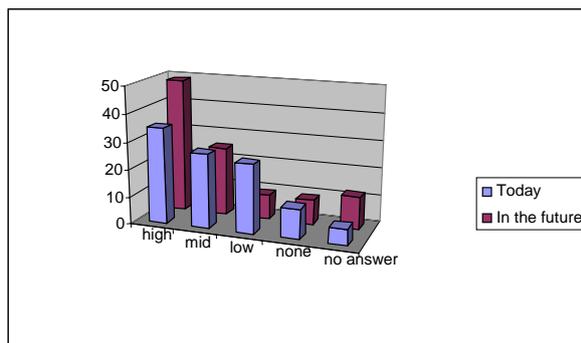


Fig.7: Estimation of importance of GIS support for today and for the future

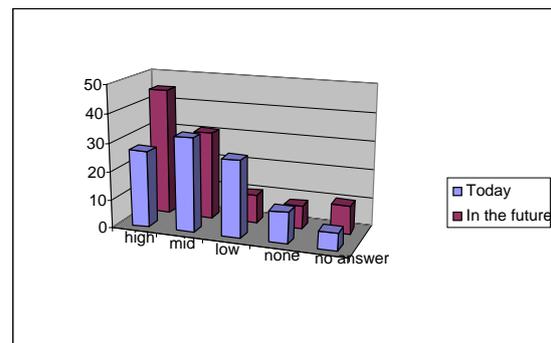


Fig.8: Estimation of importance of Foreign language for today and for the future

4.6 Continuous Lifelong Learning (LLL)

More than 65% of the companies support life long learning activities of their graduated GECS employees. Almost half of them are covering the course costs and are providing working time for training programs (Fig.9). The largest number of persons is getting trainings in the field of management skills, communication skills and Information and Communications Technology (ICT) skills (Fig.10).

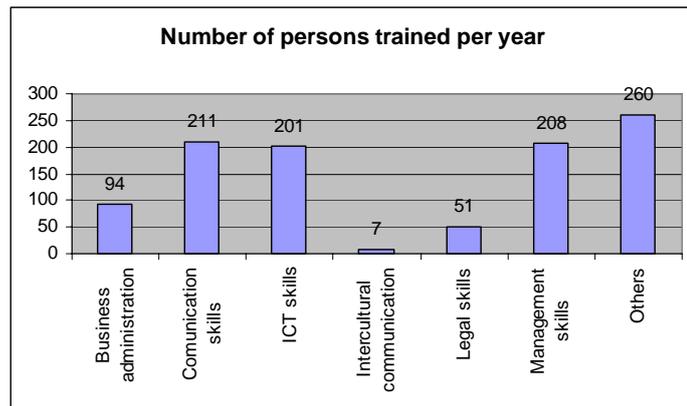
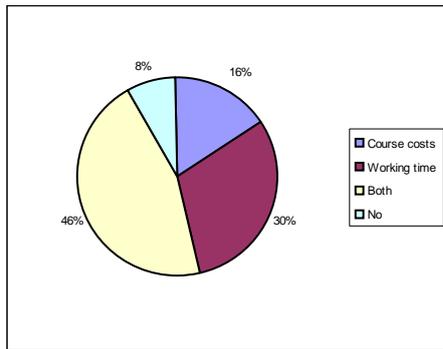


Fig.9: Way of support for LLL activities by the enterprises Fig.10: Number of persons trained per year

4.7 Mobility across Europe - willingness to employ GECS trainees from abroad

More than 75 % of the companies are willing to accept GECS graduates from abroad for practical training; most of them for a period between one to three months. A big difference in the acceptance proportion is observable when comparing the answers of group 1 (SI, HU, PL) and group 2 (“old” EU members). Almost 65% of companies from group 1 answered that they would accept students for practical training for 1 to 3 month and only 10% would accept them for a period of 4 to 6 month (Fig.11). Unlike only 39 % of the companies of group 2 would accept trainees for a period of 1 to 3 month but 41 % of them for a period of 4 to 6 month (Fig.12).

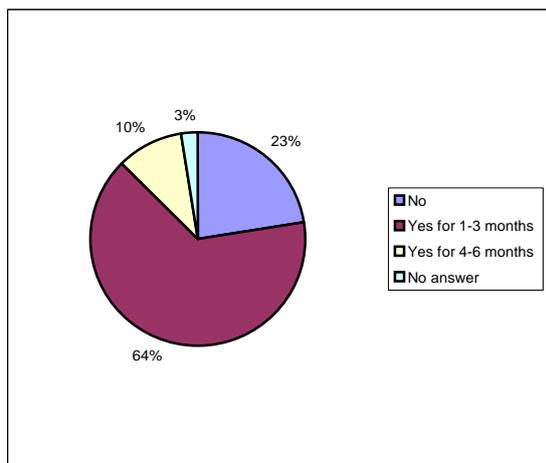


Fig.11: Willingness to employ trainees (companies from PL, SI, HU)

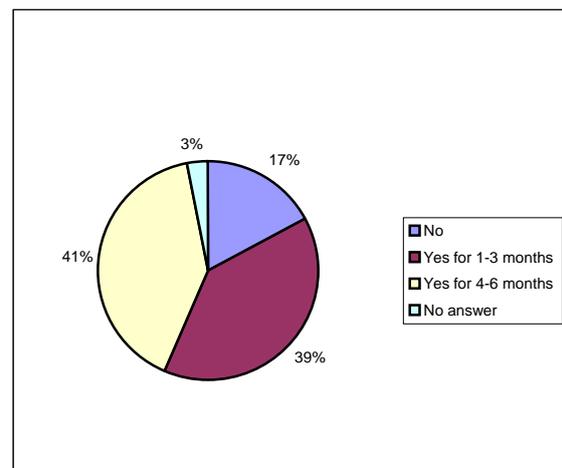


Fig.12: Willingness to employ trainees (companies from “old” EU countries)

5. EEGECS NETWORK FOR COMPANIES, STUDENTS AND GRADUATES

One of the most important outcomes of this project will be a network of companies dedicated to Geodetic Engineering, Cartography and Surveying in a European context. The purpose of this network is to provide a contact platform for those who are looking for partners, graduates or students for practical training from other European countries, and for graduates who are seeking such possibilities.

The core of this network will be a website on our project server that includes the contact details, logo and internet link of those companies who are willing to accept students for practical training. Due to the fact, that participants from 18 European countries are collaborating in the project, visitors to this network from all over Europe can be expected.

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ACKNOWLEDGEMENTS

The basis for this paper is an analysis based on questionnaires which are part of the research of working group 4 of the EEGECS project (European Education in Geodetic Engineering, Cartography and Surveillance). These questionnaires have been developed and distributed by the members of working group 4. The authors would like to thank all working group members for the effort undertaken to gather the information needed, our special thanks go to:

Francisco GARCIA GARCIA Coordinator of the EEGECS Thematic Network; Dean of ETSIGCT, Universidad Politécnica de Valencia, Spain

Guido KIPS Katholieke Hogeschool Sint-Lieven, Gent, Belgium

Emmanuel NATCHITZ ESTP (Ecole Spéciale des Travaux Publics, du Bâtiment et de l'Industrie), Paris, France

Dora PAULIK Institution of Geodesy, Cartography and Remote Sensing (Fömi), Budapest, Hungary

Jorge RECIO Polytechnic University of Valencia, Spain

But we also would like to take this opportunity to thank the participating companies and institutions for taking their time to fill out and send back the questionnaires.

BIOGRAPHICAL NOTES

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