

## **Employability of engineering graduates – Case: Results of Finnish Engineering Graduate Feedback Survey 2014**

**P. HYOTYNEN**

*Advisor, Education Policy  
Academic Engineers and Architects in Finland TEK  
Helsinki, Finland  
[pirre.hyotynen@tek.fi](mailto:pirre.hyotynen@tek.fi)*

**S. KOKKO**

*Career Specialist  
Academic Engineers and Architects in Finland TEK  
Helsinki, Finland  
[simo.kokko@tek.fi](mailto:simo.kokko@tek.fi)*

**J-P. TEINI**

*Secretary of Educational Affairs  
Student Union of Tampere University of Technology  
Tampere, Finland  
[koposihteeri@ttyy.fi](mailto:koposihteeri@ttyy.fi)*

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### **1 INTRODUCTION**

As a result of long lasting cooperation within the field of engineering education in Finland, Academic Engineers and Architects in Finland TEK and the universities of higher engineering education have conducted a joint feedback survey on national scale for M.Sc. graduates since 2011. The main target of the feedback survey is to gather accurate and comparable information on the quality of the M.Sc. degrees, the competencies gained by the graduates and their employment at graduation. The results serve as a tool for engineering education development as well as for influencing education policy.

The universities involved are the four schools of technology in Aalto University, Lappeenranta University of Technology, Tampere University of Technology, University of Oulu, University of Turku, University of Vaasa and Åbo Akademi. In multidisciplinary universities only the faculties of technology are involved in the survey. It is worth noticing that this annual feedback survey nowadays covers 100 % of the Finnish M.Sc. graduates of technology making it a very extensive research. A total of 1 526 out of 2 627 graduates participated in the survey in 2014, resulting in a response rate of 58 %.

The target is not only to offer comparable data and develop engineering education in general, but also to provide a practical tool for the universities to deepen their cooperation. TEK provides the forum and acts as a coordinator of the survey. Alongside universities, also other relevant stakeholder groups such as companies and other representatives of working life, professional associations and policy makers are actively involved in the development of engineering education. Students are also a vital stakeholder group when it comes to education development. After all, the decisions taken today affect the expertise and employability of the engineering professionals in the future.

## 2 CONDUCTING THE GRADUATE FEEDBACK SURVEY

The annual feedback survey is carried out using an electronic SurveyPal-questionnaire. The participating universities market the survey to their graduating students. The questionnaire is open from beginning of January to the middle of next January. The results are collected and analyzed by TEK. The number of respondents from Turku University, Vaasa University and Åbo Akademi are yet very small, but expected to rise in the following year. The survey covers a wide range of topics, such as duration of studies, importance and development of skills and competencies, study guidance, theses work, work experience prior to graduation, employment situation at the time of graduation and over all satisfaction and open feedback. In this paper the focus is on the employability of graduates. The results of international graduates are also compared with the Finnish ones.

University	Graduates	Responses	%	Response rate, %
Aalto University/School of Electrical Engineering (ELEC)	214	161	11	75
Aalto University/School of Engineering (ENG)	350	234	15	67
Aalto University/School of Chemical Engineering (CHEM)	147	69	5	47
Aalto University/School of Science (SCI)	274	182	12	66
Lappeenranta University of Technology (LUT)	392	197	13	50
University of Oulu	297	117	8	39
Tampere University of Technology (TTY)	812	525	34	65
University of Turku	49	8	1	16
University of Vaasa	30	17	1	57
<b>TOTAL</b>	<b>2627</b>	<b>1526</b>	<b>100</b>	<b>58</b>

Table 1. Number of responses and response rates

## 3 RESULTS OF THE FEEDBACK SURVEY 2014

### 3.1 Employment at time of graduation

As seen in Figure 1, 60 % of the newly graduated are employed at the time of graduation, 25 % are looking for a job and 6 % are continuing with post graduate studies. The percentage of the employed respondents is similar to the result in 2013. The percentage of the employed graduates was 10 % higher in 2011 and 2012, but the weakened economic situation has clearly effected the employment of the new graduates.

It is common for the Finnish university students to gain work experience prior to graduation. Students mostly work during the summer months, but some have temporary work assignments or even longer contracts also at other times. The work experience gained by engineering students is typically field related. According to the feedback survey results, the average amount of work experience prior to graduation was 25 months. 18 months (72 %) of this was specifically field related. The work experience, along with the networks and contacts from working life seems to be the way to be employed. As seen in Figure 2, the employability clearly increases according to the amount of work experience gained prior to graduation. According to results, almost 80 % of graduates are employed to places where they had conducted the Master Theses (48 %) or otherwise had been working at during studies (29 %). Only one in five of the employed graduates had no prior relation with their current employer.

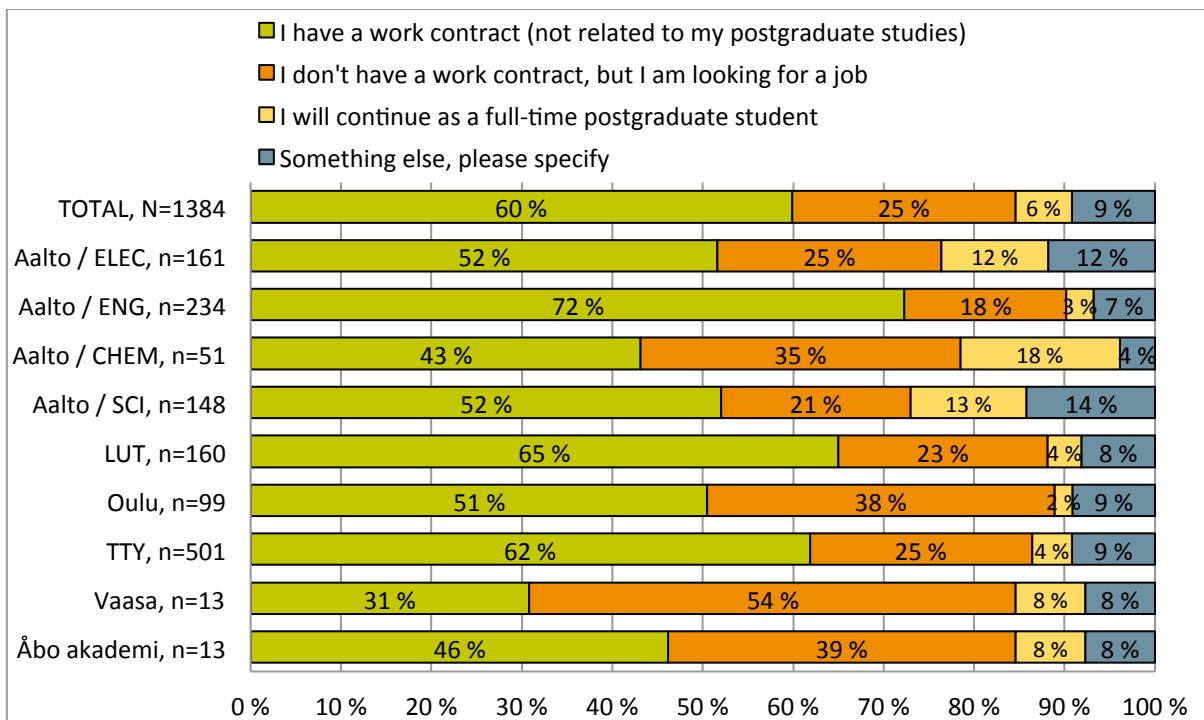


Figure 1. The employment situation at the time of graduation

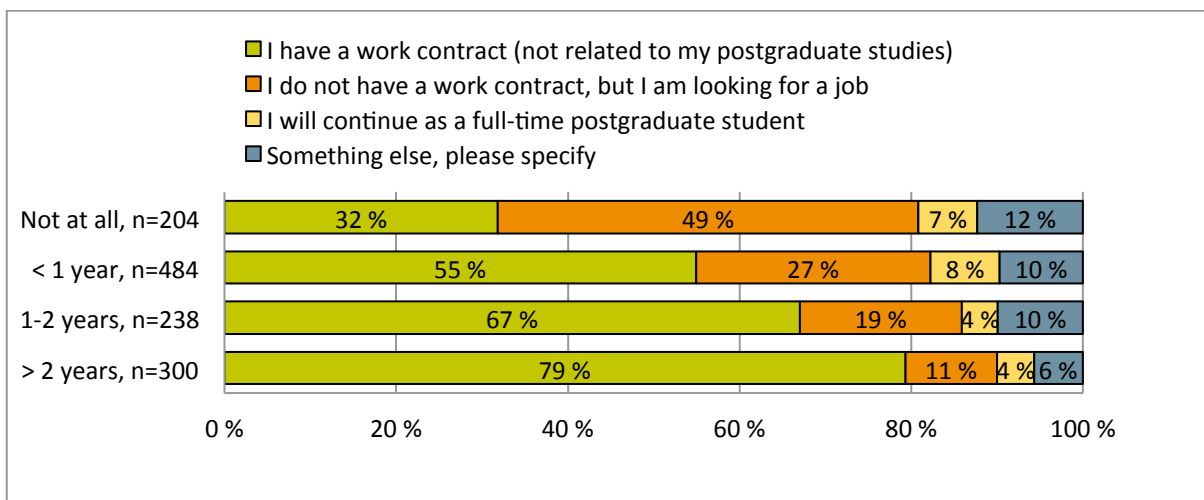


Figure 2. Employment situation according to work experience prior to graduation.

### 3.2 The Correspondence of M.Sc. degree and employment

Employment as such is important for any graduate, from a professional as well as from an economic point of view. The employment rate of the graduates can to a certain extent measure the quality of the degree. However, it is more informative to look at how well the current job corresponds with the former studies. M.Sc. degree gives a broad range of competencies and thus the graduates can be well employed also to other fields outside their own. The correspondence of the current employment with the level of education is thus an even better indicator of degree quality. The percentage of graduates who feel their current job corresponds well or very well to their line of education is 79 %. The same amount, 79 %, also feel that the level of responsibility in current job corresponds well or very well to the level of education. There is a slight increase of 2 percentage units compared to the results of the previous year. According to these results it could be argued that for those who have been employed, the education meets the requirements of the working life quite well.

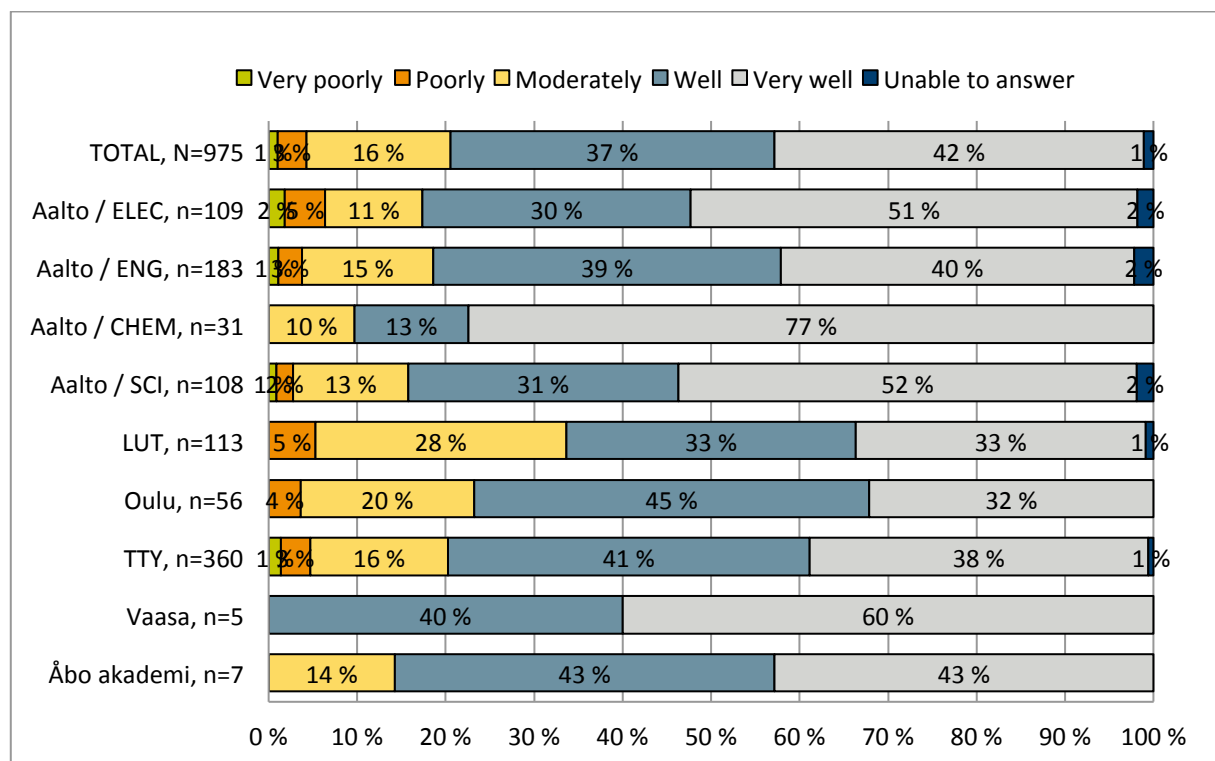


Figure 3. How well do the requirements of current employment correspond with the level of education?

### 3.3. Employability of international graduates in Finland

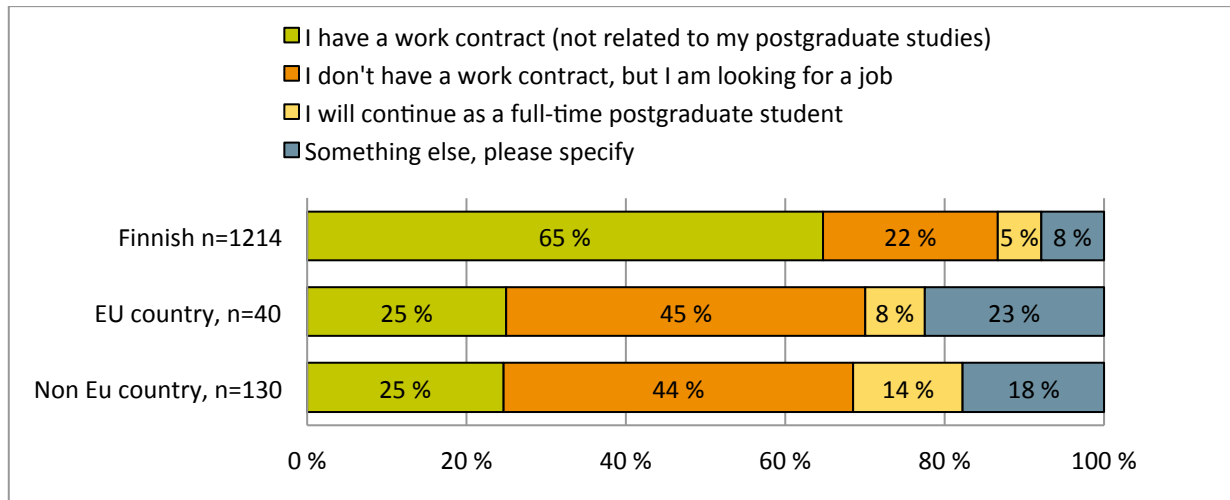


Figure 4. Employment situation according to respondent's nationality

The nationality of the respondent seems to have an effect on the employment situation. As seen in Figure 4, 65 % of the Finnish graduates were employed, but only 25 % of the international graduates had a job at the time of graduation. On the other hand, the international graduates are choosing to continue with post graduate studies more often than the locals.

As was stated already in Figure 2, work experience and contacts in working life have a significant influence on the employability of graduates. According to results, the international students typically have much less work experience at graduation than their Finnish peers. For example, the amount of international students having no work experience prior graduation is 23 % (EU citizens) and 28 % (non-EU), however the same applies to only 4 % of the Finnish graduates. On the other hand, 41 % of Finnish graduates have over two years of work experience, whereas only 8 % of students from other EU countries and 9 percentage from outside EU. This is one of the key factors affecting their poorer employability. According to experience of TEK's career services, the other factors affecting the employability of international graduates is the lack of contacts and networks (especially outside the university sector) and a poor comprehension of the Finnish language and (working life) culture.

## 4 CHANGES AND DEMANDS OF WORKING LIFE

### - how students assess the working life skills

The rapidly changing working life places continuous challenges on the university graduates. Before the focus has been more on the professional expertise and subject-specific knowledge and they are still considered paramount. However, other skills and competencies are also becoming more desirable in working life [1]. Specifically interpersonal skills are becoming more and more important. The conjoint analyses show that interpersonal skills (communication skills team working skills et cetera) are nowadays almost as important as professional expertise. Similar outcomes were reported in a work shop organized by TEK in December 2014 including a pool of university management and teaching staff, students, industry

representatives and other relevant stakeholders of engineering education. These experts listed social skills, self-esteem, ability and attitude towards lifelong learning and problem solving skills to be the most important competencies in addition to professional field specific knowhow.

Similar results are seen in the graduate feedback survey. The respondents were asked to assess various working life skills according to the perceived importance in working life as well as their development within the formal studies and through work experience gained prior to graduation. However, it should be noted that the views of graduates and employers or other working life experts may actually differ somewhat on the factors affecting employability. According to study by Tibby [2] this could be due to lack of careers information, confusing messages from employer surveys or misconceptions about definitions. As presented in Fig. 5, the most important working life skills are problem solving skills, ability and attitude for lifelong learning, field specific professional expertise, team working skills and communication skills. In addition to these, also skills related to self-management such as time management and self-confidence are considered important. The graduates assessed their current level of various skills and competencies to be less than the perceived importance in working life.

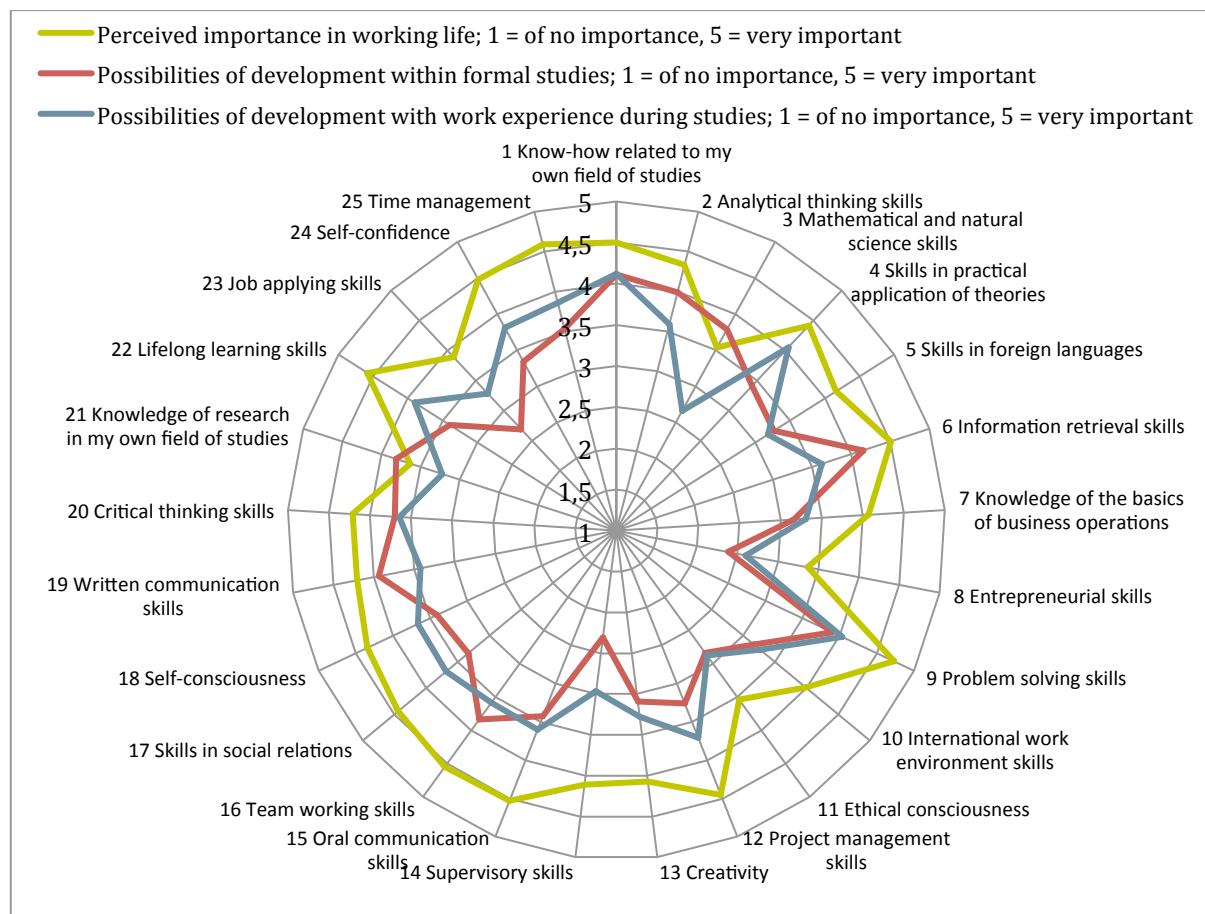


Figure 5. Importance and development of skills and competencies, all respondents

Within the skills regarded as most important, team working skills were considered to develop better in formal learning than through working experience. Social relation skills on the other hand are an example of skills that had developed better via work

experience than formal university studies. Other skills developed especially through work experience are the ability for lifelong learning, self-confidence and time management. Problem solving skills and field specific knowledge had developed just as well in formal studies and through work experience.

## **5 THE ROLE OF STUDENTS IN DEVELOPEMENT OF ENGINEERING EDUCATION AND UTILIZATION OF FEEDBACK DATA**

Finnish university students are active stakeholders when it comes to developing education. Students, mostly represented by Student Unions, are also a part of the university administration in academic affairs. Besides the mandate positions, students are also invited to unofficial organs for developing degree programmes or education. Altogether the students have very good official and unofficial channels to influence the development of education in their university.

Besides university administration, students are also widely represented in labour market organizations. For example, TEK has student representatives in the organizations' council, board and committees, which covers all levels of decision making in TEK. In addition to TEK's official organs, the steering group for the graduate feedback survey described in this paper also has a student member.

How can students enhance education? One way is providing teachers information from the feedback survey, for example on the importance and development of skills and competencies. In other words, are the universities teaching the right things from the future professionals point of view? Given the huge amount of feedback and other data available, the teaching staff can appreciate customized information for example on degree programmes and turnkey solutions provided by students. The student union in Tampere University of Technology is currently enforcing teaching methods providing better skills in human interaction such as oral communication, social relations and supervisory skills. The results of the graduate feedback survey clearly indicate that these skills are very important to develop when enhancing the employability of newly graduated.

## **6 CONCLUSIONS**

The results of the annual graduate feedback survey give a profound picture of the employability, competencies and overall satisfaction of graduates from the Finnish universities of technology. In this paper the focus has been on the employability and assessment of the importance and development of various working life skills and competencies. The graduates are quite well employed and the responsibility of the current job corresponds well to the level of education. Working experience and contacts is a key factor for graduates to be employed. International graduates typically have much less, if any, work experience prior to graduation. This clearly has an effect on their much poorer employment compared to local graduates. International students should therefore be encouraged to integrate with local community, form contacts and gain work experience. Also, the universities, student unions, employers, professional associations and other stakeholders should

cooperate to enhance the employability of international graduates in Finland. Otherwise the country is not utilizing the full potential of these professionals.

The graduates assessed their current level of skills and competencies to be less than the perceived importance in working life. It could be argued that the graduates are realistic about the level of their skills as they are yet in the beginning of their careers. Within the skills regarded as most important, team working skills were considered to develop better in formal learning than through working experience. This could be due to group working methods being utilized more nowadays in university learning environment. The results of the graduate feedback survey emphasize the assumption that formal and informal learning complement each other when it comes to development of various skills and competencies. Also, alongside professional expertise, the importance of other working life and career competencies is increasing. This trend should be taken into consideration already in the university curricula in order to ensure the professional capability and employment of future university graduates. Ideally the learning of these skills is integrated into degree covering the entire degree, not as separate topics or courses.

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