

Reselection of Engineering Studies - Are Women in Finland Opting Out of Technology?

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Keywords: engineering graduates, diversity, gender, equality

1. INTRODUCTION

The under-representation of girls in science, technology, engineering and mathematics (STEM) studies and women in technology industry is a subject of great interest to educators, policy makers and industry. The subject is studied widely and is high on the agenda in various engineering education forums as well as higher education policy discussions. The gender gap can be seen problematic both from the perspective of industry, which risks missing potential talents as well as society which suffers from the consequences of inequality, such as unequal pay. Not only are girls and women under-represented in the STEM fields but women are also less likely than men to pursue STEM careers, and more likely to drop out from STEM careers at all stages. This phenomenon is often referred to as a leaky pipeline (e.g. Blickenstaff¹).

Academic Engineers and Architects in Finland - TEK is a service and labour market organization for postgrad professionals in the area of engineering and technology. The 73 000 members of TEK mostly hold a M.Sc. degree in engineering, technology, architecture or natural sciences. In addition to labour market issues, TEK actively participates in the development of engineering education and further professional development. This is done in close collaboration with higher education institutions, political authorities, representatives of working life and other relevant stakeholders.

One of the practical tools used for monitoring the quality of engineering education is Graduate Feedback Survey² which is directed at newly graduated M.Sc. engineers and architects. TEK and the Finnish universities of higher engineering education have conducted a joint feedback survey on a national scale for graduates since 2011. The main purpose of the feedback survey is to gather comparable information on the quality of the Finnish engineering M.Sc. degrees, the competencies gained by the graduates, and their employment after graduation. This graduate feedback survey covers over 95 per cent of the Finnish M.Sc. engineering graduates. In 2014, 58 per cent of the 2627 graduates participated in the survey. The respondents were asked whether they would at the time of graduation reselect engineering studies. According to the results, satisfaction of recent graduates with their original choice of studies is high, since 86,6% of the respondents would choose engineering studies again.

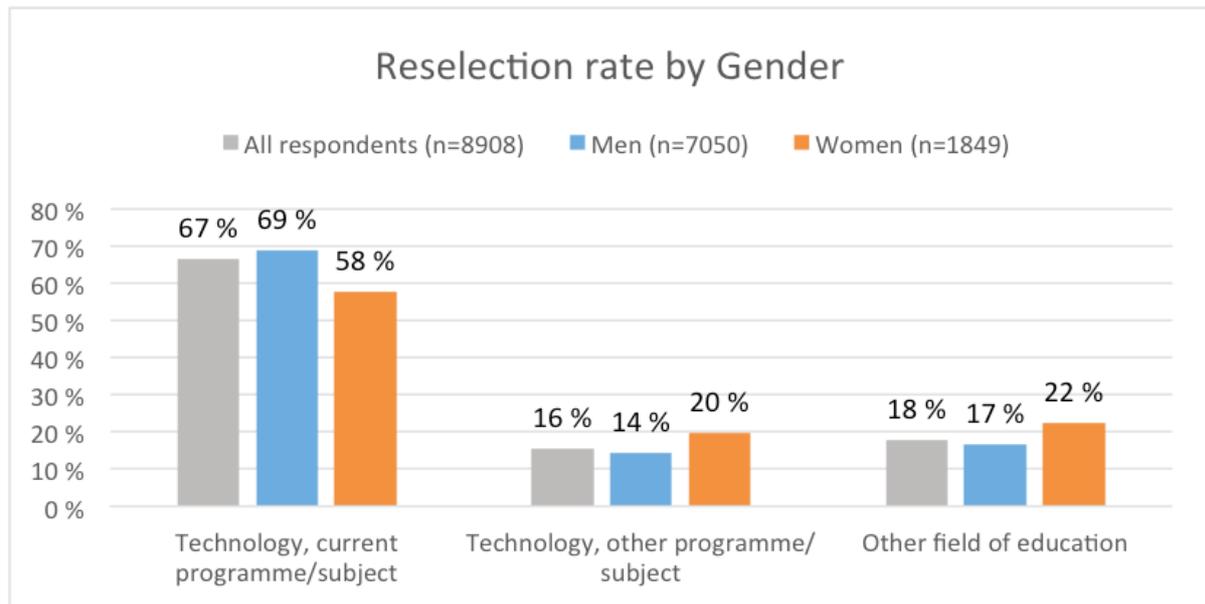
In the Survey on Professional Development³ conducted in spring 2014, TEK members were asked whether they would now reselect their current field of study. The results showed a remarkable difference between men and women: 77 percent of men but only 59 percent of women stated they would now reselect their field of study. This deviates strongly from the results of the annual Graduate Feedback Survey² referred to earlier wherein such gender difference does not exist. Since the professional development survey is targeted (with approximately 700 respondents), it was deemed necessary to study this issue in more detail with a larger population. Therefore, the tendency to reselect one's field of study was included in the Labour Market Survey³ conducted in October 2014 (with approximately 12 000 respondents).

TEK conducts annual Labour Market Surveys in order to gather information on the labour market situation, working hours and salaries of TEK members. Most recent survey was conducted in October-November 2014. Altogether 11991 TEK members took part in this survey (response rate was 28 %).

All respondents were asked: If you could choose again, which basic degree or other education would you choose now? The answer options are shown in Graph 1. The respondents were also given the opportunity to explain their answer by submitting open comments. In this paper, we focus on respondents with an M. Sc. degree in Engineering (n=9440).

This paper presents results from the 2014 Labour Market Survey⁴ and Professional Development Survey concerning reselection of engineering studies. The paper presents the reselection rate of TEK members by gender and age group and it explores certain factors impacting reselection, and discusses implications for engineering education.

2. RESELECTION OF ENGINEERING STUDIES



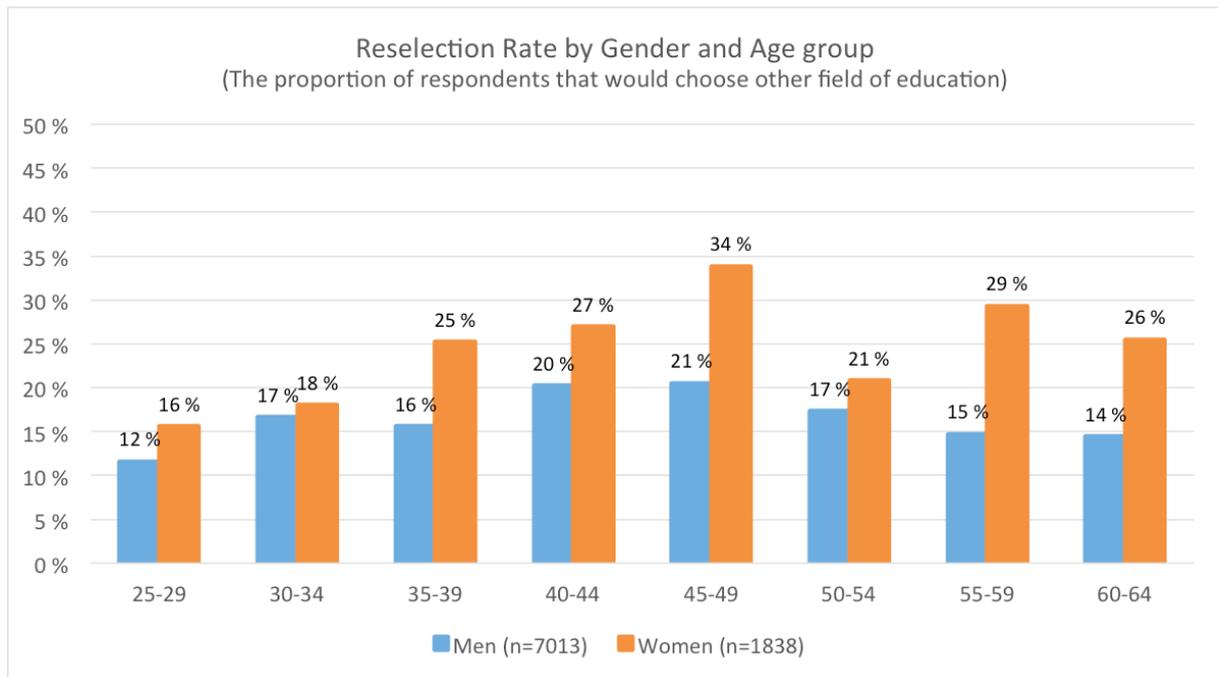
Graph 1. reselection - all respondents and reselection by gender

83 % of the respondents would still choose engineering studies either the programme they chose in the first place or another programme in engineering and technology. According to the respondents they are still interested in the field of engineering and technology, they find the job market situation good, they are satisfied with the content of the engineering studies and they find that the career opportunities in technology and engineering are good.

However 18% of the respondents would not choose engineering education if they would have a chance to make the decision now. There are dramatic differences between different age groups as well as between genders. When asked why they would be opting out of the field of engineering and technology the respondents argue that the job market situation is scarce and the salary level is not satisfactory to the respondents. The respondents also argue that they would choose another field than engineering and technology because they feel that their interests have changed or that they are not satisfied with the content of their current job.

Table 1. also presents the rate for reselection of engineering studies by gender. Women would be more likely to choose a new field of studies. They would also choose another program within engineering and technology more often than men.

Those men who would choose another field of education give following reasons: job market is poor, they are not satisfied with their salaries, or their interests have changed, whereas for women salary level is less often a motivation for choosing another field of education. They more often say that engineering studies was a wrong decision in the first place.



Graph 2. Reselection - age and gender

Graph 2 describes the reselection of engineering and technology by women and men from different age groups. It is worth noticing that women are more critical towards choosing engineering education again and there is major difference between men's and women's attitudes towards re-selecting engineering studies particularly at the age of 35 to 49 years as well as from the age of 55 to 64 years.

The respondents who are at the age of 25 to 35 years are less likely to opting out of technology than the older respondent groups. When asked for the reasons for choosing another field of education than engineering and technology, the respondents in all age groups argue that the job market for engineers is scarce. Also dissatisfaction to their salary level came up among the most common reasons across all of the age groups, with the exception of the age group from 60-64. All age groups also argue that they feel the career opportunities in engineering and technology are scarce. Many age groups also mention that they feel dissatisfied with the content of their current job. The age groups from 50 years and older feel that the field of engineering and technology was a wrong decision in the first place.

3. DISCUSSION

The under-representation of women in the field of STEM has been studied extensively in recent decades. In the research community and among people and organizations promoting gender equality projects, it has been acknowledged that sustainable improvements in women's position in STEM careers are achieved only through changes in institutional and organizational practice. (e.g. Pourrat, 2005⁵)

Nonetheless, "Engineering has proved remarkably resistant to gender change in spite of three decades of public and private sector backed efforts in many countries

to improve the representation of women in its ranks. (Lee & Faulkner, 2010⁶) Phipps⁷ (2007) explained that the dominant discourse still constructs the interaction of gender stereotyping with the masculine image of Science, Engineering and Technology (SET) disciplines and workplaces as preventing girls and women from choosing SET subjects and STEM careers. She stresses that the dominant “Women in SET” - framework based on the idea of “female lack” (lack of confidence, lack of awareness etc.) - re-inscribes the gender binaries that have, at a symbolic level, defined girls/women and STEM as mutually exclusive. Phipps pointed out that the attempts to “feminize” the image of SET (i.e. by presenting these fields as humanistic and cooperative) are based on a misunderstanding of the problem, because girls and women may not be deluded in associating SET with masculinity/ies.

In the literature and in previous studies conducted e.g. in the United States, the lack of women in Technology is often explained by difficulties in work-life balance and inhospitable climate towards women (e.g. Blickenstaff 2005¹). However, in the Nordic countries women are encouraged and financially fairly supported to have a relatively long leave of absence when they have children and due to publicly supported daycare, women are relatively equal in the labor market. Therefore, it may be necessary to seek other explanations for the under-representation of women.

According to the results of the 2014 Labour Market Survey conducted by the Academic Engineers and Architects in Finland TEK, women with the M.Sc. degree in engineering are less likely to reselect the field of engineering if they would have the chance to select again. These women have been in many ways crossing several critical turning points during their years in school, studies at the university and their careers and have been showing retention in many ways. At the time of graduation as well as during the first 10 years of their careers there are no signs that women would be more likely to opt out of engineering and technology than men.

The reselection of engineering and technology drops from the time of graduation with almost 10 % for both women and men at the age of 35 to 39. However when for men the reselection rate stays in approximately 80 % throughout their career, 34 % of women at the age of 45 to 49 years would opt out of the field of engineering and technology.

The most common reasons mentioned for opting out of engineering and technology were related to perceived scarceness of the job markets, dissatisfaction to the salary level and changed interests or poor career opportunities. None of the 9440 respondents argued that they would be opting out of technology and engineering because of difficulties in work-life balance. Only one respondent mentioned that the reason for choosing other fields than technology and engineering is linked to experiencing inhospitable climate towards women and even discrimination. According to the used data it looks like the work-life balance and inhospitable climate are not the factors explaining the leaky pipeline phenomenon for female engineers in Finland.

It is worth discussing whether the perceived scarceness of jobmarket and lack of career possibilities is linked to the mechanisms and features of the current job markets or more linked to what the future of work looks like. As discussed among others by Dr. Professor Ramakrishna at his keynote lecture in 2014 SEFI Conference, the features of job markets and future of work will include more mobility,

more variation but it also requires entrepreneurial mindset when work constitutes multiple jobs at the same time. Are the career opportunities scarcer than before? Has globalisation and digitalisation changed the engineer's job market permanently or is the insecurity and scarceness only perceived this way?

Career management skills and the ability to renew ones professional expertise are crucial skills in the future job markets. By discussing the future of work and future job markets already during the engineering studies and proving the graduates with career management skill, ability and thrive for lifelong learning the universities can play a key role in retaining the best skills in engineering career.

This practice based paper has had an emphasis on what the engineers are opting out and what are the reasons for opting out technology. Perhaps to the change of the "female lack" - discourse in STEM the focus of future surveys and studies should be more on what are the girls and women opting in when choosing engineering and technology careers. It would be also interesting to study whether the phenomenon of opting out ones current field is emerging only in engineering in Finland or whether other university graduates have similar considerations at the certain ages. Is this a phenomenon typical for certain fields or typical for certain ages? Or is the phenomenon linked to economic situation at the moment.

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