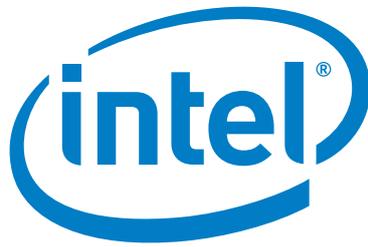


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# Skills Mismatch in Science Technology, Engineering, Mathematics - research report

# Acknowledgements



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# Executive Summary: Skills Mismatch in Science Technology, Engineering, Mathematics (STEM)

*In 2014, ThinkYoung, Intel and European Schoolnet set out to find out about the skills mismatch phenomenon which is affecting the employment of young Europeans. With over 900 000 unfilled jobs within the IT sector in Europe, a particular focus was given to STEM studies, and why people did or did not choose to study this, and the after affects of doing so. 2341 young Europeans were studied, as-well as 12 experts in the field of recruitment and STEM, developing a thorough understanding of what both young Europeans think on skills mismatch, as-well as employers.*

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## Introduction

The European Commission currently reports 2 million job vacancies in the Euro zone, with 22.8% of young people unemployed. Decision makers and employers have increasingly pointed to the issue of skills mismatch, which is repeatedly used to explain a shortage of skilled applicants on the labour market.

In 2012, ThinkYoung decided to address this issue by conducting a pan-European study on skills mismatch, which concluded that there existed a very strong cultural divide between young Europeans and employers, both in the definition and perception of the skills needed.

The following short review summarises the key findings of an updated study on skills mismatch, carried out in summer 2014, which this time focuses on the **Science, Technology, Engineering and Mathematics (STEM)** sector.

ThinkYoung, Intel and European Schoolnet seek to analyse whether recent STEM graduates are equipped with the right skills sets to meet the demands set out by employers, and further expose the relevance of the skills mismatch discourse in the issue of youth unemployment.

## 21st Century Skills

- **Innovation** is prevalent in female Romanian respondents from a non-STEM background
- Non-STEM Romanian graduates of either gender scored the highest for **creativity**
- **Critical thinking** is prevalent of British, Spanish and Belgian respondents
- Female non-STEM graduates from Spain are the most competent in **problem solving**
- **Self-reliance** and **communication** are well developed amongst respondents, with females being better at self-reliance
- **Technical skills** are ranked as the least developed amongst all 21<sup>st</sup> Century skills

Almost half of interviewed employers agree on the value of soft skills in STEM graduates, but their knowledge of what these constitute appears to be limited. Some employers also commented on the importance of communication and innovation, but there was no general consensus on the seven skills outlined above.

Instead, employers indicated the **importance of languages** in the STEM field, despite it being scientific, with the use of English being paramount. Employers also identified **cultural skills** and the ability to work in a multicultural setting as being of high value.

## Digital Competencies

- **Word Processing** is prominent for Belgian and British respondents
- **Spreadsheet software** is characteristic of STEM graduates from Romania and Bulgaria
- Male Greek and Belgian STEM graduates are the most proficient in **coding**
- **Collaborative software** is inherent to non-STEM Spanish, Belgian and British graduates

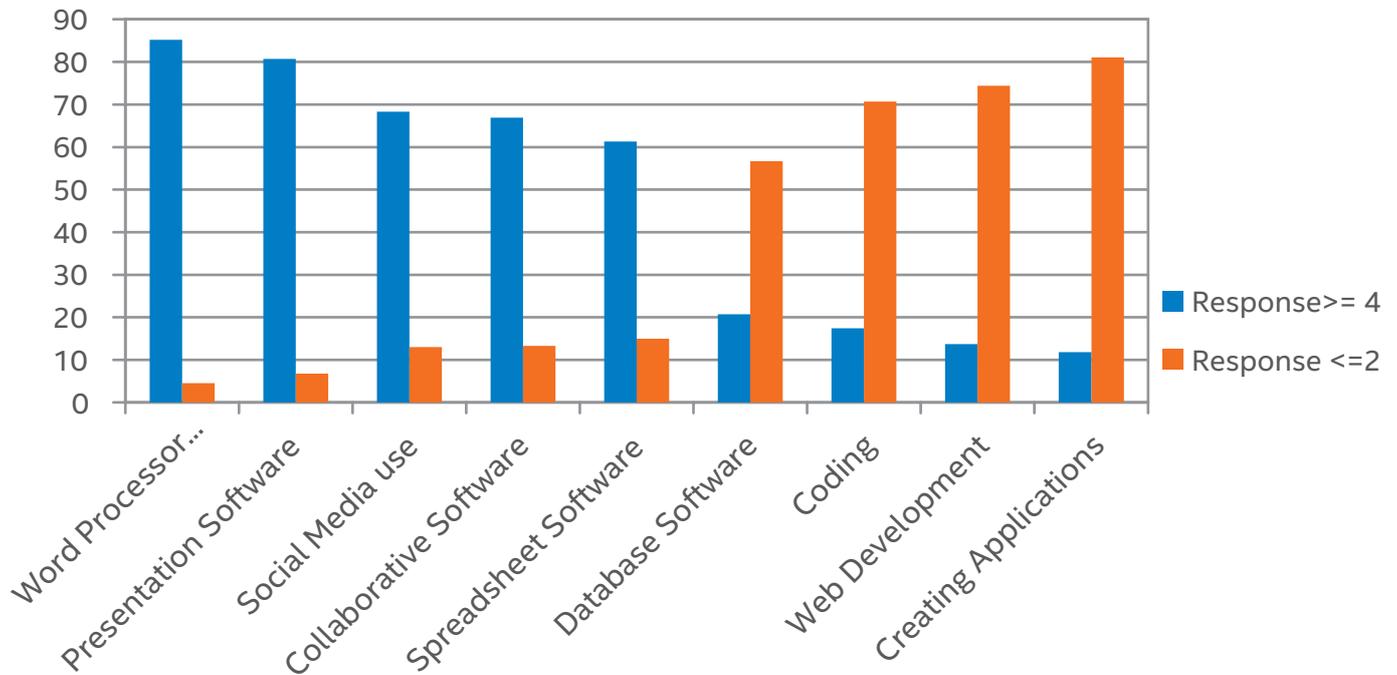


Figure 1 – Responses for ICT and Digital Competencies greater than 4 (>=4) indicate a high competency, while responses lower than 2 (<=2) indicate a low competency

- The least popular skills surveyed are **web development** and **application development**
- **Social media** is more prevalent amongst female graduates from a non-STEM background

There was no general consensus by employers on the lack or importance of ICT and digital competences. Employers working in this field indicated how they had **no major issues** in recruiting graduates from all fields to join their organisations. As such, they had no major contribution to this part of study.

## STEM Skills

- British graduates have the best developed **quantitative** and **qualitative skills** in research methods, with females faring better at quantitative research methods
- **Computation** and **Data processing** skills are predominant in Belgian and British respondents, with males being more competent in computation
- **Experiment design** and **risk assessment** scored the lowest in terms of STEM skills

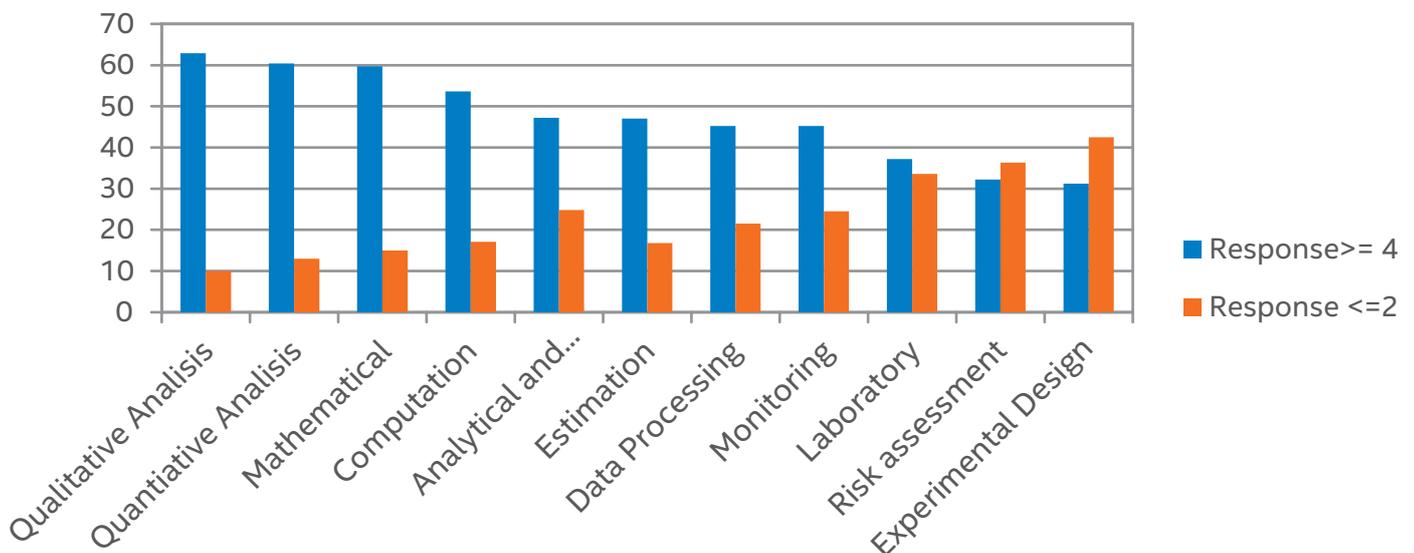


Figure 2 - Responses for STEM Skills greater than 4 (>=4) indicate a high competency, while responses lower than 2 (<=2) indicate a low competency

Employers provided **no general insights into STEM skills**. They neither agreed or disagreed that these are a prerequisite for hiring a candidate in a STEM field.

Employer respondents deplored the lack of mathematics and STEM skills in general among graduate pools, whilst others indicated that current graduates are not proficient in applying technical skills. A quarter of employers additionally expressed a strong **lack of business skills** among STEM graduates.

## Stigma

- The majority of STEM students cite **personal interest** behind their choice of education.
- Respondents scored **job security as not** being a driver behind their STEM choice.
- There were relatively **little differences between genders** in terms of why STEM was chosen.
- **No apparent difference** between STEM and non-STEM students for career choice.
- **Non-STEM respondents** indicated a general inclination towards other subjects and disinterest in STEM professions, leading to their different career choice.

Employers feel there is no stigma associated with a STEM career. A quarter of respondents indicated the general low numbers in female applicants in the STEM field.

## Mobility

- Close to half of the respondents have spent a period of their studies abroad, with 'gaining new language skills' being their main driver. Bulgarians are the most likely to embark on such a study period in order to improve STEM skills.
- The **United Kingdom and Germany** were listed as the most attractive European study destinations, while the United States was the most popular non-EU study destination.
- More than half of the respondents concluded that **mobility was a key factor** in improving their STEM skills and employability in general.
- A third of STEM and non-STEM graduates cite **financial difficulties** as hindering mobility

The main, but not definitive, outcome that may be concluded from the interview analysis is overall consensus among employers about a **lack of student mobility in STEM fields**.

## Employment

- Amongst respondents that had attended job interviews, a third indicated **not receiving any feedback** from employers.
- Alarming, those that received feedback cited **insufficient level of STEM skills** as the main type of feedback received.
- In contrast, 21st century skills and language skills appear to be the least likely reasons impeding STEM graduates from obtaining a job.

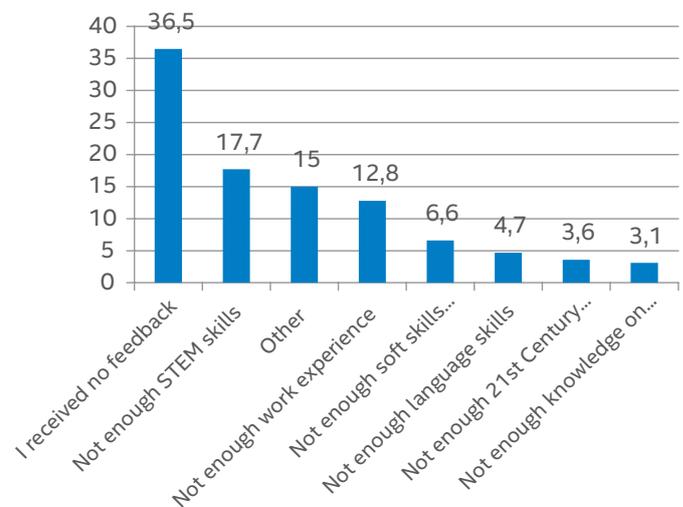


Figure 3 - Respondent's answer to the feedback received from a negative job interview

Employers agreed that **work experience is key criteria**, with a quarter of respondents pointing at SMEs as being a good source of experience. Despite current unemployment levels, half of the interviewed employers pointed at a **shortage of good applicants, especially for the IT and engineering sectors**.

A third of employers cited **difficulties in attracting people** to their industries as an employment barrier, with graduates' work-life balance and high salary demands being given as main reasons. In spite of this, interview respondents indicated that '**passion**' and '**drive**' are **central/essential qualities** that they screen for during the recruitment process.

Employers also recognise some issues which may hinder a candidate's employability, such as the fact that **some companies may not always recognise qualifications** from educational institutions located in a country different than the one in which the company is established.

## Conclusions

- **21<sup>st</sup> Century skills are more prominent in non-STEM than STEM graduates**, with the former showing/ demonstrating higher competencies in most of the seven skills investigated. However, employers do not undermine other skills such as languages, multicultural adaptability and business skills.
- When it comes to **digital competencies and STEM skills**, despite these being well developed by most STEM candidates, there appears to be no indication of their direct relevance to employers during the recruitment process.
- Given the balanced results from both quantitative and qualitative data obtained, this study can conclude that **no apparent stigma exists surrounding STEM careers**, with young people mainly choosing STEM and non-STEM subjects according to their personal interest
- **Employers did not directly point to mobility** as being either beneficial or a hindrance to STEM graduates. However, it has indirect implications as it is best way that STEM graduates can gain language and cultural skills through periods spent studying abroad. In spite of this, mobility can be a hindrance in terms of obtaining academic qualifications, which specific companies may or may not recognise.
- This study revealed that **skills mismatch as a fact may not be that relevant**. Yet it is still used by employers to account for the apparent lack skills they do not manage to find when hiring new graduates.

## Recommendations

A first, and central, point of recommendation drawn from this study is to **increase dialogue between employers and higher education institutions about STEM skills and STEM needs in the labour market**. This study has reported a difference/ misunderstanding in students' perception of the value of their qualifications (and skills developed through education) and the skills that are actually most relevant in the labour market. This perception gap is all the more complex to address given the difficulty that employers surveyed in this study have had to specify which STEM skills they identified of highest value for activities in their field. As a result, increasing dialogue between STEM graduates and STEM employers would not only allow to re-think the structure of STEM courses in tertiary education, but also promote a better skills match and school-to-work transition.

An additional recommendation relates to the issue of **STEM student mobility**. The present study found students occasionally unsatisfied with the diversity of STEM educational pathways (or lack thereof) existing in their countries. Enhancing opportunities for student mobility through financial assistance programmes (i.e. scholarships) could thus prove key to increasing students' expertise in STEM fields. Quite importantly, it would also have a positive impact on STEM graduates' language skills levels, which were often deplored by employers in this study. Needless to say, both of these aspects would favour considerably students' potential for employability.