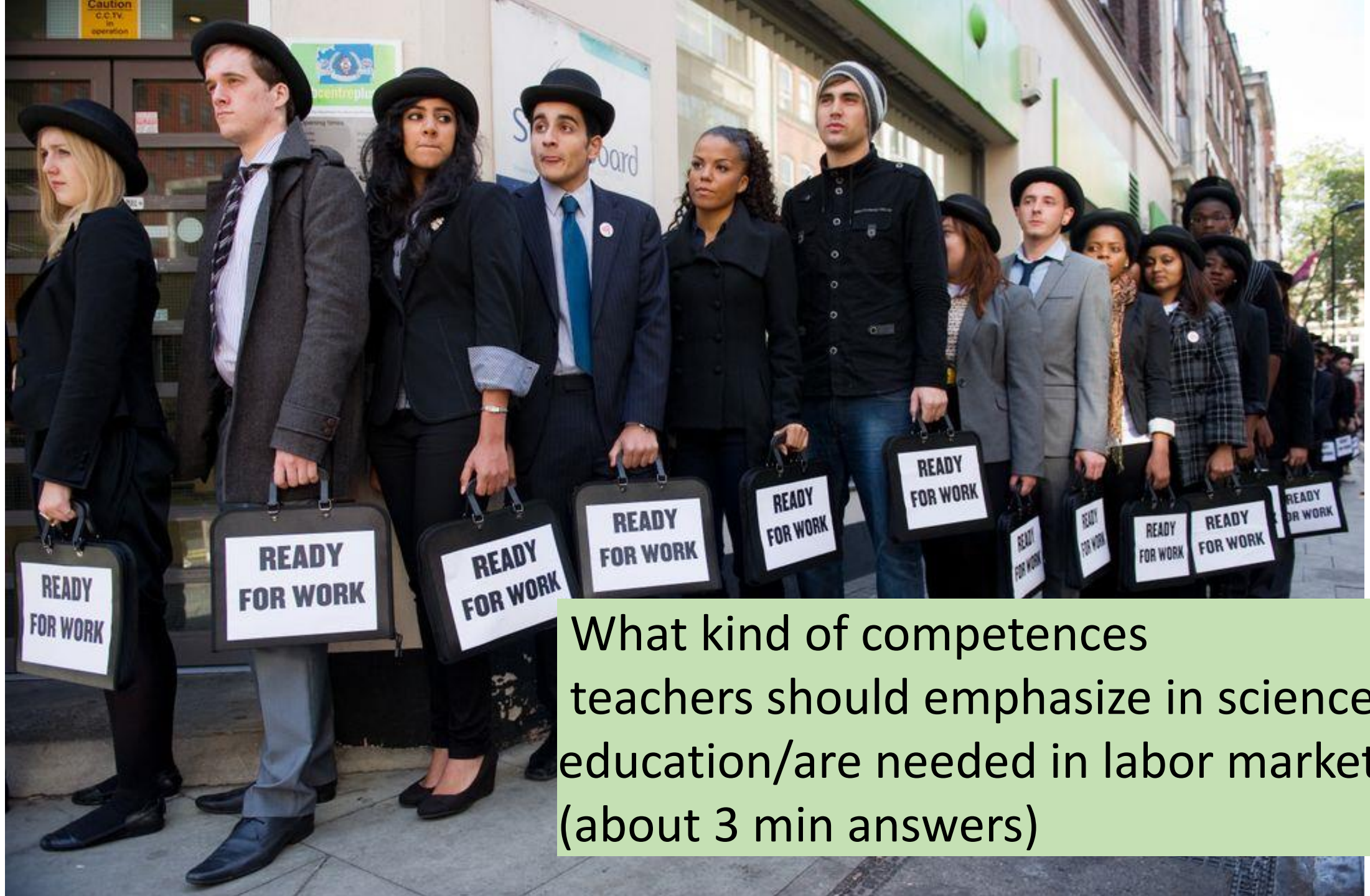


**Panel discussion, 15.15 – 16.00:**

**Which competences are essential for a career in the private sector and in industry – expectation of the input from school science education**

**Panelists: Prof András Patkós, Prof. Ron Blonder, Dr Katrin Vaino, Dr Helin Semilariski**  
**Chair Prof Jari Lavonen, University of Helsinki**



What kind of competences teachers should emphasize in science education/are needed in labor market? (about 3 min answers)

Some answers ....

# Several frameworks for 21<sup>st</sup> century / transversal / generic competences

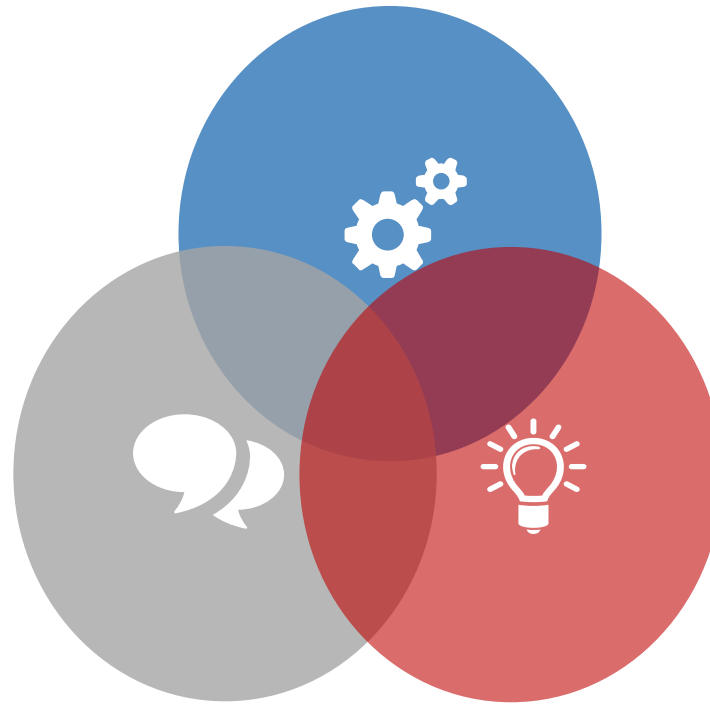
Organization and Year	Terminology and connotations (Competence /knowledge/skills/attitude/values for different purposes)
UNESCO (Universal Learning) 2013	What learning is <u>important for all children and youth</u> for the 21 <sup>st</sup> century <u>for good life</u>
OECD Future of Education and Skills 2030 (Learning Compass)	... <u>knowledge</u> , <u>skills</u> , <u>attitudes</u> and <u>values</u> , <u>transformative competencies</u> ... that learners need to fulfil their potential and contribute to the well-being of <u>their communities and the planet</u> . <u>Practical</u> and <u>physical</u> skills; <u>cognitive</u> and <u>meta-cognitive</u> skills, <u>Social</u> and <u>emotional</u> skills
EU (Lifelong learning, 8key competences) 2006; 2018	<u>Competences (knowledge, skills, and attitudes)</u> needed <u>for personal fulfilment</u> , active citizenship, social inclusion and <u>employment</u>

# What competences should be emphasised in education according to OECD learning compass 2030 ?

## Basic competences

Know-what (*concepts, principles, processes*)  
and know-how  
(*inquiry, problem-solving, design solutions*)

**Social and emotional skills:**  
empathy, self-efficacy,  
responsibility and  
collaboration



**Cognitive and meta-cognitive skills:**

critical and creative  
thinking,  
learning-to-learn  
and self-regulation

What are the challenges in science education related competences needed in labor market and aimed to introduce in science classes?  
(some examples)

*Percentage of students who expect to work in science-related professional and technical occupations when they are 30*

# Students' enjoyment of learning science according to PISA 2015

I enjoy acquiring new knowledge in science

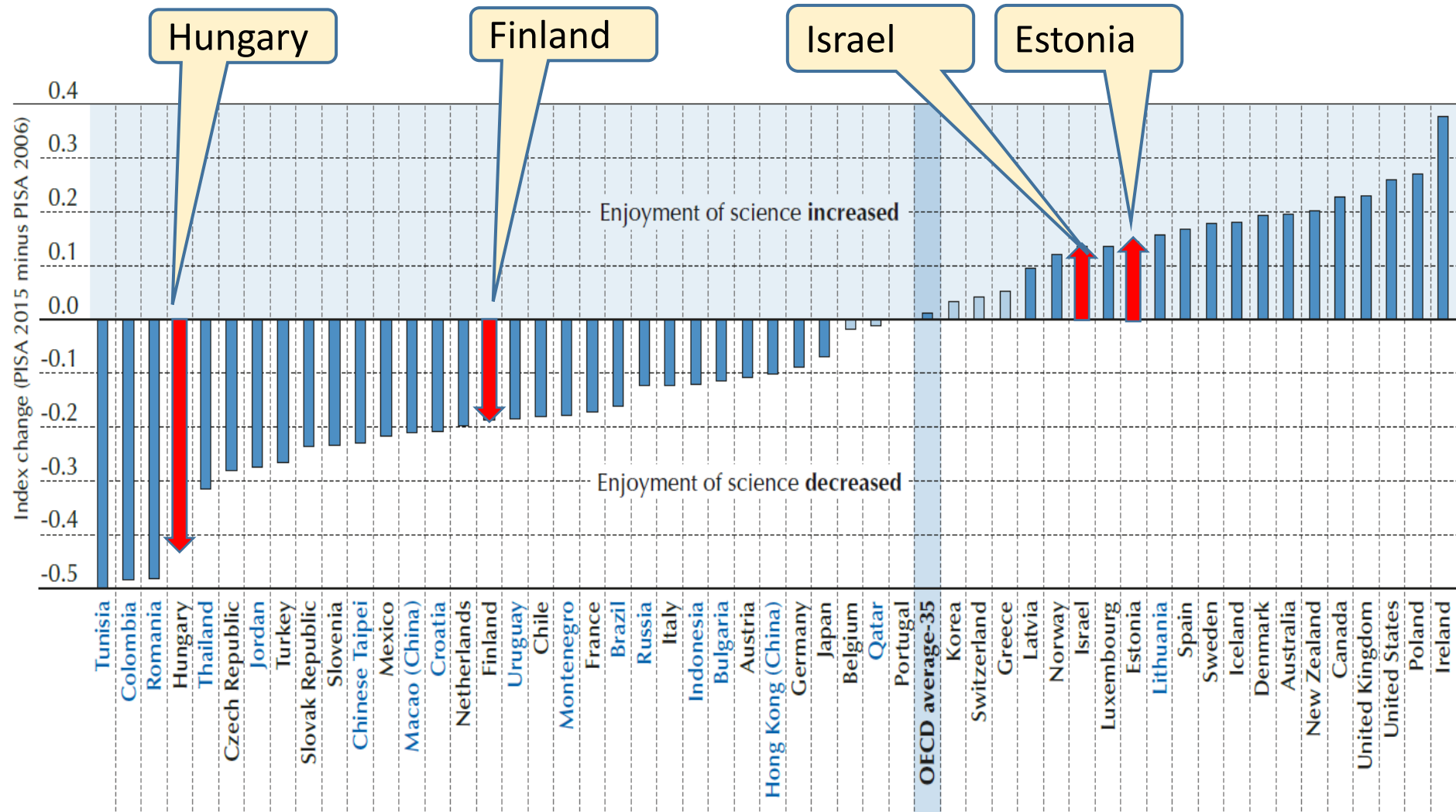
I am happy working on science topics

(

**Percentage of students who “agree” or “strongly agree” with the statements**



# Change between PISA 2006 and 2015 in students' enjoyment of learning science



# PISA 2018 Trends in performance in reading, mathematics and science

- ● Estonia — OECD average — Trend - Estonia
- ● Finland — OECD average — Trend - Finland

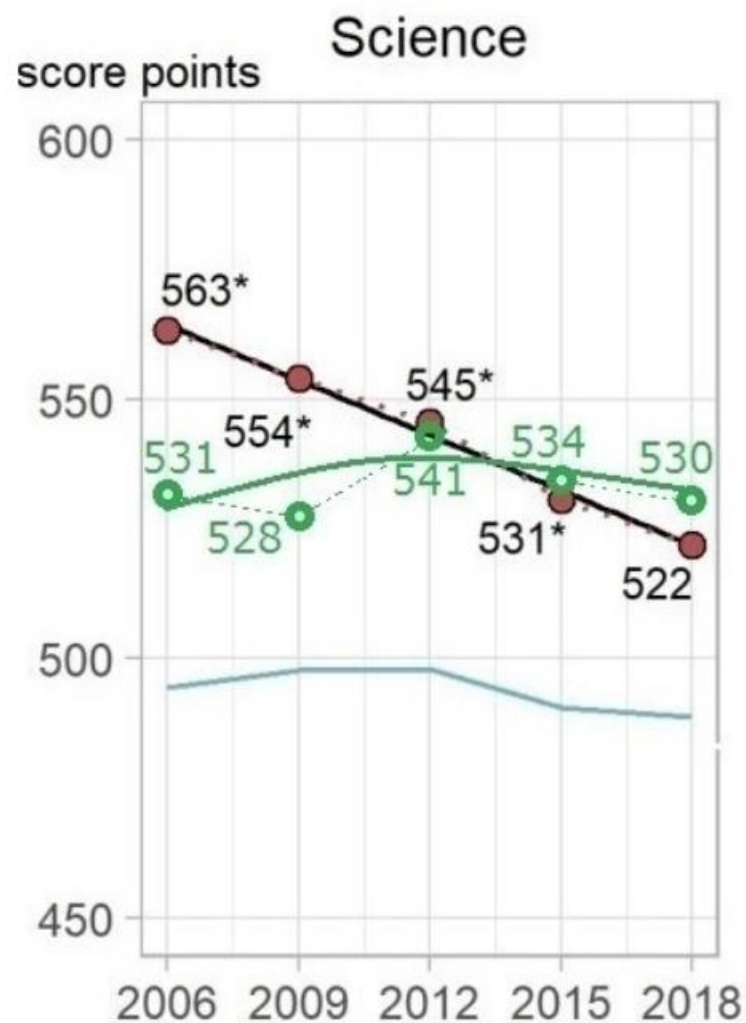
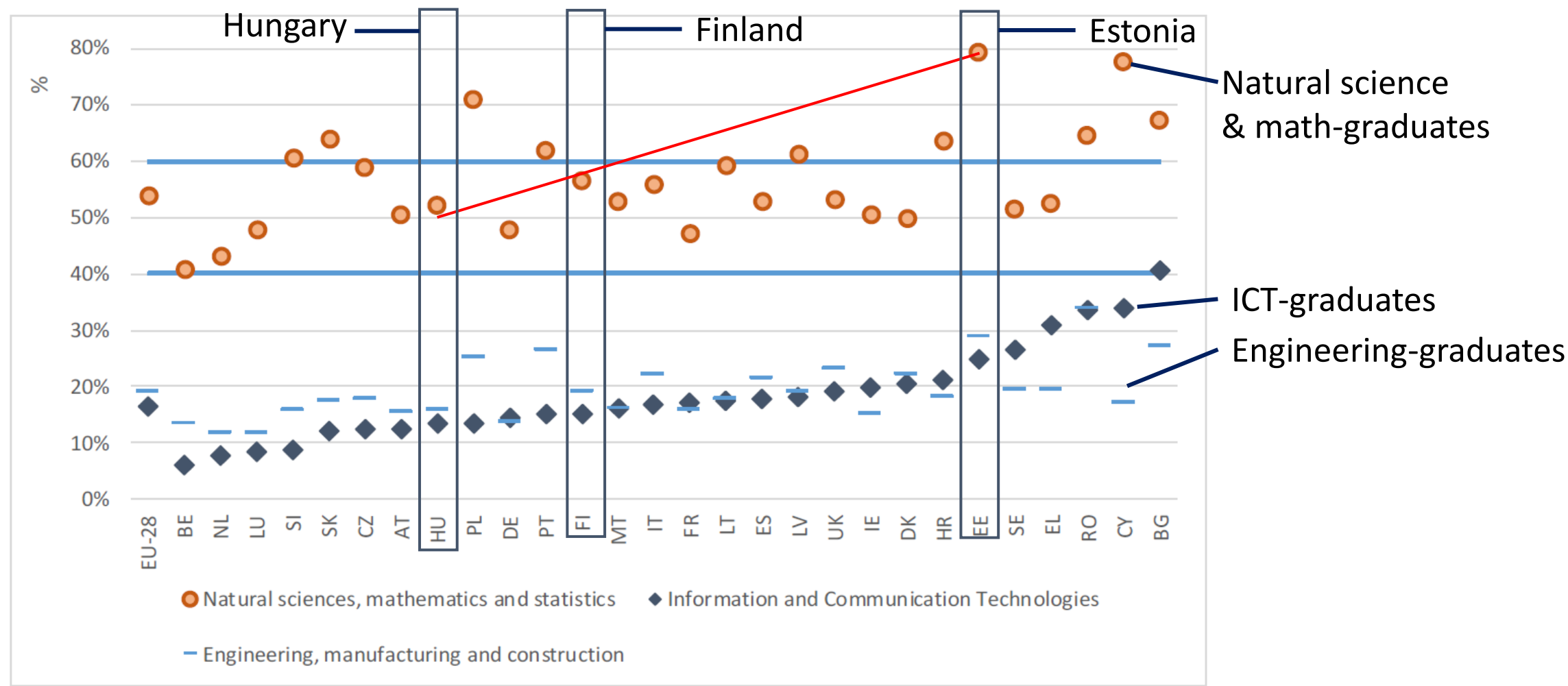
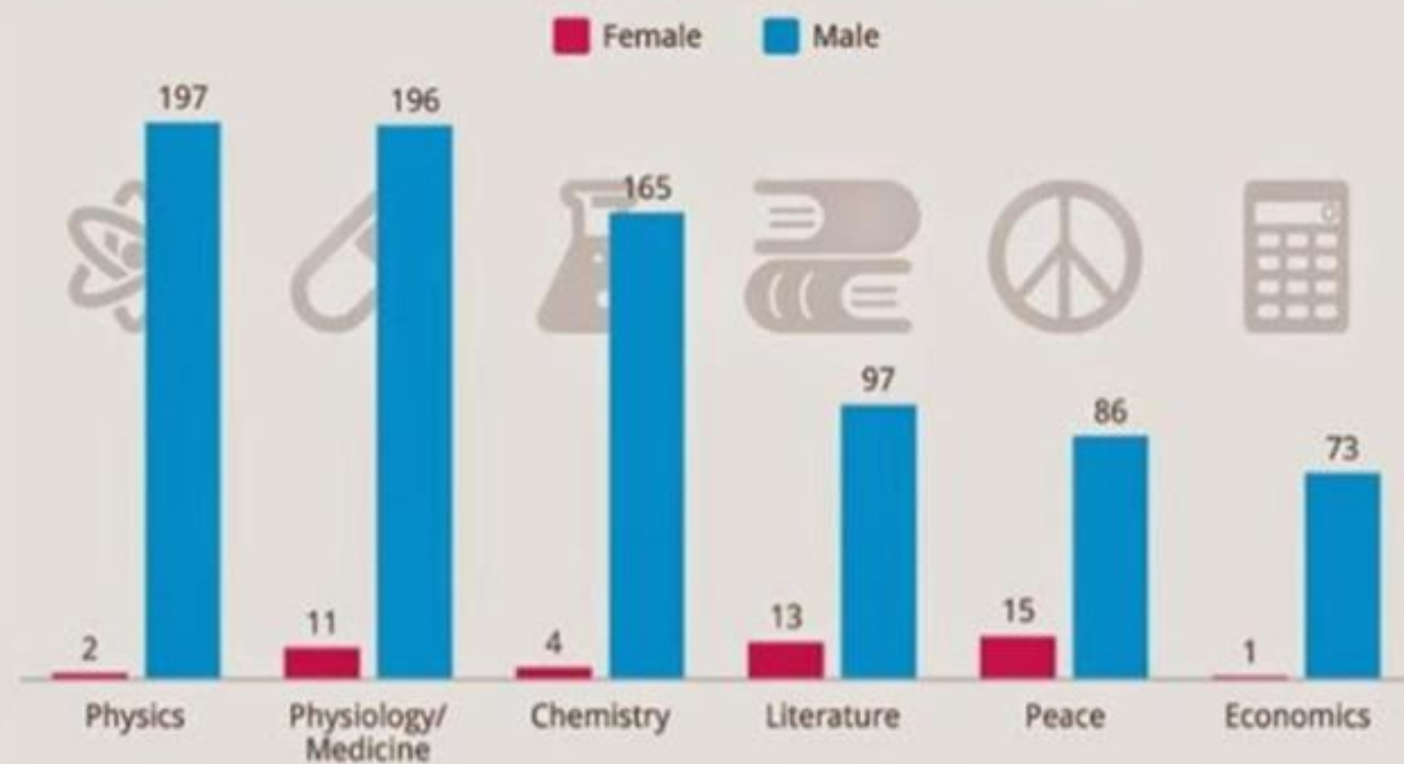


Figure 2. Proportion of women among STEM graduates, by field of education and country (%), (2013–2015)



## The Nobel Prize Gender Gap

Nobel Prize winners since 1901 by category and gender (as of Oct. 8, 2014)



Courtesy [www.statista.com](http://www.statista.com)



How to overcome challenges?  
(you can take only one challenge  
and analyse it, about 3 min answers)

Sociologically or psychologically  
oriented models?

Which orientation we should have  
in our research (about 3 min answers)

## ***Theory of Circumscription and Compromise is a theory of career development (Linda Gottfredson)***

- Theory explains how career aspiration depends on student's gender and social class.
- Occupational stereotypes are picked from social surroundings; sex-type, prestige level and field of work are taken into account and these influence, which occupations are acceptable and which are not (importance of self-concept).
- Ages 9-13 are characterized by sensitivity to prestige and status.
- From the age of 14 onwards occupations that were regarded as acceptable in childhood are still valid according to social attributes such as gender, social class, and intelligence,
- ...

## **According to international ROSE (Schreiner & Sjøberg, 2005) and SAS surveys (Sjøberg, 2000)**

- the social position of scientists and engineers has weakened in developed countries
- their lifestyle appears unattractive to students: working hard and alone in a laboratory.
- Science and technology occupations are perceived as being of too low in status in relation to the workload.
- scientists and engineers are no longer such strong symbols of social and economical progress in developed countries as they were before or as they are in developing countries.
- students have stereotypical views of science and technology occupations.



