Science Education: The voice of the learners

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Why Science in (compulsory) schools?

- Main focus is ***not*** on recruitment and preparation for academic studies, but…
- for citizenship, critical thinking, (Bildung!) Slogans: "Science for all", "scientific literacy" etc.
- **School science** is essential for perceptions of science, attitudes to science, appreciation, acceptance and respect for S&T
- and ***may,*** if properly done, lead to improved recruitment!

Learning from others: Comparative studies

- Studies like TIMSS and PISA are important, but …
- Focus is on **achievement** – *not* on interest, motivation and choice
- Even very able pupils opt out of SET – in particular girls!
- Young people do *not* choose SET careers because it is good for the national economy!
- But make choices based on their own values, motifs, interests and 'self realization'.

The value of international comparative research

- Understanding that education is based on human, political choices and traditions
- Question the 'taken for granted'
- Seeing your own choices and challenges with new eyes
- Learning from others, understanding that things may be different…

- Needed: Not only theoretical, ideological deliberations – but *empirical evidence*

Pupils' choices: Key factors

- Pupils' **emotions:** interests, attitudes, values, future plans, perceptions of SET, prior experience with school science
- Key words:
- **Motivation**
- **Relevance** (personal, social etc.)

Pupils' attitudes to science and technology. Summary (to be illustrated):

- **The positive side:**
- They accept the importance of S&T for **society**
- S&T will improve life
- S&T will make work more interesting
- S&T has more advantages than dangers
- Young people love modern ICT: They are great consumers!

Pupils' views, the dark side

- They dislike S&T at school, S&T is difficult and boring etc.
- They are interested in 'real science' – but less in 'school science' (a 'living fossil'?)
- The curriculum is overloaded with 'correct answers' – no room for creativity, fantasy etc.
- They are very hesitant to *study* S&T and to *work* with S&T
- They often have a negative perception of scientists as *persons* (no good role models?)
- Evidence to follow…

ROSE: a cross-cultural comparative project

The voice of the learners

ROSE
The Relevance of Science Education

ROSE details at http://folk.uio.no/sveinsj

Method and logistics

- Standard survey methods
- Target population 15 year-old, whole cohort, or defined sub-population
- Representative sample (one class per school, at least 25 schools, more if strata or groups are to be contrasted) N>650
- 'Original' questionnaire in English – translations to different languages
- Correspondence etc by e-mail and attachments
- Resources on ROSE home page

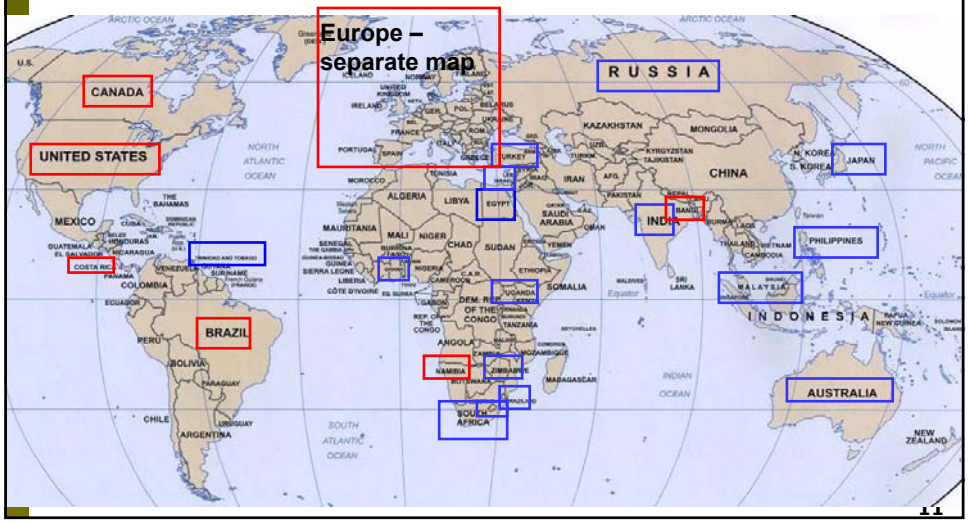
Method and logistics (cont'd)

- Data collection and data entry by national researcher in provided empty SPSS or Excel file
- Return to project organizers
- Data cleaning, quality check, merging of files by organizers
- Only data that meets certain standards to be merged in joint file

ROSE
The Relevance of Science Education

Collected data
Not finished (or uncertain)

ROSE countries April 2004



ROSE Europe – April 2004

Austria
Denmark
Cyprus
England
Estonia
Finland
Germany
Greece
Iceland
Ireland
Israel
Italy
Latvia
Malta
Northern Ireland
Norway
Poland
Portugal
Russia
Spain (Baleares)
Spain
Sweden
Switzerland
Turkey

Collected data
Not finished (or uncertain)

ROSE
The Relevance of Science Education

ROSE Data file, March 2004

Denmark	538	Latvia	1065
Egypt	292	Norway	1204
England	1284	Philippi	6943
Estonia	672	Poland	654
Finland	3666	Russia	721
Ghana	1027	Spain	769
Greece	583	Sweden	751
Iceland	620	Trinidad	699
Ireland	688	Turkey	1260
Israel	635	Uganda	836
Japan	560	**Total**	**25467**

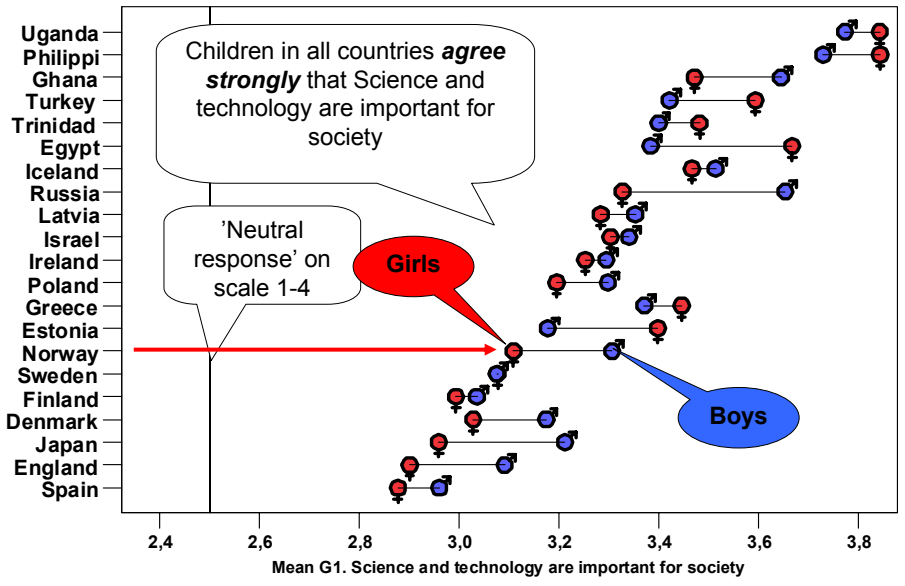
ROSE Questionnaire: 7 Item groups

- **In total 250 items, all on a 4-point Likert scale:**
  - **Disagree – Agree**
  - **Never - Often**
- ***My out-of-school experiences***
- ***What I want to learn about***
- ***My future job***
- ***Me and the environment***
- ***My science classes***
- ***My opinions about science and technology***
- ***Myself as a scientist*** **(Open written response)**

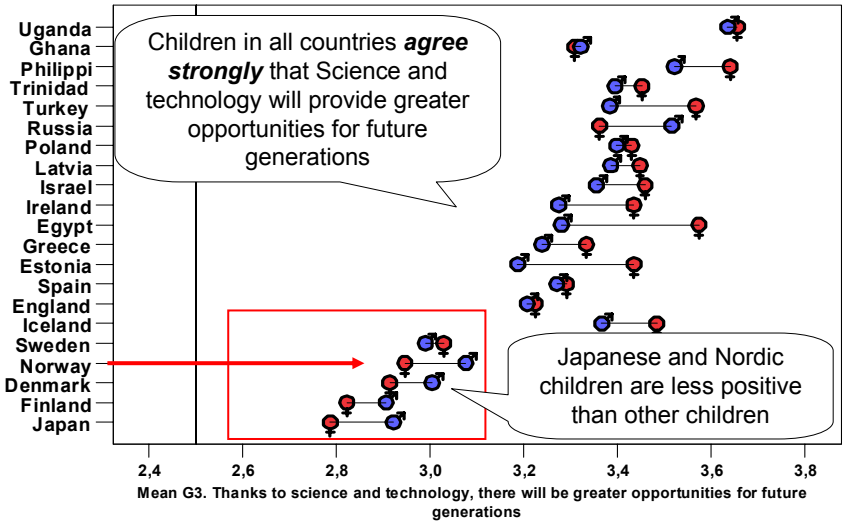
”My opinions about science and technology”

- 16 items
- From 1 = Disagree to 4 = Agree
- (2,5 is ’neutral’)

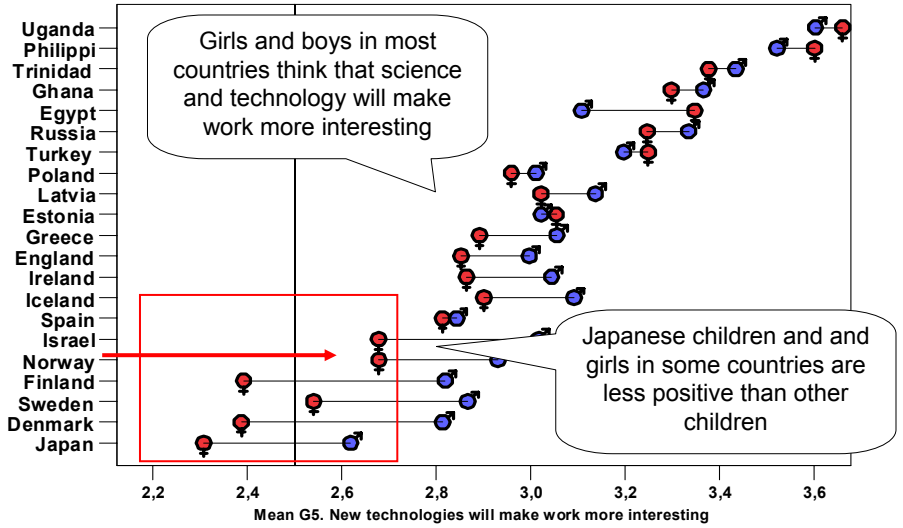
”Science and technology are important for society”



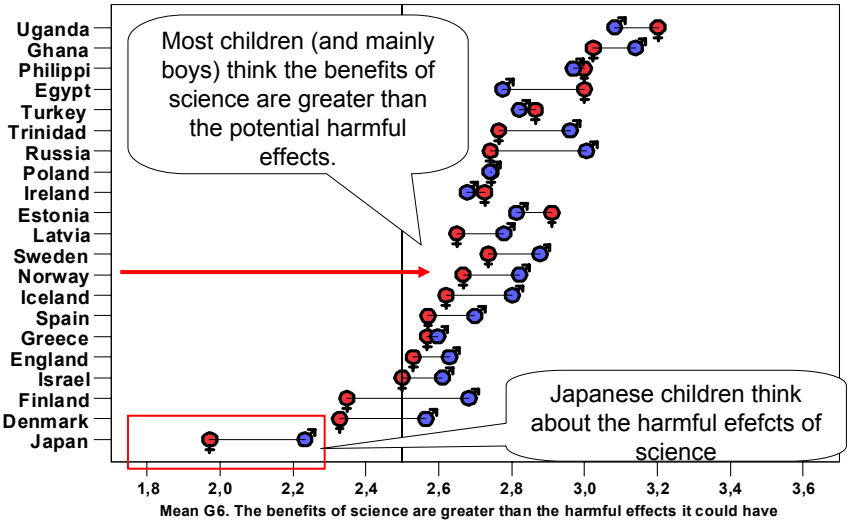
”Thanks to science and technology, there will be greater opportunities for future generation”



”New technologies will make work more interesting”



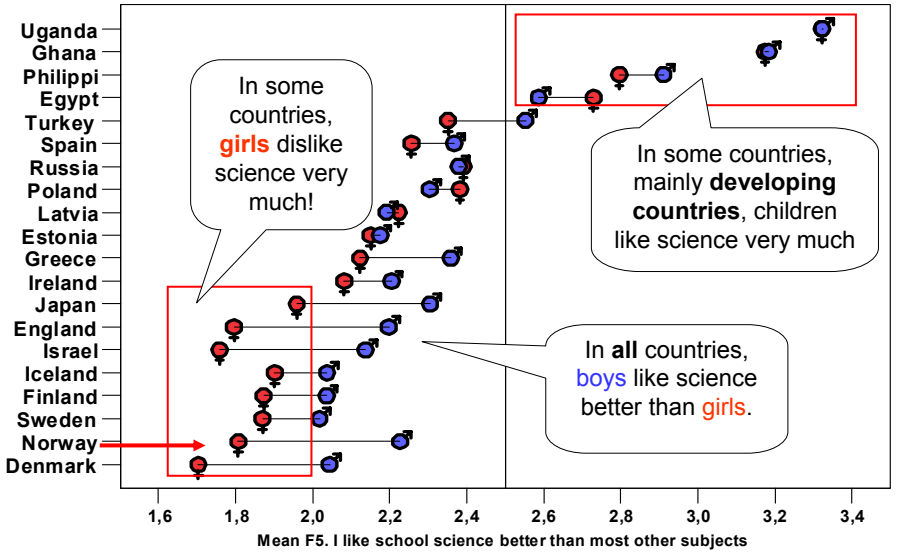
”The benefits of science are greater than the harmful effects it could have”



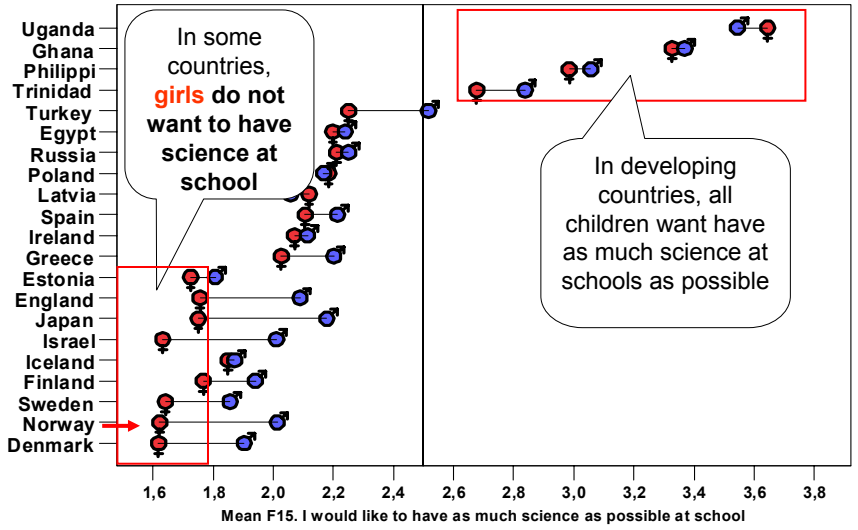
ROSE (preliminary) results

- **”My science classes”**
- 16 items
- From 1 = Disagree to 4 = Agree
- (2,5 is ’neutral’)

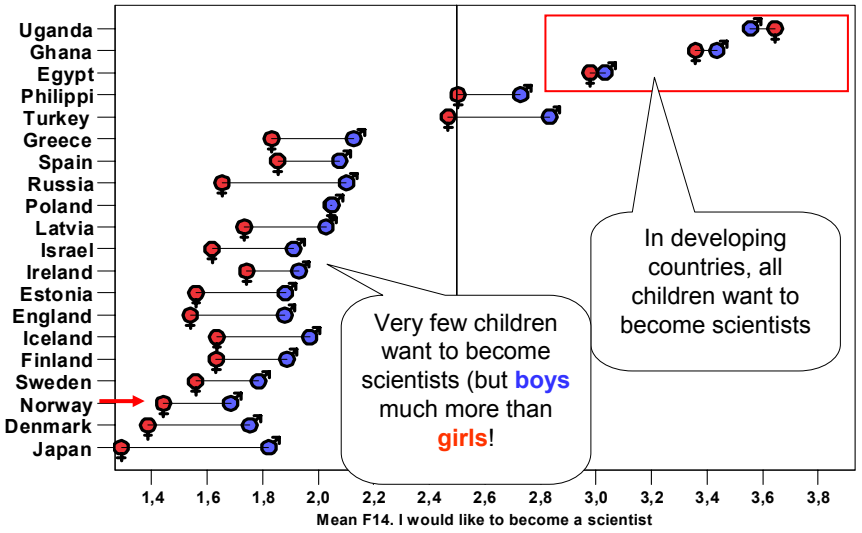
”I like school science better than most other subjects”



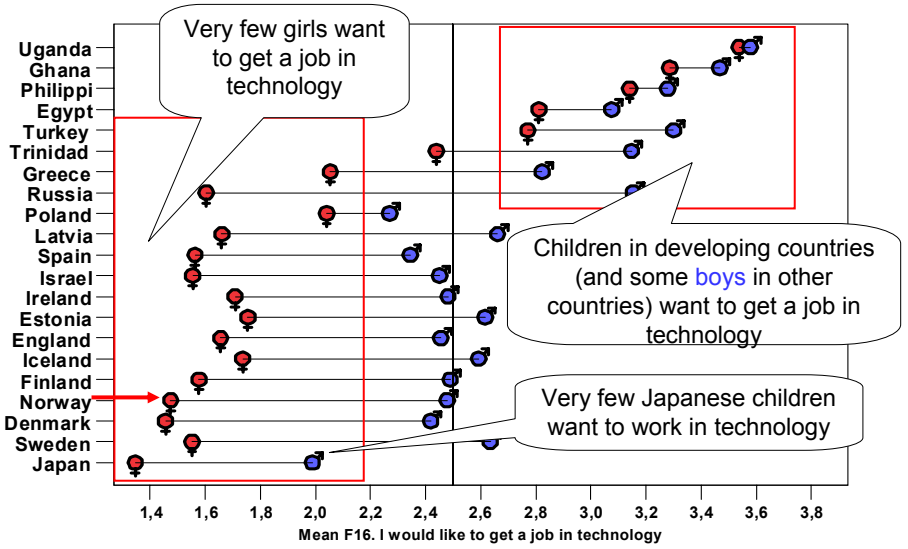
”I would like to have as much science as possible at school”



”I would like to become a scientist”



I would like to get a job in technology”

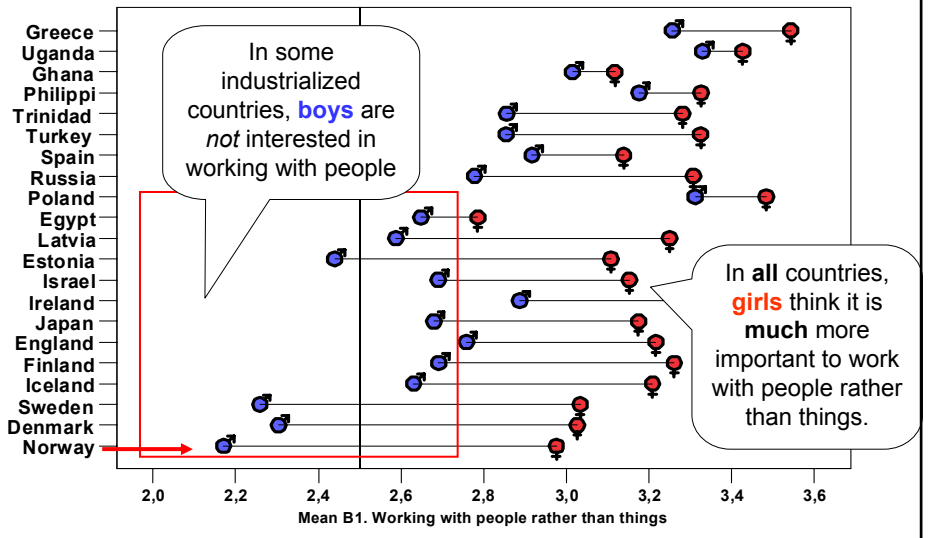


”Important for my future job”

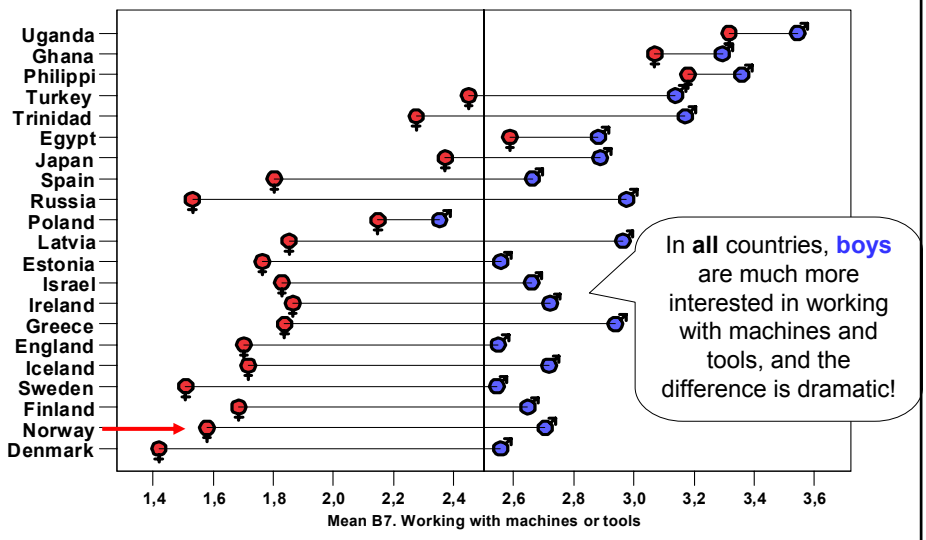
- 26 items
- From 1 = Not important to 4 = Very important

Important for future job:

”Working with people rather than things”



Important for future job: "Working with machines or tools"



ROSE: Further plans

- Data collection to be finalized June 2004
- Report on ROSE background, rationale, development and data collection: July 2004
- First reports to be presented at IOSTE (International Organization for Science and technology Education) symposium in Poland 25-29 July 2004 (8 national papers, three international)
- Data files accessible for joint research available September 2004
- Some 10 PhD students base their work on ROSE
- Research papers to be presented at coming international conferences and in journals