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EDUCATION
CURRICULUM
RESEARCH
SEVENTH FRAMEWORK
PROGRAMME

THE SECURE PROJECT: SOME RESULTS COMING FROM THE RESEARCH OF SCIENCE CURRICULA AND TEACHERS' AND LEARNERS' OPINIONS ON SCIENCE EDUCATION

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Abstract

- The focus of the “Science Education Curriculum Research” project is: balancing the needs between training future scientists and broader societal needs. The SECURE research focused on 5, 8, 11 and 13 years old learners, their science curriculum and their teachers. The author will present shortly the research strategy, including comparison of curricula, questionnaires and interview formats for teachers as well for all four age categories of learners. The presentation will give an idea of the huge amount of relevant and rigorous research data that have been found. Apart from studying thousands of pages of paper curricula, also over 8000 learners and 1400 teachers filled out a questionnaire and more than 1300 learners and 450 teachers were interviewed.

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- Based on this research, the SECURE consortium has made a number of recommendations to policy makers who have an impact on curriculum development as well as on teacher education. These recommendations address the question how the interest in Math, Science, Technology and ICT (MST) can be enhanced among youngsters and in particular their future teachers, along with the learning of those pupils.
- Starting from EU key competences, the variety of learning activities and differentiation, results and conclusions will be presented that provide evidence for the given recommendations.
- In view of the aims of this SAILS project, some SECURE project research results will be shown to enhance the debate among policy makers on the topic of assessment of IBL.
- During the poster sessions, several posters produced during the lifetime of the SECURE project, will be shown.

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7th Framework Programme

Balancing the needs between training for future scientists and broader societal needs

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SECURE key vocabulary

- "Science" curricula of 10 countries: comparative study
- Perceptions of
  - 5, 8, 11 and 13 year old learners
  - Their teachers
- Exploratory research
- Trends
- Recommendations
- Paper curricula, questionnaires, interviews
- Intended, implemented, attained

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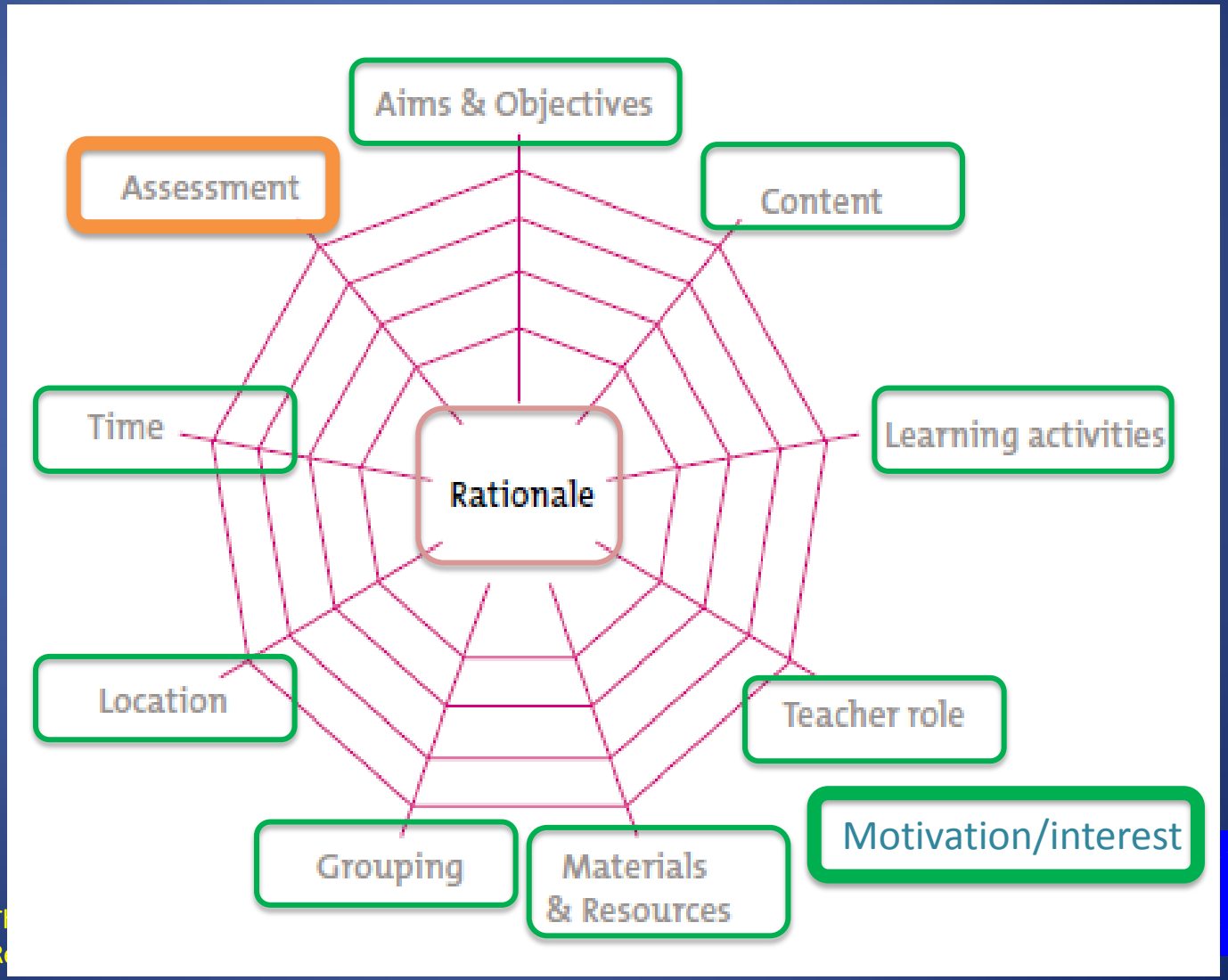
Spider web (SLO, J. Van den Akker et al.)



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Science in curricula

- Complexity of 10 systems
- Spider web gives a guideline
- Motivation/interest is missing in curricula, but crucial for perceptions of teachers and learners (Timperley)

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Remark: the spider web indicates the connectivity between elements of a curriculum.

Assessment is one of them

There is a strong relation with almost all other topics:

- Aims and objectives
- Grouping
- Materials and Resources
- ….

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Teachers and assessment (13 yo learners)

- Question 10.1:

How much emphasis do you place on the following sources to monitor pupils' progress in *S/T*?

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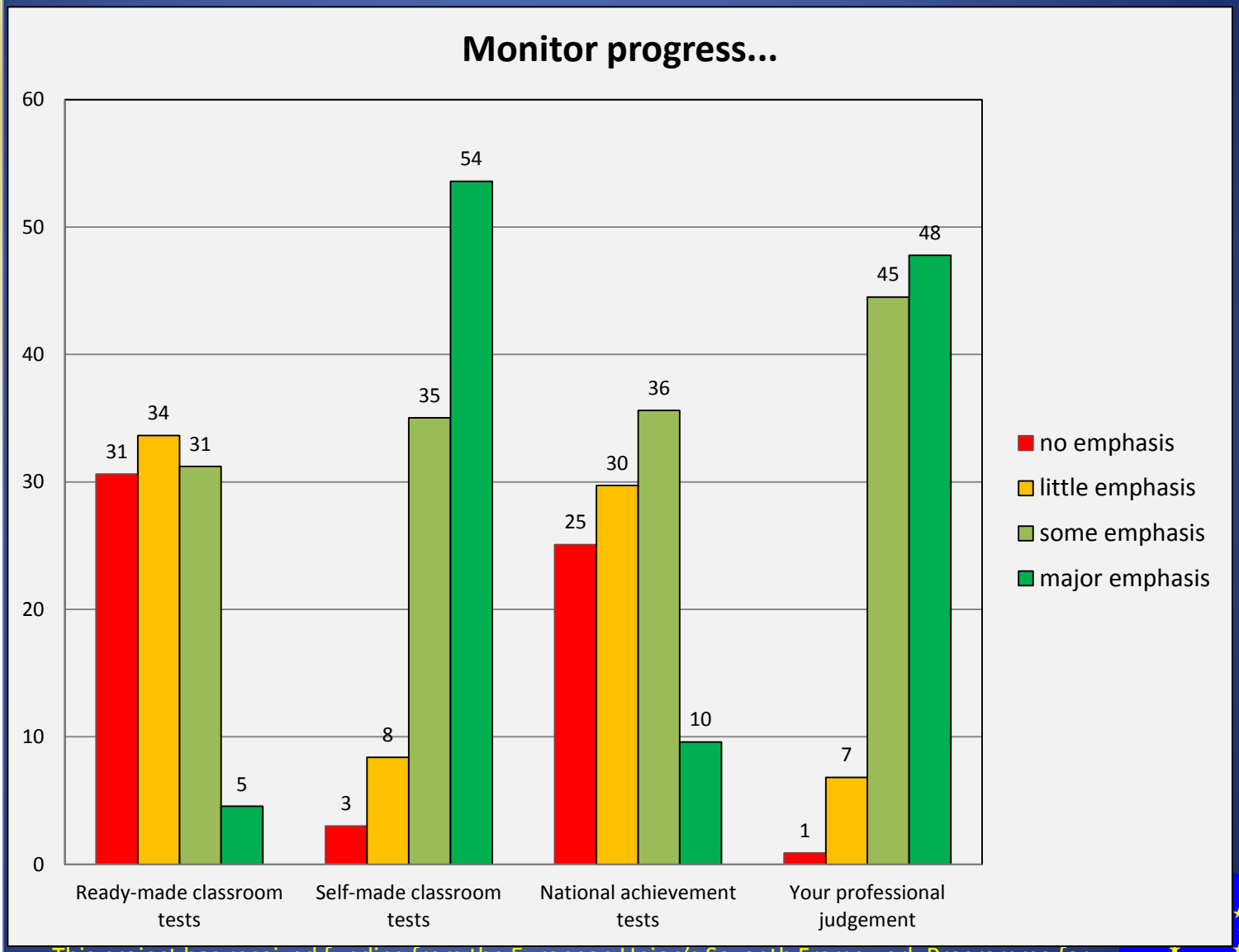

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Teachers and assessment (13 yo learners)

- Are there standardized guidelines for assessing your pupils at your school?

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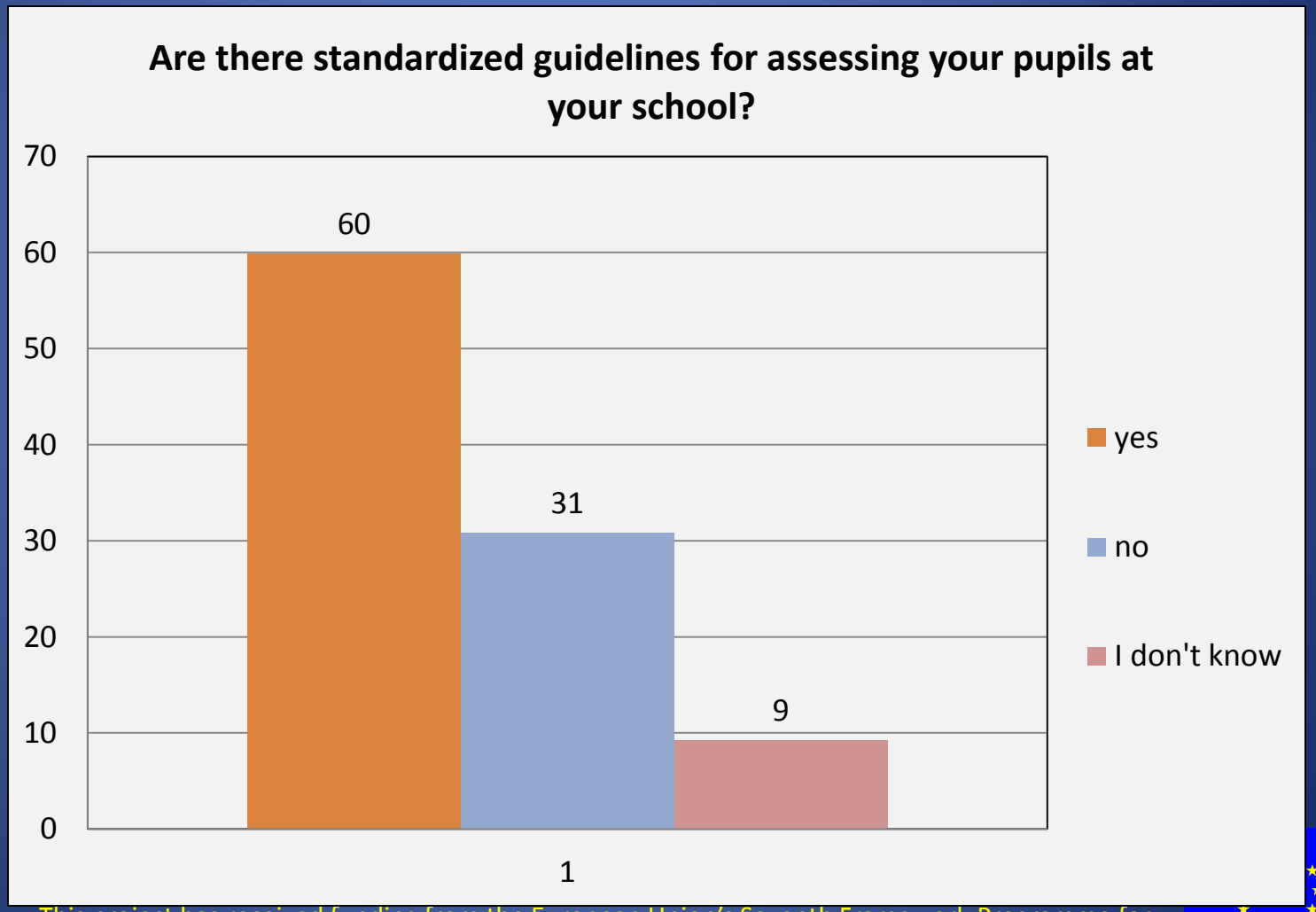

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Teachers and assessment (13 yo learners)

- How often do you give a *S/T* test to your class?

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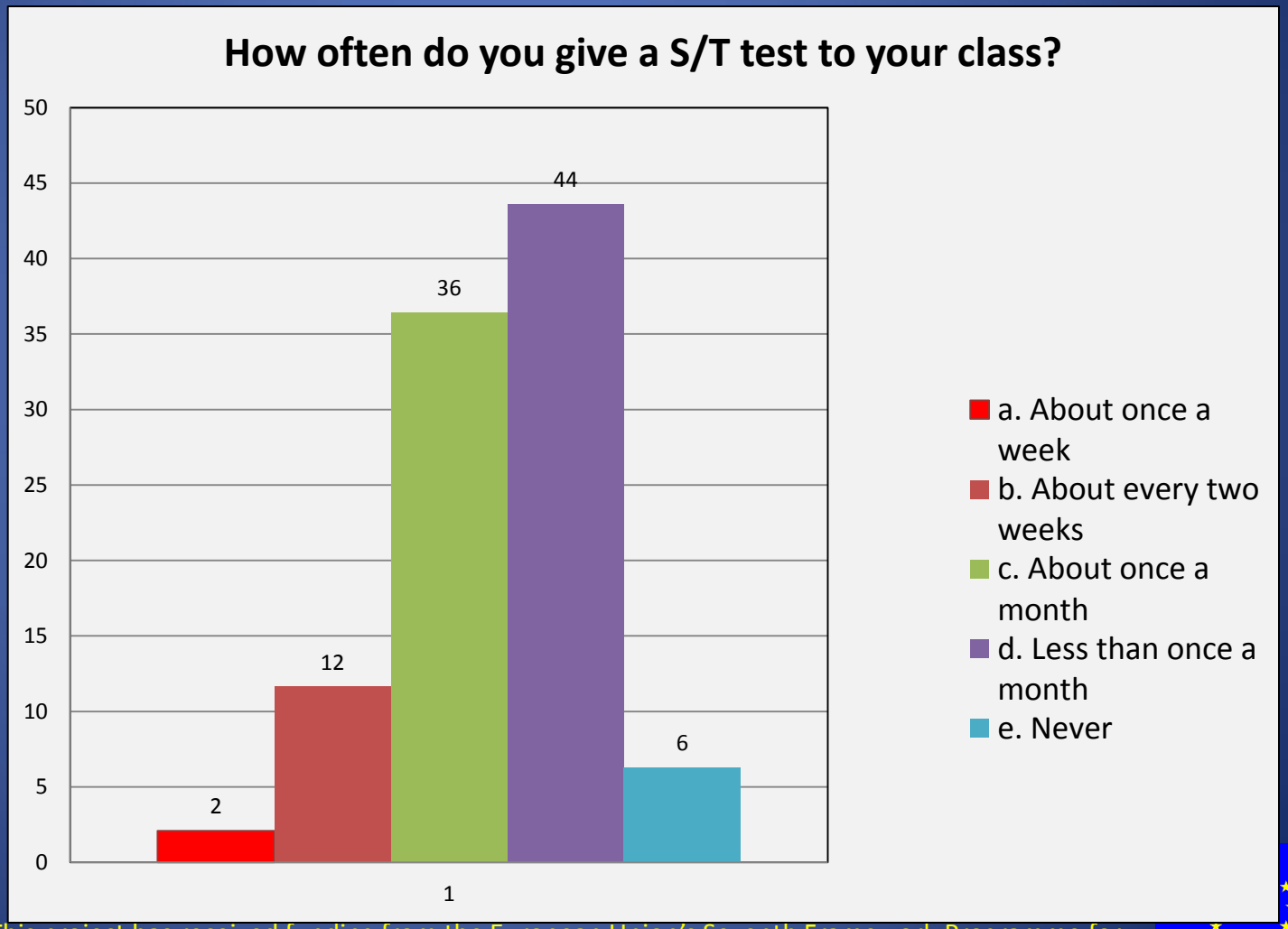

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Teachers and assessment (13 yo learners)

- How often do you include the following types of questions in your *S/T* tests?

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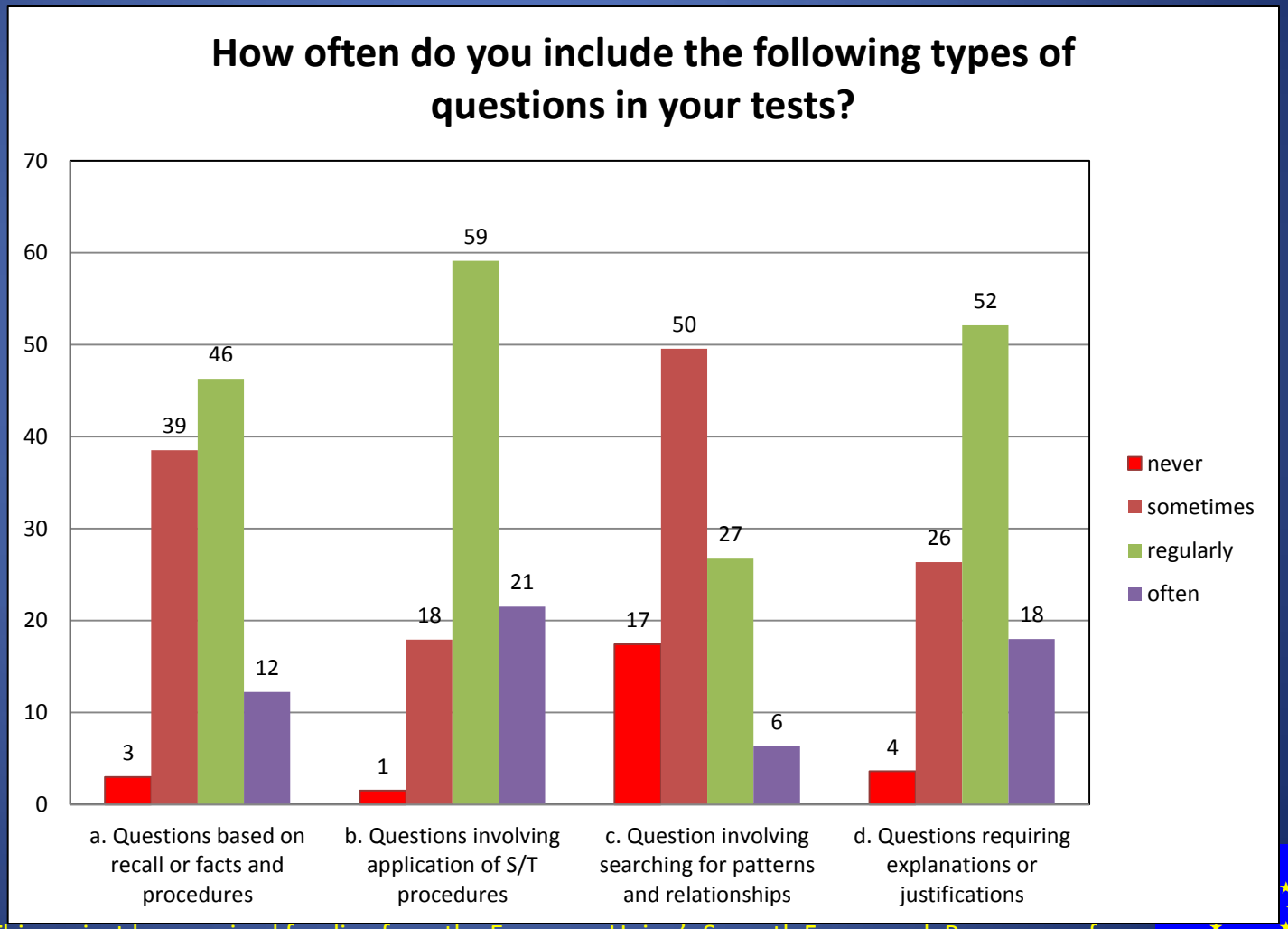

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Teachers and assessment

- How often do you assess the following aspects with respect to *S/T?*

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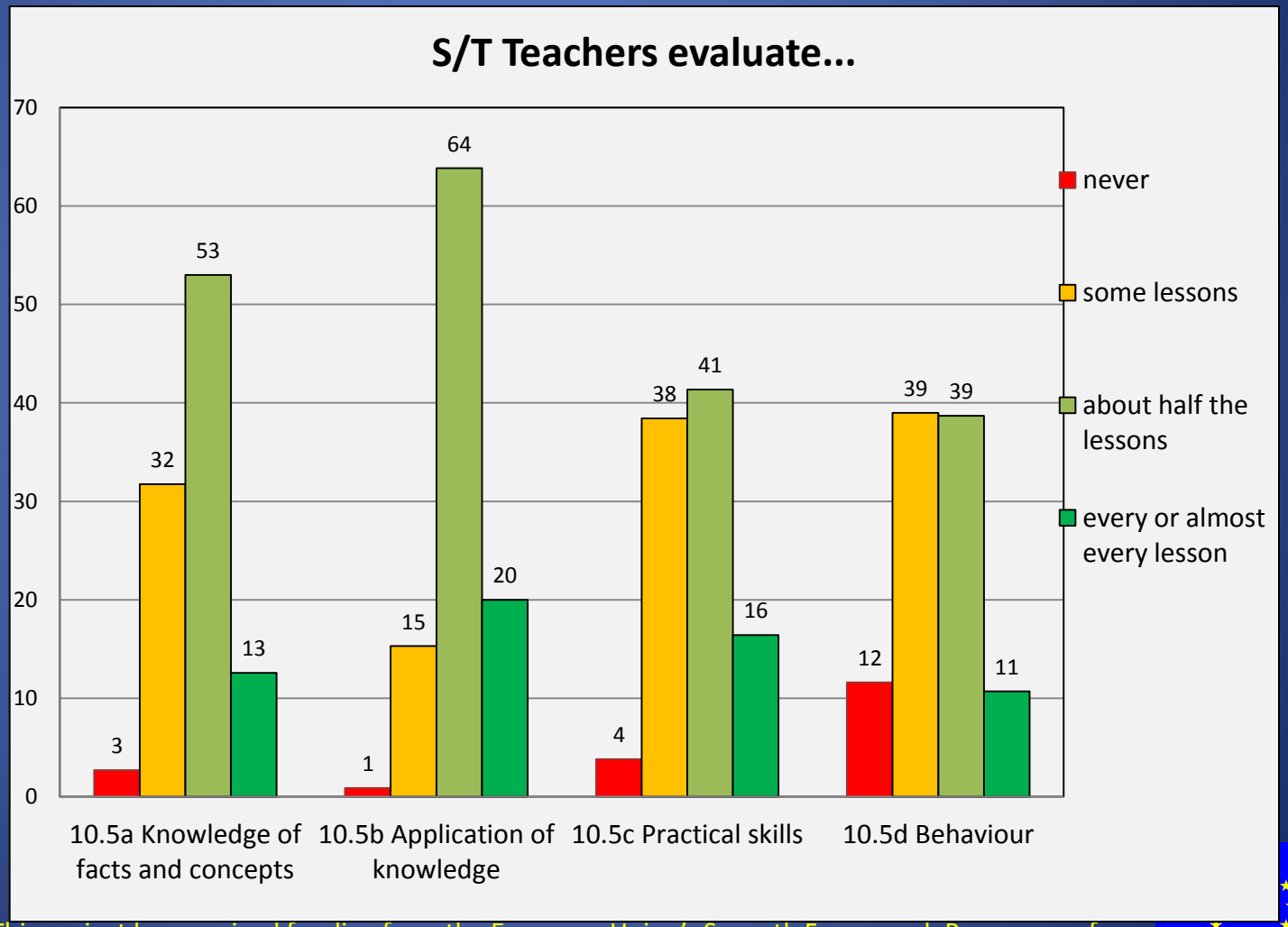

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Big spread between countries

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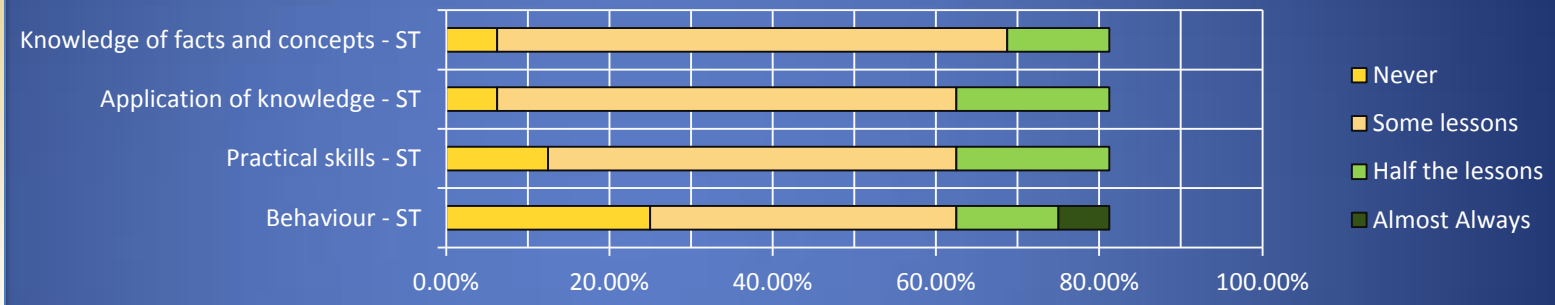
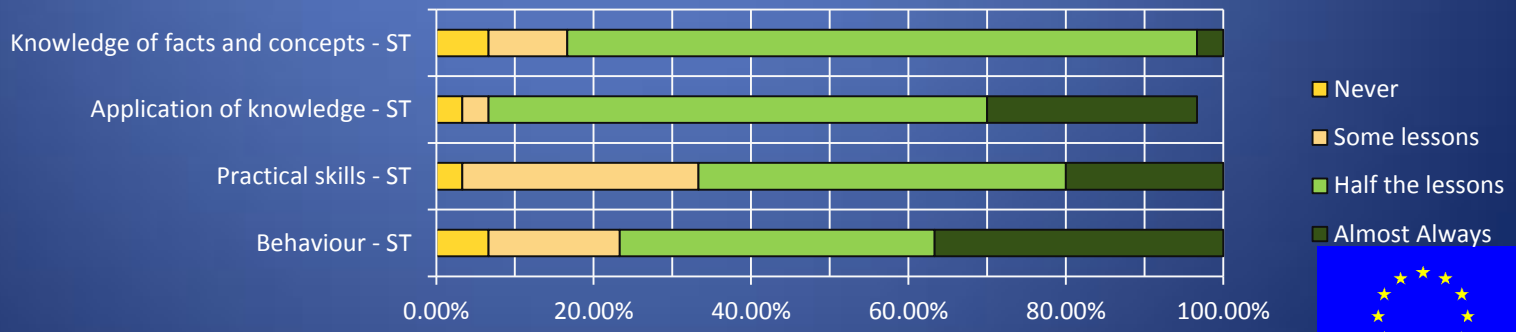
Austria: Assessment
How often do you assess the following aspects with respect to ST?



Belgium: Assessment
How often do you assess the following aspects with respect to ST?



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Conclusions: teachers

- Teachers find themselves the best to assess: they are confident
- They do not assess very much: once a month or less: 86%
- Knowledge (66%) or application of it (84%) is assessed most, while skills (57%) and behaviour (50%) less. (There is hope!)
- The results should be studied separately per country.

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Learners and assessment

- Results for 13 yo learners, for all science directions (int. Science, biology, chemistry, physics)
- Sometimes what they answered for maths or technology

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Learners and assessment

7.1b	How is the work you do in ***science*** marked?		
	a. I get planned tests	Yes	No
	b. I get graded for projects I do	Yes	No
	c. I get graded for assignments I do	Yes	No
	d. I get graded for homework	Yes	No
	e. I get graded for presentations	Yes	No
	f. I get unexpected tests	Yes	No
	g. I get oral tests	Yes	No

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13 yo learners perceptions on assessment

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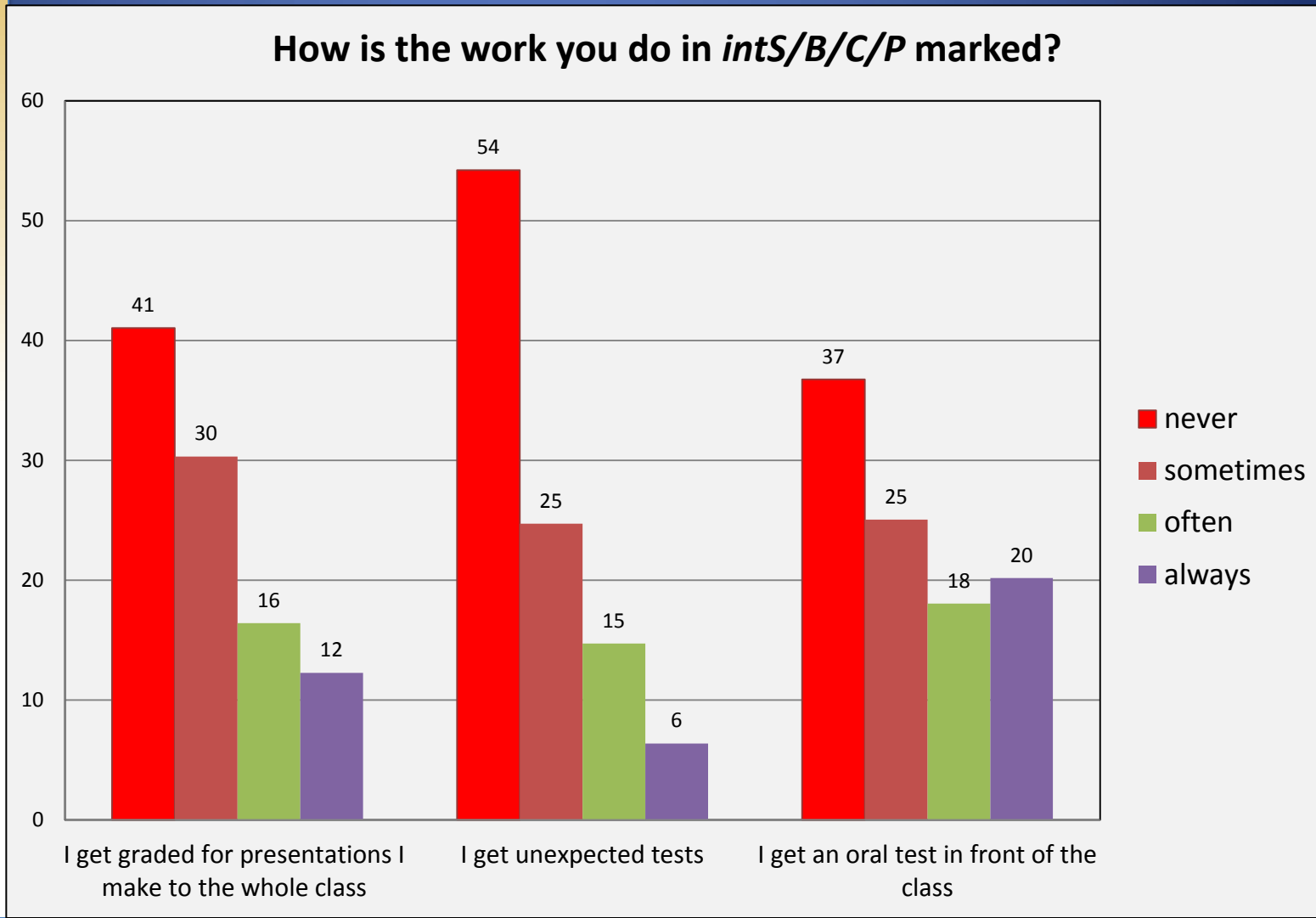
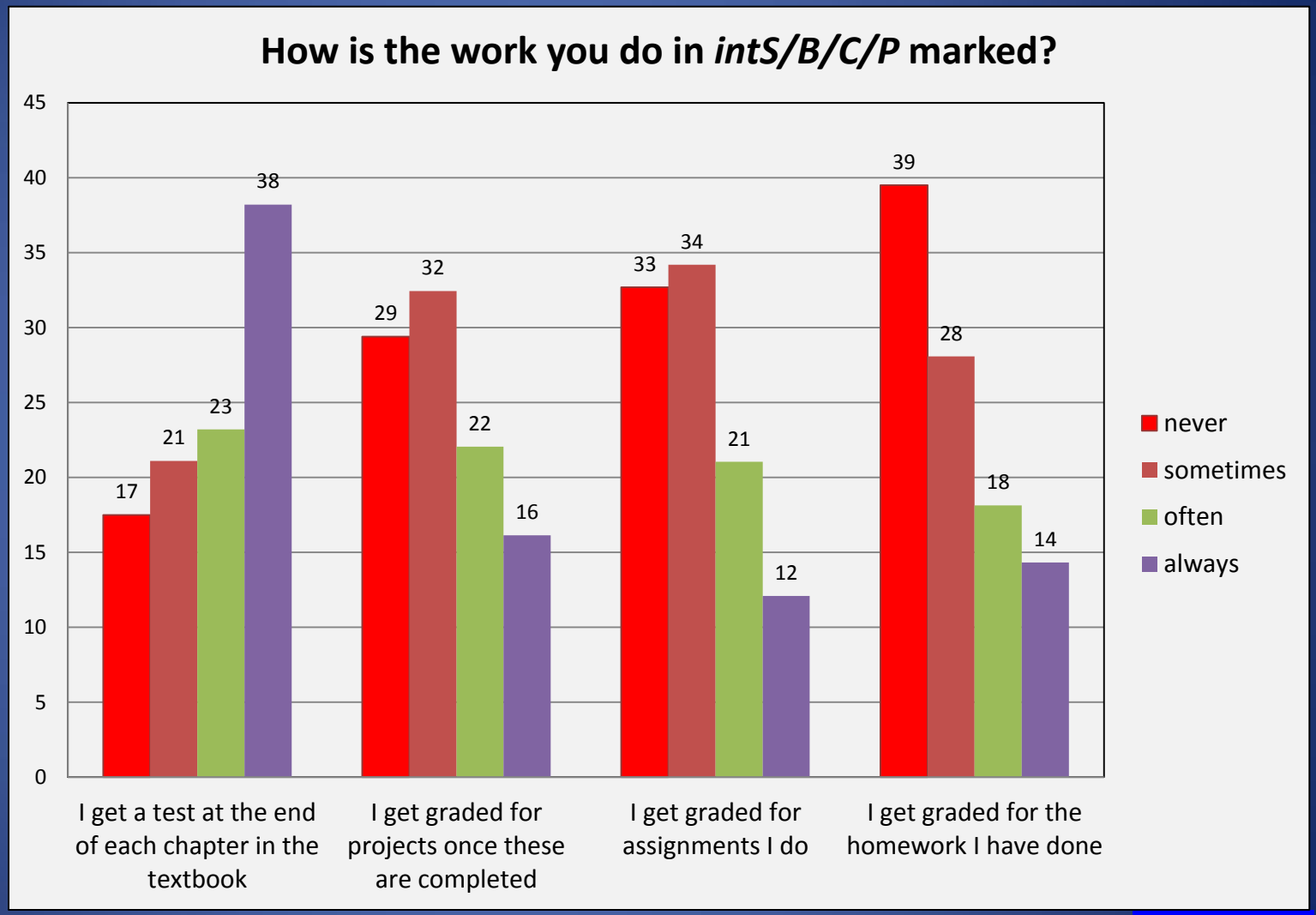


N=7445, intS, B,C, P, 13 yo, all countries



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Recommendation

- **SECURE Recommendation 8 Assessment**

- **Actions should be undertaken to design and promote formative and summative assessment tailored to classroom practices and innovative learning methods.**

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More in SECURE…

- Same questions /answers for 8 and 11 yo available.
- Split per country can give extra, targeted information

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Studying SECURE's results

- Will reveal more hindering factors for implementing new assessment strategies
- Comparing 8yo-11yo and 13 yo shows in many cases a decrease of active learning

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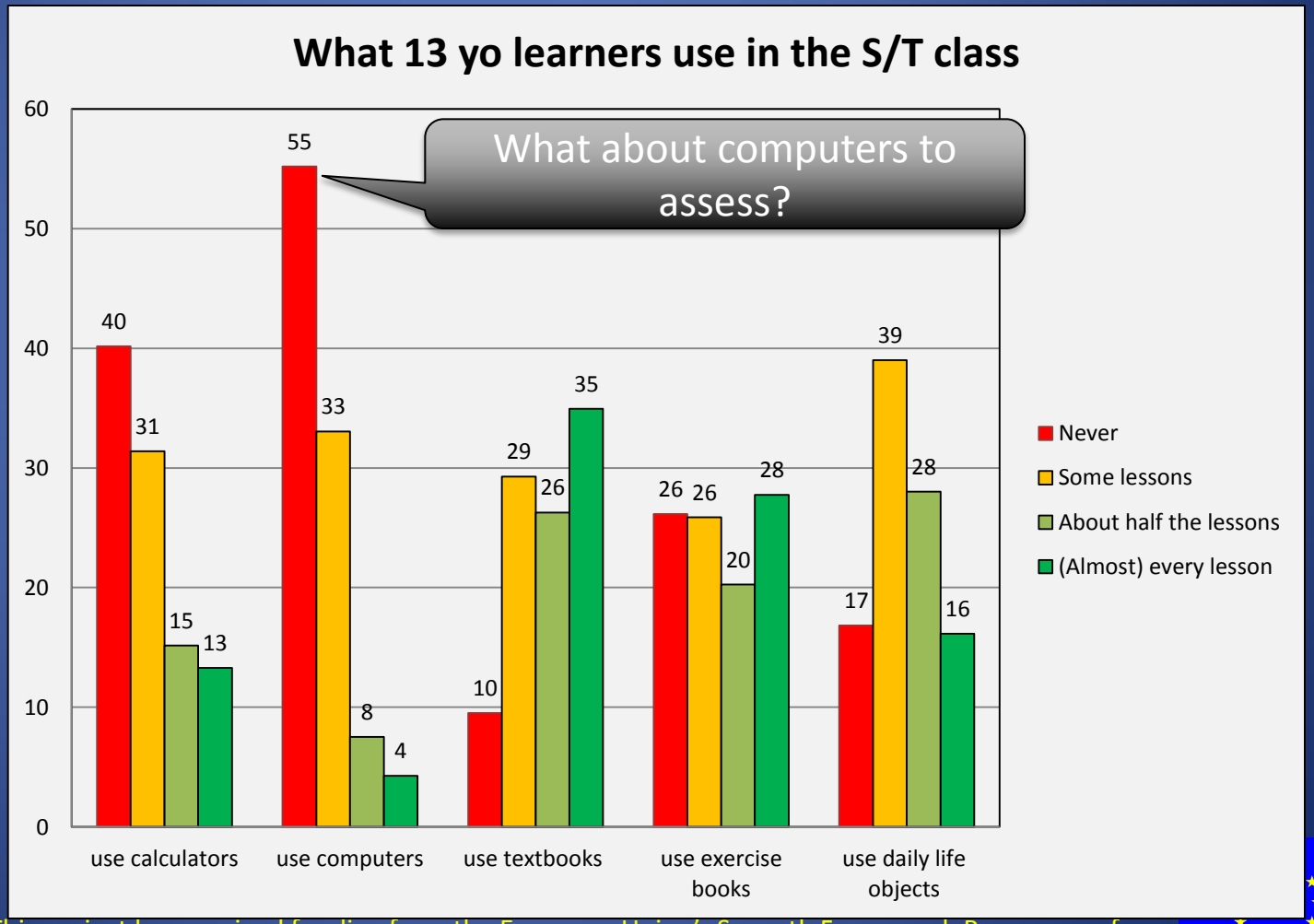
Learners: what they say they use: is there a link to possible assessment methods?



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Learners: what they say they do

3. About what you do during the lessons

3.1a	What do you do in your ***mathematics*** class?			
	a. We do practical work: we measure, fold or build things	Often	Sometimes	Never
	b. I present results to the class	Often	Sometimes	Never
	c. I learn how to make assignments	Often	Sometimes	Never
	d. We work in small groups on a problem	Often	Sometimes	Never
	e. I work on my own	Often	Sometimes	Never
	f. We listen to the teacher explaining	Often	Sometimes	Never
3.1b	What do you do in your ***science*** class?			
	a. We do practical activities: we do tests, search things or watch how animals live	Often	Sometimes	Never
	b. I present results to the class	Often	Sometimes	Never
	c. I learn how to make assignments	Often	Sometimes	Never
	d. We work in small groups on a problem	Often	Sometimes	Never
	e. I work on my own	Often	Sometimes	Never
	f. We listen to the teacher explaining	Often	Sometimes	Never
3.1c	What do you do in your ***technology*** class?			
	a. We do practical activities: we make or built things, we watch how things work	Often	Sometimes	Never
	b. I present results to the class	Often	Sometimes	Never
	c. I learn how to make assignments	Often	Sometimes	Never
	d. We work in small groups on a problem	Often	Sometimes	Never
	e. I work on my own	Often	Sometimes	Never
	f. We listen to the teacher explaining	Often	Sometimes	Never

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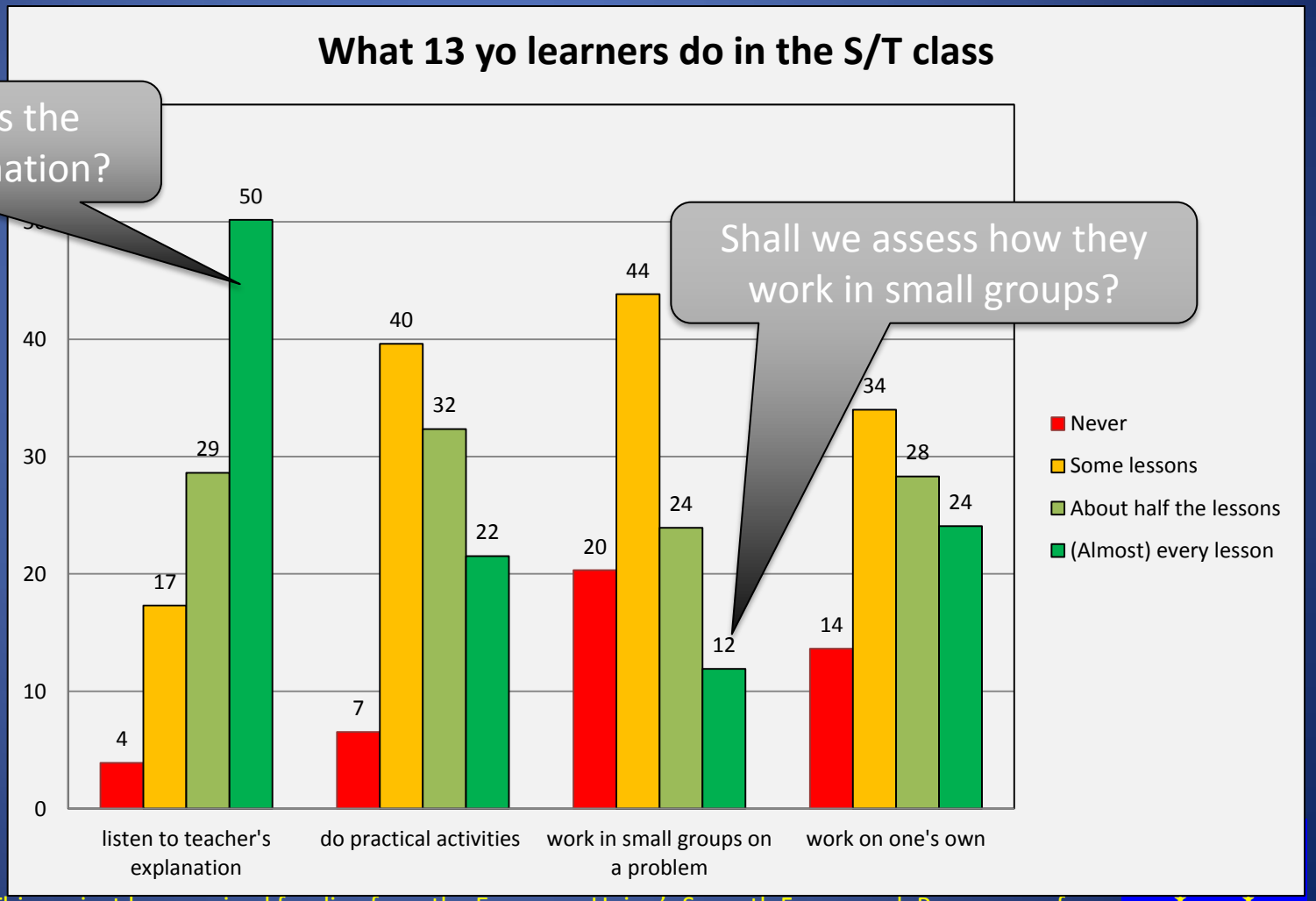
13 yo Learners: what they say they do: is there a link to possible assessment methods?



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Across countries

8 yo	Q1 (work in small groups), answer "never" in %			Q2 (present to the class), answer "never" in %		
Country/Age learners	Maths	Science	Technology	Maths	Science	Technology
SE	8	9	17	53	30	40
PL	17	15	18	23	34	26
GE	19	13	No Technology (!)	29	20	No Technology

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What do teachers say?

- In the case of the second question,(Listening to presentations) Polish mathematics teachers say 28% “never”, (⇔ 23% learners) science teachers 4% “never” (⇔ 34% learners) , technology teachers this is 5% “never” (⇔ 26%) . One must bare in mind that the numbers are very low (tens of persons), so the data are indicative but not representative. One could elaborate this for all countries and all disciplines.
- During the EGM it became clear that experts (representing the interested field) are keen on finding the most relevant and surprising comparative analysis.

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(i) Education is very traditional

- Some graphs…
- … show what we indicated already.

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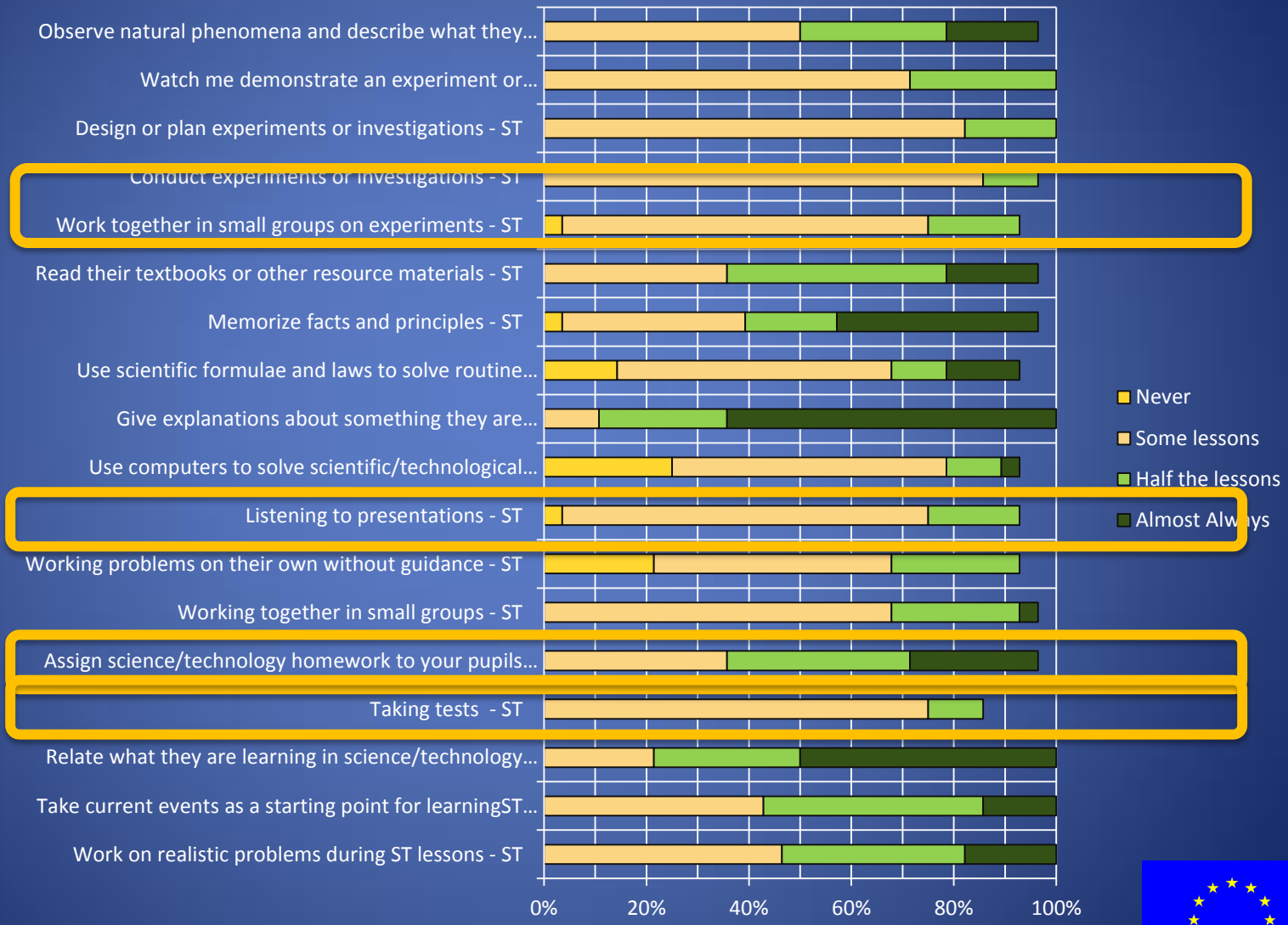
(i) PL: All Teachers: Learning activities
In teaching ST, how often do you usually ask your pupils to do the following?



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(i) Learners are ready when they are 8yo

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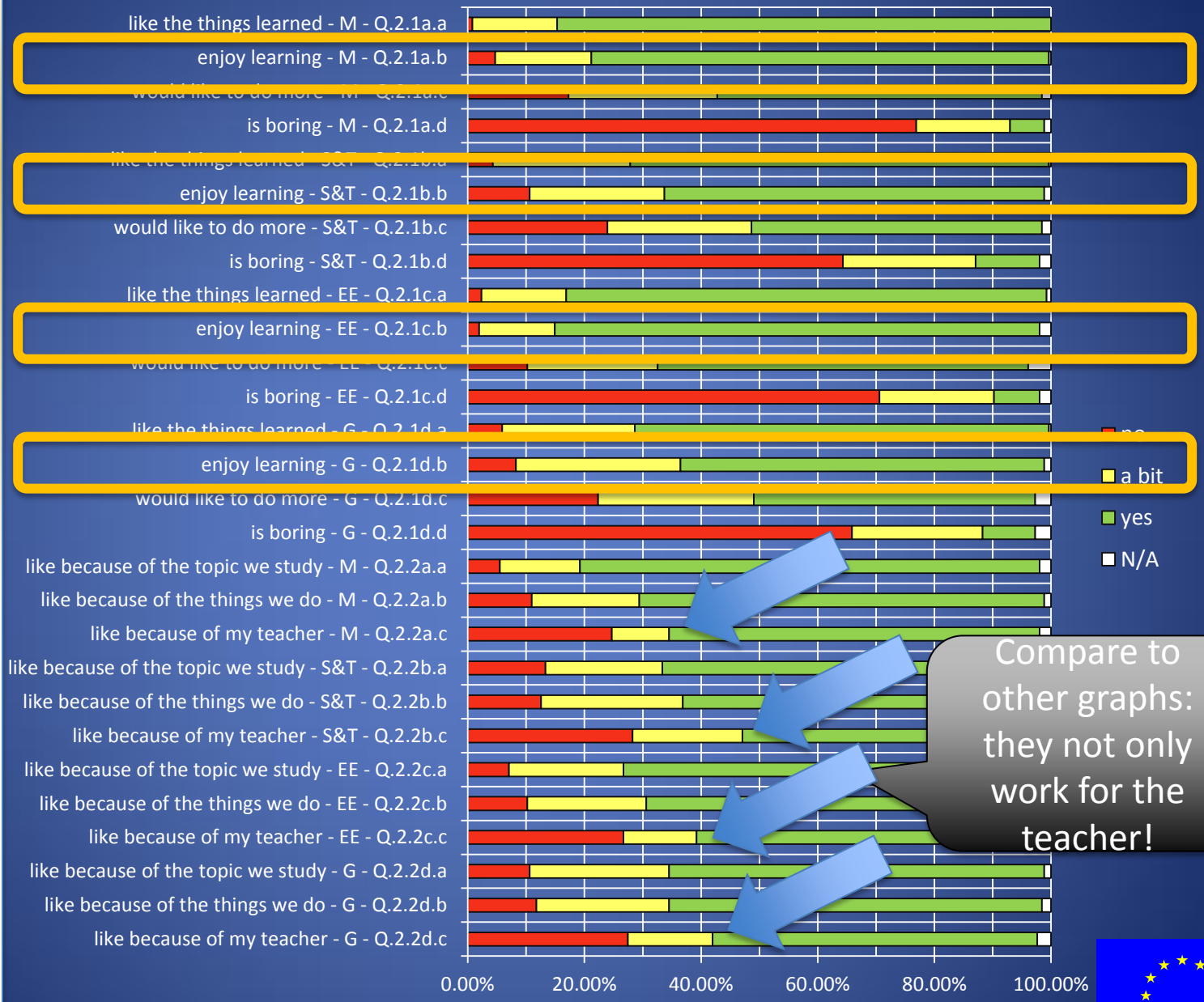
(i) CY, 8yo: Interests



Compare to other graphs: they not only work for the teacher!

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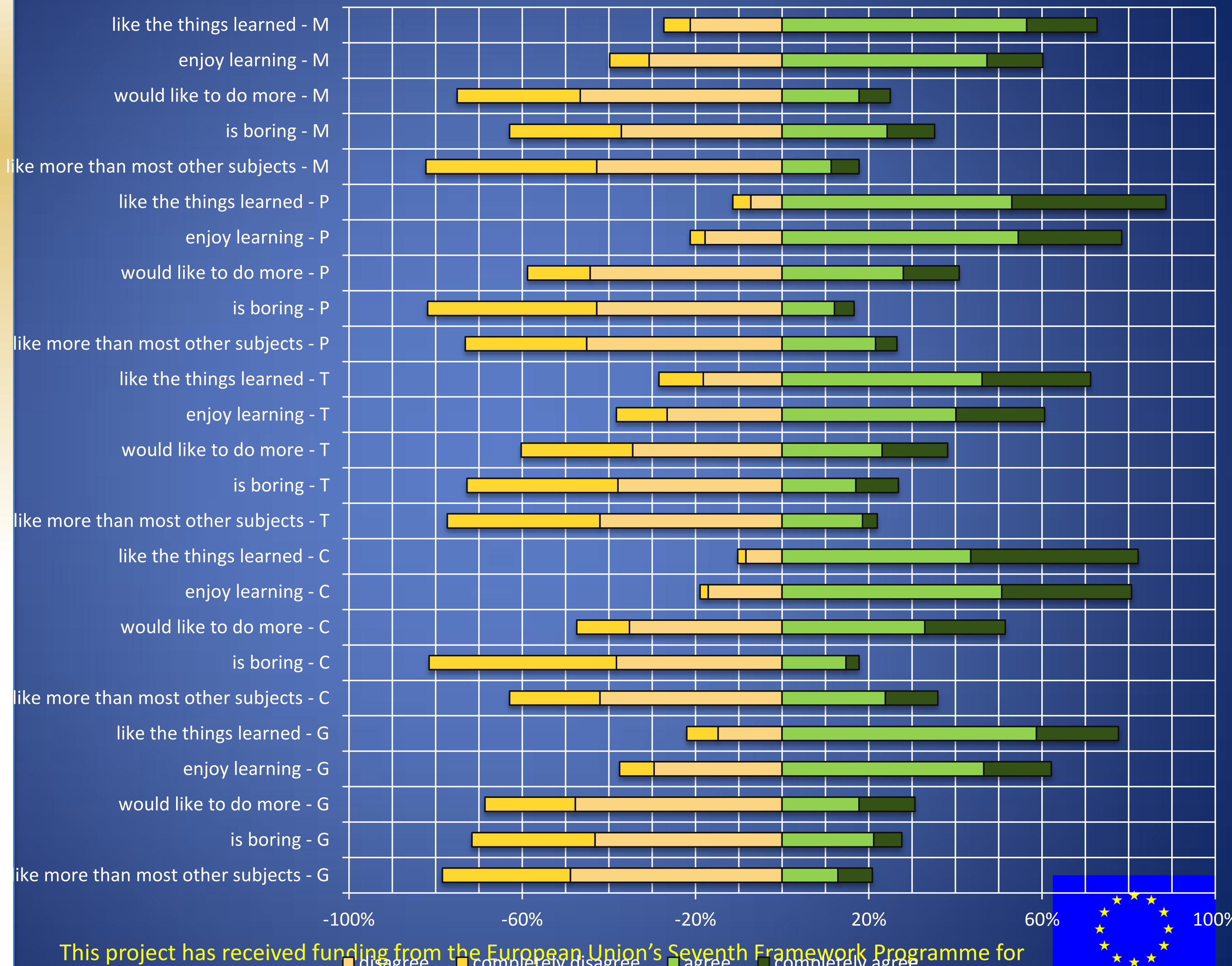
(i) CY: Interests, 13 yo



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CAPACITIES

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Conclusions

- The SECURE project provides a lot of data for many stakeholders. A wide set of angles of looking at curricula, perceptions of teachers and students is available.
- The "assessment aspect" in science is studied both from teachers' point of view and learners' point of view, both on the level of curriculum as well as perceptions of teachers and learners.
- Maths, science and technology education as such can be very motivating and interesting for learners, although scores tend to decrease with age. Some countries do significantly better than others. Technology is more motivating than other "science" courses for learners. (why?)
- Teachers realize that continuous professional development is absolutely necessary, but they do not attend too many sessions, mainly because of lack of time.

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Kevin McLean (Departement of Education and Skills (Ireland), Inspectorate

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Important messages from the SECURE project for Ireland are outlined below:

•Awareness of MST learning and teaching in other countries through the outcomes of the project will provide a background to what we are doing well and how we can improve. For example, in many countries, the time spent on primary science is higher than in Ireland, Science is a core subject at junior cycle and Science is supported through special education centres in some countries. All of these initiatives support scientific literacy.

•The amount of time spent on Science education in primary school should be reviewed.

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- Transitions from primary to post-primary Science and Mathematics require attention.
- To review if we should be cutting the time allocation to Science at Junior Cycle from 240 hours to 200 hours in line with junior cycle curricular reform.
- To consider if Science at junior cycle should be a core subject alongside Irish, English and Mathematics.
- To promote the increased uptake of physical science subjects at senior cycle.

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The strength of this study is the large data collected. The data can be used to cross analyse numerous variables of motivation such as gender issues, integrated science subject and differentiation of the teaching in the classroom, for example.

- Anssi Lindell (Finland)

The dissemination of the SECURE results and recommendations can help any country, even those which have not participated in the research.

- Joan Borg Marks (Malta)

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Thank you!

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