

Improving Education

Main questions:

1. How do we know what needs to be improved?
 2. How do we know that we are improving?
- These questions were also underlying a recently finalized study for the European Commission



Indicators on ICT in Primary and Secondary Education



OCTOBER 2009

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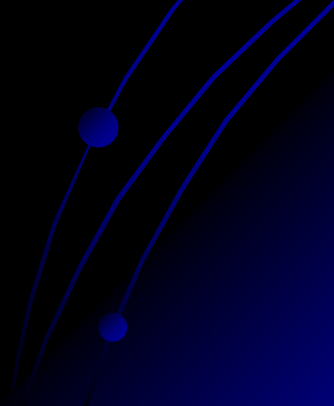


Education and Culture DG

EACEA
European Agency
for External Cooperation
in the Field of
Education, Youth and Culture




edasmO



This presentation

- The main questions addressed in this study
- The importance of monitoring ICT
- Which information is needed?
- Observations:
 - Availability of indicators
 - New indicators
 - Ongoing national and international initiatives
- Monitoring ICT in the EU
- Recommended actions

Main questions

- What should be monitored → Which indicators are needed?
 - Are those indicators available?
 - If not, how can the missing indicators be collected?
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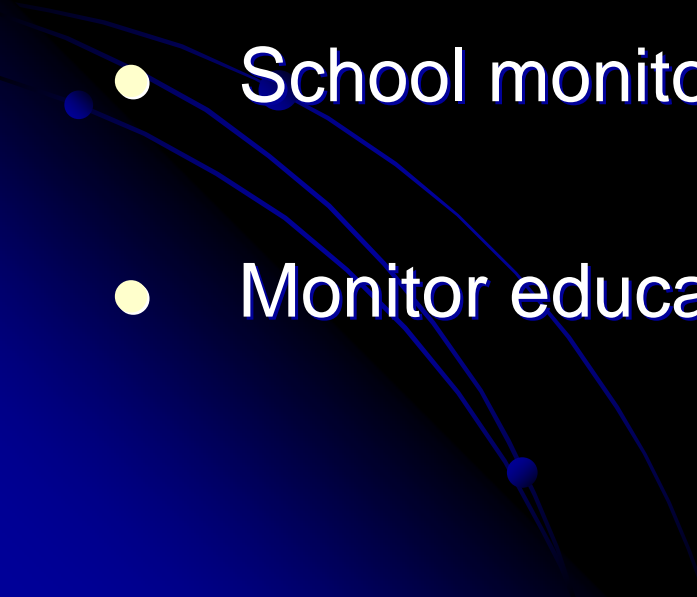
The study from a birds-eye perspective

- Analysis of ICT policies
- What should be monitored → Which indicators are needed?
- Are those indicators available?
- If not, how can the missing indicators be collected?

Desiderata for monitoring in general

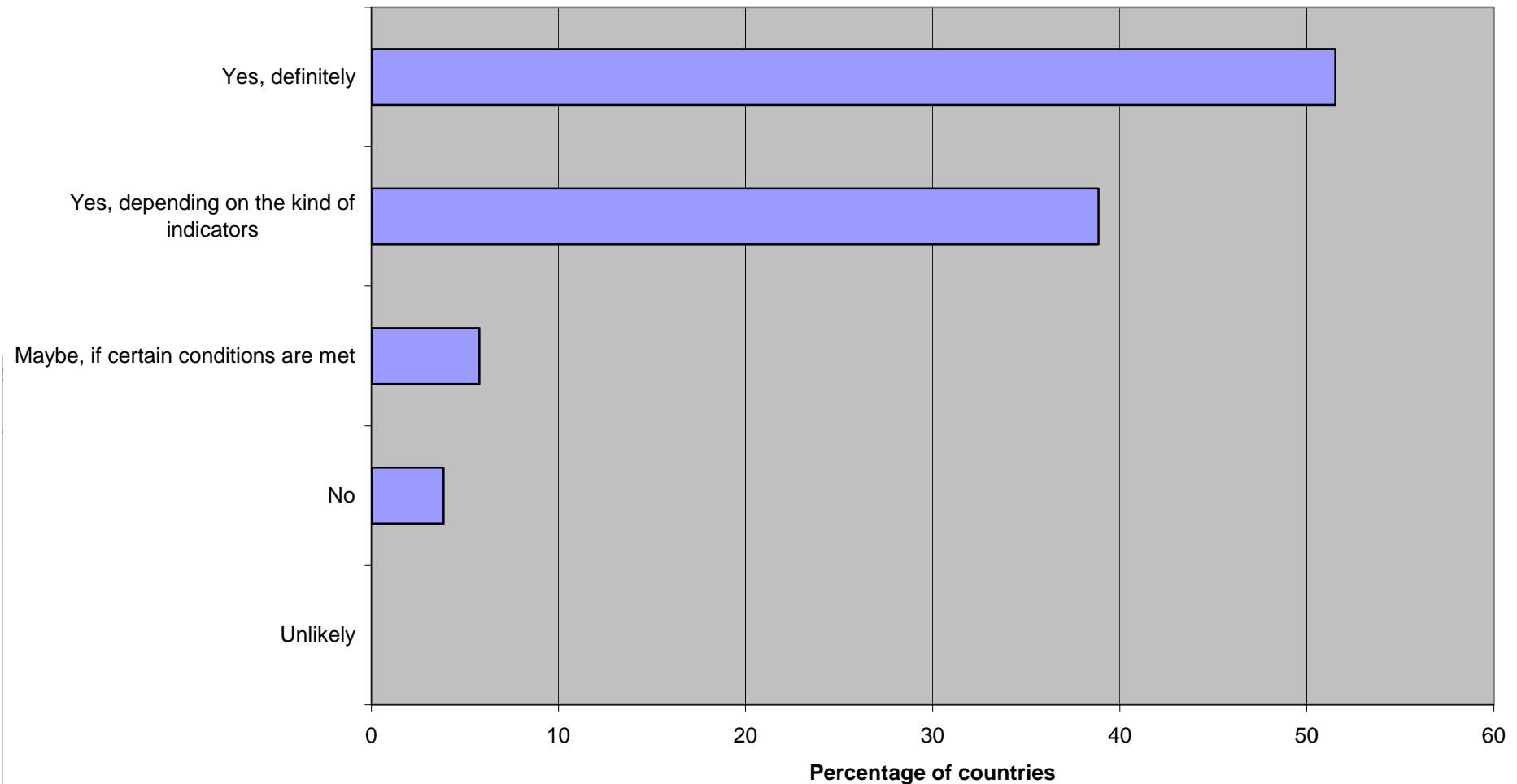
- Policy cycle: common targets, primary and secondary indicators
- Primary indicators should be student outcomes
- Holistic (avoid conservative effects)
- Multi-level (schools also develop policies)
- Flexibility (curricular variations)
- Online data collection

Desiderata for monitoring the Use and Impact of ICT

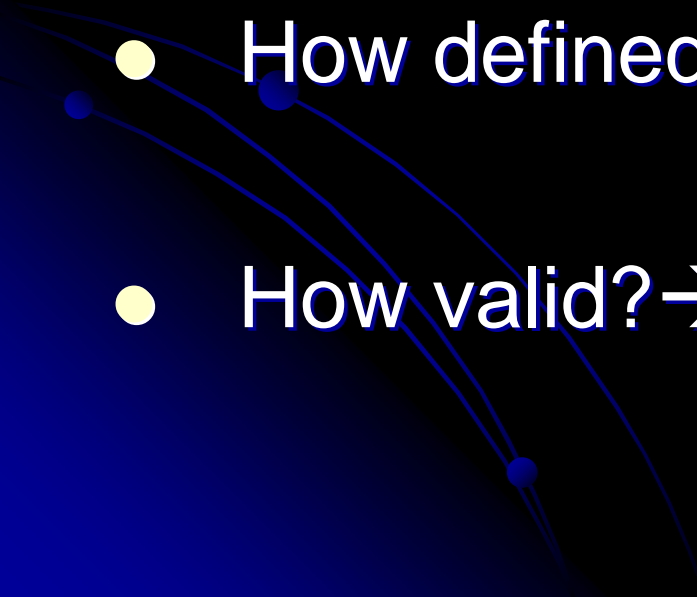
- EU key competency areas: outcomes and opportunities to learn (holistic)
 - Flexibility
 - School monitoring
 - Monitor educational change (ICT as aspect)
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The importance of monitoring ICT

Need for international comparative monitoring of ICT in education

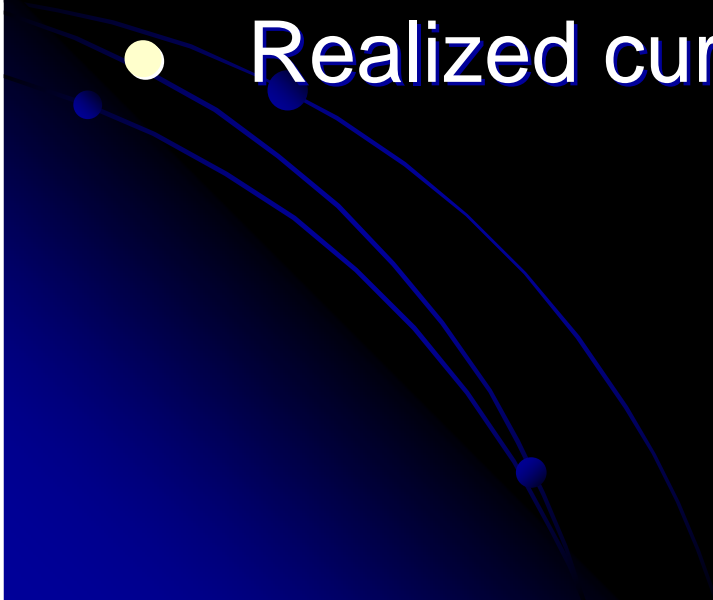


What should be monitored

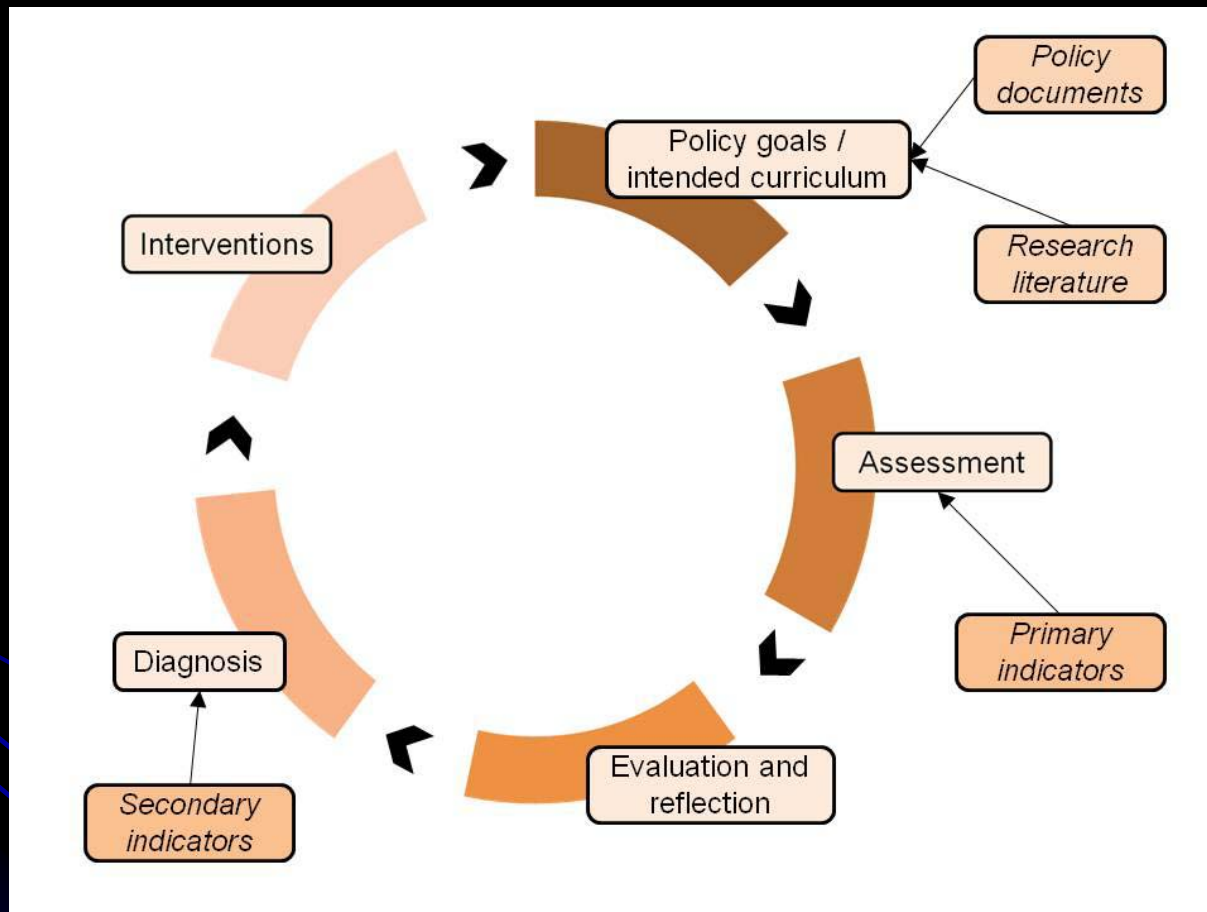
- Student outcomes are core
 - Which outcomes? → holistic
 - How defined? → Intentions
 - How valid? → Opportunity to Learn
- 

IEA model

- Intended curriculum
- Implemented curriculum
- Realized curriculum



Need more indicators



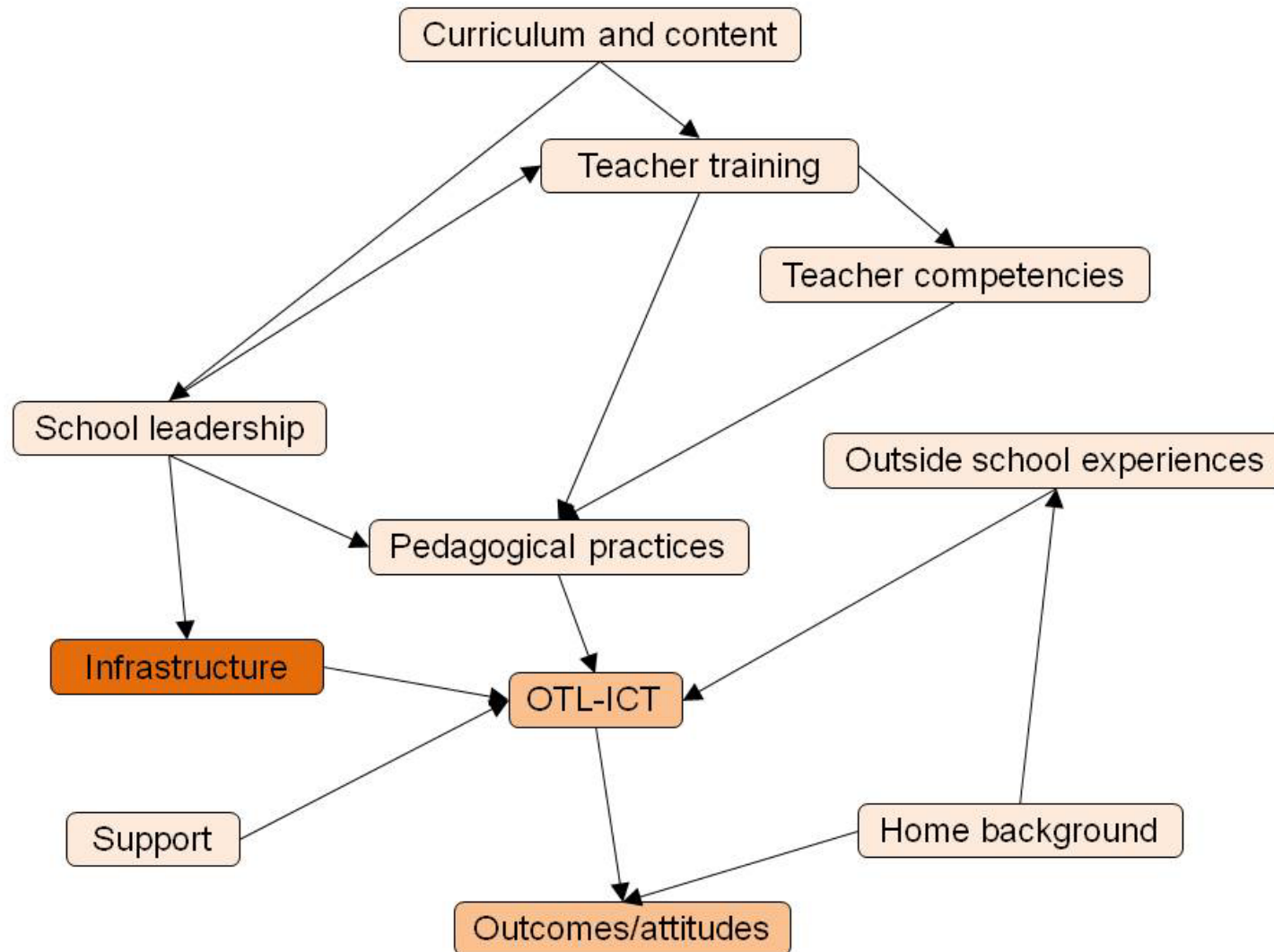
- Dilemma defining secondary indicators

Many potential secondary ICT- indicators

Policy topics:

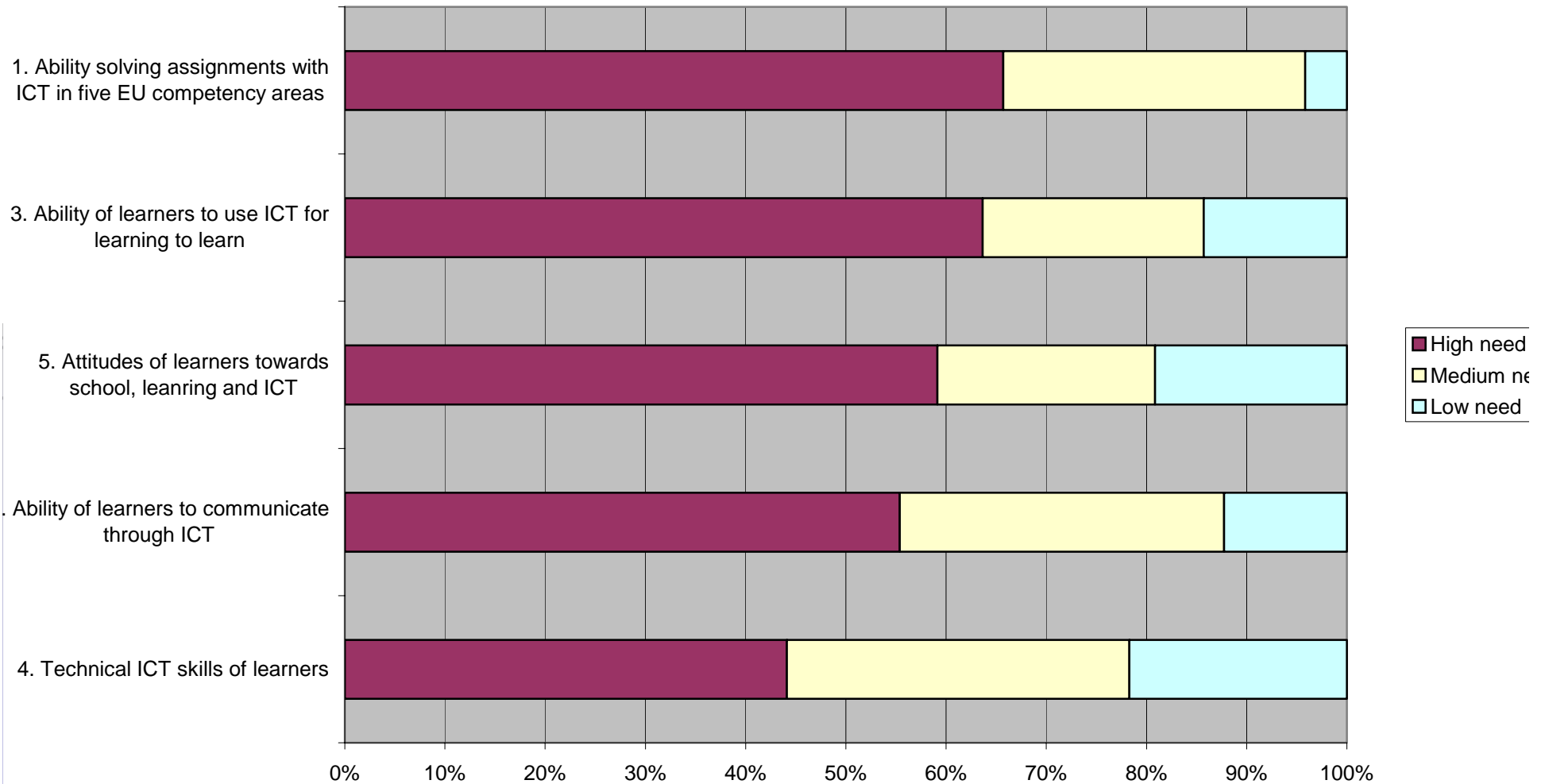
- Infrastructure. This concerns issues like hardware and software and within these sub-issues such as access to the Internet, broadband connections, open source software.
- Curriculum and content. This covers issues such as pedagogical approach (e.g. autonomous learning), content (e.g. development of methods), assessment (e.g. portfolio's, digital drivers license)
- School leadership, e.g. change management.
- Connectedness, e.g. national and/or international cooperation, public-private partnerships.
- Teacher training, e.g. teacher competencies, pedagogical drivers license.
- Support, e.g. the way technical and/or pedagogical support is made available.
- Transversal issues, e.g. equity, financing, safety.

Conceptual framework



Importance of indicator areas

Percentage need indicators for competencies and attitudes of learners



Importance of indicator areas

Indicator areas	Percentage high need
a. Opportunities to learn with and/or about ICT	
6. For which kind of activities students use ICT for learning in the five EU key competency areas (literacy in reading, mathematics and science, language skills, ICT skills and learning to learn skills)	73%
10. The extent to which students use ICT for cooperation and/or communication	65%
5. For which kind of activities students use ICT in general at school	60%
1. The extent to which students use ICT at school	60%
b. Competencies and attitudes of students	
1. The ability of students to solve assignments that require the use of ICT in the five EU key competency areas (literacy in reading, mathematics and science, language skills, ICT skills and learning to learn skills)	66%
3. The ability of students to use ICT for learning to learn (goal setting, self evaluation, management of learning, self evaluation)	64%
c. ICT support	
3. The extent to which pedagogical support is available for teachers (for lesson preparation, class management issues, assessment procedures, etc.)	61%
d. Teacher training	
2. Pedagogical ICT competencies of teachers	82%
6. Ability of teachers to build their own individual and collaborative learning activities around digital resources	68%
4. Ability of teachers to locate digital content resources that fit their curriculum targets	62%
7. Application of innovative forms of assessment	61%
e. School leadership	
6. Competencies of the school leadership to manage ICT-related innovations	63%

Observations from this study

- Availability of international comparative indicators:
 - Mostly secondary
 - A few on use, but quite general
- New indicators:
 - Developmental work for core indicators needed
 - Adapt secondary indicators to core definitions
- Unknown what students should know (use ICT to learn, learn use of ICT)
- Ongoing national and international initiatives as source of inspiration

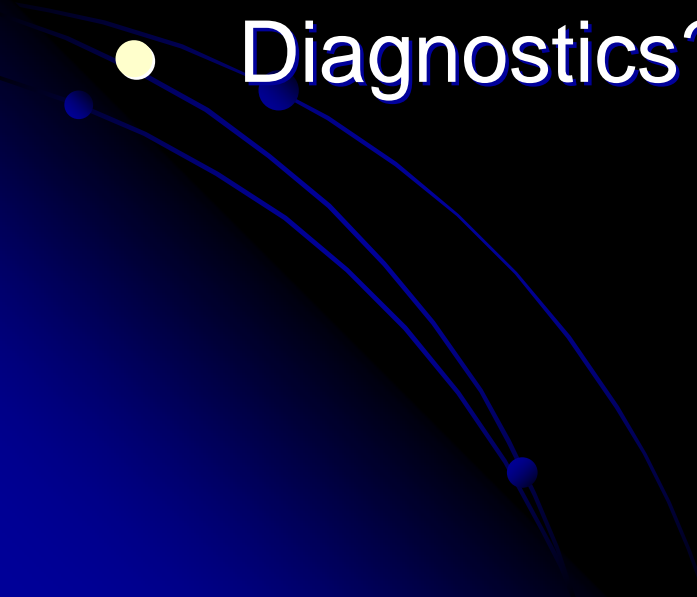
Illustrations

- Available data
 - Statistics: life time, validity, analysis
- 

Available indicators from students

Area	Short label	Statistic per EU-plus country	Primary education				Secondary education					
			PIEA	TIEA	PIEA	TIEA	PISA	PISA	TIEA	PISA	TIEA	
			2001	2003	2006	2007	2000	2003	2003	2006	2007	
OTL-ICT	Use overall											
	Overall	% students having used computers at all	L	L		L		L	L	L	L	L
	Frequent	% students using computers overall weekly	L		L							
	For writing	% students using computers for writing					L	L		L		
	Information retrieval	% students using computers for information retrieval	L		L			L		L		
	Collaboration	% students using computers for collaboration						L		L		
	Spreadsheets	% students using spreadsheets					L	L		L		
	Programming	% students using computers for programming					L	L		L		
	E-mailing/chatting	% students using computers for e-mailing/chatting	L		L		L	L		L		
	Educational software	% students using educational software						L		L		
	Use at School											
	Overall	% students having used computers at school overall	L	L	L	L	L	L	L	L	L	
	Frequent	% students having used computers at school weekly	L		L		L	L		L		
	Mathematics overall	% students having used computers at school in mathematics overall				L					L	
	Schoolwork	% students having used computers for mathematics and science schoolwork				L					L	
	Use outside school											
	Overall	% students having used computers outside school overall	L		L				L		L	

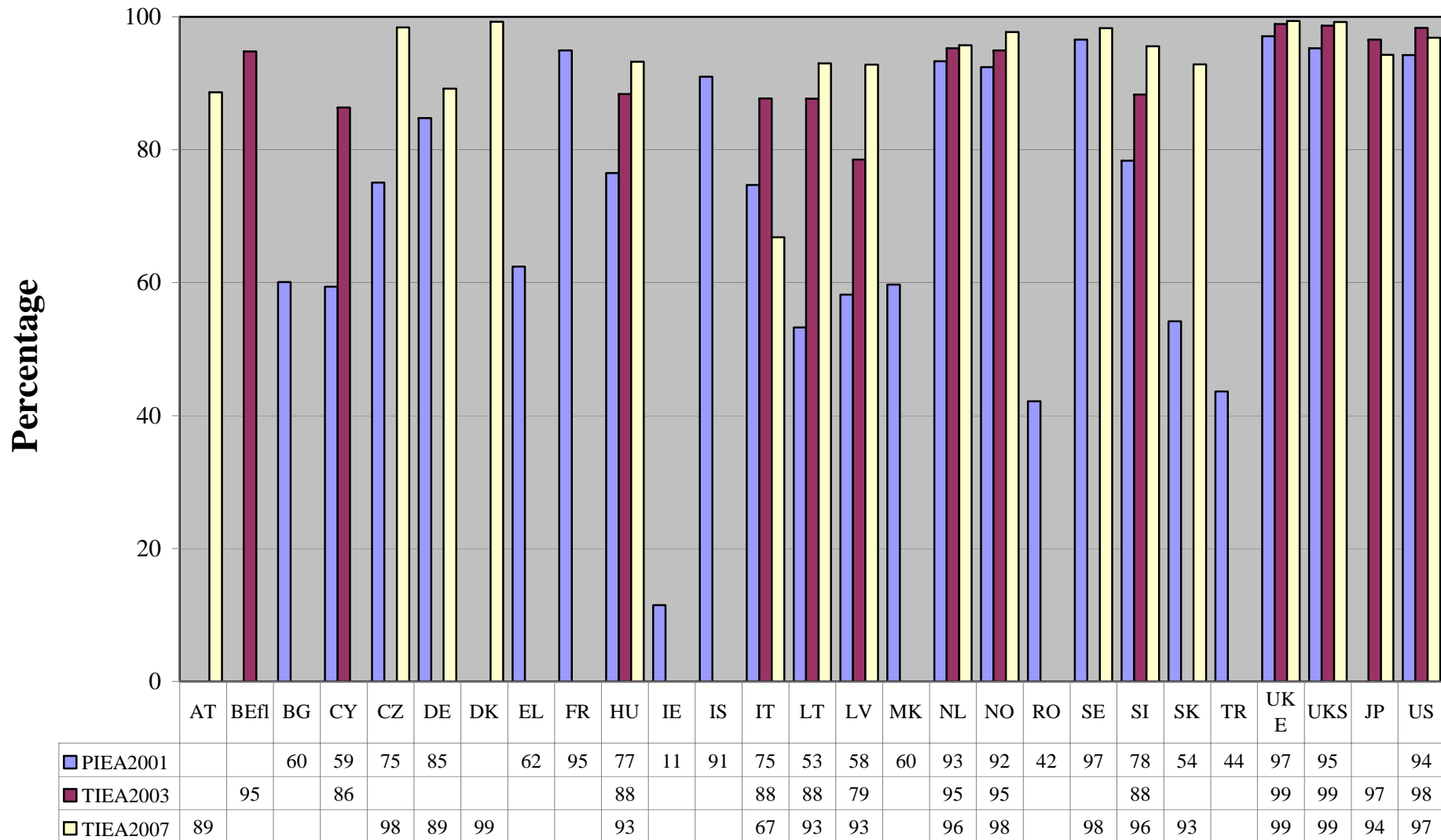
What do the available statistics show?

- Data gaps?
 - Data quality?
 - Life expectancy of indicators?
 - Periodicity?
 - Diagnostics?
- 

Examples (data gaps, lifetime)

Primary education

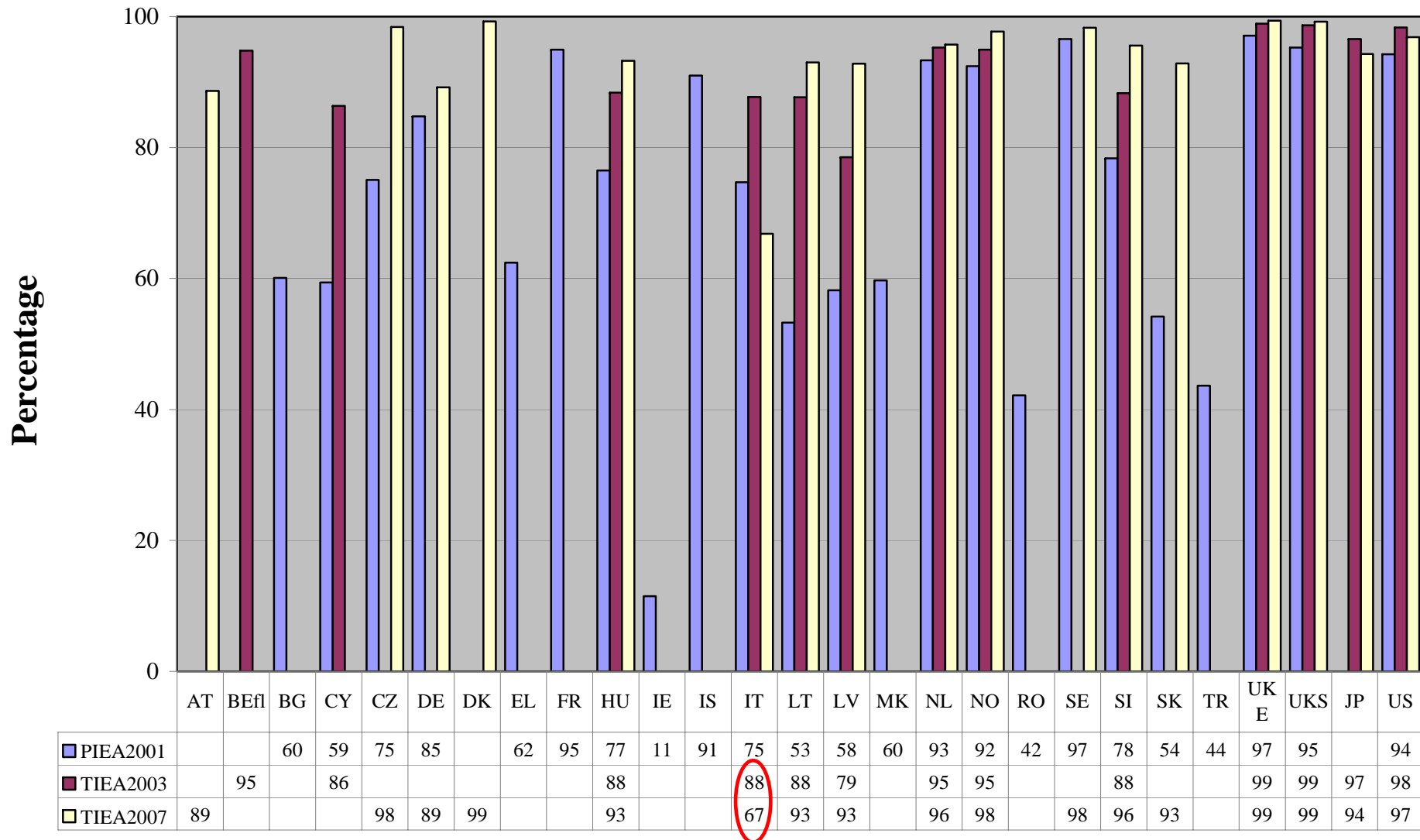
% students used computers at all



Examples (validity?)

Primary education

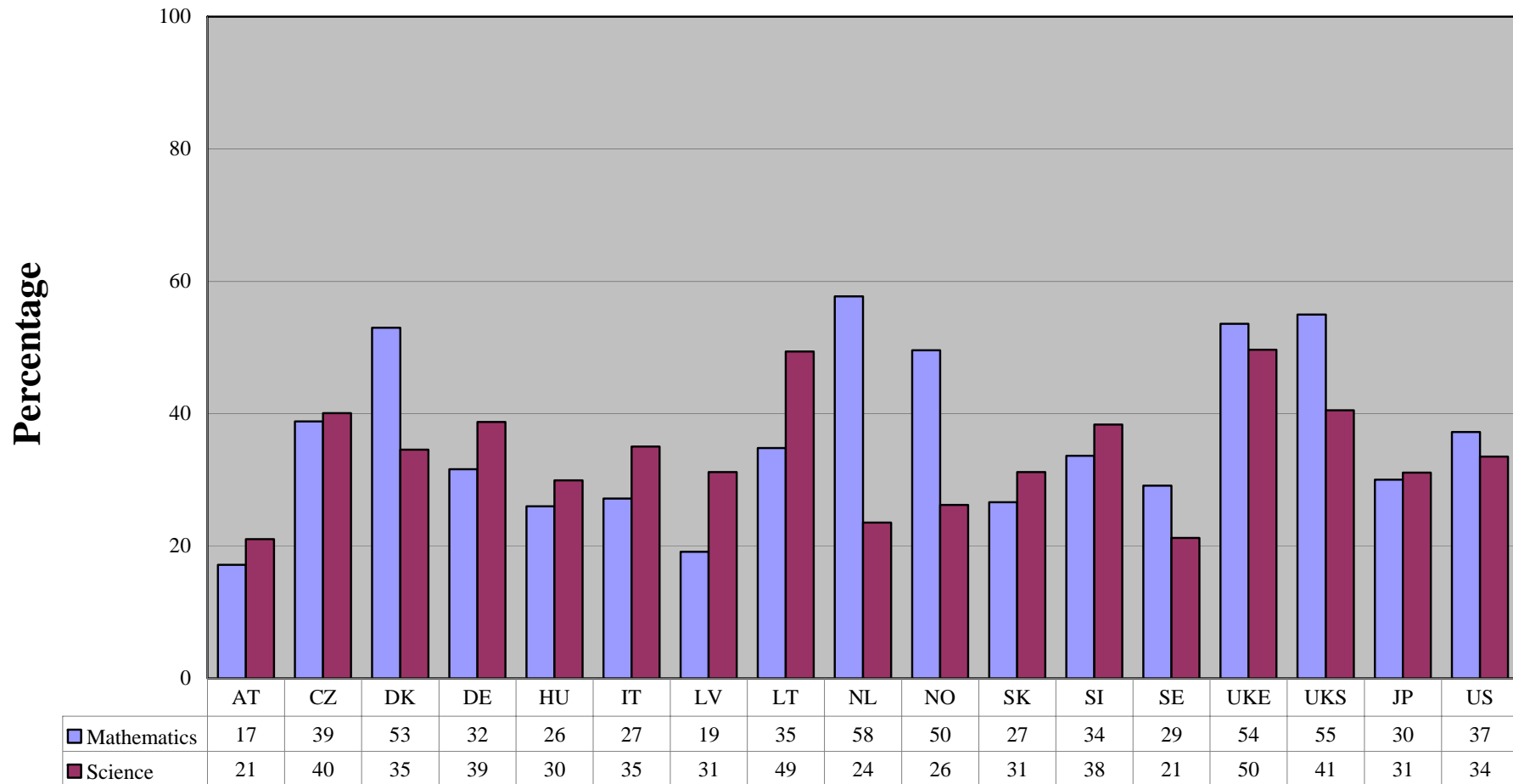
% students used computers at all



Examples (lifetime)

Primary education-2007

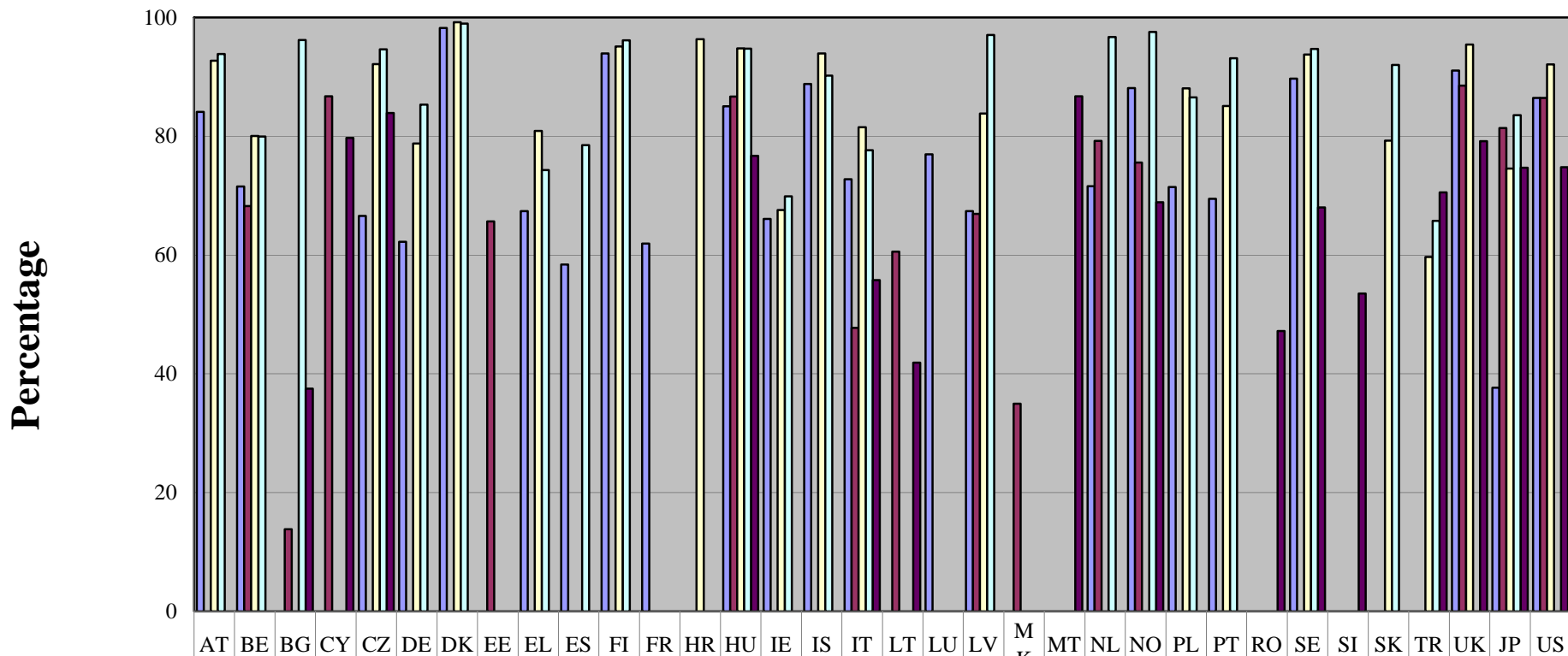
Percentage of grade 4 learners using computers in general for mathematics and science schoolwork



Examples (data gaps, lifetime, X-studies)

Secondary education

Percentage of students using computers at school

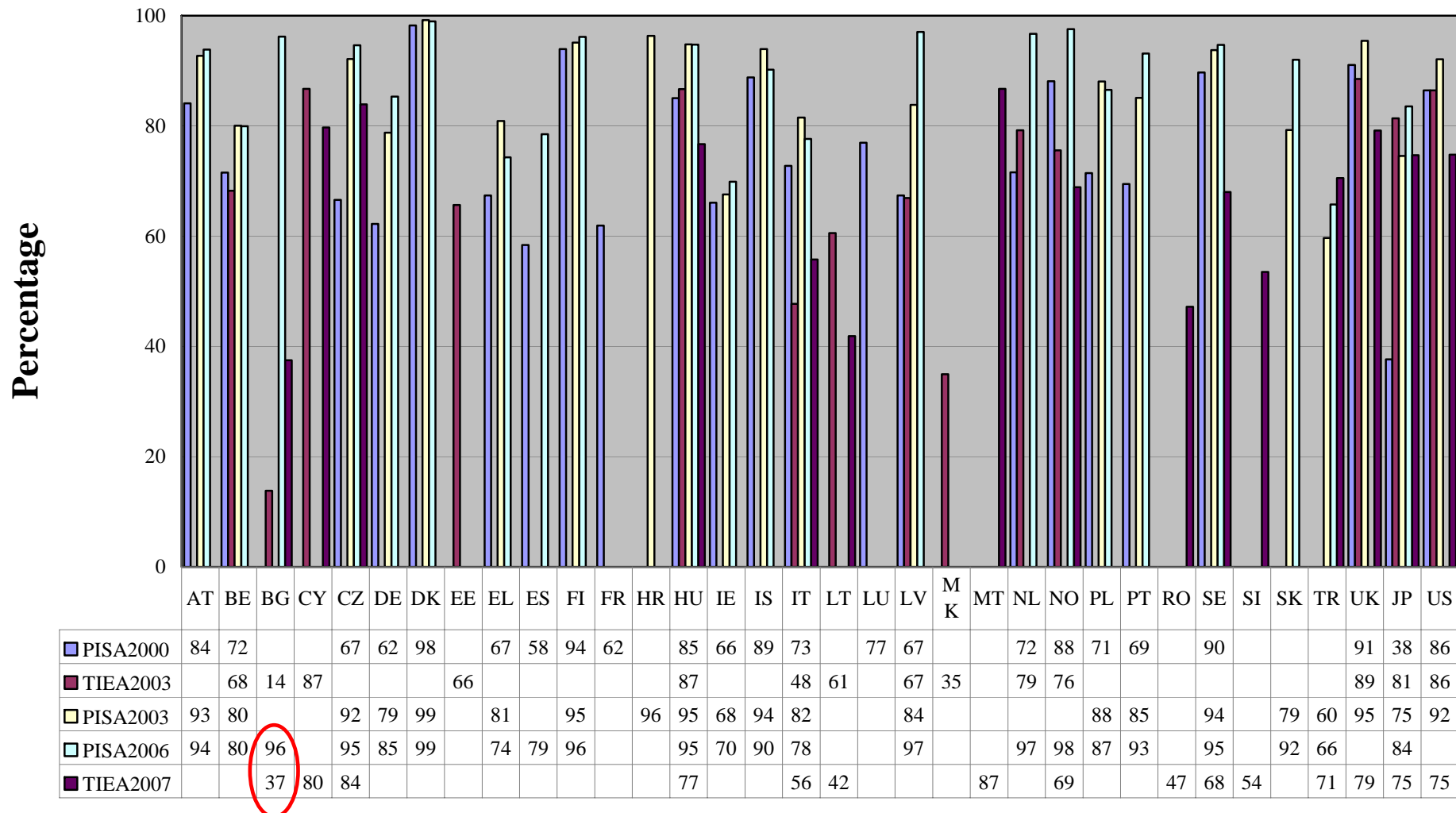


	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IS	IT	LT	LU	LV	M K	MT	NL	NO	PL	PT	RO	SE	SI	SK	TR	UK	JP	US
■ PISA2000	84	72			67	62	98		67	58	94	62		85	66	89	73		77	67			72	88	71	69	90				91	38	86	
■ TIEA2003		68	14	87				66						87			48	61	67	35		79	76								89	81	86	
■ PISA2003	93	80			92	79	99		81		95		96	95	68	94	82			84				88	85	94	79	60	95	75	92			
■ PISA2006	94	80	96		95	85	99		74	79	96			95	70	90	78			97			97	98	87	93	95	92	66		84			
■ TIEA2007			37	80	84									77			56	42				87	69			47	68	54	71	79	75	75		

Examples (validity?)

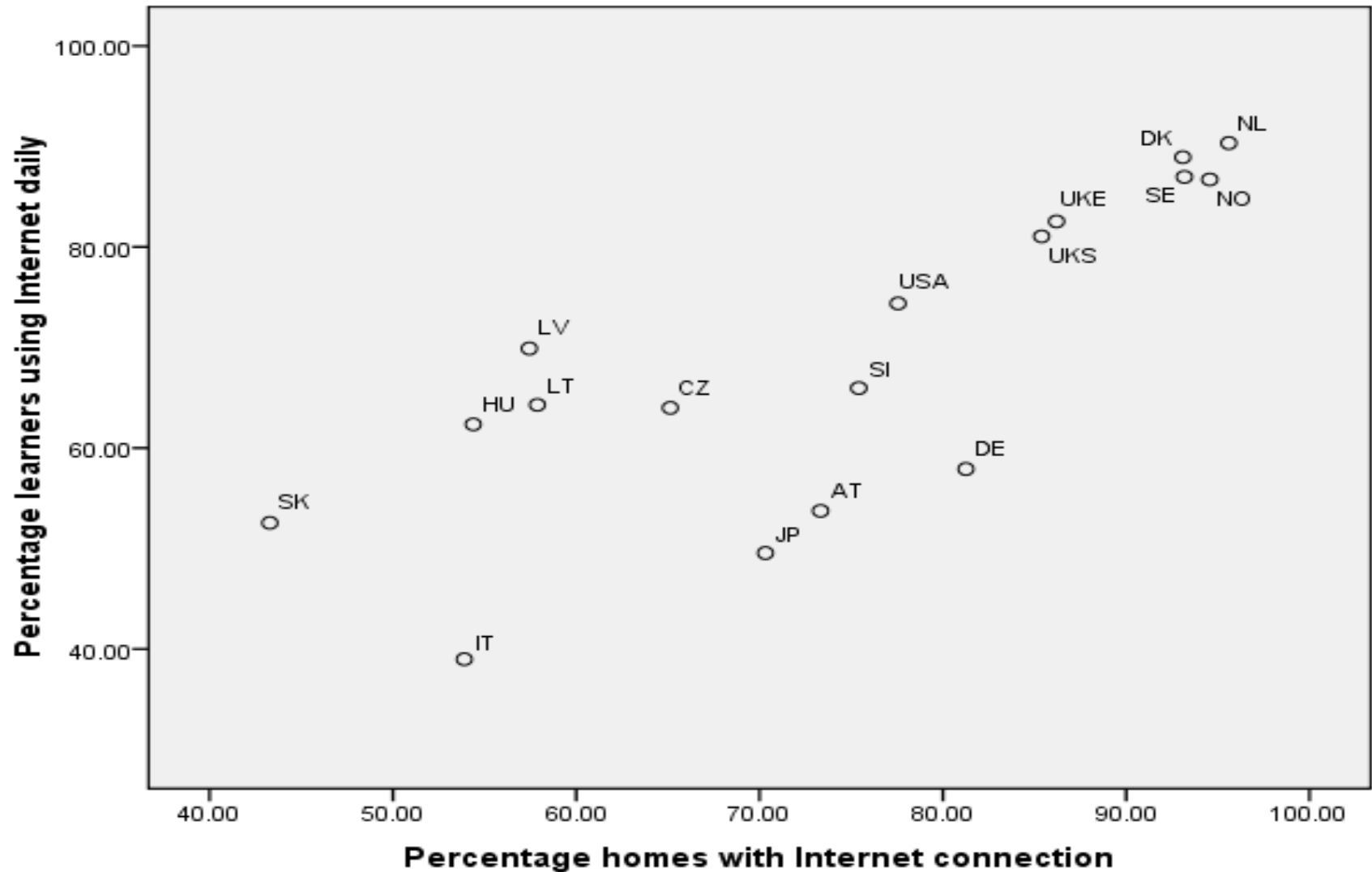
Secondary education

Percentage of students using computers at school



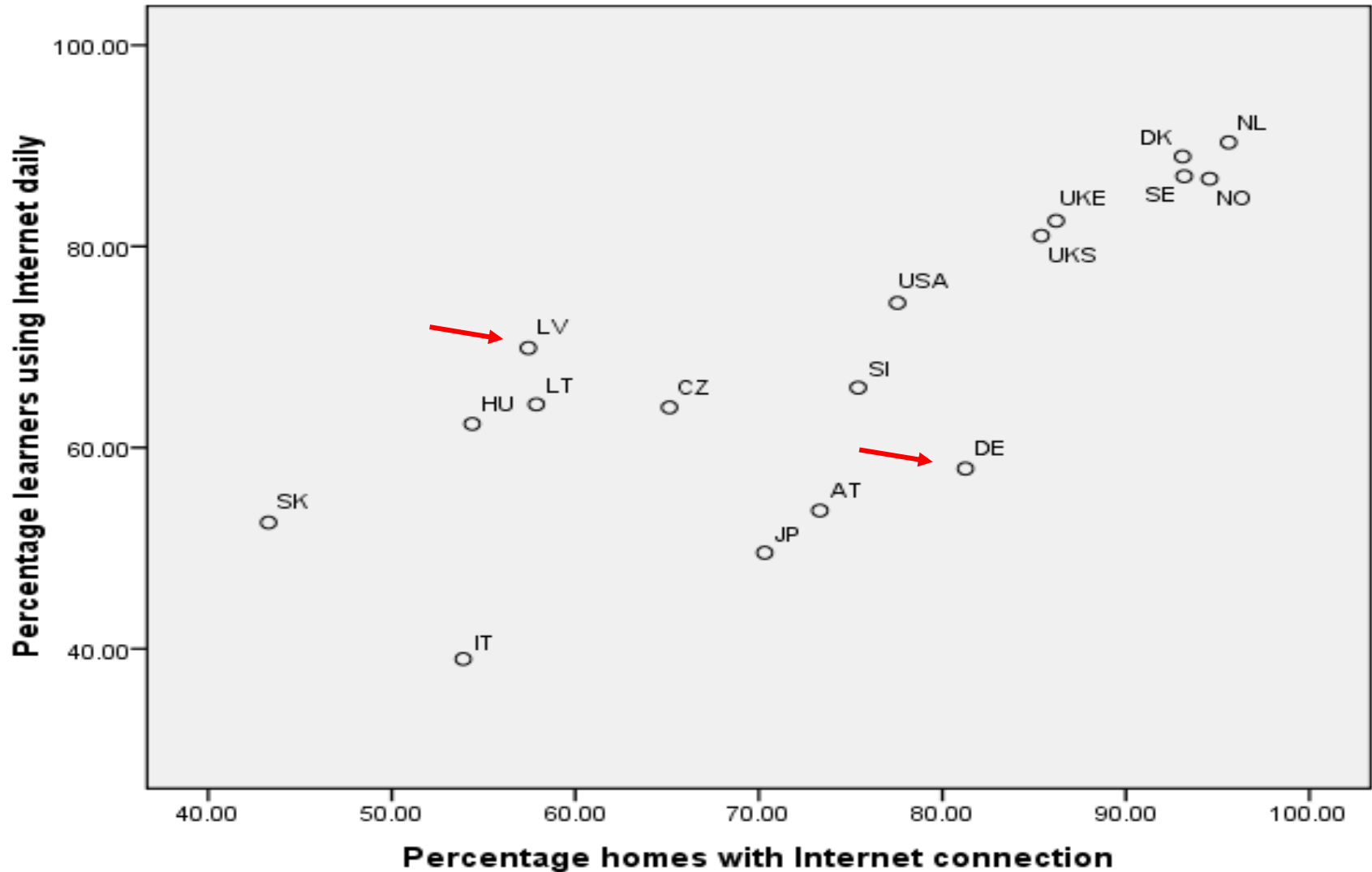
Examples (diagnostics?)

Primary education



Examples (diagnostics?)

Primary education



New indicators needed

- Need for indicators of students competencies to use ICT for learning:
 - Learning about ICT (technical, information skills) → **Learn to Use**
 - Learning/working with ICT (knowledge acquisition, learning to learn, cooperation, etc.) → **Use to Learn**
- Develop international frameworks and item (assignment) banks

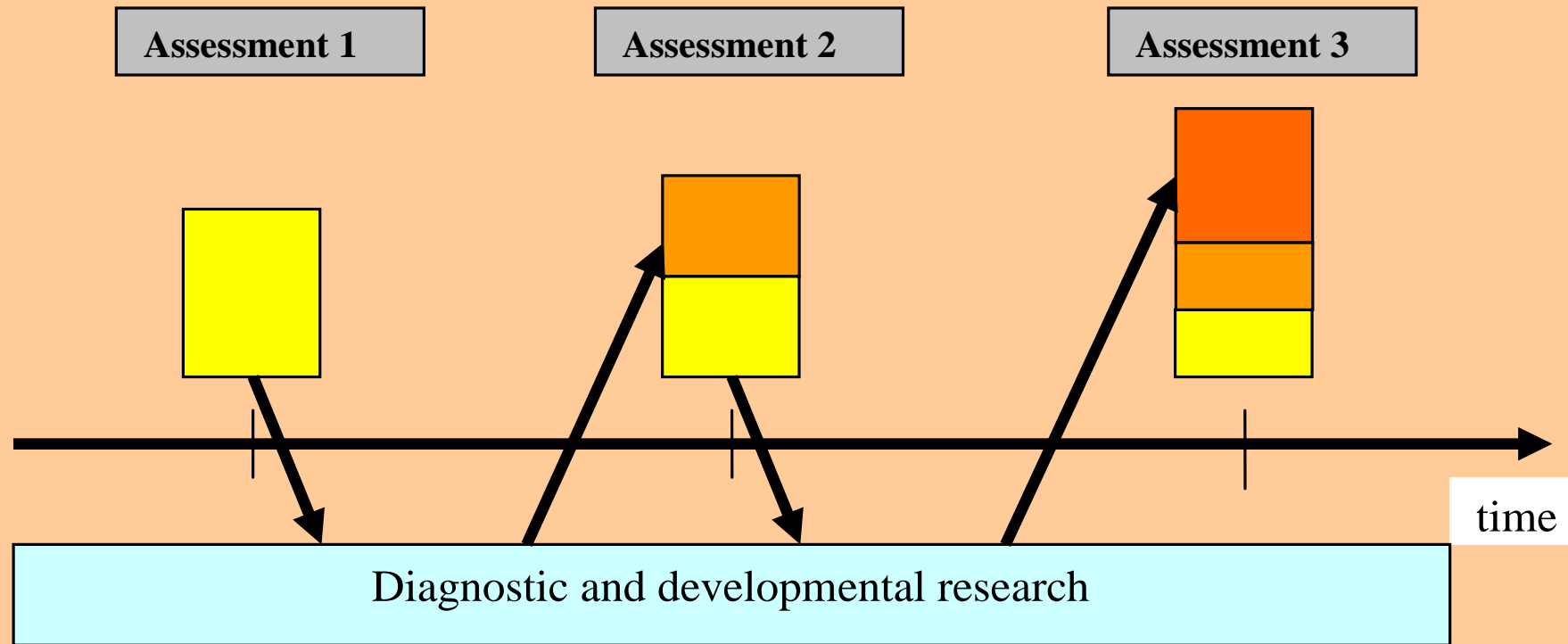
Ongoing national and international initiatives

- National monitors: more info in coming years
- School monitoring: in-depth studies needed
- International initiatives:
 - IEA-ICILS
 - Unesco-LAMP and ICT4E
 - CISCO-INTEL-MICROSOFT
 - OECD-NML

What does the previous mean for monitoring ICT in the EU?

- Many scenarios, depending on:
 - Preliminary Choices:
 - Financial
 - EU stand alone and/or add-on
 - Primary/secondary indicators
 - Mode of data collection
 - Flexibility: cafeteria model?
 - Identification of common objectives
- Advice: start modest and increment

GENERIC SCENARIO



Legend

Indicators first used in assessment 1



Indicators first used in assessment 2



Indicators first used in assessment 3



Conclusions-1

Policy-makers need educational monitors in order to make inferences about the strengths and weaknesses in the competencies of students, how these are developing over time and what are the potential causes of weaknesses. This holds for education in general, but also more specifically for ICT. With regard to ICT the core questions which should be addressed by educational monitoring are: (1) are students during compulsory education sufficiently skilled to use ICT in the competency areas that are targeted by the European Commission for benchmarking, and (2) do students have sufficient opportunities to learn about ICT (in this study abbreviated as 'OTL-ICT') at and/or outside school? Indicators are needed for addressing these questions.

Conclusions-2

A survey among ICT policy experts in the EU showed that there exists a high need for indicators regarding 'Opportunities to learn with and/or about ICT', 'ICT-related competencies and attitudes of students', 'ICT support', 'Teacher training', and 'School leadership'.

Conclusions-3

Suitable indicator definitions do not exist for the key competency areas that should (ideally) constitute the core for monitoring ICT in education (see conclusion 1), namely the ICT-related student outcomes and opportunities to learn, which are called in this study 'primary indicators'.

Conclusions-4

Before indicator definitions can be generated, first the key competency areas need to be defined (in terms of assessment frameworks) and operationalized in internationally agreed upon (exemplary) tasks that students are expected to master at certain points during their school career.

Conclusions-5

International comparative indicators of student competencies in the EU, which are regularly collected, exist only for a few traditional subject areas. ICT related indicators collected from students mainly concern very general indicators of the use of ICT in and/or outside school. Moreover, for those indicator areas that are covered in existing international comparative assessments, data gaps exist in the EU+: for many countries the time series since 2000 are incomplete or lacking at all. Hence, new indicators definitions and instruments need to be developed.

Conclusions-6

Ideally monitoring should lead to a well qualified evaluation of the strengths and weaknesses in educational systems. It was concluded that, in order to avoid undesirable side-effects, a broad coverage of competency areas is needed. Next to traditionally valued competences also so called 21st century skills should be covered.

Conclusions-7

A first step in using indicator statistics from educational monitors should be the identification of potential weaknesses in student competencies and/or attitudes. If weaknesses exist questions can be generated that call for further analysis for which so called secondary indicators are needed. It was concluded that in the absence of statistics for the primary indicators it is difficult to define the secondary indicators that are needed for conducting these analyses. Hence, the analysis activity (mainly focussed on secondary indicators) requires separate data collection next to the data collection for primary indicators.

Conclusions-8

Previous assessments contain many examples of indicator definitions for conditional factors, the so-called secondary indicators. It was concluded that for future use these definitions need to be fine-tuned to definitions of primary indicators (regarding student competencies and OTL-ICT).

Conclusions-9

Educational change requires initiatives of many educational actors. National (regional and sub-regional) policy makers have to create conditions and set outcome targets. Also at school level school policies need to be developed which are based on a common vision and understanding among the relevant actors about the actions that need to be undertaken for realizing educational change. Just like international and national policy makers need educational monitors as navigation tools for evidence-based policy-making, also for school-policy making such tools are needed. Educational actors inside the school (including parents) would be informed about how the school is developing over years and how this compares with other schools. In recent years initiatives have been undertaken in some countries to develop tools for ICT-related school monitoring. More empirical evidence is needed on how these monitors function, how they offer support for educational reform at school level, whether they are up scalable to the education system at large and to what extent they are transferable to other countries.

Conclusions-10

From the analysis of existing practices for international comparative educational monitoring it was concluded that modernization of the currently used methodology is needed. Several considerations that have been dealt with in this report could be taken into account, such as (a) capitalizing on highly innovative forms of monitoring (through online data collection and authentic tasks), (b) holistic and multi-level monitoring (e.g. including school monitoring) and (c) tailored monitoring allowing for flexibility according to the indicator needs of countries.

Recommendations/Actions-1

On **short term** the coverage of EU countries in regular assessments of IEA and OECD should be improved (see conclusion 5). Initiatives to realize this target could come from countries not yet participating in these assessments. This could be through ministries of education, but also through active networking by national coordination centres from already participating countries. The Commission could stimulate and facilitate these initiatives through its regular contacts with these countries and potentially, if needed, (co-)finance the fees that are associated with participation in these assessments.

Recommendations/Actions-2

Initiatives are needed on **short term** for a better coverage of ICT indicators in existing international comparative assessments (see conclusions 5 and 8). First a better coverage of school subjects for the current indicators on use of ICT is needed. EU researchers participating in these assessments could take initiatives in this direction during the instrument development. Also this coverage could be realized by building into the overall design an EU regional option, with a focus on the areas mentioned in conclusion 2. The Commission could facilitate this development by (co-) financing the additional costs associated with designing such an option. It is also recommended that the Commission will play a pro-active role in the currently ongoing ICT-related initiatives that were mentioned in Chapter 7. Moreover, the feasibility of expanding the Eurostat household surveys by including students from primary and secondary education needs to be explored.

Recommendations/Actions-3

From conclusion 3 one may infer that new indicator definitions and instruments need to be developed. Given the complexities and manpower needed, this is not a task that single countries can undertake. Therefore, it is recommended that international cooperation is stimulated and that the Commission facilitates the creation and use of an European instrument bank containing measures that can be used for assessing the developments of ICT in education. The setting of priorities for indicator areas could be based on the overview provided in Table 3.1. Incentives might for instance consist of co-financing national projects in which measures from this EU instrument bank are used. The profit for countries would consist of being able to use measures that have relatively high quality and are extensively tested, whereas also (in case other countries use the same measures) comparative data become available without the need for a heavy international overhead. An initiative that could be undertaken by organizations involved in national educational monitoring of ICT would be to cooperate in order to harmonize the definition of indicators and instruments.

Recommendations/Actions-4

From conclusion 9 it can be inferred that tools for monitoring the Use and Impact of ICT at school level could be an important lever for educational change. It is recommended that the Commission issues on **short term** a study in which characteristics and impact of existing ICT-related school monitors are investigated.

Recommendations/Actions-5

Conclusion 4 calls for the development of assessment frameworks. In order to create, for the **medium term**, these frameworks and tasks a number of steps need to be undertaken. A first step is to determine whether in the EU a core set of rubrics and assessment tasks can be defined for the areas that were mentioned in conclusion 1. Initiatives are needed from educational testing institutes from EU countries to develop (in cooperation with ICT experts) proposals for these areas and to provide evidence on international consensus regarding the relevance of the tasks. The Commission could stimulate this development through the regular research programs.

Recommendations/Actions-6

On the **long term** a modern system for educational monitoring is needed with characteristics as mentioned in conclusion 6, 7 and 10 (also taking into account the design recommendations mentioned in Chapter 8 of the report). Designing and implementing such a system is a complex process, in which the engagement of multi-disciplinary development teams is needed. This is a big challenge, but not impossible. Just as mankind is able to build sophisticated telescopes to observe far distant planets, it is certainly possible to create a system for permanent observation of educational progress.

Recommendations/Actions-7

It is recommended that the Commission develops a strategy regarding the future of monitoring educational change (of which ICT is one component) in the EU. A key question is whether this monitoring will be run fully under the auspices and control of the Commission addressing the key core competency areas that are in the EU targeted for benchmarking. This would be a strategy for the **long-term** (10-15 years) which could set the scene for developing appropriate solutions for organisational, financial and methodological issues. Part of this strategy would be to sketch a vision on the responsibilities and roles of the Commission as compared to other organizations involved in regular international comparative assessments.

The End

THANK YOU FOR YOUR ATTENTION!

