



IEA · International Association for the Evaluation of Education Achievement

Second Information Technology in Education Study 2006

HIGHLIGHTS OF FINDINGS FROM MAJOR INTERNATIONAL STUDY ON PEDAGOGY AND ICT USE IN SCHOOLS

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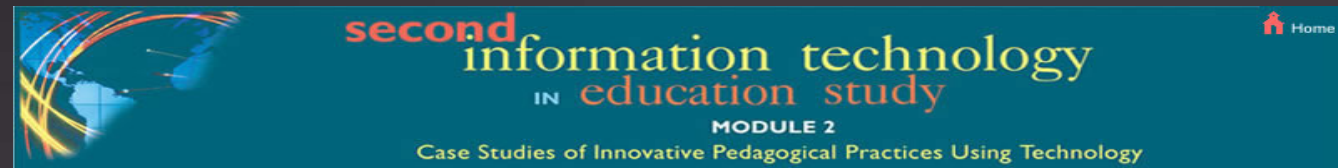
About SITES

A series of three studies by IEA:



Module 1 - a survey of schools on IT infrastructure & use

<http://www.msdp.edte.utwente.nl/sitesm1/>



Module 2 - case studies of pedagogical innovation using ICT

<http://www.sitesm2.org/>



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Latest study - pedagogy & ICT use in mathematics and science classrooms

<http://www.sites2006.net/>



About SITES 2006

Conducted by a consortium comprising

International coordinators:

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Hans Pelgrum, University of Twente

Study Director:

Tjeerd Plomp, University of Twente

IEA Data Processing and Research Centre , Hamburg



Content of presentation

I Conceptual framework & design

II Key findings

Status & change since 1998

Impact of ICT use

Strategy related findings

III Policy implications of key findings



Emphasis in SITES 2006

concepts

- How is ICT used in teaching & learning?
- Any evidence for ICT as leverage for educational change & pedagogical innovation?
- Conditions relevant for ICT integration and educational change, including:
 - Leadership: vision & priorities
 - Infrastructure
 - Staff development
 - Support



Policy focus: education for 21st century skills

concepts

- “**21st Century Skills**” - the capacity to engage in
 - life long learning (self-directed & collaborative inquiry)
 - connectedness (communication and collaboration with experts and peers around the world)
- Educational theories postulate that the development of these new learning outcomes require new approaches to teaching, i.e. **pedagogical innovation**
- Hence SITES 2006 focuses on **pedagogy and ICT use**



From policy orientation to core concepts in SITES

concepts

Policy orientation:

- Less traditional, more Lifelong learning and connectedness

SITES concepts:

- Traditional orientation
- Lifelong learning orientation
- Connectedness orientation

**ICT as lever for
change?**



Pedagogical orientations

concepts

Traditional orientation:

- focus on content goals
- typically the teacher plays the main role as instructor and assessor in the learning process
- the students follow instructions and work on assigned close-ended tasks



Pedagogical orientations

concepts

Lifelong learning orientation:

- Typically require students to work in teams on open ended real world problems
- Emphasis on developing problem solving, collaborative and organizational skills
- Students play an active role in identifying the learning problem as well as how to tackle it
- The teacher plays a facilitative role in the learning process



Pedagogical orientations

concepts

Connectedness orientation:

- Provide opportunities for students to learn from local and/or international experts
- Provide opportunities for students to work and learn with peers in other schools, which may be located in the neighborhood or in distant locations
- Provide opportunities for students to develop global understanding & cultural sensitivity through collaborating with students from other countries



Survey data collected from

- 22 participating education systems

Canada (2 provinces: Alberta and Ontario), Chile, Hong Kong SAR, Chinese Taipei, Denmark, Estonia, Finland, France, Israel, Italy, Japan, Lithuania, Norway, Russian Federation, Russia-Moscow, Slovak Republic, Singapore, Slovenia, Spain-Catalonia, South Africa, Thailand

- Total of almost 9000 schools
- Total of ~35000 grade 8 mathematics and science teachers



In this presentation:

Findings related to:

Status &
change

What impacts have ICT-related policies and strategies made on the school conditions for ICT use & teachers' pedagogical use of ICT?

Impact

What impacts have ICT use made on students (as perceived by teachers) and are there tentative indications that these are related to how teachers make use of ICT?

Strategy

What strategies work best to foster ICT use to improve learning?



Policy level findings

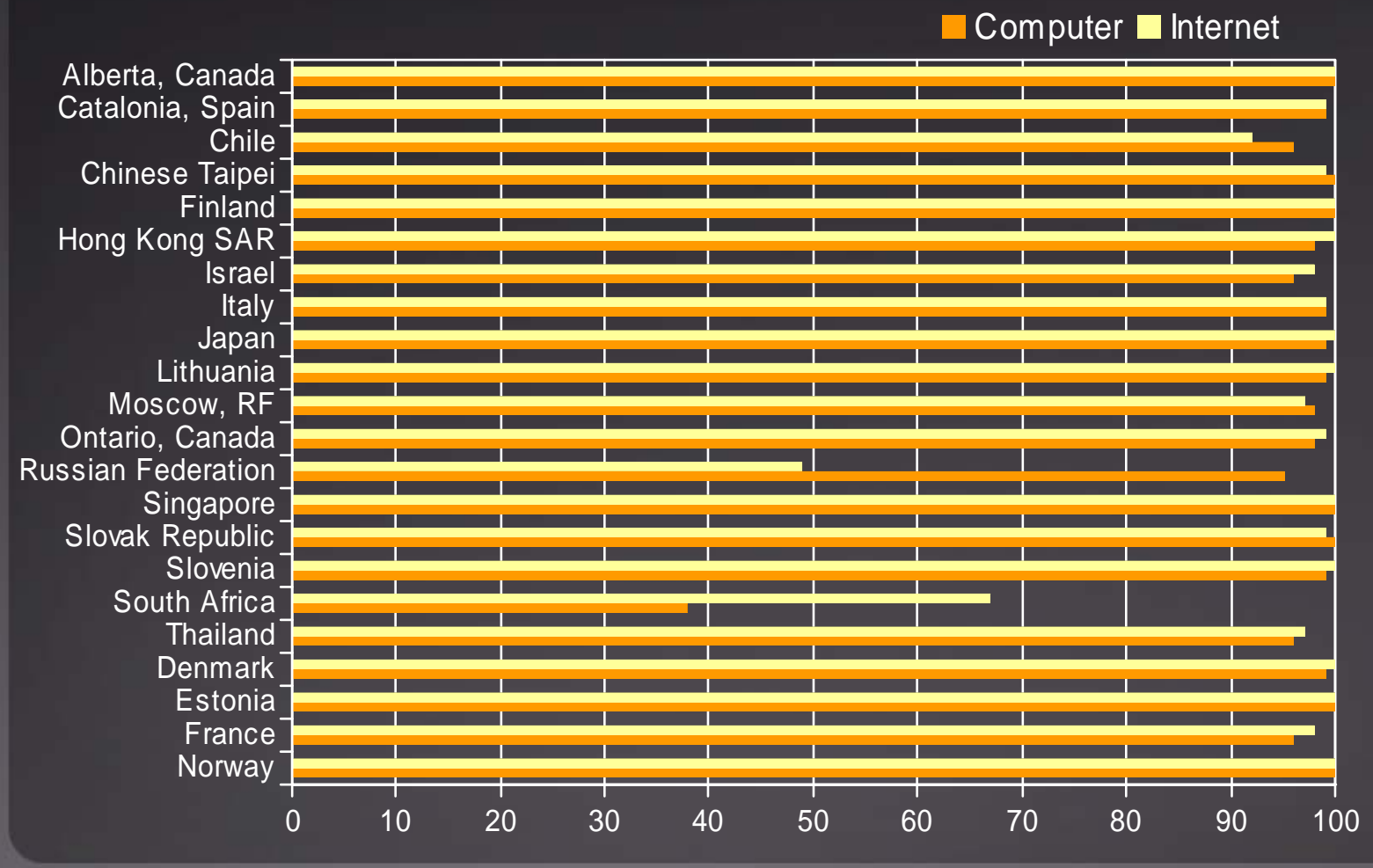
Status

- 20 systems have system-wide ICT in education policy – concerns differ widely
- Majority had at least slightly increased ICT spending during the past 5 years – government funding in nearly all of the systems



Nearly 100% ICT access in schools

Status

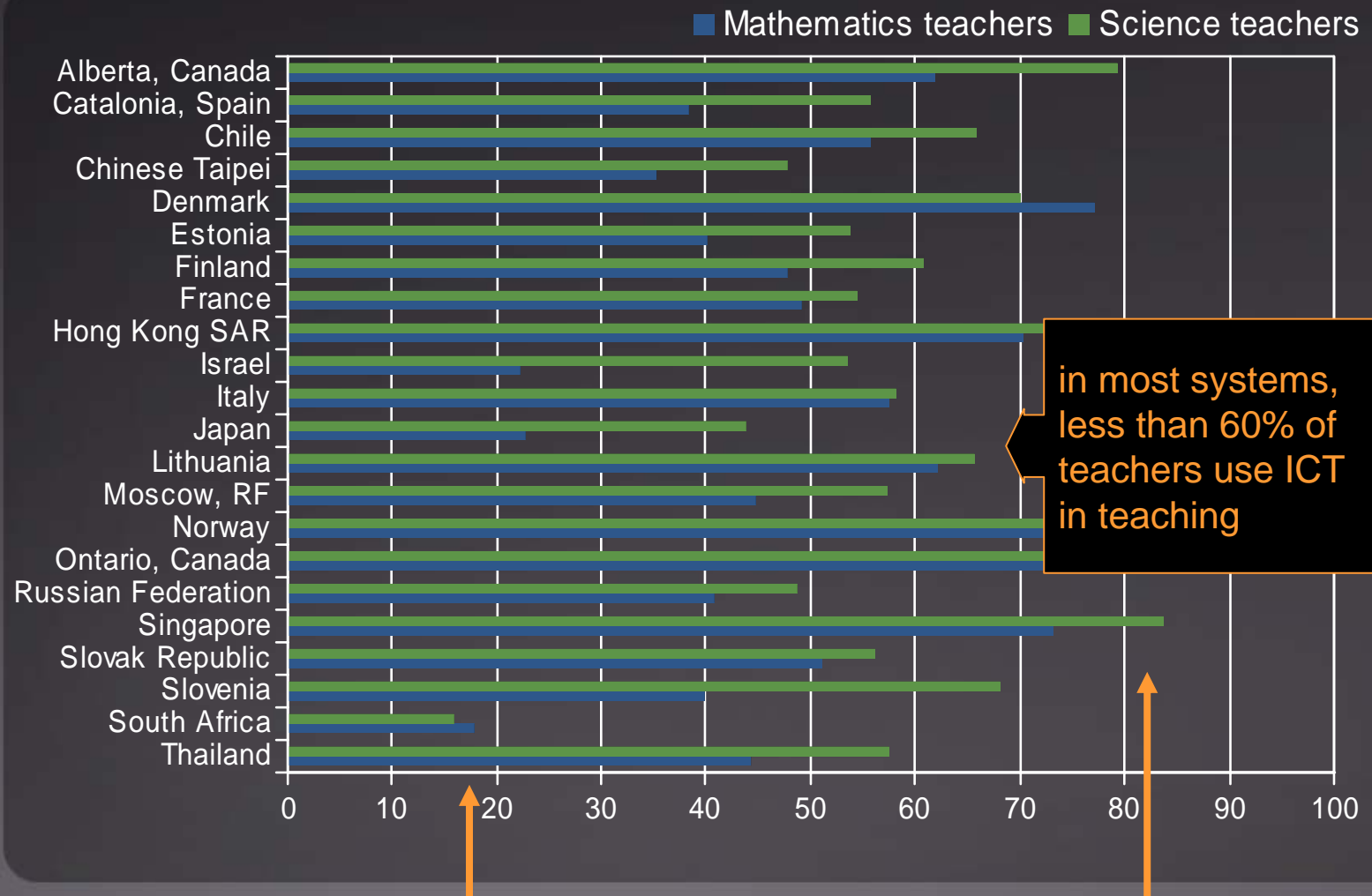


Percentage of computer and internet access in schools



Wide variations in ICT adoption across systems

Status



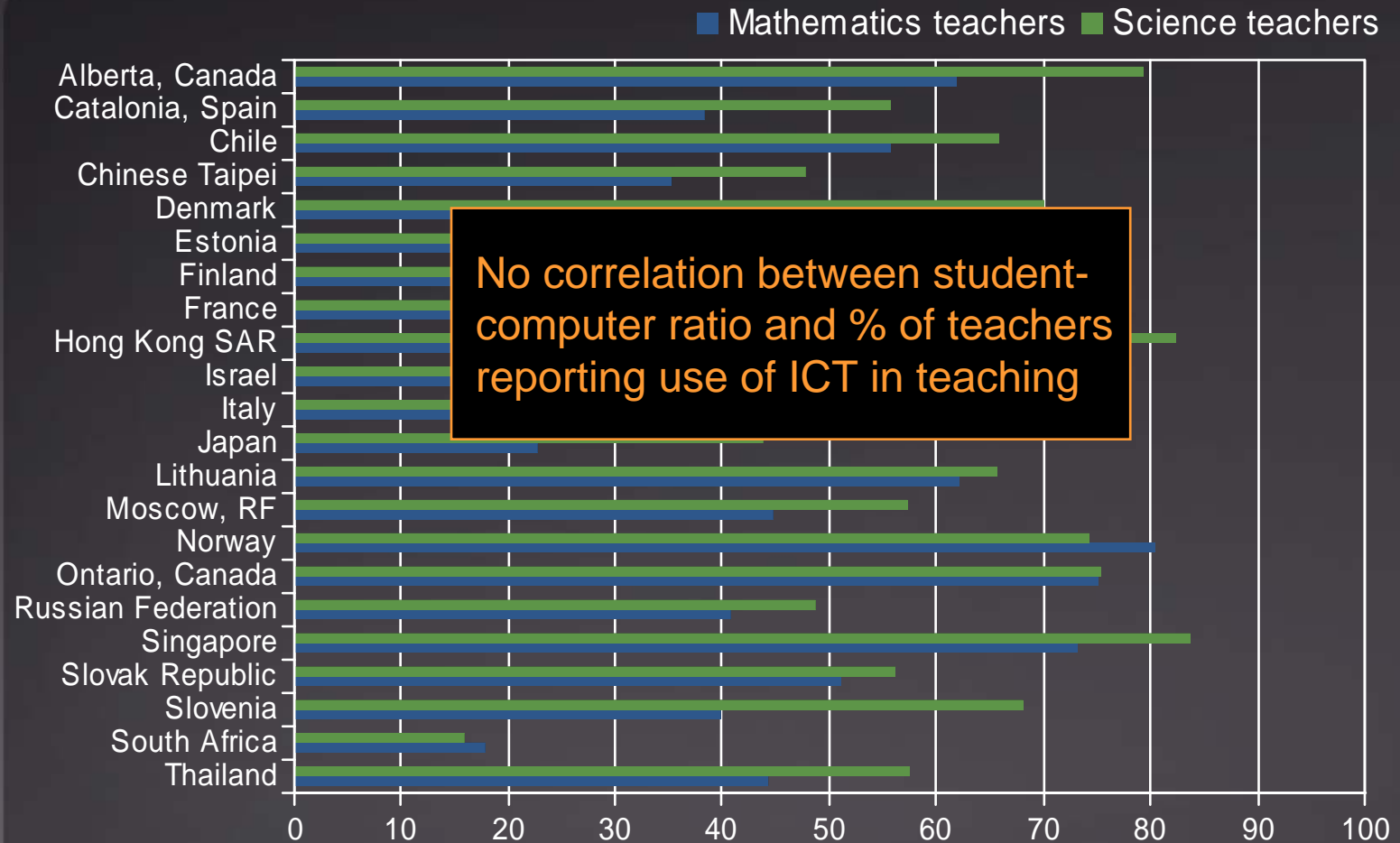
in most systems, less than 60% of teachers use ICT in teaching

Percentage of teachers using ICT



Wide variations in ICT adoption across systems

Status

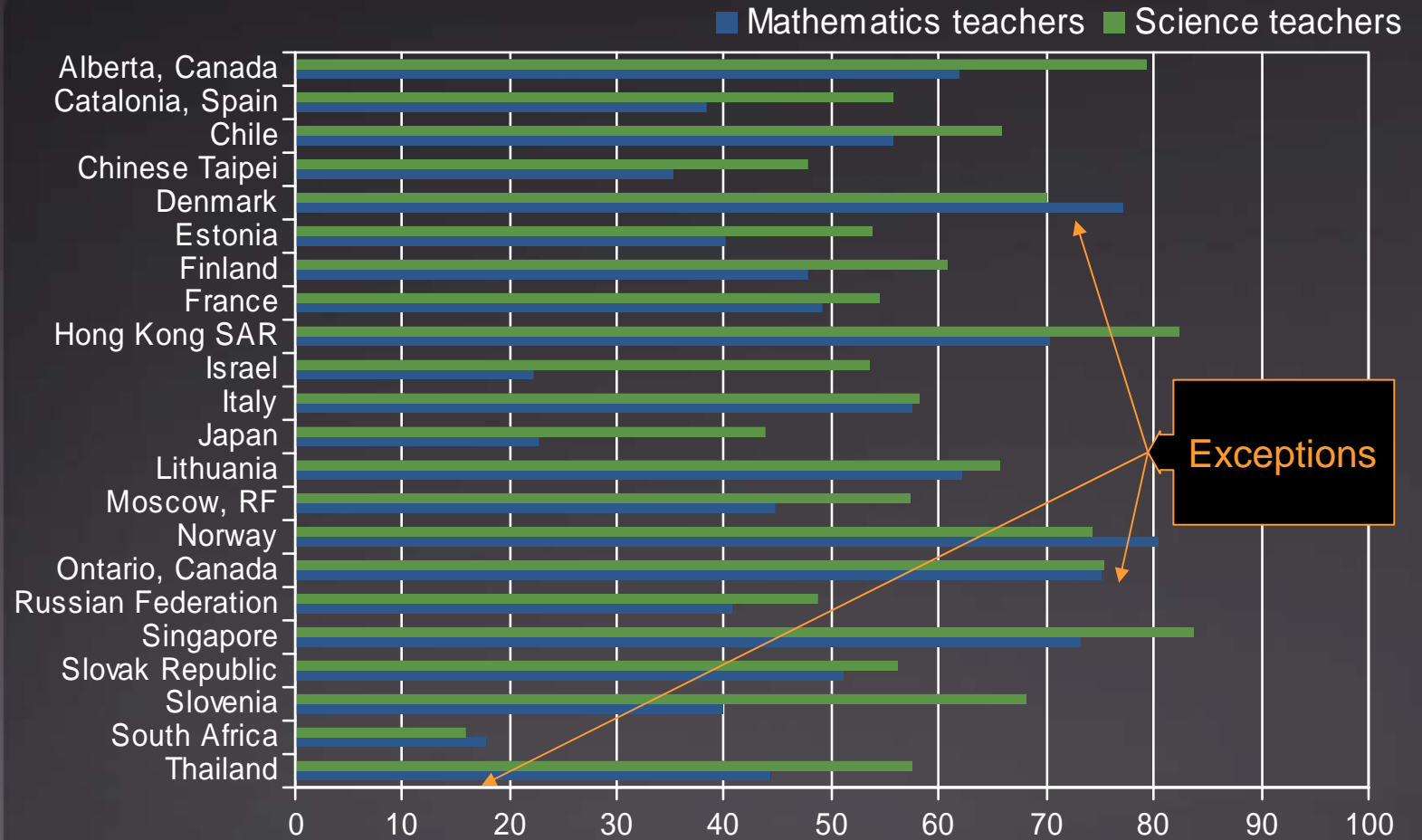


Percentage of teachers using ICT



In most countries, science teachers more likely to use ICT

Status

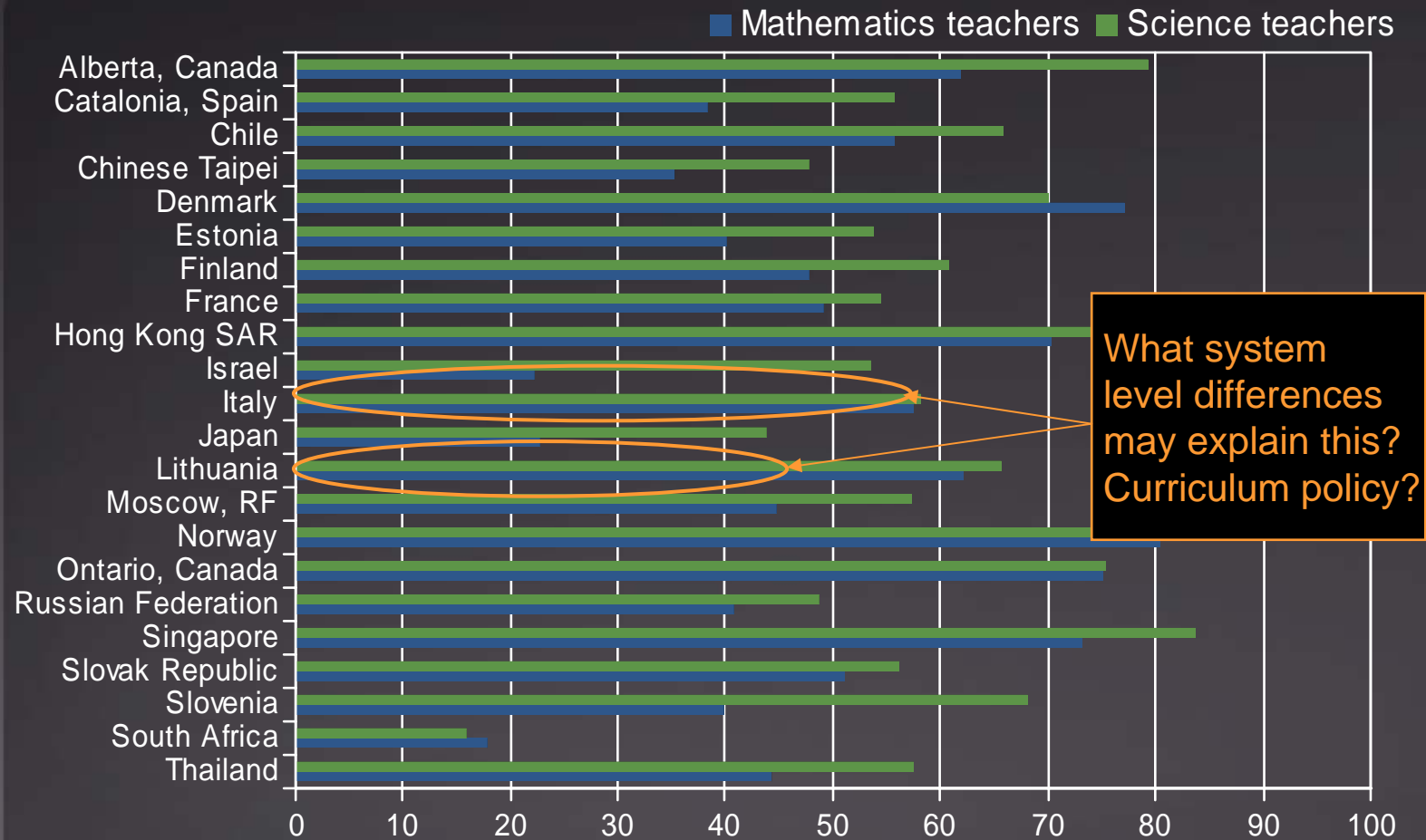


Percentage of teachers using ICT



Huge difference between subjects within the same country

Status



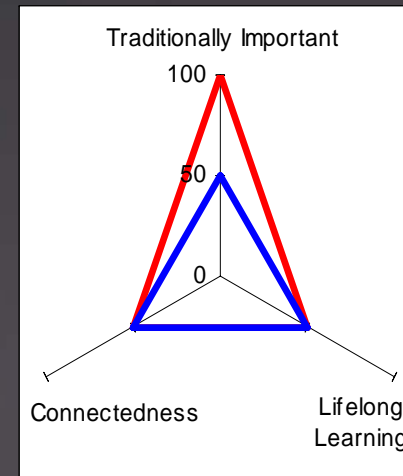
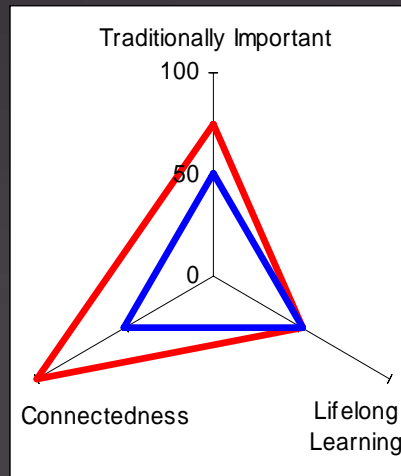
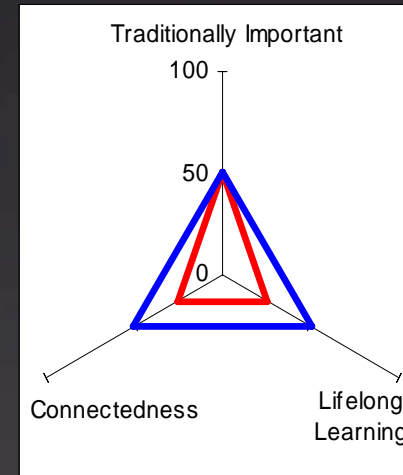
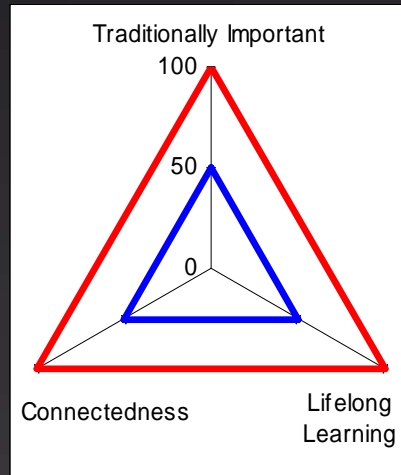
What system level differences may explain this?
Curriculum policy?

Percentage of teachers using ICT



Comparing pedagogical orientations

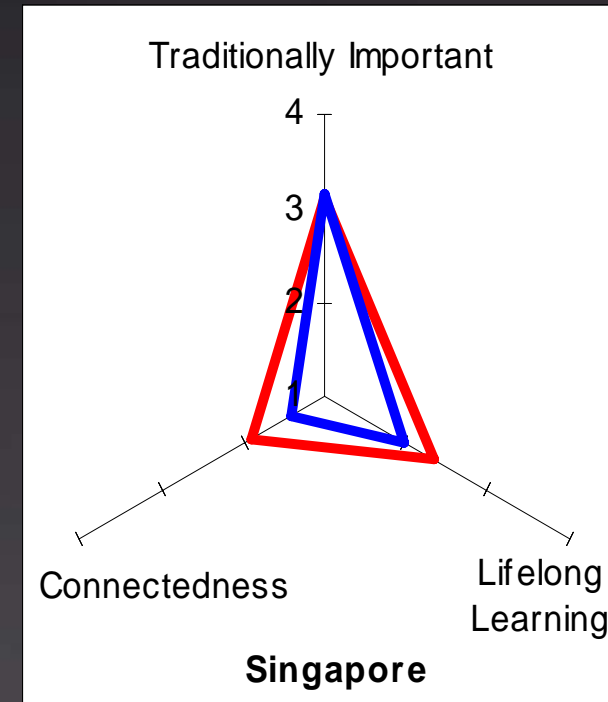
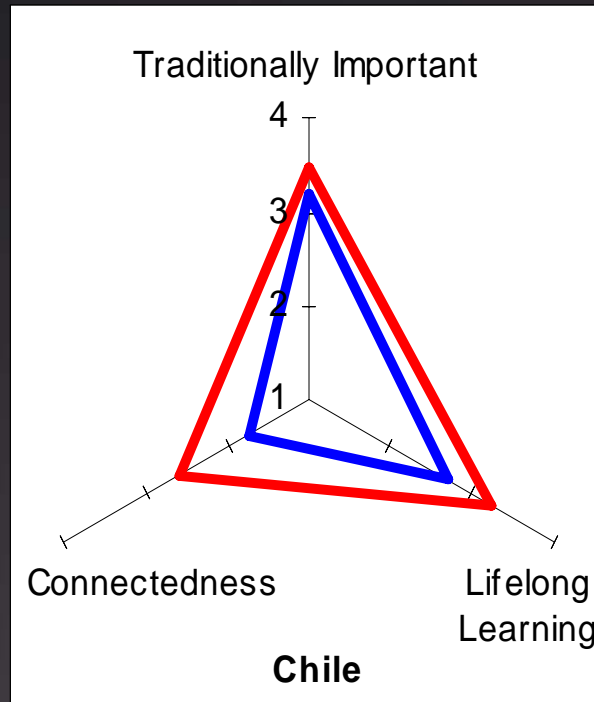
Comparing profiles holding blue triangle as reference



How teachers teach

Teaching mainly traditional, and teachers engaged more than students

Status



Teacher-practice orientation

Student-practice orientation

This picture is similar for most countries.

Orientations for teachers' and students' practices in science

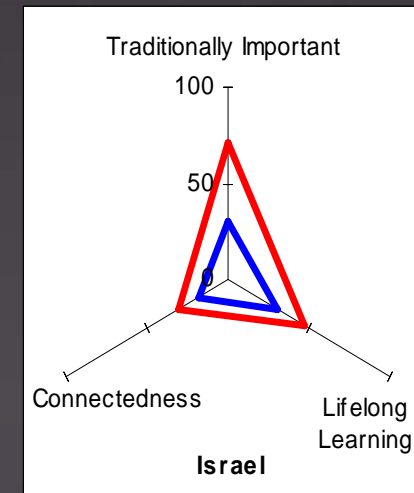
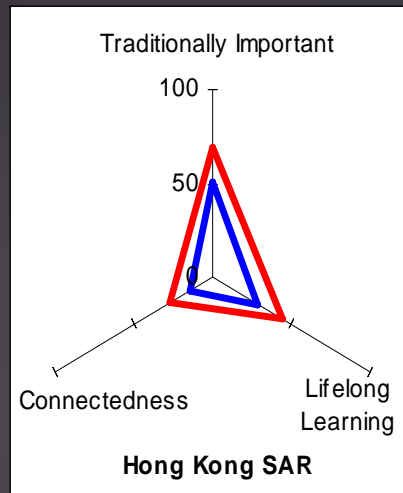
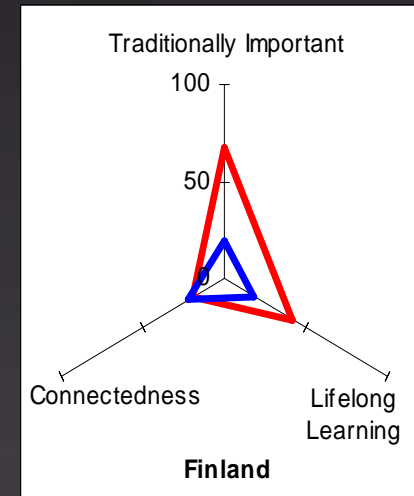
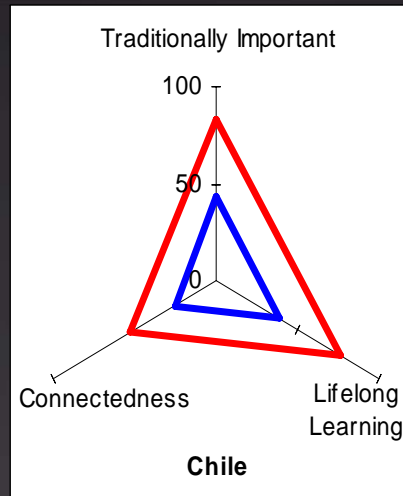


Teacher practice can become more 21st century oriented when ICT used

Status

- Overall teacher practices
- ICT-using teacher practices

Implications:
ICT can be used as a lever for pedagogical change, and some countries appear to exploit this potential more than others.



Orientations for overall and ICT-using teacher practices in science

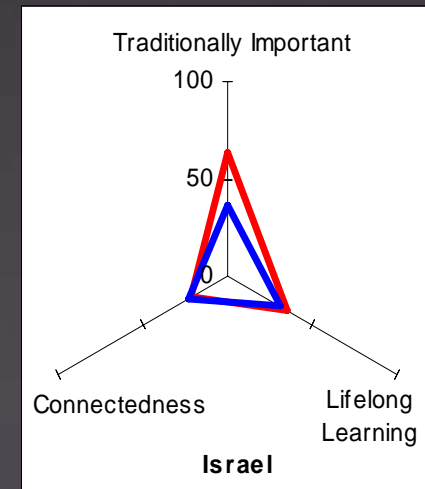
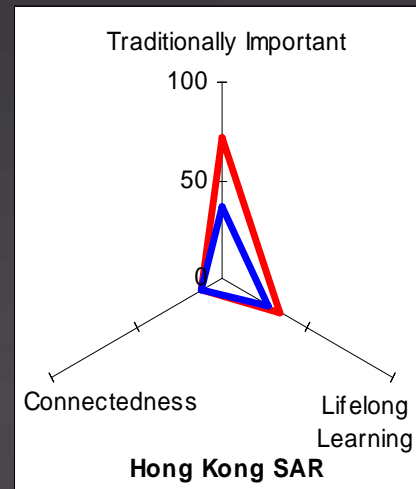
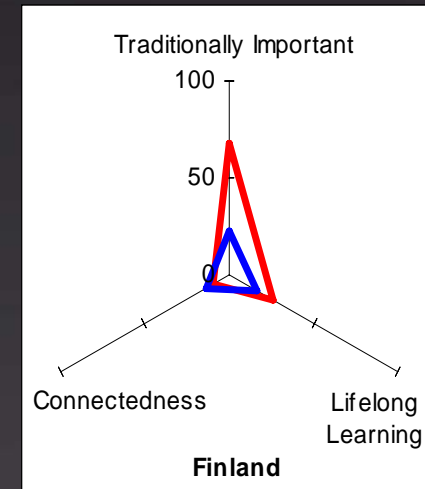
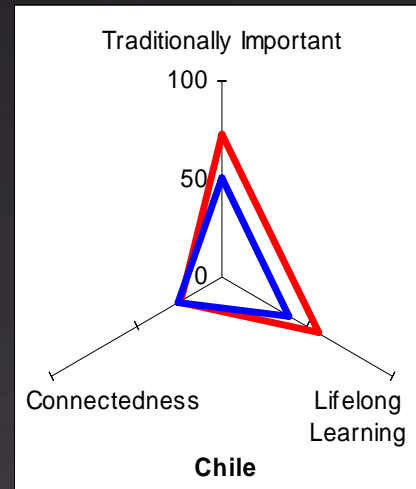


Students' ICT-using learning activities are more strongly 21st century oriented

Status

- Overall student practices
- ICT-using student practices

Implications:
ICT can be a more effective lever for pedagogical change if used in students' learning activities.

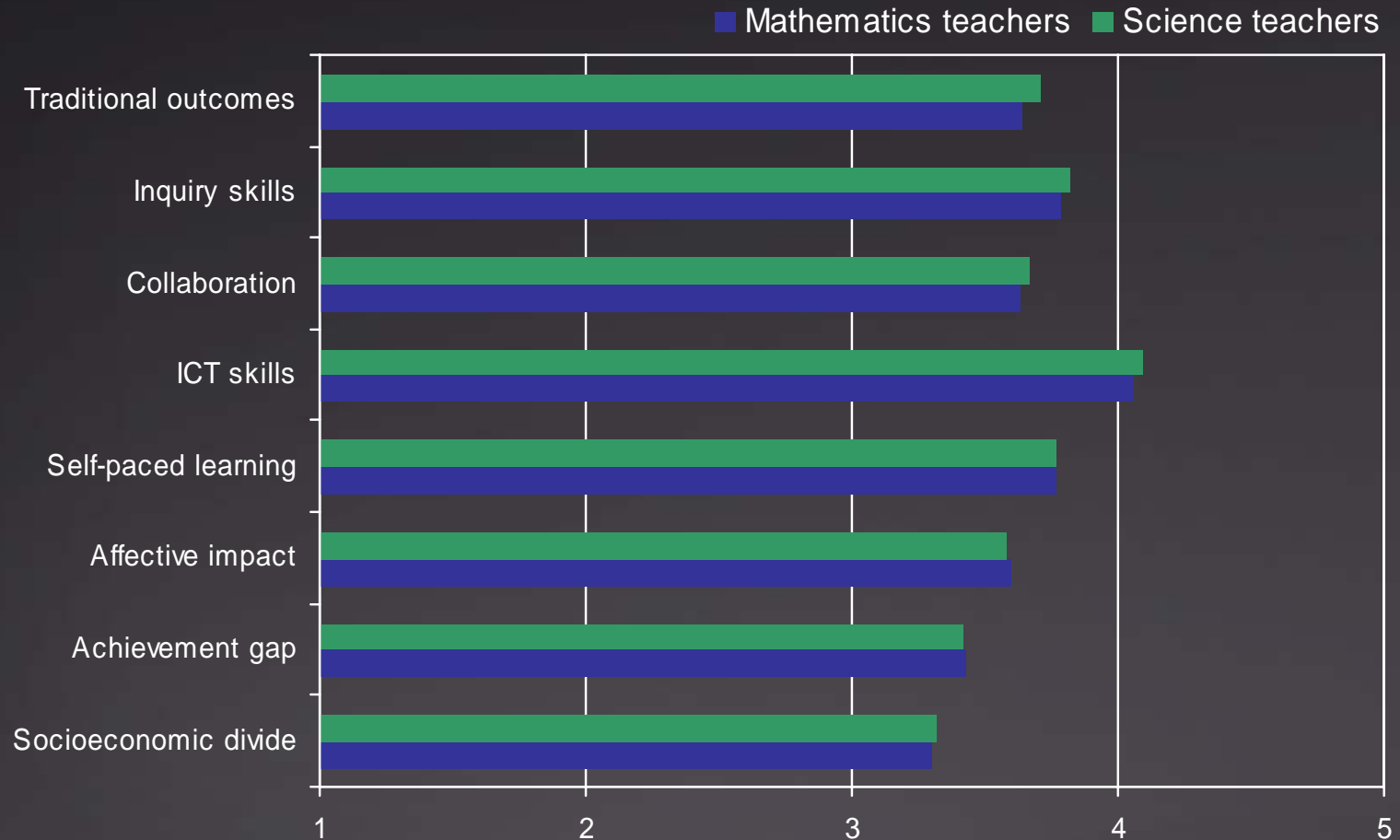


Orientations for overall and ICT-using student practices in science



Perceived impact of ICT use on students largely positive

Impact



Extent of impact on students



Impact depends on how, but not how often ICT is used

Impact

Mathematics		ICT-using teacher practice orientations		
		Traditionally important	Lifelong learning	Connectedness
Kinds of impact on students	Traditional outcomes	0.47	0.56	0.26
	Inquiry skills	0.39	0.70 *	0.45
	Collaboration	0.30	0.69 *	0.44
	ICT skills	0.39	0.82 **	0.59 *
	Self-paced learning	0.19	0.62 *	0.48
	Affective impact	0.35	0.68 *	0.43
	Achievement gap	0.45	0.59 *	0.24
	Socioeconomic divide	0.26	0.24	0.03

Science		ICT-using teacher practice orientations		
		Traditionally important	Lifelong learning	Connectedness
Kinds of impact on students	Traditional outcomes	0.50	0.64 *	0.32
	Inquiry skills	0.38	0.77 **	0.49
	Collaboration	0.24	0.76 **	0.56
	ICT skills	0.22	0.72 **	0.53
	Self-paced learning	0.23	0.74 **	0.60 *
	Affective impact	0.35	0.71 *	0.51
	Achievement gap	0.48	0.65 *	0.33
	Socioeconomic divide	0.40	0.38	-0.01

Notes:

Systems not meeting the requisite participation rate or not following the procedures for target-class sampling were excluded from the computation of the correlations; hence, N=12

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

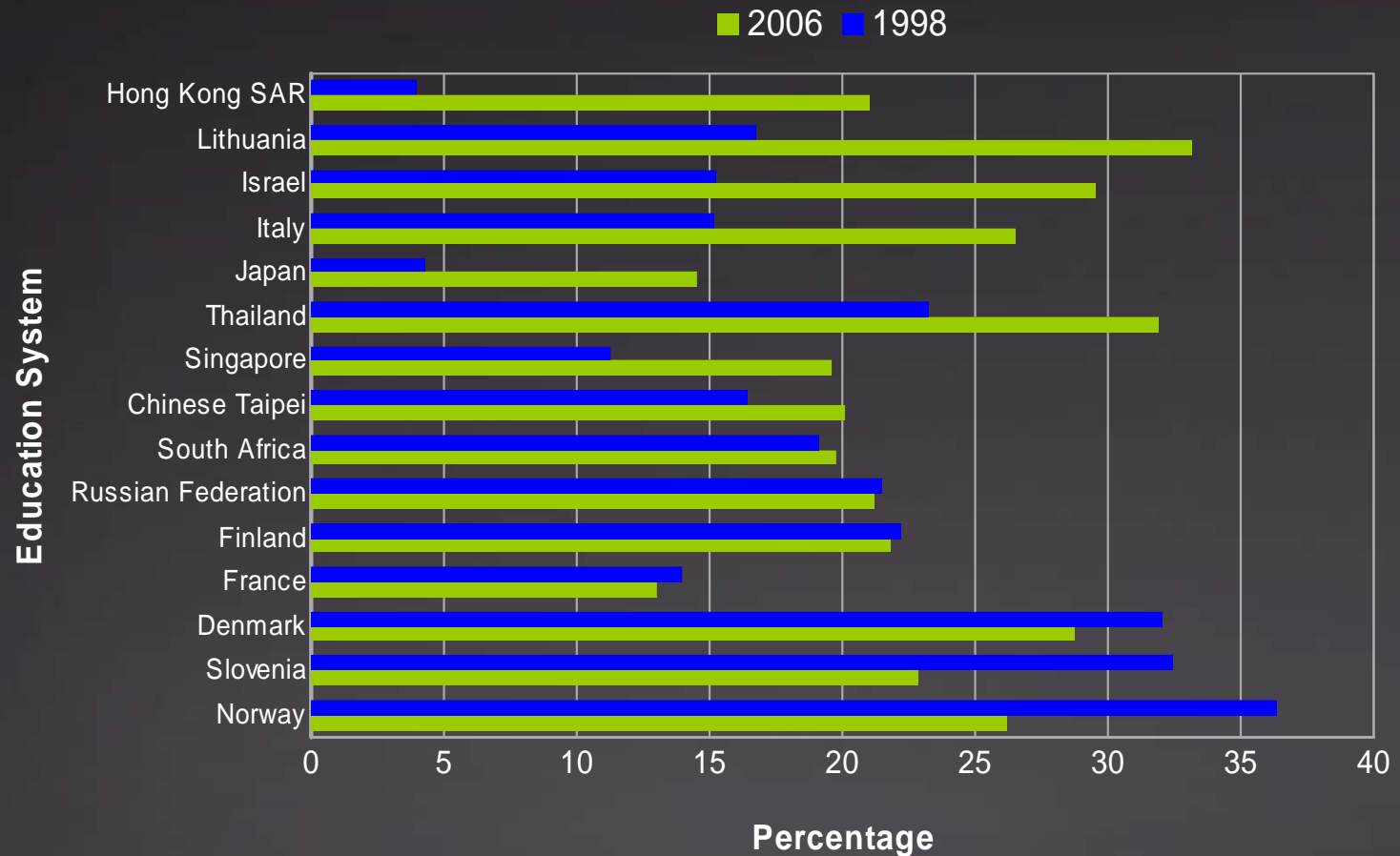
Correlations between mean strength of ICT-using teacher practice orientations and mean level of impact on students at system level



Pendulum swing 1998 - 2006

Changed priorities for lifelong learning

Status
&
Change
in
Strategy



Presence of LLL practices in school as reported by principals



Strategy to foster ICT use to support learning effectively:

What matters most?

Policies to promote teacher adoption of ICT use generally involve strategies on the following:

- Infrastructure & support staff time
- Technical & Pedagogical support for ICT use
- Professional development for teachers
- Leadership development in school

Strategy

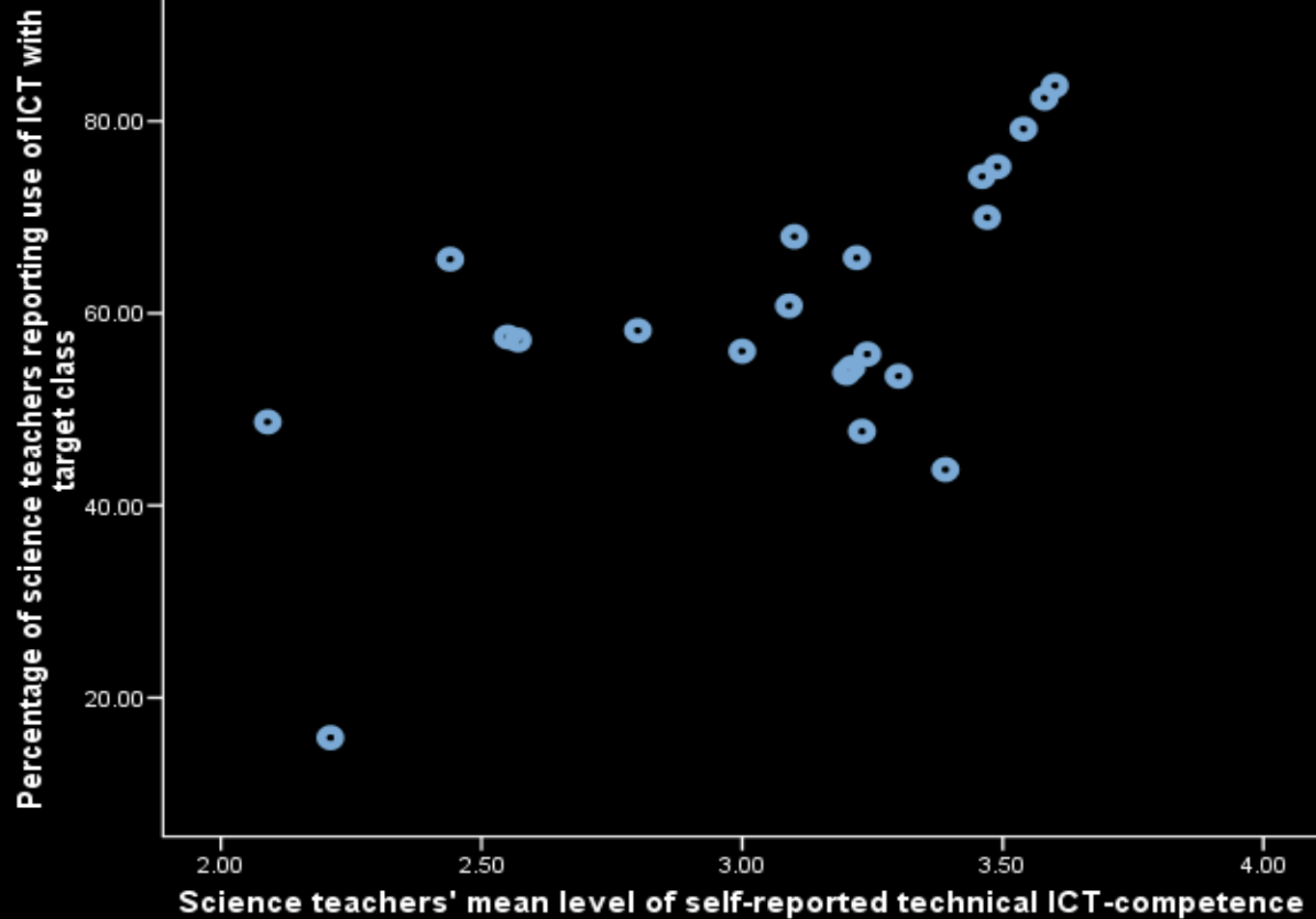


Teachers' self-perceived technical competence & ICT use in teaching: relationship not clear

Status & change

Impact

Strategy



Scatterplot of mean level of technical competence and percentage of teachers using ICT in teaching for science teachers

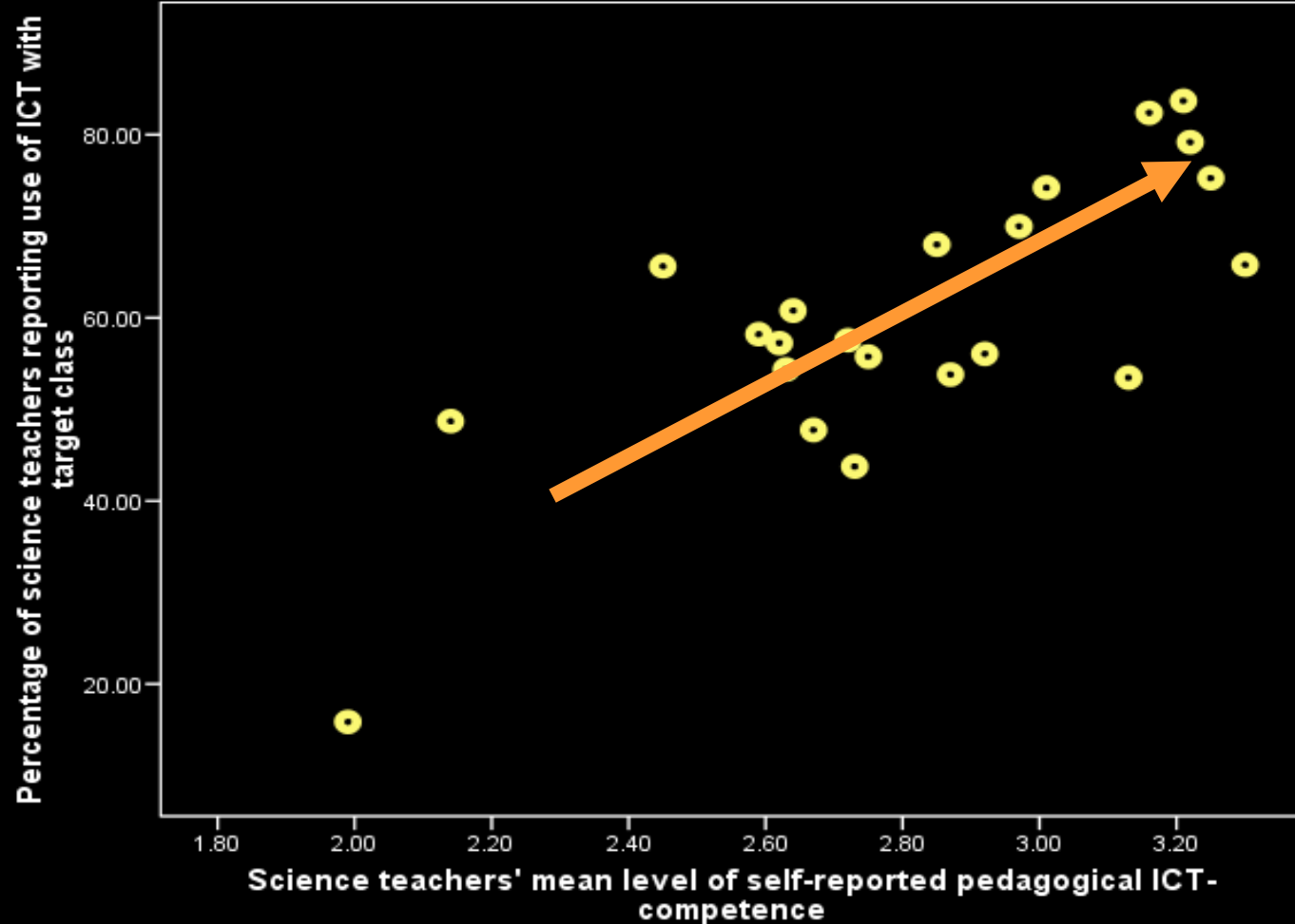


Self-perceived pedagogical ICT competence correlate significantly with ICT use in teaching

Status & change

Impact

Strategy



Scatterplot of mean level of pedagogical ICT competence and percentage of teachers using ICT in teaching for science teachers

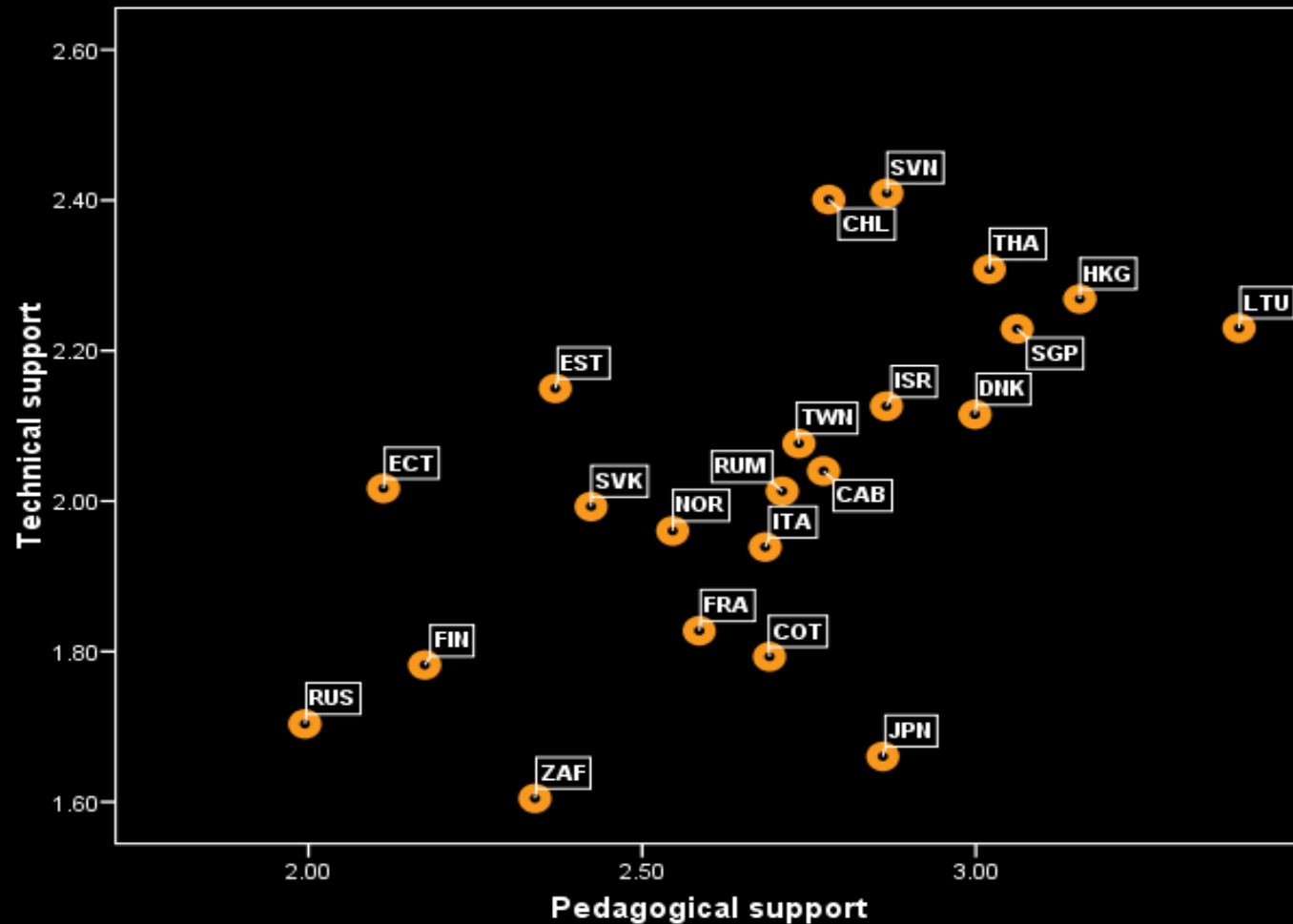


Huge variations in levels of support available at school

Status & change

Impact

Strategy



Scatterplot of mean levels of Pedagogical vs. Technical support available according to the principals

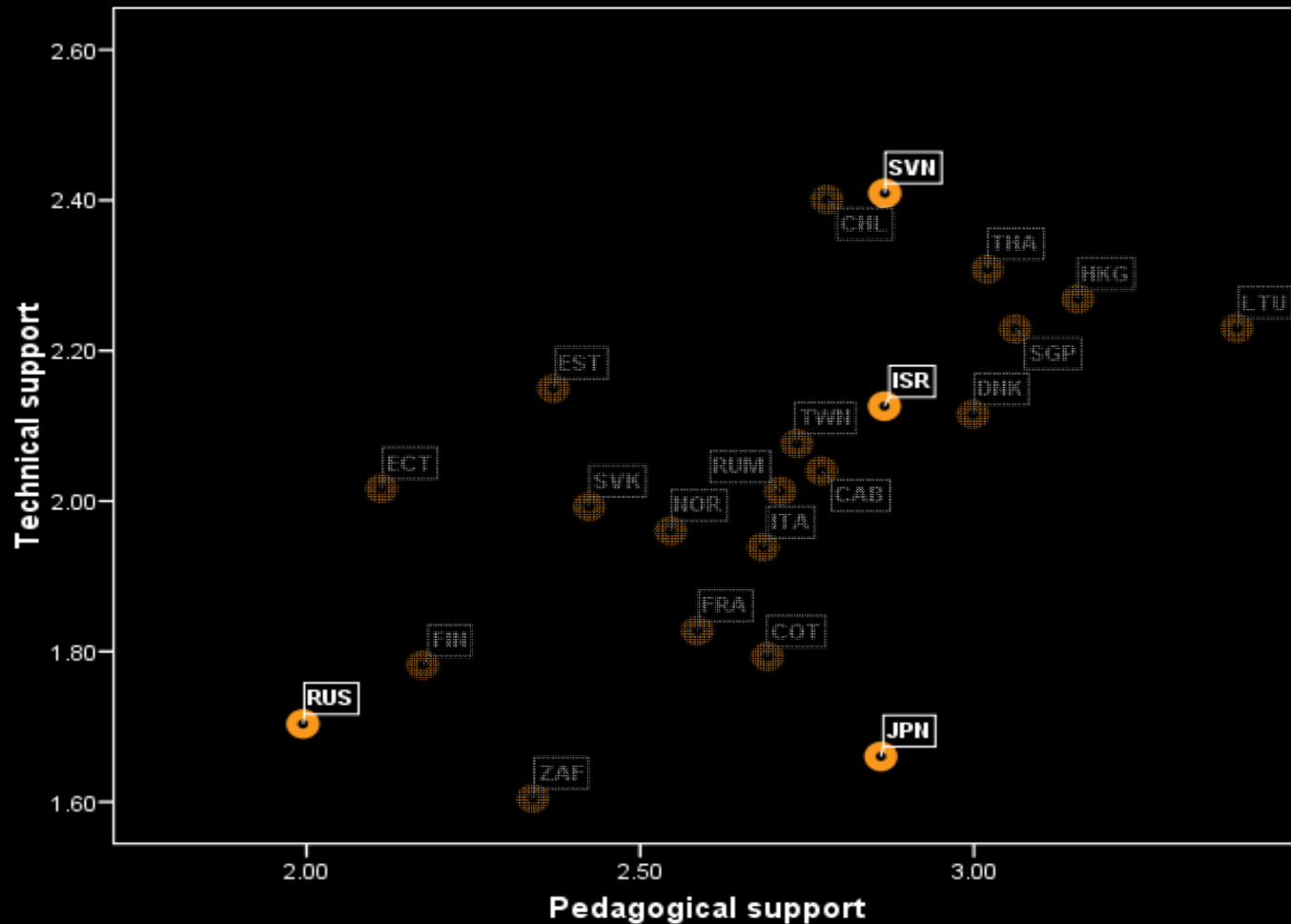


Different strategic priorities are clearly at work

Status & change

Impact

Strategy



Scatterplot of mean levels of Pedagogical vs. Technical support available according to the principals



Key school factors for ICT use for LLL: vision, support and leadership dev.

School factors	Pedagogical orientation in ICT-using teacher practices		
	Traditionally important	Lifelong learning	Connectedness
Principal's vision for ICT-use to support LLL	0.53	0.84 **	0.72 **
Student-computer ratio	0.05	0.51	0.34
Technical support in minutes per student per week	0.21	0.50	0.33
Technical support for ICT-use	0.69 *	0.77 **	0.36
Pedagogical support of ICT-use	0.80 **	0.45	0.08
Principal's priority for leadership development	0.38	0.64 *	0.55

Notes:

Only the 12 systems for which the teacher questionnaire data met the IEA minimum participation rate and followed all required administrative procedures in the data-collection process

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

Strategy

Correlation between some means of school factors and mean strength of the 3 ICT-using pedagogical orientations



Factors influencing ICT use by teachers - Does history of ICT use matter?

- Multilevel analysis found no difference in the relationship between school level factors and ICT adoption by teachers whether they are in countries with longer or shorter histories of ICT use

Strategy



Implication: pedagogy matters!

Status &
change

Impact

Strategy

- Traditional orientation: no significant correlation with extent of any impact on students' outcomes as perceived by the teacher, except ICT skills
- Lifelong learning & connectedness orientations: significant correlations with all positive learning outcomes as perceived by the teacher, with the highest correlation shown for collaboration & inquiry skills



Implication: policies & strategies matter!

Positive support measures:

- Professional development for teachers - priority for pedagogical ICT competence
- Leadership development in schools, including a vision for ICT use to support lifelong learning
- Technical & pedagogical support for ICT use
- Infrastructure & support staff time

Strategy



Policy Implications

- Policies have impacts on perceptions, beliefs and practices
- Infrastructure, support, professional development & leadership development are important conditions
- Pedagogy matters, and strategy in all of the above 4 areas need to maintain a strong pedagogy consideration in its provisions
- A balanced, holistic approach probably work best

Strategy



Full report

Law, N., Pelgrum, W. J., & Plomp, T. (Eds.). (2008). *Pedagogy and ICT use in schools around the world: Findings from the SITES 2006 Study*. Hong Kong: CERC, University of Hong Kong and Springer

1. Introduction to SITES 2006
2. Study Design and Methodology
3. National contexts
4. School Practices and Conditions for Pedagogy and ICT
5. Pedagogical orientations in Mathematics and Science and the Use of ICT
6. Teacher Characteristics, Contextual Factors, and How These Affect the Pedagogical Use of ICT
7. Satisfying pedagogical practices using ICT
8. In search of explanations
9. Summary and reflections



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THE END

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