



# ICT(s) and socialization: The role of schools and teachers

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# The gender gap in attitudes and beliefs about ICT(s)

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Female students tend to be less interested in computers, to have less positive views about the value of computing, and to report more computer anxiety and less confidence in their computer abilities (Tømte, 2008; Volman & van Eck, 2001)



# The study of attitudes and beliefs about ICT learning

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- Researchers have conceptualized student beliefs about ICT learning in different ways:
  - Self-efficacy beliefs, computer confidence beliefs, etc.
  - Attitudes: interest, enjoyment, linking, anxiety, perceived usefulness, etc.
- Two useful constructs:

*Self-efficacy beliefs* are students' subjective perceptions of their ability to perform specific tasks ("Can I do this?") (Bandura, 1993).

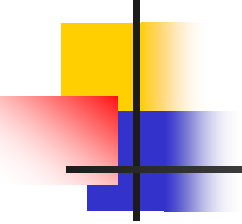
*Task-value beliefs* are students' perceived enjoyment, importance, and usefulness of specific tasks ("Why should I do this?") (Eccles & Wigfield, 1995).



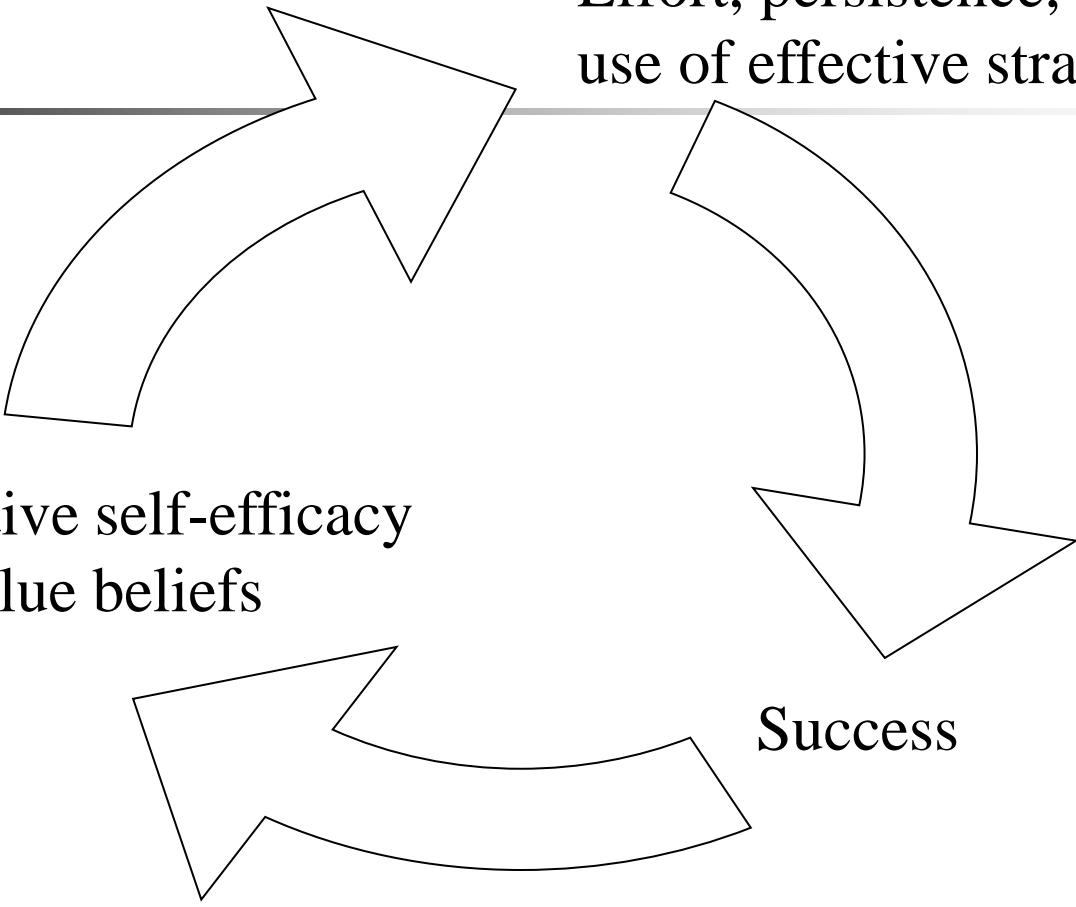
# Why bridge the gender gap in attitudes and beliefs about ICT learning?

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Self-efficacy and task value beliefs influence the quality of learning and are important predictors of students' future academic and career choices (Pintrich & DeGroot, 1990; Bandura et al., 1996; Jacobs et al., 1998).

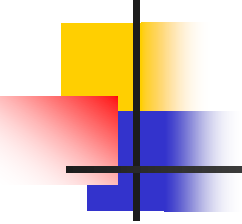


Effort, persistence,  
use of effective strategies



Positive self-efficacy  
& value beliefs

Success



Avoidance of challenge,  
reduced effort, ineffective  
strategies

Lower self-efficacy  
& value beliefs

Failure





Why is it so?

(1)

## Possible interpretations of the ICT gender gap

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- Boys have more opportunities to experience success in ICT activities (Tømte, 2008; Volman & van Eck, 2001).
- Parents and peers mediate children's interpretations of their experiences (Vekiri & Chronaki, 2008)

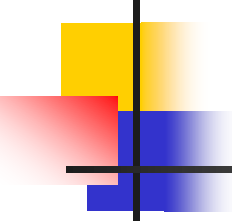
Why is it so?

(2)

## Possible interpretations of the ICT gender gap

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- Stereotypes about gender and ICT:
  - about gender appropriate behaviors (Funk & Buchman, 1996)
  - software & ICT activity preferences (Pinkard, 1995)
  - about gender differences in ability (Oosteregel, 2004; Vekiri & Chronaki, 2008)
  - about the nature of computer ability (Margolis & Fisher, 2002)



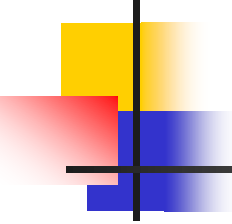
# Do stereotypes affect/relate to students' motivation for ICT learning? (1)

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Boys tend to agree with stereotypes and their stereotypical views correlate positively with their interest and with their beliefs about the value of ICT (Newman et al., 1995; Vekiri & Chronaki, 2007).

Girls tend to disagree with stereotypes (Newman et al., 1995; Vekiri & Chronaki, 2007).

But then, do stereotypes affect girls' motivation???

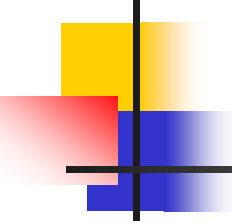


## Do stereotypes affect/relate to students' motivation for ICT learning? (2)

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The answer is less straightforward for girls.

- What seems to affect girls' motivation is the stereotypical view that computer ability is a fixed entity.
- Girls tend to attribute their success with computers to luck or effort and their failure to lack of ability.
- Girls have less positive self-efficacy after unsuccessful ICT experiences but boys are not affected by failure (Nelson & Cooper, 1997).



# Do stereotypes affect/relate to students' motivation for ICT learning? (3)

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- **Stereotype threat:**

Stereotypes can cause high levels of anxiety even in high-achieving confident female students, when they think that other people are going to judge their performance according to dominant gender stereotypes (Spencer, et al., 1999).



# Which school and teacher practices contribute to positive self-efficacy beliefs and motivation?

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A “mastery-focused” approach:

- Emphasis on learning for its own sake
- Positive expectations for students
- Cooperative learning
- Recognition of progress and improvement
- Opportunities for student choice and decision making
- Challenging, complex work
- Viewing mistakes as part of learning
- Encouraging students to take academic risks and engage in problem solving



# Which school and teacher practices have negative effects on self-efficacy beliefs and motivation?

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A “performance-focused” approach:

- Emphasis on grades and performance
- Competition between students
- Recognition for relative performance
- Normative grading
- Decisions are made by administrators and teachers
- Rote learning, overuse of textbooks and worksheets

Source: Midgley & Urdan (1992)



# Mastery-focused approaches correspond better to the needs of NMLs.

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## **ICT learning outside school**

Student directed

Student control and choice of activities

Challenge and novelty

Activities relate to student interests

Ill-structured, complex problems

Students collaborate and communicate with peers

Information can come from a variety of sources: internet, peers, other adults

Students have to gather, evaluate, and synthesize information

Students have responsibility for their own learning

## **School learning**

Teacher directed

Teacher control and choice of activities

Lack of challenge

Activities reflect curriculum goals

Well-defined problems

Individualistic or competitive activity structures

Information comes from the teacher and the textbooks

Information is already selected, evaluated and synthesized for students

Teachers are responsible for student learning



However,

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there are differences in boys' and girls:

- approach to collaboration (Barbieri & Light, 1992; Ching et al., 2000):
  - boys enjoy working alone and discovering things on their own while girls prefer working in groups and sharing what they learn with others,
  - boys tend to be task-focused and to ignore group processes while for girls it is equally important to discuss and negotiate what to do and to resolve interpersonal conflicts.



there are also differences in boys' and girls:

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- interest in certain aspects of ICT learning:
  - girls are interested more in using ICT(s) to create useful things and less in the technical aspects of ICT(s) (Volman & van Eck, 2001)
- interest in certain applications of ICT(s):
  - communication & writing vs. programming & gaming (Tømte, 2008)
- software preferences:
  - girls like software with female characters, adventure, problem solving & creative scenarios & boys like software with male characters, competition and violence, (Volman et al., 2005)
- prior experience with ICT(s) (Tømte, 2008)



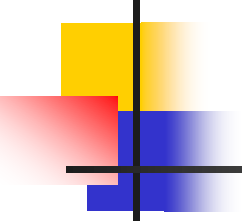
Therefore,

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progressive pedagogical approaches can work only when instruction is *differentiated* to address both boys' and girls' interests, needs, and learning approaches.

Otherwise, well-intended practices may be detrimental for girls (or for boys),

i.e. working in mixed-gender groups during collaborative activities

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- Evidence from a small number of studies (Ching et al., 2000; Joiner et al., 1996) shows that gender differences in ICT performance can decrease or disappear when the design of the learning environment takes into account differences in interests and learning approaches.



# Questions

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- Which aspects of ICT learning environments contribute to positive attitudes and self-efficacy in girls?
- Which practices may limit girls' access to cognitive and physical resources in the classroom?



# Preliminary findings from a recent pilot study on the role of teacher behavior (1)

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- Participants were 301 grade 7-9 students from 4 Gymnasiums (middle schools) in Greece.
- Students responded to Likert-type questions (1-strongly disagree, 7=strongly agree) about:
  - *perceived support* from their information science (IS) teacher ( $\alpha=.66$ ), "My IS teacher thinks that I am doing well in this class"
  - whether the IS teacher had a *mastery-focused* approach ( $\alpha=.85$ ), i.e. "Our IS teacher stresses that effort is the best way to improve"
  - whether teacher practices encouraged *student creativity* ( $\alpha=.60$ ), i.e. "In the IS class I can use my creativity and imagination"



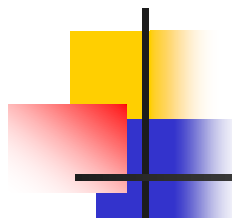
# Preliminary findings from a recent pilot study on the role of teacher behavior (2)

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..... and about students':

- *self-efficacy* about computers and information science (a=.75), "Compared to other kids of my age I know enough about computers"
- *ICT value beliefs* (a=.72), "My knowledge about computers is useful to me in my everyday life"
- *perceived parental encouragement* (a=.70), "My parents think I am smart enough to improve my knowledge about computers"

*Correlations between self-efficacy, value beliefs, and teacher behavior variables for **boys** and **girls**.*



	1	2	3	4	5
1. Mastery focus	-	-	-	.219**	.144
				.193*	.266**
2. Creative work		-	-	.336**	.204**
				.330**	.539**
3. Teach. expect.			-	.624**	.303**
				.603**	.446**
4. Self-efficacy				-	.393**
					.579**
5. Value beliefs					-

*Summary of simultaneous regression analysis for variables predicting boys' (n=135) and girls' (n=166) self-efficacy beliefs about ICT.*

Variable	Boys			Girls		
	B	SE B	$\beta$	B	SE B	$\beta$
Parental support	.583	.076	<b>.504</b>	.326	.076	<b>.271</b>
Teacher gender	-.355	.149	-.138	-.143	.133	-.066
Mastery focus	-.075	.064	-.075	-.068	.063	-.075
Creative work	.076	.064	.075	.130	.059	<b>.149</b>
Teacher expect.	.281	.057	<b>.333</b>	.403	.055	<b>.495</b>

R = .777, R<sup>2</sup> = .604 for boys; R = .693, R<sup>2</sup> = .480 for girls

*Summary of simultaneous regression analysis for variables predicting boys' (n=174) and girls' (n=166) ICT value beliefs.*

Variable	Boys			Girls		
	B	SE B	$\beta$	B	SE B	$\beta$
Parental support	.414	.060	<b>.476</b>	.601	.070	<b>.595</b>
Teacher gender	-.262	.116	<b>-.136</b>	.023	.121	-.112
Mastery focus	-.015	.050	-.019	-.011	.058	-.015
Creative work	.246	.050	<b>.327</b>	.058	.054	.079
Teacher expect.	.069	.044	.109	.018	.050	.027

R = .758,  $R^2 = .574$  for boys; R = .624,  $R^2 = .390$  for girls



## Research in the area of mathematics

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- Teacher expectations relate to student motivation for math learning and girls are more susceptible to teacher expectations (McKowin & Weinstein, 2002).
- Teachers have higher expectations for boys and they think that boys are more able in mathematics (Li, 1999)
- Teachers attribute boys' success to ability and girls' success to effort, and they associate math ability with particular traits: "boys are more competitive, more logical, more adventurous, and more independent in mathematics" (Fennema et al., 1990)



# Questions

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- What beliefs do teachers have about ICT(s), boys and girls?
- How do they communicate tacit assumptions and expectations?
- Which practices can change student stereotypes and attributions about ICT learning?
- If teachers have stereotypical views, how can these views change?