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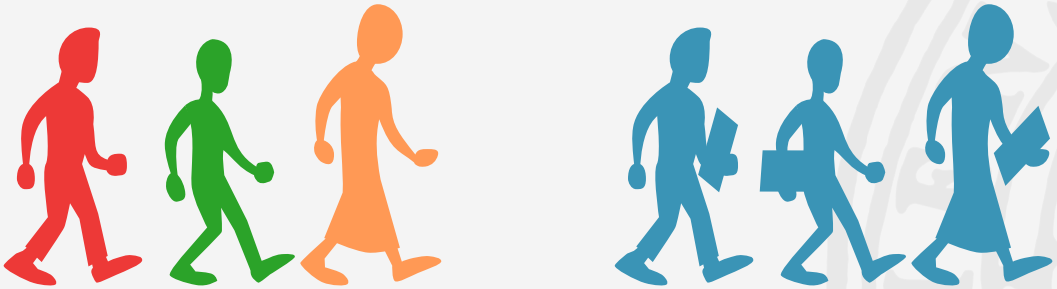
Identity perspectives for greater diversity in computing

Who do students become?

Who are they allowed and encouraged to become?

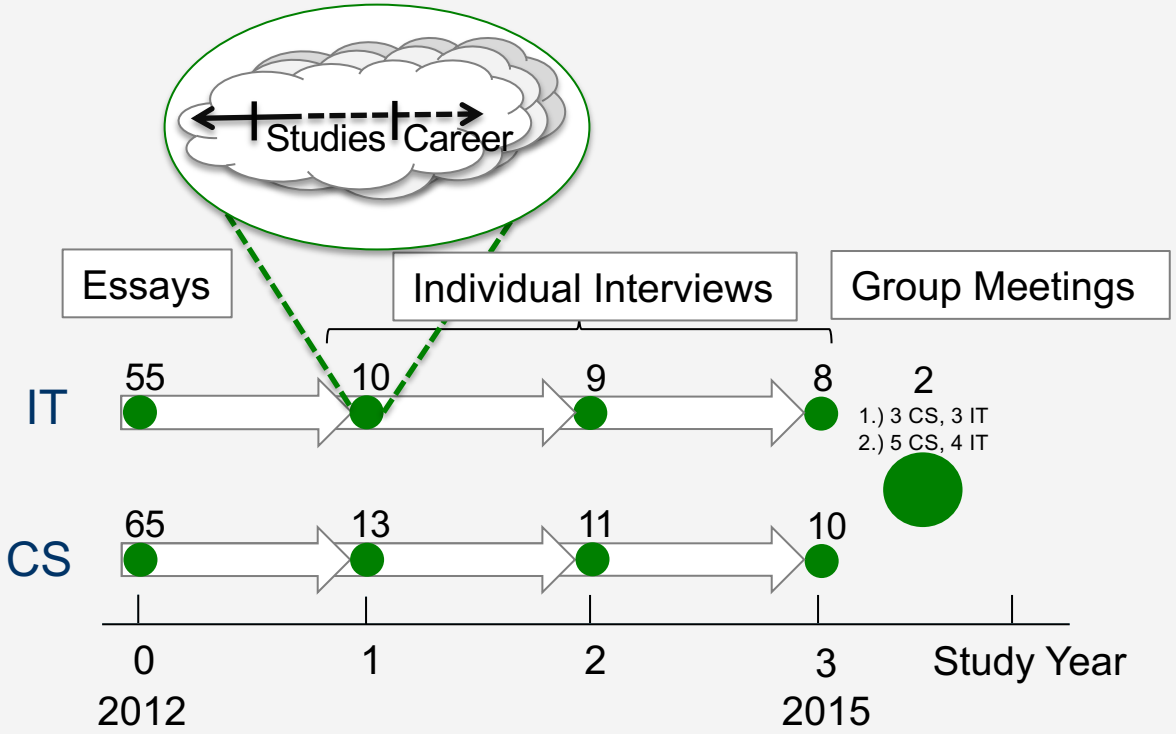


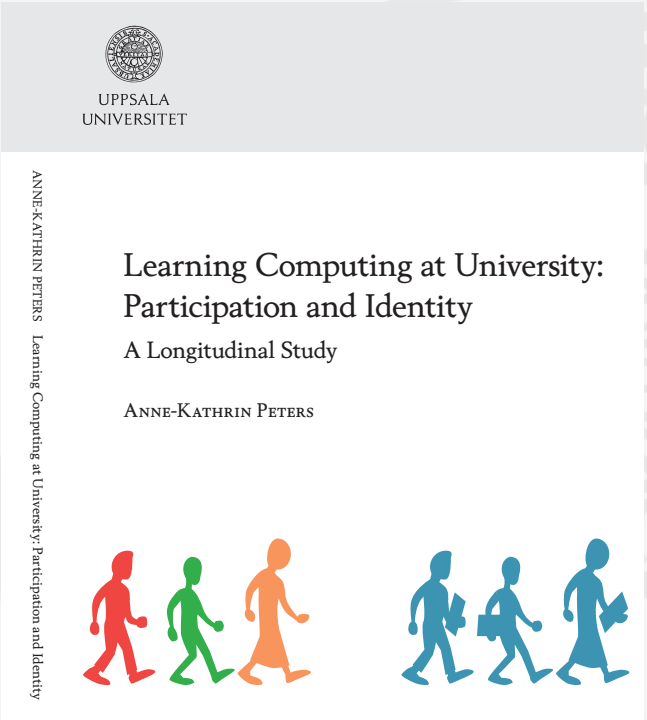
Anne-Kathrin Peters

Uppsala Computing Education Research Group (UpCERG)

Coordinator Climate Change Leadership Initiative (UU)

Longitudinal Interview Study





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A student example

Matthew Year 1: *"The connection between Computer Science and political science comes naturally."*

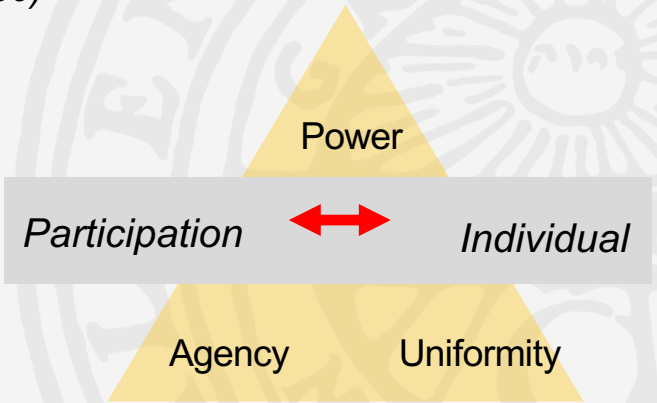
Matthew Year 2: *I am not thinking much about politics anymore. Now I am mostly interested in back-end problem solving.*

Matthew Year 3: *"I think, one misses a lot when combining politics and CS. […] Political science is about discussion without getting anywhere. The only way to come to a point of right or wrong is to look at reality. […In CS] it often feels like I want to do a better solution. One tries: Can I do this algorithm slightly, slightly faster? As this is a theoretical, a natural science discipline, one can always test the solution […] in a very small, secure environment."*

Social Identity Theory

Identity: possession vs. negotiation approach
(Jackson & Pozzer '15)

Participation: *Doing, thinking, feeling, negotiated among different people* *(inspired by Lave and Wenger 91, 99)*



Participation in CS/IT at university

Participation in CS/IT is experienced as…

	Label	
A	… using	
B	… learning	
C	… creating	
D	… problem solving	
E	… problem solving for others	
F	… creating new knowledge	Future contexts
G	… contributing to societal endeavours	Future contexts

Jaylin (CS, year 3): "[As a student], you discuss [. . .] different mini-projects that you are engaged in. [. . .]
For example one person was doing some kind of a blinking light-thing for a jacket, so he had a little arduino kit that he programmed."

Participation in CS/IT at university

Participation in CS/IT is exp

	Label
A	… using
B	… learning
C	… creating
D	… problem solving
E	… problem solving for others
F	… creating new knowledge
G	… contributing to societal end

Amari (CS, year 3): "We have this bible, [. . .] a thick book which contains a lot of algorithms [...] and data structures. [...] it is very complete, [...] it contains only necessary text.
I: "How did you use it?"
Amari: "[. . .] The book contains a list of different algorithms that you can go through to see: 'That algorithm is suitable for this problem!'."
I: "How did the book get the name bible?"
Amari: "[. . .] Older students have called the book 'the bible', because for many students, CS is all about algorithms and data structures."

Participation in CS/IT at university

Participation in CS/IT is experienced as…

	Label
A	… using
B	… learning
C	… creating
D	… problem solving
E	… problem solving for others
F	… creating new knowledge
G	… contributing to societal ende

Finley (IT, year 3): When you have managed to divide the problem into parts and merge the small solutions, and when you in the end have created something that seems to give the result that you were aiming for, when you realise that this can work, then I feel 'This is fun!' and then you become a junkie - that you want to feel this feeling again and again. And then you work towards that feeling that can exist in other situations as well.

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Participation in CS/IT at university

Participation in CS/IT is experienced as…

	Label	Social Context
A	… using	Various, e.g. family, peers, school
B	… learning	
C	… creating	
D	… problem solving	
E	… problem solving for others	
F	… creating new knowledge	
G	… contributing to societal endeavours	

Finlay (CS, year 3): "[The HCI course was about] improving a user's interaction with a program. [We tried to do interviews with users. That was quite interesting, something that I didn't think about earlier."

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Accessibility

Chris (CS, year 3): “The teacher [of the HCI course] was very interested in HCI. [. . .] We thought: ‘He is not a real computer scientist!’ (laughs) But then it turned out that he actually could program and that he was as good as we are, [. . .] just that he had an interest in that which was a bit fuzzy.”

Recognition & Accessibility

Included, recognised

- Backend programming
- the invisible, hardly noticable
- Technical
- Logical / Objective
- Difficult

Excluded, Marginalised

- Frontend programming
- visible
- Not/less technical
- Subjective / Emotions
- Easy

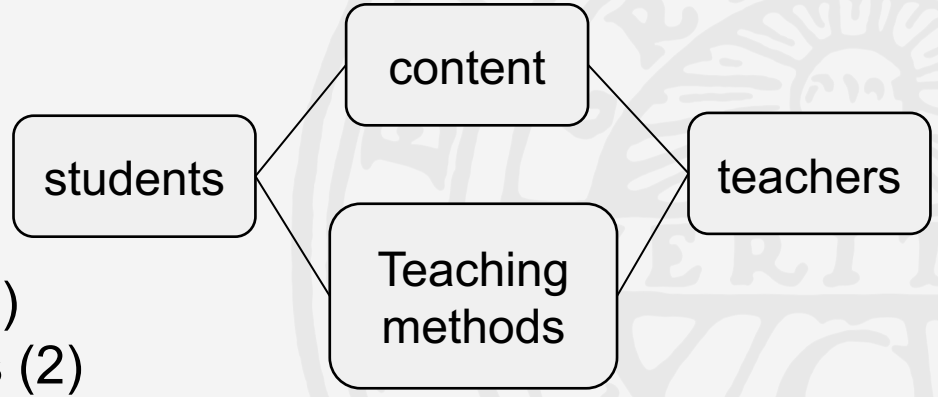
Computing identities in the classroom

Research Questions:

- How are computing identities constructed in social interaction?
- How do students, teachers, and programme coordinators view results and opportunities for change?

Research Activities:

- Participant observations: Imperative programming (26h), Human-Computer Interaction (11h)
- Workshops: students (4), teachers (2)



Ulriksen 2009

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Participant Observations

Programming course

Human Computer Interaction course

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Expert Programmer

- Programs easily, fluently
- ”Talks to” other programmers through code
- Can ”digg deep” in the ”back-end”
- Does ”magic”

Learner

Programming is difficult, requires dedication, perseverance, priorisation

”This course is where you learn the real stuff”

”the best course ever but be careful not to fall behind!”

”Give up your hobbies during the time of the programming course”

The expert programmer

The learner

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User-Dedicated Designer

- Designs work, life, the world through interactive systems
- ”What a computer is is ’fuzzy’”
- Requires a ’fusion of skills’

Teacher Ed: ”15 people here, nice representation!”
Teacher Smith: ”Your study directors want you to learn this!”

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Conclusion

- Education is encouraging and allowing for certain kinds of being and becoming
- Working for change is complex and important

Koch-Svedberg, Peters (2021)
About the opportunities of education to change the male dominated technology culture

Thank you for listening!

Anne-Kathrin Peters
anne.peters@it.uu.se

Conclusion

- Education is (re-)producing and allowing for certain kinds of being and becoming
- Working for change is complex and important

→

Questions for discussion

- What does being and becoming entail at your place?
- What competences are valued by the teachers and students, and assessed?