

# Engineering educators as (un)aware role models

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## Role model

Someone who is observed by others and may be imitated



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# The extraordinary ones



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Particularly for members of marginalized groups:

- + motivation (Gladstone & Cimpian, 2021)

- + self-esteem (Wohlford et al., 2004)

- + academic achievement (Zirkel, 2002)

Effective role modeling

(Gladstone & Cimpian, 2021)

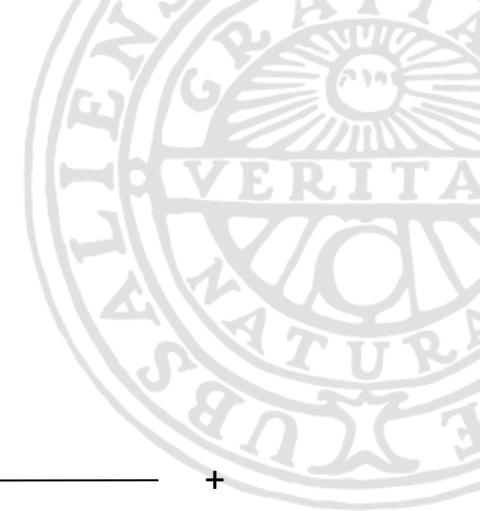


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# Experiences of computing teachers as role models

Level of understanding



V. Grande, A. Berglund, and M. Daniels, "Experiences of teachers in computing as role models: a phenomenographic study," in *Proceedings of the 17th Koli Calling Conference on Computing Education Research*, pp. 133–137, ACM, 2017.





## Teacher perspectives (with alias and emphasis added)

*Joe: I remember, this was a student who started, he remembered sitting in meetings discussing research where people were being really aggressive and he thought: ``OK, this is the way I have to be'', just start doing the same thing.*

*So the people who were being **aggressive**, they were role models **whether they wanted to be it or not**, they were **bad examples** of how you should behave.*



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## Role model



## Emulator(s)

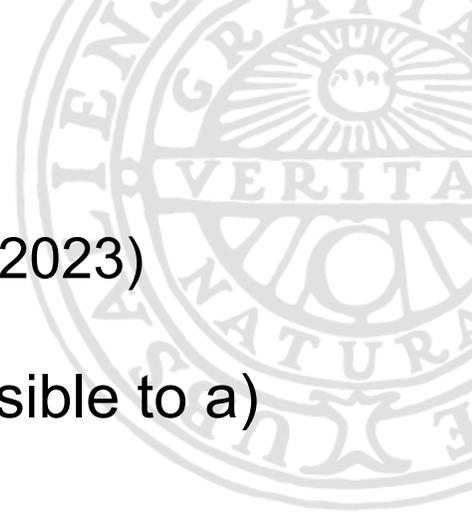


- + Positive
- Negative (Lockwood, Marshall & Sadler, 2005)

## Observer



- + Endorsed
- Detrimental



**Role model** (Gibson, 2003; Lockwood & Kunda, 1997; Grande, 2017, 2018, 2023)

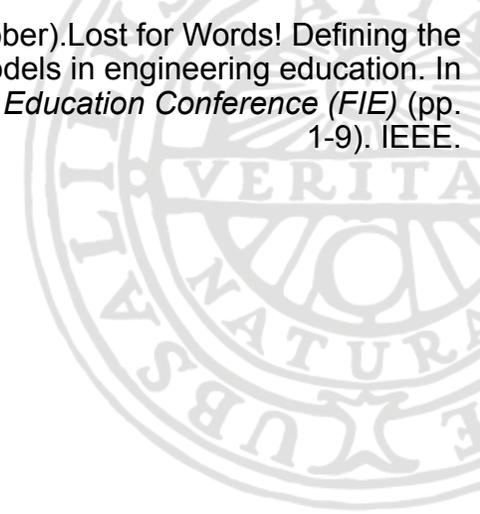
Someone who embodies [something] that the emulator perceives as feasible to a) emulate or to b) avoid emulating in order to achieve a goal



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# Achievements

Grande, V. (2018, October). Lost for Words! Defining the language around role models in engineering education. In *2018 IEEE Frontiers in Education Conference (FIE)* (pp. 1-9). IEEE.



Objective: a position



Subjective: successful



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Grande, V. (2023). *That's How We Role! A Framework for Role Modeling in Computing and Engineering Education : A Focus on the Who, What, How, and Why* (PhD dissertation, Acta Universitatis Upsaliensis). Retrieved from <https://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-500388>

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# Aspects

Competency:  
knowledge/skill



Character trait:  
“by default”



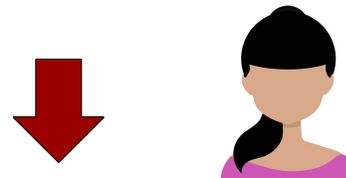
Attitude/behavior:  
specific context



# Reflection on what to model as an individual



Achievement		Aspect		
Objective	Subjective	Competency	Character attribute	Attitude/Behaviour
Immigrant pursuing a PhD	Immigrant <i>successfully</i> pursuing a PhD	Non-technical	Kind	Humble
			Fair	Proud



Can I add to any column?

Achievement		Aspect		
Objective	Subjective	Competency	Character attribute	Attitude/Behaviour
Immigrant pursuing a PhD	Immigrant <i>successfully</i> pursuing a PhD	Non-technical	Kind	Humble
<b>Publications</b>		<b>Programming</b>	Fair	Proud



# How to behave in a “good” (ethical) way as a teacher?



Thomas Lennerfors  
(he/him)



Anne-Kathrin Peters  
(she/they)



Kristina von Hausswolff  
(she/her)

Virtue ethics: good character



Care ethics: address needs



Ethics of freedom: become unique self



Pennock, R. T., & O'Rourke, M. (2017)

Virginia Grande, Thomas Taro Lennerfors, Anne-Kathrin Peters & Kristina von Hausswolff (2023) The virtuous, the caring, and the free: ethical theory to understand the ethics of the teacher as a role model in engineering education, European Journal of Engineering Education, DOI: 10.1080/03043797.2023.2236959



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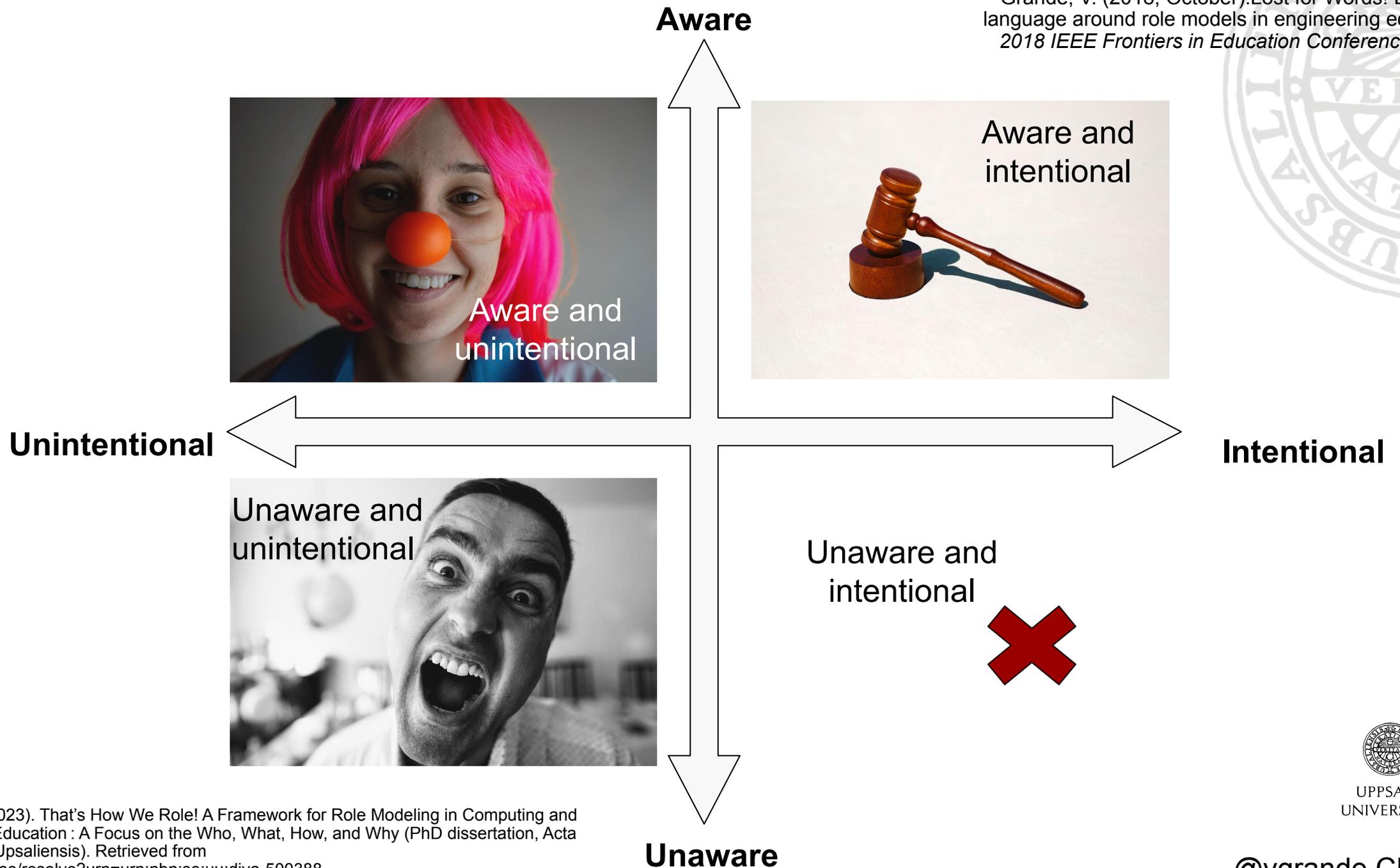
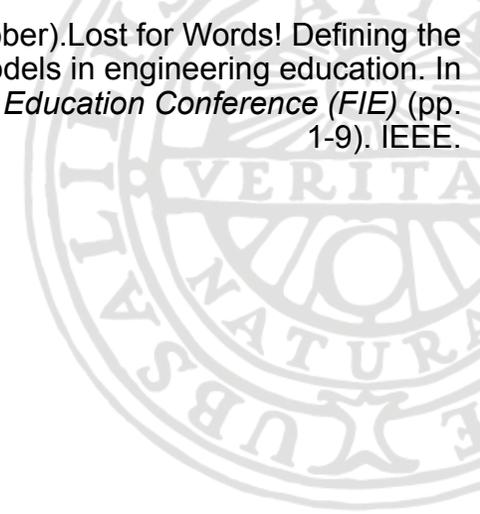
## Teacher perspectives (with alias and emphasis added)

Max: *Also since I can't claim that I am perfectly **reflecting on myself all the time**, I don't 100% know exactly what is it that I **project**, \*laugh\* right? I don't have complete **control** of it. So there is a danger in that. \*long pause\**

*It's not like preparing a lecture [...], then you have complete control over what you want to say, what you project as a role model, you **don't control** in the same way.*



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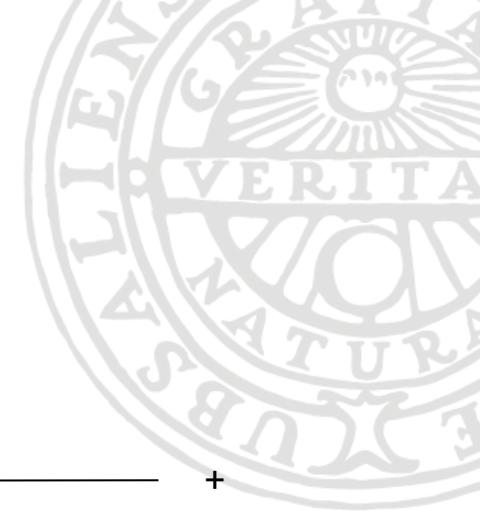
## Reflection on what to model with external input

Achievement		Aspect		
Objective	Subjective	Competency	Character attribute	Attitude/Behaviour
Immigrant pursuing a PhD	Immigrant <i>successfully</i> pursuing a PhD	Non-technical	Kind	Humble
Publications		Programming	Fair	Proud

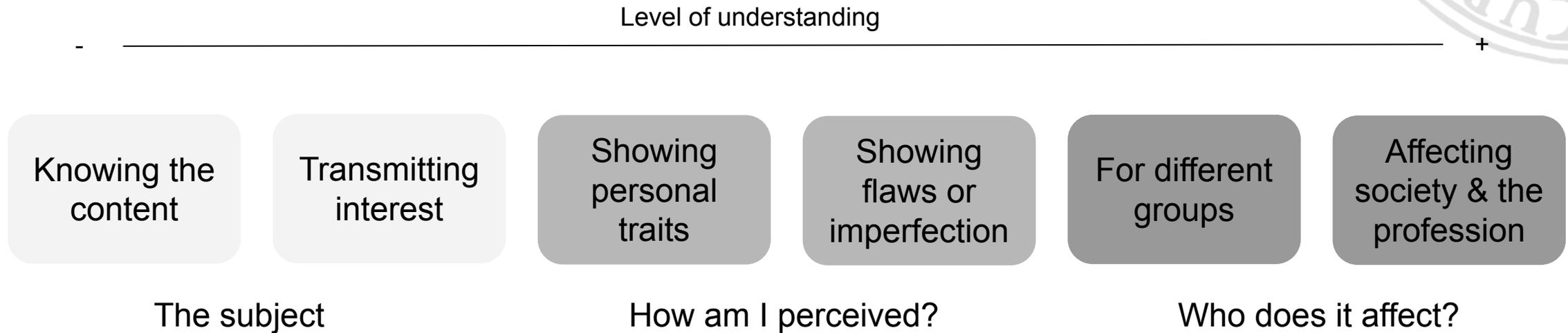


Achievement		Aspect		
Objective	Subjective	Competency	Character attribute	Attitude/Behaviour
Multidisciplinary background	Good strategies for well-being	Intercultural skills	Proactive	Perseverant
	Part of a good network	Networking	Fair	





# Experiences of computing teachers as role models



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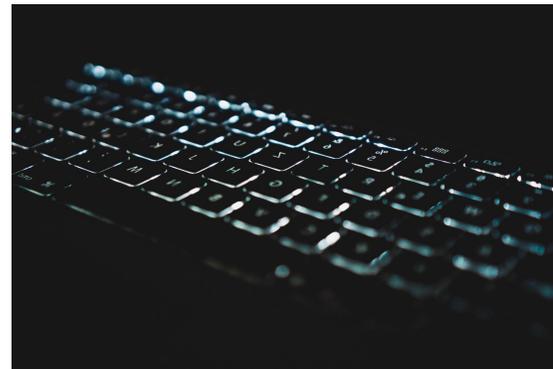
Who gets to *actually* be a role model?

*The teacher [of the Human-Computer Interaction 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 for that which was a bit fuzzy.*



Anne-Kathrin Peters  
(she/they)



Chris\* (CS, year 3)

\*alias, emphasis mine

A.-K. Peters, “Learning Computing at University: Participation and Identity: A Longitudinal Study”. Phd thesis, Uppsala University, Sweden, 2017



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# Norms: unwritten rules

- Computing as rational and logical => masculine (Ottemo, Berge & Silfver, 2020)
- Different traditions (Tedre, 2015)
- “I’m a bad geologist” (Malm, 2021)
- Straight path of the biologist (Günter, 2022)
- Dehumanization of researcher (de Barros Vidor, 2021)
- Call to action!



Anne-Kathrin Peters (she/they)



Mats Daniels (he/him)



Matti Tedre



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Grande, V., Peters, A. K., Daniels, M., & Tedre, M. (2018, October). “Participating Under the Influence”: How Role Models Affect the Computing Discipline, Profession, and Student Population. In *2018 IEEE Frontiers in Education Conference (FIE)* (pp. 1-9). IEEE.

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# Reflection on what to model in a context (conference)

Achievement		Aspect		
Objective	Subjective	Competency	Character attribute	Attitude/Behaviour
Multidisciplinary education / experience	Long career, broad experience	Convey credibility	Charisma	Self-confident
Technical Background	Interesting job/ High-ranking position	Good speaker	Constant, persevering	Have initiative

Desired

Achievement		Aspect		
Objective	Subjective	Competency	Character attribute	Attitude/Behaviour
Diversity in the area of computer science	High impact initiative, experience not required	Besides their own field, they are able to present a broader context	Flexible, accepts there are different ways of doing things	Willing to collaborate
	Interesting job/ High-ranking position	Good speaker	Constant, persevering	Have initiative

New

Potential



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## Emotions, care, and norms



- “If you’re having a bad day, leave that at the door”
- Survey with 199 educators in computing
- Care for yourself, other (non) human beings, technology, the planet
- Emotions: fulfillment, enjoyment, hope, pride, frustration, confusion
- How often do you show the emotions and types of care, and in what situations?
- Which of these emotions and types of care do you **not** show, and why not?





## Frustration, confusion and pride

- Showing frustration impedes students' confidence in the educator's expertise VS "important to convey that it's normal" (28).
- "Often me and my fellow TAs are very humble to the students and sometimes students can take it for granted and start to perceive it in a way that allows them to think they are above us and that talking to us can seem like a waste of time." (87).



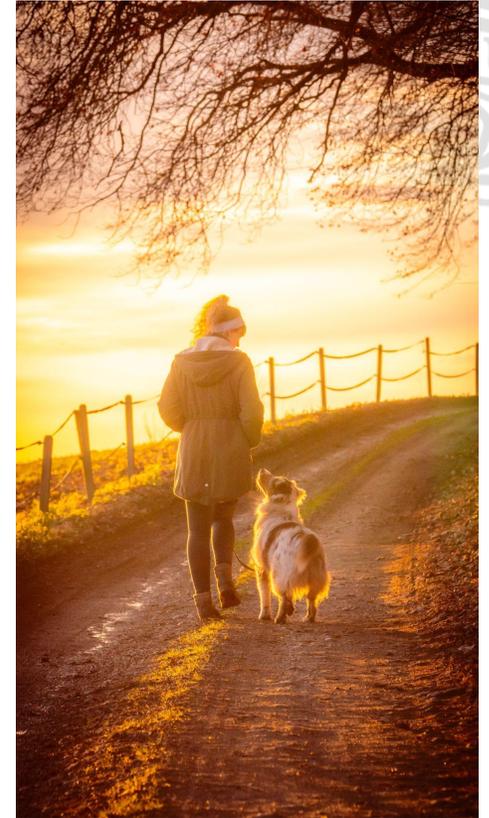
## Care

“I do talk about the fact that software can kill - plane crashes - and have huge costs - crashed satellites, etc.” (49).

“Looking after my dog (more than myself)” (145).

“My well-being is of low priority to me, so there is not much to show” (139)

“I point out I try to keep weekends free of work, and that meetings have to sometimes be moved due to caring responsibilities” (126).



Who teaches this?

“the course is information dense and technically challenging, so there is very little room for discussions outside the subject matter (this is **not an ethics course**, after all)” (6).

“ [I feel] **ill-equipped** to engage in those discussions [on endangered species] and rarely **have an expert** in the topic to lead the discussion” (198).





## Questions explored

- Role model, emulator, observer
  - Positive/negative, endorsed/detrimental
- What can be role modeled?
  - Achievements (objective, subjective)
  - Aspects (competency, character trait, attitude/behavior)
- How it is role modeled?
  - (un)aware, (un)intentional
- Why?
  - Ethical theories as guidance
  - Norms around the discipline



When? After the break :)



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## Take-home reflections

- In what contexts
  - am I potentially a role model?
  - do I have the power to give visibility to others as role models?
- In these contexts, what do I believe it is important to role model?
- How do context and norms affect this role modeling?





**YOU  
MATTER**

**Thank you!**

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## References

The literature used in this presentation, plus an extended list of references, can be found here:

Grande, V. (2023). That's How We Role! A Framework for Role Modeling in Computing and Engineering Education : A Focus on the Who, What, How, and Why (PhD dissertation, Acta Universitatis Upsaliensis). Retrieved from <https://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-500388>

And:

Malm, R. (2021). What is fieldwork for? Exploring Roles of Fieldwork in Higher Education Earth Science (PhD dissertation). Retrieved from <http://urn.nb.no/URN:NBN:no-85642>





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