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SITUATING ‘THE GENDER QUESTION’ IN ENGINEERING EDUCATION: CURRICULUM, STUDENT CULTURE AND BEYOND

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Outline

- Ways of addressing 'the gender question' in engineering education
- Integrative approach: Student culture and the interweaving of formal/informal (based on dissertation study, Ottemo 2015)
- Discussion



‘The gender question’ in engineering education: three tendencies in previous research

- Focus on gender differences, assuming already established gender categories.
 - Problem: Homogenizes gender categories. Assumes gender as explanatory factor/cause.
- Focus on women/femininity.
 - Problem: Deficit model/studying down. Women/femininity as problematic.
- Focus on classroom practices and subject matter (curriculum)
 - Relevant for engineering educators, but challenging for a number of reasons...



”Subjectless” curriculum: content

- Engineering education rooted in an “engineering science-based model” (Crawley et al 2014), prioritizing mathematics and science, decontextualizes technology.
- “The student must learn to perceive the world of mechanics and machinery as embodying mathematical and physical principle alone, must in effect learn to *not* see what is there but irrelevant. [...] Reductionism is the lesson.” (Bucciarelli 1994:107f)
- ”Such exercises also act to exclude much ‘social’ information, which is vital to the design and implementation of new technologies.” (Faulkner 2001:87)
- Distances engineering education from “other fields where the human connection is more manifest” (Bug 2003:890). This also makes it methodologically challenging for gender researchers to address.



”Subjectless” curriculum: teaching

- Seymour & Hewitt (1997:150ff) *Talking about leaving: Why undergraduates leave the sciences:*
 - ”There’s no sort of interaction back and forth. Just the professor sitting up there presenting material to you. It’s sort of a one-way kind of lecture.”
 - ”You walk in, you sit down and you get your pencil going. It’s just write, write, write.”
 - “The first chem class was totally *dead*.”
 - ”I liked science, I really did. But in the liberal arts, you would bring more of yourself into the class.”



Conclusion

- Technological subject matter is articulated in a "subjectless", reductionist mode that privileges certainty, objectivity, distance, non-relationality...
- Claim: This makes subject matter as well as teaching hard to analyze in relation to gender. No explicit articulation of subjectivity, particular conceptualizations of the body or of categories such as race, gender, sexuality etc. (cf. Trojer 2002;)
- Irigaray (1985:74): "In the language of science there is neither I nor you nor us. There is no subjective..." (1985:74).



”Solution” – The imputation of gender into the analysis

- Mode 1: Through equating what women/men say, do, prefer or complain about with articulations of femininity/masculinity.
- Mode 2: Through pre-establishing what femininity and masculinity “is” drawing on feminist philosophy or the history of ideas (~ masculinity = mind, reason, rationality, reductionism, valuing objectivity, ~femininity = body, emotions, relations, connectedness, valuing context)



Schematically

P: "Feminist critiques of science have demonstrated [...] that 'scientific reasoning' is profoundly masculine" (Stonyer 2002:395)

P: Engineering education is dominated by 'scientific reasoning'.

C: Engineering education is masculine.

- What such analyses do not show is *how* objectivity, reason, non-relationality, "subjectlessness" or certainty are articulated with masculinity within the contexts researched.



Alternative

- Follow Jezze Bazzul's (2012:1016) suggestion to continually "ask after the types of subjectivities" articulated in engineering education.
- Given the "subjectless" of technoscience, we might not expect to find an explicitly gendered subject within the classroom.
- Solution: trace the production of this subject in its broader context
 - Broad focus on formal + informal aspects of education -> student culture
 - Engineering education *means* a lot and student culture is an important arena for the establishment of such meaning.
 - Ambition: avoid doing 'pure' cultural studies, retain an interest in subject matter/curriculum.



The CSE student - passion

- Strong emphasis on being passionate about computers (although not necessarily in relation to the formal studies).
- David: “People who study here have grown up with computers and have their entire background... We don’t encounter a new subject, we just continue with our hobby”.
- Those who are most passionate about what they're doing, that's probably CSE students. [...] Most people that study here, if they choose to study mechanical engineering, they have no experience with that, they come here, they learn, and they might change a bit. But a CSE student, a classical CSE student, has lived in this “world of computers” all life, before applying here.
- Derek: "I was interested in computers long before I started studying here, for sure!"
- Well documented, see Holth & Mellström (2011), Margolis & Fisher (2002)



Gendering passion

- Diana: “A girl who is really into fashion would probably find the program really boring [...] You’ve got to have an interest in computers, and if you do, you are kind of ‘boyish’. Of course, as a girl at the program you could probably like computers and still have an interest in fashion, but you cannot be the stereotype who only likes to shop. People like that would find the program really boring because their oriented in the completely opposite way.”
- Douglas: “To be feminine is to go shopping for clothes. To be masculine is to go shopping for unnecessary gadgets [laughs].”



The CSE student - style

- Dennis: "Sweatpants and a washed out t-shirt, preferably from a programming contest, that is the ideal here."
- David: "Well, you know... It's this CSE guy, with a bit of a slacker posture and often sweatpants. And if you see someone at School, you recognize... Maybe I'm being caught up with appearance, but, I don't know, generally CSE students seem a bit less concerned with appearance..."
- Derek: "Characteristic for the CSE student is a very poor taste in clothes [...] It is a man, fairly fat hair, was not the coolest guy in high school... I spend most of my time with computer people and this is almost extra true among them... it is not a random stereotype."



Carrie Paechter, on the importance of embodiment and style:

- "It is also important to be aware that legitimacy is connected to embodiment in multiple ways. Legitimate peripheral participation [...] is in most cases initially conferred on the basis of bodily forms, and we continue to use an individual's appearance to confirm or to question their membership." (2006:15)



Nothing new - Sherry Turkle (1984/2005:183)

- On the MIT contest “the ugliest man on campus”:
- ”For several weeks, the students who think of themselves as most ugly parade around the main corridors of the Institute, wearing placards that announce their candidacy. They flaunt their pimples, their pasty complexions, their knobby knees, their thin, undeveloped bodies.”
- A former student: ”Everyone knows that engineers are ugly. To be at Harvard is to be a gentleman, to be sexy, to be desired. To be at MIT is to be a tool, a nerd, a person without a body. The contest just makes irony of the obvious” (Ibid: 183)



CSE and the rejection of the body

- Rejecting the (aestheticized) body:
 - ”No pants pub”
 - ”Plastic wrap pub”
 - ”Gross sketches” – the male body nude, throwing up, “grossing out”.
- Interpretation:
 - ‘Symptomatic’ for intimate male homosocial settings
 - Border work against homoeroticism (cf. Andreasson, 2007; Brännberg, 1998; Skelton, 1993; Žižek, 1997)
 - Border work towards other programs
 - A form of “geek” identity that resonates well with a gendered mind/body split and CSE as ‘immaterial’



Consequences

- Daniela, when asked if she considers herself interested in computers: “Well, I am, but it feels as if someone has patented the words “interested in computers” and that definition I do not know if I conform to. That's what’s making me feel hesitant to the term. Because, myself, I think it's really exciting with computers and their possibilities. [...] But still, if someone would ask me "are you interested in computers", I would probably feel compelled to narrow down and clarify what one means with being interested in computers...”
- Dexter: “I do not want the perception to be that if you are a CSE student you are also fat, have a beard and a pony tail and like to play computer games. I really wish that that image, which is unfortunately still prevailing, I wish it would go away so that we can form a new image.”
- Darin: “It is a male dominated program – without men.”



The CE program

- Profound 'expectancy-experience gap' (cf. Henriksen, Dillon & Ryder 2015)
 - The focus on chemical *technology* surprised many
- Students articulate a very *limited* relation to CE (in sharp contrast to the students at the CSE program).
- Student adopt an instrumental approach to studies.



A limited relation to CE

- Karin: "I really do not know why people end up in the chemical engineering program, there is no one that stands out as particularly interest in chemistry."
- Kristoffer, on whether an interest in chemistry is something one nurtures or has nurtured before or beyond school, "Nah, it's really not. I had no interest in chemistry before meeting it as a school subject. I didn't engage with it at all"



Manifested in the formal education

- Kajsa: Many classmates have thought that “god no, it's so boring” and “no, do we have to do that now?” and “yikes and boo”.
- Kasper suggests that the three, four courses in chemical technology they have studied have been “really tough” to get through because “they have been so terribly boring.”
- Karin, responding to whether she has found anything she has studied so far particularly interesting: “No, not really, not so far, more of a constant pain” but she remains on the program because she wants to “get a good education so you can get a good job”.
- Instrumentalism a recurring theme: Students emphasize “graduation” and to “get a job” rather than interest in the area.



Instrumentality as pluralization

- The position as CE student is ‘empty’, in the sense that being a CE student does not seem to say so much about who one is or one’s interests.
- Thus, the CE student position becomes more open to identification for both males and females.
- In line with previous research on gender and technology, that suggest that many women emphasize good career opportunities rather than an interest in the subject matter as such (cf. Holth 2012, Lagesen 2008, Margolis & Fisher 2002).



The same phenomenon characterizes the CSE program

- "Most of it is interesting really, but they manage to make things so dull in the courses. You do not realize that it is interesting until the last week in the course. But then there is so much to do, so then it becomes boring anyway." (CSE student)
- Dylan, on entire study periods he finds "terribly boring": "You almost become depressed. I mean, you really do get... It's no fun at all to go to school, knowing that 'Whew, now I have to do this and... it's boring ... "
- Darin: "It's like, I don't enjoy this at all [laughs] There is no pleasure right now. So I just have to finish this crap and move on."



Technology taught – the cause of instrumentality?

- Reductionist technology articulated during ‘non-relational’ teaching. (Fill-in-the blanks during laboratory work, exam questions with irrelevant context and so on).
- Students struggle to find the meaning and relevance of the teaching and subject matter they encounter (cf. Feenberg 2011:161).



Gender relevant?

- As demonstrated above, it is often argued that reductionism, valuing objectivity, rationality and (instrumental) reason establishes technoscience as “masculine”. Women want context and interactive/relational teaching.
- Many of these studies do not show *how* these aspects of technology and teaching are articulated with masculinity.



Alternative analysis

- The combination of subject matter and the way it is taught privileges ‘the already passionate student’. This student can cope with teaching that fails to engage.
- A position that is primarily available at the CSE program, where it is established and masculinized in contexts *beyond* the formal education.
- Conclusion: Reductionist technology taught in a non-relational mode ‘inherits’ gendered meanings/consequences through the context of where it is enacted.



Thank you for listening!

Questions?