Practical and Project Work in Computer Science Education

Funded by Chalmers' Genie - Program
Chalmers | Gothenburg University

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Motivation 1: Yearly Study Barometer

Women in SE programs report to be:

- ***more stressed*** and report a worse balance between studies and private life than their male peers

- ***more socially isolated:*** lack of social contact is named the main hinderance for studying by women on master level (while it plays rarely a role for the men)

- Fewer women perceive their study environment as free of discrimination (compared to men)

Motivation 2: Research

- ***a) Biases in teamwork: perception and behavior:***
  - Different ways of working in OSS (Catolino et al. 2019)
  - Women tend to perform less technical tasks in OSS (Robles et al. 2016)
  - Gender-typical communication differences lead to lower perceptions of women's qualification and ability to contribute to group work among engineering students (Wolfe & Powell 2009)
- ***b) Need for sense of belonging and working harder:***
  - Women in STEM1 higher education feel pressure to work harder to be accepted and succeed (Blackburn 2017)
- ***c) Limited access to online resources:***
  - Stackoverflow: women engage less and have lower reputations than men (Vasilescu et al. 2012)
- ***d) Limited participation in open source software projects:***
  - Women still contribute less to open source software (OSS) projects (Robles et al. 2016)
  - Likely reasons: avoidance of competitive situations and lower confidence (Wang et al. 2018)
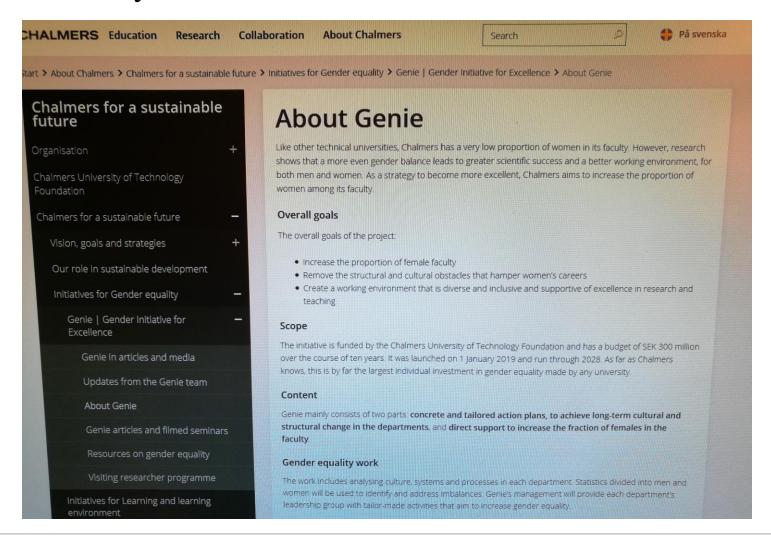
Concerns

- **C1:** Women are likely to benefit less from team and project-based learning in computer science.

- **C2:** Women are likely limited in their access to online learning resources (impacting the benefit of project-based learning).

- **C3:** Women are likely to make limited use of outer curricular learning opportunities, especially in context of OSS.

> But, project courses present
> - ***more than half of the credits*** in core software engineering courses in Master's courses
> - ***4 out of 5*** core software engineering courses in the Bachelor

Project

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- 2 Universities, 2 Bachelor and 2 Master's Programs

Goal:

- Identify how our students are affected by mechanism known from literature

- Develop interventions to support teachers and female students to *mitigate the concerns C1-C3*

	VT 2020	HT 2020/21	VT 2021	HT 2021/22
Phase 1: Exploration and Replication	▓	▓		
Phase 2: Intervention Development		▓	▓	▓
Evaluation of Interventions				▓

Phase 1: Exploration & Replication

Tool 1: Questionnaires to students and teachers participating in project courses

- First iteration: Spring-term 2020

Tool 2: Interviews

- Volunteers are interviewed over the course of one year
- About to start soon

Early Results Questionnaire

- Part 1: 70 answers (send to 556 students, 12,5% response rate)
- Part 2: 49 answers (send to 381 students, 12,8% response rate)

- Female and male students aim for different tasks at the beginning of a course
  - Male students report having done more quality assurance
  - Female students report having done more coding
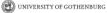 - Both is contrary to the aims formulated during the course start

- Online Resources:
  - More male students report to use manual and static online resources (youtube, tutorials, wikis…)
  - No significant difference in the reported use of online communities, e.g. stack overflow

Summary

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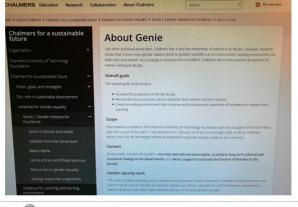> - **4 out of 5** core software engineering courses in the Bachelor

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