Motivation and Grade Gap Related to Gender in a Programming Course

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ABSTRACT
In a programming course at Uppsala University, Sweden, there has been a significant difference between the average grade of female students and that of their male counterparts. This work in progress presents some results and potential solutions related to this problem, and makes them explicit.

Categories and Subject Descriptors
K.3.2 [**Computers and Education**]: Computer and Information Science Education – *Computer science education, Information systems.*

Keywords
Motivation, grade gap, gender and computing.

1. MOTIVATION AND BACKGROUND
Women experience unconscious bias [1,2], applied by people they interact with or by themselves, which affects their performance at work. Women apply for jobs only when they meet 100% of the requirements, whereas men may do so at just a 60% of the requirements [3]. Clearly, there are differences in how women and men experience their professional life.

At Uppsala University, the grades for the required Programming course in the System i Teknik och Samhälle program can be 3, 4, and 5. In order to get a grade higher than 3, students must submit additional work, the completed amount of which qualifies them for a 4 or a 5. The last two instances of the course (autumn 2013 and 2014) showed a significant difference in average grade: while men had a 4.3 (2013 and 2014), women reached a 3.4 (2013) and 3.7 (2014). The gender distribution regarding enrolment is balanced.

The main question addressed in this study is: what caused this difference in the results?

2. METHOD
Data has been gathered at teacher's meetings (from the instructors, i.e. course coordinator and assistants), course evaluations and semi structured interviews (from the students), as well as observations during the lab sessions, of the instance of the course run in the autumn 2014. The majority of the data has been analysed, and interviews will be conducted and analysed during this spring semester.

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3. RESULTS
The middle and end of the course evaluations showed that women were less motivated than men to follow the course. Students also expressed their belief in the need of prior programming experience (more common among men) in order to obtain a higher grade. However, the course grades show that this is not true.

The instructors did not seem to perceive any difference in their interactions with male and female students. However, several mentioned that they paid special attention to women because they *"wanted them to succeed"*.

During the lab sessions, some students asked the grading assistant to assess their incomplete work, arguing that, even though it did not meet 100% of the requirements, it was good enough for the higher grade. This fact may imply that students who were not so proactive or confident in their possibilities of achieving the higher grade (according to [3], more common among women) did not receive more than a 3, even though their work may have been similar to the one by the more confident students.

4. DISCUSSION
Motivation is an important success factor in all learning, and it connects closely to grit and perseverance. One important implication of this study is to provide a learning environment that strengthens the motivation of the female students.

Future work involves compiling similar data from future instances of the course. This way, data related to different instances of the course can be collected and triangulated.

Based on our results, some questions raised so far are: Are female students less likely to ask for a higher grade based on incomplete work? Do women feel more pressured to perform well in all parallel courses (regardless of the actual results or grades)? Do male students receive more scaffolding than female students (e.g. they have more friends who have programmed before)?

Future instances of the course will "debunk the myths" pointed out in the course evaluations (e.g. need of prior experience) and instructors' training will include awareness of unconscious biases.

The interviews will allow us to ask the students whether they perceived any bias in the assistance and assessment by the instructors, among other related topics of interest.

5. REFERENCES
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[3] Sandberg, S. (2014). *Lean in*. Random House.