

Gender Differences

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May 10, 2024

1 Introduction

This paper includes two sections:

- Interesting aspects in the findings/background of [4]
- A description of activities for retention and recruitment, with the aim of reducing the observed gender disparities in computer science higher education.

2 The Strength of Numbers Strategies to Include Women into Computer Science

In the study by Lagesen [4], an initiative at the Norwegian University of Science and Technology (NTNU) is analysed. Referred to as the 'Women and Computing Initiative' (WCI), aimed to increase female enrollment in computer science, it led to a significant rise in the proportion of female students from 6% to 38% between 1996 and 1997 intake years. The WCI included measures like a gender quota, an advertising campaign to change perceptions of the discipline, and some educational reforms. The paper includes certain findings and related research of interest, which are outlined in following subsections.

2.1 Programming in K-12 Mathematics

Kunnskapsløftet 2020 (LK20) is the latest change of the K-12 education curriculum in Norway, mandating programming for all students [1]. Programming became a part of various subject objectives, including Mathematics, Science, Music, and Arts and Crafts. However, while Mathematics consistently integrates programming throughout multiple grade levels, Music and Arts and Crafts mention it only once each. This close tie between programming and Mathematics reflects the understanding that computer science is a subset of Mathematics, but it may exacerbate existing gender disparities in both fields.

Kvande & Rasmussen (1989) contend that broadening the professional context of computer courses beyond technical and mathematical realms to encompass social and artistic subjects could attract more women to computer science. This perspective appears overlooked in the integration of programming into the K-12 curriculum.

Evidence from the National Prior Knowledge Test in Programming reveals a significant performance gap between men and women, with men outperforming women [2]. This performance gap may be influenced by the strong association between programming and mathematics.

2.2 Women, Women, Women Focus

One interesting aspect of the WCI was its approach to the woman's role in computer science. Some parts of the initiative positioned women differently from men in the field. Rather than integrating women naturally into computer science, many interventions seemed to create a separate space for women, rather than integrating them into the existing environment.

This phenomenon is seen in the advertising campaign of the WCI. As part of the initiative, an advertising agency collaborated closely with the initiative manager and computer science faculty. The campaign comprised a cinema screen advertisement, a website, and informational brochures. Specifically, the screen advertisement depicted the content as described in the following quote from [4]:

The [screen advertisement] was a brief film advert about a young man (Tom) and a young woman (Linda). The picture of a young man appears on the screen. The text says: 'This is Tom. When Tom started the computer science programme he took one hour to get into the database of the Pentagon. Today it takes him only ten minutes. Well done, Tom!' Then the picture of a young woman appears on the screen and the text says: 'And this is Linda. Linda knew nothing about computers. Today she talks to people, analyses problems and solves them. Besides, she can get into the database of Pentagon – if she wants to.' The punch line of the third and final picture is: 'The computer science programme is more about human beings than about machines. NTNU wants more women in computer science.'

Lagesen provided a critique of the advertisement campaign, particularly focusing on its gender politics. The critique highlighted how the campaign portrayed highly stereotypical and dichotomous images of men and women in relation to computer science [3].

Another measure of the WCI involved the establishment of a computer laboratory exclusively for women, named 'Cybele'. Additionally, a female lecturer was assigned to the introductory course, and a course on future job prospects for graduates was introduced. Furthermore, lectures were scheduled featuring women practitioners intended to serve as role models.

Although many of these measures appear to have been beneficial to the gender disparities in computer science at NTNU, the insistence on "placing women in a different circle" seems counterproductive to the intended goals. It is crucial for a minority group to feel integrated and valued within a larger community rather than being perceived as different or separate. This sense of inclusion is essential for fostering a supportive and inclusive environment where all members feel like equals.

3 Activities to Address Gender Disparities in Computer Science

This proposal outlines a strategy to enhance certain established activities at the Department of Informatics at the University of Bergen, with a focus on improving recruitment and retention for women. The proposal suggests leveraging the department's largest female workforce: the group leaders. Group leaders are students pursuing bachelor's or master's degrees who hold part-time paid positions in courses they have completed one or more years earlier. Increasing the visibility of female group leaders during key events to the broader student body may be effective in the recruitment and retention female candidates. This approach aims to provide more female role models, which is widely recognized as important for attracting and retaining female students in the field [5][6][7].

One of the activities is a group leader recruitment meeting, where the role of a group leader is introduced to the broader student body. The session commences with administrative details including job responsibilities, academic prerequisites, salary information, and the application procedure. Towards the end, current group leaders are invited to share their experiences in the role. Given the ease of inviting a majority of women to speak, this presents an opportunity for female group leaders to be prominently featured. This visibility can potentially serve as a form of role modeling for female audience members, fostering their interest and confidence in pursuing similar opportunities.

Another activity involves a recruitment presentation aimed at middle school children. Annually, 8th graders are welcomed to the department to gain insights into the field of computer science and the activities conducted by students and staff. During these sessions, a Ph.D. candidate or professor typically leads presentations and engages the students in various activities. This event holds significant importance as it may influence students' decisions regarding their future studies. If such presentations were delivered by women, rather than the usual male presenters, it could impact female participants and encourage them to consider computer science as a viable career choice for women. Leveraging the capabilities of group leaders becomes relevant here. In recent years, the responsibilities of Ph.D. candidates have increasingly been delegated to group leaders. Given the competence demonstrated by group leaders, the task of conducting these presentations could be seamlessly transitioned to student workers, many of whom are women.

References

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