Participation of Female Computer Science Students in Austria

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INTRODUCTION

The situation of women in computer science education has been a major topic of feminist researchers. It has received widespread attention in many countries all over the world. In general, it can be said that in almost all the countries of the world women are underrepresented in computer science education at university level. This phenomenon is, however, a very complex one. In many industrialized countries, there was a peak in women's participation in computer science studies in the middle of the 80s of the 20th century. After that, the number of women who studied computer science in these countries decreased again. This development has been discussed, for example, by Behnke and Oechtering (1995) for Germany, by Kirkup (1992) for Great Britain, and by the EECS Women Undergraduate Enrollment Committee (1995) for the USA. In recent years, there is some indication that the percentage of women who choose Computer science at universities is rising again, at least in Germany (Kompetenzzentrum, 2003) and in Austria (Österreichisches Statistisches Zentralamt, 1971-2001). Apart from that, some cultural differences can be observed. It has been mentioned in several publications that the percentage of Asian women studying computer science is often higher than that of women in Western industrialized countries (Greenhill, von Hellens, Nielsen, & Pringle, 1997).

In the following text, we want to discuss possible reasons for the increase in female computer science students in the last years in a few countries. We want to analyze the reasons for this increase. Detailed information about the motivation of women who study computer science at universities should be helpful in formulating strategies to overcome the under-representation of women in this area. Such strategies should take differences between countries into account. Case studies for single countries could provide relevant information in this context. The following text describes the situation in Austria.

BACKGROUND

The under-representation of women in computer science has been discussed quite extensively. Many reasons have been given why women apparently avoid computer science despite the fact that computer systems do influence all aspects of working conditions and the private life of people quite heavily. A higher percentage of women who take part in shaping computer technology would, therefore, be very desirable. Nevertheless, women do not feel motivated to participate in this process. Several publications have discussed the reasons for this in great detail (see e.g., Gürer & Camp, 2001; Margolis & Fisher, 2003; Schinzel, 1997).

Gürer and Camp (2001) developed a very comprehensive framework of reasons for the under representation of women in computer science consisting of 13 different issues, which have to be considered. Among these issues, Gürer and Camp mention that a positive attitude towards computers is necessary, that computer games developed specifically for boys exert a negative influence, and that equal access of girls and boys to computers is important. In general, the environment in the family, in school, at work, and in society plays a crucial role.

Schinzel (1997) discussed a few additional reasons why women do not go into computing anymore. She points out that (at least in Germany) there was "a shift in the definition of computer science from

discrete applications of mathematics to an orientation towards applied and engineering sciences" (p. 368). She argues that this made it more difficult for women to identify with computer science. In her view, computer science strongly influenced by mathematics is more appealing to women. This argument is probably quite specific for Germany. There is empirical evidence that many female German computer scientists originally studied mathematics or feel very attracted by the mathematical side of computer science (Erb, 1996). This contradicts Margolis' and Fisher's (2003) view who assume that the similarity of computer science to mathematics makes it especially difficult for women to get interested in this subject. Schinzel also emphasizes the concept of highly diverse socially created gender-based interests of girls and boys.

Margolis and Fisher (2003) assume that an important reason for the under representation of women in computer science is the "geek mythology" prevailing among computer scientists. Computer science students are seen as persons who are obsessed with their machines and who are rarely ever communicating with normal people. This image is supposed to deter many women from computer science.

Margolis and Fisher also point out that there is a difference between female American students and students from other countries (especially from Asia) who study at U.S. universities. In their interviews, they found out that these students often had no previous computer experience but persisted because they experienced financial pressure either from companies, which granted them scholarships or from their families. In some cases, these women acquired an increased self-confidence towards computer science. This is also supported by the work of Greenhill et al. (1997). They investigated female Asian students of computer science in Australia who also seem to be very job-oriented.

Given that the under-representation of women in computer science still persists several authors tried to formulate measures to overcome this problem (see e.g., Gürer & Camp, 2001; Margolis & Fisher, 2003). In addition, it seems to be necessary to analyze in more detail which conditions promote the access of women to computer science studies and which do not. In Austria, for example, there has been an increase in the percentage of female computer science students during the last few years (since 1998).

Several reasons might explain this development. Especially in the year 2000, the shortage of IT experts was widely discussed in Austria and other European countries. It should be noticed that the increase of female computer science students coincides with this discussion. It might, therefore, be argued that these students were motivated by the demand for IT specialists on the labor market. In the literature, there is some indication that an increased demand for experts in specific areas can lead to a higher degree of women in the workforce (see e.g., Roloff, 1989). The economic crisis and the problems with the so-called new economy led to a decrease in the demand for IT experts but there is still a shortage of IT experts with specific skills. Another development which might be responsible for the increase in female students of computer science might be the fact that there is a tendency in Austria that young girls and women use computers and the Internet as often as boys/young men do. In the age group between 16 and 24 years, 90.9% of all women have used a computer and 68.5% the Internet. The corresponding figures for males are 90.6% and 68.3%. In contrast to that, there is a pronounced gender difference in all other age groups (Statistik Austria, 2003). This indicates that the problem of access for girls and young women is not extremely relevant anymore. A third explanation might be that in the year 2001 five different computer science bachelor studies were introduced at Austrian universities. The disciplines of media informatics and medical computer science were especially attractive for women. The introduction of such fields of specialization might aid female students to choose computer science as a subject. To find out whether there is some empirical evidence for these explanations we conducted a survey at an Austrian technical university concerning attitudes of computer science students towards their discipline. Selected results from this survey will be discussed in the next section.

RESULTS OF A SURVEY CONDUCTED IN 1993 AND 2004

In 2004, we conducted a survey, which was based on 41 females and 247 males, who are students of the BSc in computer science at the Vienna University of Technology. Most of them (256) enrolled in October

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