Gender and Computing at University in the UK

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INTRODUCTION

In the late 1970s, women's progress and participation in the more traditional scientific and technical fields, such as physics and engineering, was slow, prompting many feminist commentators to conclude that these areas had developed a near-unshakeable masculine bias. Although clearly rooted in the domains of science and technology, the advent of the computer was initially seen to challenge this perspective. It was a novel kind of artefact, a machine that was the subject of its own newly created field: "computer science" (Poster, 1990, p. 147). The fact that it was not quite subsumed within either of its parent realms led commentators to argue that computer science was also somewhat ambiguously positioned in relation to their identity as masculine. As such, it was claimed that its future trajectory as equally masculine could not be assumed, and the field of computing might offer fewer obstacles and more opportunities for women than they had experienced before. Early predictions of how women's role in relation to information technology would develop were consequently often highly optimistic in tone. Computing was hailed as "sex-blind and colour-blind" (Williams, Cited in Griffths 1988, p. 145; see also Zientara, 1987) in support of a belief that women would freely enter the educational field, and subsequently the profession, as the 1980s advanced.

During this decade, however, it became increasingly difficult to deny that this optimism was misplaced. The numbers of females undertaking undergraduate courses in the computer sciences stabilised at just over a fifth of each cohort through the 1980s and 1990s, and they were less likely to take them in the more prestigious or research-based universities (Woodfield, 2000).

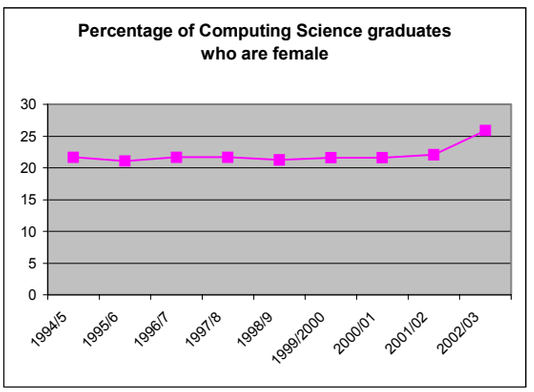
Tracy Camp's landmark article "The Incredible Shrinking Pipeline" (1997), using data up to 1994, plotted the fall-off of women in computer science between one educational level and the next in the US. It noted that "a critical point" was the drop-off before bachelor-level study—critical because the loss of women was dramatic, but also because a degree in computer science is often seen as one of the best preparatory qualifications for working within a professional IT role[1]. The main aim of this article is to examine how the situation has developed since 1994, and within the UK context. It will also consider its potential underlying causes, and possible routes to improvement.

BACKGROUND

In the UK, throughout the 1990s and into the new millennium, the achievements of secondary school-age girls (11-16 years) progressed significantly in the more traditional scientific and technical subjects, and began surpassing those of boys. Before an age when some curriculum choice is permitted (14 years old), girls perform better in science. Furthermore, although fewer of them take science once they have choice, they continue to surpass boys' achievements in the area. Higher proportions of girls now gain an A-C grade pass in their GCSE examinations in chemistry and biology and physics (Department of Trade & Industry (hereafter DTI), 2005; Equal Opportunities Commission (hereafter EOC, 2004)). In terms of A levels, the qualifications usually taken at the end of the first two-year period of non-compulsory education (16-18 years), girls also proportionately achieve more A-C passes in these subjects (EOC, 2004).

Achievements in computing courses have followed this trend. Over the last decade, girls have gained around 40% of GCSE qualifications in computer studies, and they are now more far likely to gain an A-C pass than their male counterparts (EOC, 1994-2004). Nevertheless, at A level, when students traditionally specialise in three or four subjects, the trend has been for the majority of girls

Figure 1.



Note. Based on original analysis of Higher Education Statistics Agency data provided under ad hoc data enquiry: 23148

to opt out of computing. In 1993, in England, girls only accounted for 13% of students deciding to further their computing education to A level standard in England (EOC, 1994). By 2003, this picture had significantly improved, with girls comprising 26% of those studying computing or information technology A level (Joint Council for Qualifications, 2004). Although this still represents a substantial "leak" between one educational level and its successor, it is noteworthy that girls have recently become proportionately more likely to gain the top grades in these qualifications as well (DTI 2005; Joint Council for Qualifications, 2004).

COMPUTER SCIENCE AT THE HIGHER EDUCATION LEVEL[2]

As Figure 1 indicates, the proportion of women within computer science courses at tertiary levels remained fairly static between 1994-2003, despite the improving proportion of them taking computer science at A Level over the same period. Although there appears to be a slight increase between 2002 and 2003, this is likely to be due to changes in the way graduate statistics in the UK were calculated between these two years[3]. On average, women comprised 22% of those completing a degree in the area over the period.

In the UK, female applicants to computer science courses differ in key respects from their male counterparts. They are especially likely to cite their interest in the subject as the main reason for studying it and are committed to finding the right course above other considerations, such as location of university and so forth (Connor, Burton, Pearson, Pollard, & Regan, 1999; Craig, Galpin, Paradis, & Turner, 2002b; Millar & Jagger, 2001). This interest would seem to be intrinsic, as they are less likely to cite future employment prospects as a motivating factor for their subject choice than their male counterparts (Millar & Jagger, 2001). Female computer science applicants have indicated that, in order to aid course choice, they review a wide range of information and are especially influenced by the information provided in university prospectuses and by experiences of pre-entry campus visits. Indeed, information deriving from universities is deemed far more helpful than advice from secondary school teachers and careers advisers (Connor et al., 1999; Craig et al., 2002b; Millar & Jagger, 2001).

Women are slightly more likely to be accepted for a degree within the broad area of mathematical sciences and Informatics, of which computer science is a subset, probably due to their better success rates at A-levels. They are also more likely to complete their degrees (DTI, 2005).

Once on their degree courses, although they are now over-represented within higher education as a whole (comprising 56% of new graduates), as Figure 1 has illustrated, women remain significantly outnumbered within each cohort of computer science undergraduates. This is in a context where computer science is attracting more undergraduates year-on-year whereas physics, chemistry, and engineering are attracting fewer, and mathematical sciences broadly the same numbers (DTI, 2005). As Figure 2 chronicles, between 1994/5-2002/3 the numbers of men and women completing degrees in this area in the UK climbed throughout the period, with the percentage of men climbing slightly faster than the percentage of women. In 1995, 5.5% of all male graduates qualified in computer sciences, as against only 1.5% of all females. By 2003, 11.8% of males were graduating in this area, as against 2.8% of females. While there are grounds for optimism insofar as the proportionate increases during this period for women were comparable to those of men,