Gender Bias - The Insoluble Problem?

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Introduction

In the field of computing there seems to be no obvious reason why a gender imbalance should exist, yet this phenomenon is evident to all who work in and around the industry. From training and education through to practice and management, women are often in a significant minority, and tend to receive lower remuneration on average than their male colleagues.

Of course women have made outstanding contributions to IT. The long and honourable list includes such leading computer scientists as Ada Lovelace and Grace Hopper; leading IS industrialists such as Steve Shirley (FI Group, UK); famous IS research professors like Gunhild Agner-Sigbo (Informatics, Lund University Sweden), and Shirley-Ann Becker (Computer Science, Florida Institute of Technology USA). The list would have to include the leading expert on safety-critical computing (Nancy Leveson), renowned experts on quality issues and software metrics (Barbara Kitchenham and Shari Lawrence Pfleeger), and methodology innovators such as Enid Mumford, amongst many others. So why is the general trend in the opposite direction?

IT and its associated industries have become a highly significant part of economies around the world. Everywhere predictions are being made that IT will provide the catalyst for new economic growth, that it will revitalise older industries, that new and undreamed-of synergies will emerge. Yet the gender imbalance so evident in many sectors of public and economic life is replicating itself even in this new 'sunrise' industry. Doubtless this is in part a reflection of wider social issues; perhaps it is exactly because IT has been accorded such significance, and is achieving concomitant status, that women are not equally represented in these high-earning 'plum' roles, but it does seem difficult to explain the contradiction that a field to which women have made such notable contributions, and whose sole requirement is human brain-power, should so little reflect the abilities of 50% of its potential workforce. This standard 'equal opportunities' argument for busniess competitiveness is well-rehearsed, and no less valid for that, but incredibly IDC and Microsoft forecast that Europe by 2003 will lack 1.7 million 'technology workers' at a cost to business of £232bn (Islam, 2000). The gender imbalance must be a significant factor in this shortage.

Education

A typical entry point into the industry is the education process. The authors' environments are those of graduate and postgraduate education in a wide range of computing subjects. Most of the students at their respective institutions go on to work, research, or teach within IT. Both authors have observed that, in fact, over the last decade the gender imbalance in their student cohorts has become more pronounced. In the UK this is despite government sponsored initiatives such as Women Into Technology (WIT) and Women Into Science and Engineering (WISE) during this decade.

The figures for computing subjects at Sheffield Hallam University (SHU) England, are very similar to those for Lund, Sweden (see tables 1 & 2). Lund has a higher percentage of females overall (51% to SHU's 46%), but note that Lund's Dept. of Healthcare Education has a major impact on this. (At SHU the School of Health and Community Studies has 83% female students).

Industry

A survey in 1999 by our colleague Angela Lauener shows a representative picture from industry (see table 3). University of Aberdeen researcher Androniki Panteli and her co-authors have noted the under-representation of women in the IT industry, stating that in no member state of the European Union is female employment in this industry greater than 30%. Writing in 1998, they record that, although Spain and France show an increasing proportion of women in the IT industry, in Germany, Italy, Belgium and the UK the trend is declining. 'From as high as 25% women in the IT workforce in the UK in the 1980s, the propor-

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tion has fallen to a low of 19% in 1993, and is now between 20% and 22%. This is at a time when women form about 45% of the UK labour force'. They also present evidence that women also tend to occupy lower employment grades and be less well remunerated than their male colleagues. Not surprisingly they go on propose that the IT industry take positive steps to encourage the recruitment, retention, and more equitable treatment of women.

Membership of Professional Organisations

This is a good indication of long-term commitment to the industry. The membership (all grades) of the British Computer Society is approximately 86% male and 13% female, out of a total membership of 37,825. This is by no means a quirk of the BCS. Another representative professional organisation in the UK is the Institute for the Management of Information Systems, with 27,000 members. Here 69% of the membership is male, and 31% is female.

The Implications

Information Systems Development (ISD) has always been connected to organizational change and business strategy, and this was consciously recognized as early as the 1960s. Modern research has looked into areas such as Interpretative approaches to ISD, and Contextual Dependency in organizational analysis. Argyris & Schön have proposed the idea of the 'learning organisation'. Since Learning Organizations are supposed to maximize the knowledge use and rejuvenation of the organization (because knowledge is a major resource), it would be strategically unacceptable to underestimate any possible gender related factors. That would hardly be a 'learning organisation'.

We need to understand the damaging effects of this imbalance. There is some evidence, for instance, that the ethical outlooks of male and female IT professionals differ. If women are underrepresented in the industry, then this and other dimensions will be influenced in subtle ways. Another outcome to be considered is the nature of the artefacts themselves that are produced by this far-reaching industry. If these are made in a predominantly male industry, what are the implications for women 'end users'?

Possible Reasons for the Gender Imbalance

Presumably managers no longer discriminate against women, at least not openly, since this is illegal under UK and most EU countries' employment law. The writer Cynthia Cockburn suggests that management strategies as such are not the main perpetrator of an exclusion of women in specific professional areas. Those organisations that experience severe skill shortage seem to be very adaptable to employ individuals no matter their sex. Cockburn does however reflect upon the crucial necessity of initiatives that support women to acquire technical capabilities which enables them to cross the boundaries of sex-segregated work.

No doubt if the industry can make itself more attractive to women, then more women would wish to study computing subjects, but the imbalance at least in part has its roots in the shortage of women entering the education system to study computing. Schoolteachers would not overtly discourage female pupils from subjects and careers involving IT, so it would seem that some other, earlier, and less obvious, mechanism is at work.

Cockburn has presented concerns about technology and skills as one of the most important aspects of social gendering. She also put emphasis on the strong connection between technology and masculinity. A major problem is the social prejudice that femininity would be incompatible with technical competence. Possibly some subtle Foucauldian self-policing mechanism is at work, for both men and women, whereby we unconsciously identify what seems to be 'suitable' for us in terms of our gender? We all need to feel comfortable with our indentities in our working lives.

Conclusion

IT professionals are often asked to help deliver systems that have a great mix of performance and features. Gender bias seems to have deep and subtle origins, but with gender strategy and organizational learning in focus, we may have an ace in the business competitiveness card pack. There will be serious pressure for more than just 'sufficient' quality in the way IT works to meet business and social needs. From what we have seen in the field so far, demand will be high.

Table 1: Lund University (Sweden)

Department of Informatics[1] (Social Science Faculty)	**Female students**
Overall (777 students)	40%
Design & administration	45%
Design & construction	30%
Successful degrees during the last three years	BSc: 33% MSc: 41%
Department of Computer Science[1] (Mathematics & Natural Science Faculty)	
Overall (402 students)	21%
Lund University Overall[2]**, 1999**	
All Subjects[3]	51%
Social Science Faculty	51%
Mathematics & Natural Science Faculty	41%
LTH (Lund Institute of Technology)	29%

1) based on registered students in LADOK, (Lund university central database over students, spring semester 2000)
2) from the University of Lund annual budget at: http://www.plan.lu.se/AR99/index.html
3) Dept of Healthcare Education (89% females) has a major impact on the numbers

Table 2: Sheffield Hallam University (UK)

First degree-level computing courses, 1998/99 School of Computing & Management Sciences[1]	**Female students**[2]
Computing Maths with Business & Finance	38%
Computer Studies	38%
European Computing	31%
Applied Computing	23%
Computing & Management Science	21%
Business Information Systems	19%
Computing Mathematics	16%
Computing (Software Engineering)	7%
Computing (Networks & Communications)	7%
Average across all 9 courses above	22%
Entering SHU 1998/99 [1]	
All subjects	46%
Engineering School	8%
Maths & Sciences School	63%
Social Sciences	38%

1) http://shu-registry.adc.shu.ac.uk/mit/Profiles/
2) percentages rounded to nearest whole number

Table 3: Large UK Bank[1]

IT - departments	**Female**
Retail Systems	26%
Corporate Systems	27%
Global Markets	36%
Employees that like programming	**Person**
Retail Systems	40%
Corporate Systems	60%
Global Markets	35%
Age (Male & Female)	**< 36**
Retail Systems	41%
Corporate Systems	47%
Global Markets	67%

1) overall response rate 42% Source: Lauener A., SHU (1999)

Further Reading

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