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## **Title**

Gender & ICT – a 10-year study of new undergraduates

## **Abstract**

To help us to provide better support at the University of Edinburgh for undergraduate ICT literacy we have collected information from new students since the early 1990s'. Students' views of the importance and use of ICT in their education have risen steadily, and we have seen a complete disappearance of the original gender difference in these areas. Ownership of PCs has also risen but a difference between males and females with respect to the types of PCs they own has remained. Women appear to favour an approach to ICT that is based on its utility whereas as men take a more technical approach. A small, but important, proportion of students still have some apprehension about using technology in their university studies. We discuss these and other findings in the light of our university strategy options for undergraduate ICT literacy.

## **Why study undergraduate ICT literacy?**

In the early 1990's, within the University of Edinburgh we became aware of the need to make systematic provision for the development of ICT literacy in our students. This was partly due to the changing nature of ICT with the advent of the PC and its consequent availability for widespread use in education, and also due to an increased focus in the UK on graduate employability, which included ICT skills. To develop a university-wide ICT literacy strategy we needed to know more about our incoming students in terms of their experience, skills and attitudes to technology, and of course, over the years we needed to know in what ways these were changing so as to modify our

strategy appropriately. For instance, use of computers in teaching and learning is essentially based on the general ICT skills-base of the student group. Bromley (1998) makes the point that it is often assumed that the introduction of ICT into education will be of general benefit, implying benefit to all the students equally. If there are different patterns of ICT literacy in the student body, that assumption may be fundamentally flawed.

Other factors which have influenced our data gathering have been the changing gender ratio of our undergraduates, with substantial increases in female students in all subjects, and the wider European context of encouragement of student and graduate mobility. The former leads us to reconsider whether the support mechanisms we provide are adequate for the gender mix of our students, and the latter to a collaboration with six other peer universities in Europe (the SEUSISS project funded by the European Commission: [www.intermedia.uib.no/seusiss](http://www.intermedia.uib.no/seusiss)).

## **Collecting the data**

All our data have been gathered by means of short paper tick-box questionnaires, issued to students prior to their arrival at the university along with their official documentation, and collected by postgraduate students in Freshers' Week at enrolment. Thus the respondents answered the questions before they had any direct knowledge of the type or extent of use of ICT in the university, and our collection of the forms alongside the official university documents helped us in achieving a good response rate (generally between 60% and 80%). We captured the data from the sheets electronically (at first with an OMR scanner and more recently with an image scanner) so that we could get a quick analysis of the new students' responses early in the first term. A similar protocol was used in the European project. The questionnaires can be found in PDF format at ([www.flp.ed.ac.uk/LTRG](http://www.flp.ed.ac.uk/LTRG) and [www.intermedia.uib.no/seusiss](http://www.intermedia.uib.no/seusiss))

## Findings & discussions

We only have space here to discuss a small portion of our findings, and so we will concentrate on those with most significance from the point of view of the gender of our students, and also those where we have seen most changes.

Many of the questions in our survey have changed over the years as new technologies became prominent (like the Web and electronic mail) or issues of policy developed. However two particular questions have remained constant across the entire period from 1990 to 1999, and these gather information about *attitudes* towards the use of ICT. Students were asked to rate, on a five-point scale from “irrelevant” to “vital” how important they thought that computers would be on their University courses, and to rate, on a five point scale from “never” to “daily” how frequently they thought that they would use computers on their courses

In the early 1990's we noted a substantial difference between men and women in frequency with which they expected to use computers (Fig 1): around 30% of men but only 15% of women said that they expected to use a PC 'routinely' or daily'. However over the next 10 years we observed that although usage by both genders rose, the rate of increase of expectation of frequent use of a PC by women rose faster so that at the end of the decade both were reporting identical levels at around 65%. There also appears to be a plateau forming at this expected frequency for both genders.

We found a similar pattern when we looked at the new students' views of the importance of ICT in their university studies (Fig 2). In 1991, 36% of males but only 21% of females thought that ICT was going to be 'vital' or 'important' in their studies, whereas by 1999 the views of both genders had converged, with 73% seeing it at this level.

It appears that use of ICT has become increasingly mainstream within HE, the gender differences in attitudes have evaporated. In the early years we were seeing attitudes driven by gender differences in intrinsic interest in technology, while now we have a situation born of the perceived usefulness and relevance of ICTs to learning and study, and to social communication. Within the university we can draw on this base for further development of use of ICT in education.

As one would expect, ownership and use of computers also increased sharply during the 1990's. By the start of the new millennium, just over 40% of new students **owned** a PC (as opposed to being able to access a **shared** one, i.e. at home), but within this ownership there were interesting gender differences that related to both type and operating system.

Men are still more likely to own a computer than are women (44% vs 37%), although the margin of differences is getting smaller with time. Considering those students who do own their own machine, there are interesting differences in the systems which have been chosen. Women are more likely to own an Apple Macintosh (8.9% vs 7.5%) and also to have a machine which is dedicated to word processing (5.2% vs 1.3%). This is a pattern which we have found consistently over recent years of the survey. This differential purchase of Macs by women accords with the findings of Weinstein (1998), who has analysed gender bias in computer advertising and notes that the only context in which a reversal of this gender bias was encountered was in Mac magazines. One might assume therefore that this particular demographic is known about elsewhere in the industry, and that women are seen as more worthwhile targets for the advertising of Macintosh equipment than would be the case for PC equipment.

Women are also significantly more likely to own a laptop as opposed to a desktop computer system than are males (38% vs 31%). The average laptop system is a much more expensive purchase in the UK than the average desktop computer. This observation thus represents an interesting paradox

with respect to the relationship between gender and the purchase and ownership of a computer system. While males are more likely to have purchased their own computer system, women who make the decision to own a computer are investing more in their decision. Although a step of inference is required, this may be understood in the fact that the portable machine is a more practical part of the peripatetic lifestyle of the undergraduate student, and that women are more prepared to pay to obtain this practical advantage. These speculations are in keeping with a number of authors who have remarked, and presented evidence, on the more pragmatic orientation of women in relation to technology (Bjorkman et al, 1997; Durndell et al, 1987; Margolis & Fisher, 2002 & Wilson, 1997).

The other side of this argument is that a desktop system is more amenable to expansion, and to the addition of peripheral devices, and so if the engagement of men is more frequently driven by recreational and hobby-oriented uses of the computer then they may have more frequently made the active decision *not* to acquire a portable machine.

Considering the differences in type of system owned, perhaps the increased likelihood that women will be owners of dedicated word processing systems can also be understood as a product of this pragmatic orientation. If writing is the main task for which the device will be needed, the purchase of a machine for writing makes economic sense (although one would question the wisdom and flexibility of that decision in the context of currently increasing use of networked communications). The greater likelihood of women owning Apple Macintosh systems might also be understood in terms of investing more to obtain perceived advantages of usability.

As with the choice of type of PC to own, we find gender differences in the types of *use* to which our new students put their equipment. Females reported almost identical extent of frequent use of ICT for study and recreation (62% vs 61%) whereas males reported significantly higher levels of

frequent use for recreation than for study (69.2% vs 74.5%), a finding in agreement with those of Phillips et al, 1995; Colwell et al, 1995. This effect was seen even more strongly in the male-dominated Faculty of Science & Engineering.

We asked new students about their use of email and the World Wide Web in a number of different public and private settings. Distilling this down to a single question of whether a student had, or had not, used these communications technologies it was found that women were not significantly less likely to have used email than their male colleagues (never used email: 21.6% vs 20.2%), nor were they less likely to have an email address of their own (own email address: 67.9% vs 70.1%). They were however still less likely to have made use of the Web (never used web: 14.4% vs 11.7%). These data are an example of the convergence which we have observed in responses to our survey by men and women over recent years. Put simply, we have found that as the practical relevance of new technologies has become increasingly evident, so the gender differences in reported engagement with these technologies have become increasingly eroded. Electronic mail and the Web are presently the key areas in this respect, as the use of word processing has been in the past.

Finally, and of importance to us as it influences our views about support, we still see a significant difference between males and females in their degree of apprehensiveness about using ICT in their university courses. Although most students described themselves as 'confident' or 'very confident' about ICT, 25% of females and 11% of males still felt 'apprehensive' or 'very apprehensive' at the start of their university careers. We consider that the gender difference is another manifestation of the general tendency of males to self-report higher and females lower confidences with technology. Highly significant gender differences exist in expressed confidence in the complete range of ICT skill areas about which the students were questioned. First of all, we should note that self-reported confidence is a completely different matter from objectively determined competence, or frequency

of engagement. In self-report measures of this sort men are frequently found to display higher levels of confidence than women of a given level of competence.

Looking further afield and comparing our data with those obtained from new entrants at six other old, research-intensive universities in mainland Europe (Abo, Finland; Bergen, Norway; Groningen, Netherlands; Pavia, Italy; Poitiers, France and Salamanca, Spain), we see very similar results, both in terms of attitudes and skills and gender differences in these. We had anticipated that there might be differences between students at universities in northern and southern countries (a North-South divide, and a topic of much concern to the European Union), but this largely proved not to be the case. Moreover, we have observed that ICT skills vary across cultures in interesting ways, rather than just quantitatively, and *en masse*. An example is the relationship between Minitel and the relatively low uptake of email and Internet commerce in France, where the very early introduction of a digital communication channel made later uptake of email slower than in neighbouring countries.

## **Conclusions**

In terms of the University of Edinburgh, there are lessons for us from our data, plus some insights from recent surveys and interviews we have conducted with various groups around the university.

New students' reporting of apprehensiveness with respect to use of ICT in their studies has been falling over the years, but now appears to be reaching a stable baseline, perhaps reflecting a group in our population with general apprehensiveness about university life and studies. The steadily rising female:male ratio in our undergraduate population will tend to exacerbate this issue. One approach which we could take would be to give more information to prospective students about the



extent and types of use of ICT in their courses, and to focus in on this topic in the early days and weeks of the first term. Another approach is to provide more explicit guidance to students about the sorts and levels of skills we expect graduates to achieve. We know that students leaving the university for professions such as teaching, medicine and law are more confident about the match between their future employers' needs than are other students, probably because the courses leading to professional qualifications are more explicit than are more 'academic' subjects. Provision of materials to enable students to self-assess their skills against objective tasks might enable men and women to become more accurate in their self-reporting of skills. The formal demonstration (even to oneself) of one's ICT skills may be more of a support to the technological confidence of women than of men. Although the point applies equally to any students who are anxious about their skills in this domain: self assessment is more important to those low in confidence than to those high in confidence. An example of such objective testing can be found in the European Computer Driving Licence ([www.ecdl.org](http://www.ecdl.org)). At present, the university favours integration of ICT skills development into academic studies, which although good for encouraging engagement by its relevance, may well make wider and generic self-assessment more difficult.

Interviews with technical support staff who come into direct contact with students in the university microlabs and who run the voluntary courses provided in the first weeks of the academic year, have provided us with useful insights into gender differences in requests for assistance. Although most students appear to turn first to peers for help (something we have observed in other studies), females are more willing to ask for assistance, and particularly with technical problems, than are males who may view such difficulties as 'something they should be able to solve'. The great majority of our student technical support staff are males, and this in itself may raise barriers for the increasing proportion of female students in the university. Seeking cost-effective ways to provide appropriate assistance will continue to be an issue for us over the coming years.

## References & further reading

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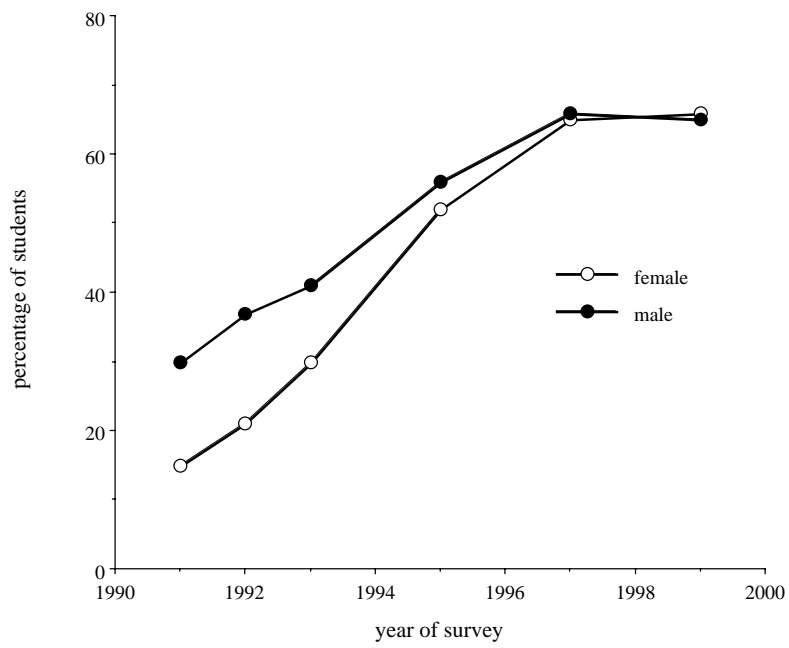


Fig 1. Anticipated frequency of use of ICT in university studies

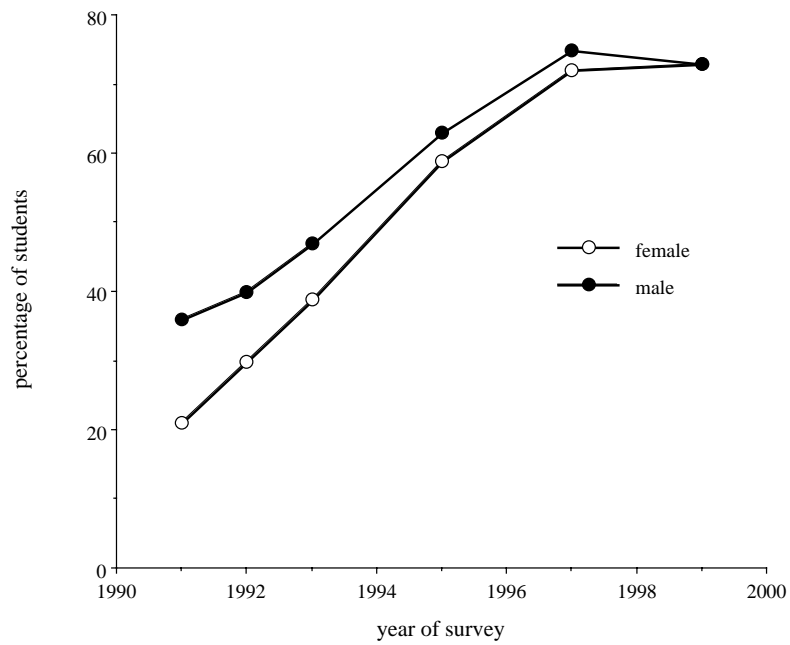


Fig 2. Importance of ICT in university studies