

WHERE WERE THE WOMEN?

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Abstract: There were few women in the early days of computing. Why was this so? Who were the female pioneers in higher education in the area of Information processing? How were women represented in higher education? What was it like to be a female academic student in those days? Has the situation changed?

Key words: Women, higher education, computing, information processing.

1. WHY A WOMEN INTEREST?

Why is it of interest whether there were more women involved in the early development of Information technology and its applications? Would the technology have looked different? Would females have developed other applications? Would the implementation of IT applications have been different? Would the resources allocated to research, development, and implementation be different if there had been more women involved in the development processes?

When I was studying and teaching Informatics (Informationsbehandling – ADB) in the late 60s and the 70s, there was no such debate. By that time, the technology had not yet reached very far out in society and the topics that we studied and discussed were primarily technological such as programming languages, database technology, and systems design methodologies. When applications were studied or discussed it was often done in order to show that something could be made – a kind of proof of principal – rather than focusing on the effects or impact of application of the technology. New

areas of application were very interesting as they introduced new requirements and thereby challenged the existing technologies and influenced the development and improvements in the technology.

In today's information society, most people agree that information technology is a powerful tool changing, developing, and innovating any business, as well as social development in general. With that perspective, it becomes necessary that people share the vision for change and development – that is, among both men and women. It becomes important that women understand the technology and the potential of that technology, and that they are involved in the development, production, and innovation processes where IT is an enabling technology.

Below, comments are given concerning the IT and the gender situation in Sweden. Certain additional material is available concerning the US situation. In Europe, however, Sweden was as an early information society developer. For that reason, the situation in Sweden in the early days can be of interest.

There are different approaches for quantification of the importance of women in businesses. For example, in a recent report "*Jämställdhet och lönsamhet*" published by the Swedish public authority NUTEK in 2002, it addressed gender equality and profitability acquired in 14 000 Swedish companies. One conclusion in the report was that low equality in working groups had negative impact on profitability. Reasons why equality may have positive impact on profitability are, for example, that employees find themselves more motivated, resources are better used, and synergic effects emerge as new views and contacts open.

The Swedish public national IT strategy since 2001, formulated in an IT bill by government, has as a goal that every citizen should have equal possibilities to use IT as a tool for access to increased knowledge, democracy, and civil rights. A prerequisite for this is equal impact on information society, and its development for men and women.

2. WOMEN IN INFORMATION SOCIETY TODAY

Even today, early in the new century, there are comparatively few women in the IT area, in businesses as well as in higher education. In the year 2000, only 20% of persons working in Swedish IT companies were women. In leading IT positions, there were only 6% women. As the main reason for this situation, company representatives expressed that it was not easy to find and employ women with higher technical education, and specifically IT education. From the women organizations point of view, however, this seemed a contradiction and women argued that there generally

are well-educated women available, but that the companies and the recruiters are looking in the wrong places, and are using only traditional networks. However, among the university graduates from electronics, computing and data processing areas the number of women still is less than 30%, and is even decreasing (for example from 26% to 19% during the period from 1990 to 1999).

Access to Internet in Sweden (2003) exceeds 65% of the population, and the differences between men and women here are small. However, concerning specific application services like Internet banking and shopping, the differences in usage between men and women is bigger.

3. FEMALE STUDENTS IN HIGHER EDUCATION IN THE IT AREA 1967 - 1985

In the Information technology field in Swedish universities, the first PhD thesis was presented in 1973, the first licentiate thesis in 1972, and the first master thesis in 1968. In all, for the period from 1966 until 1985, there were 202 masters' theses, 11 licentiate theses, and 19 PhD theses published in the department for Informationsbehandling at Stockholm University/KTH. For the master's theses, there was often more than one author. For the 202 masters theses, there were in all 518 authors; that is, an average of two or more authors per such thesis. Of the 518 authors, there were 388 men and 130 women. This shows that of those students that reached the masters level 74% were men and 26% were women. For licentiate theses during this period there were 11 theses, of which only one had a female author, i.e. 9% women. For the 19 PhD theses presented at Stockholm University during this period, none had a female author. In summary, 74%, 91%, and 100% of the authors were men!

During this period, I received my PhD degree in Informationsbehandling in 1979 at Chalmers Technical University in Göteborg. This was the first female PhD in Informationsbehandling-ADB in Sweden. The title of the thesis was "A study on conceptual modeling". The examiner was Professor Janis Bubenko, the opponent on the thesis was Professor Arne Sölvberg. During the period mentioned above, there were a few female PhD exams in Lund University and a few in Linköping University (datalogi). In Stockholm University, however, it took many years before there was a female PhD. The first was Terttu Orci who received her PhD in 1997.

4. WHO WERE THE PIONEERS?

At Stockholm University, in the department for Data och Systemvetenskap (formerly Department for Informationsbehandling-ADB), it has been preserved files of all theses that have been presented since the department started to exist in 1967. These files include information about PhD, licentiate, and master levels. (At that time, the level most comparable to master's level was the "3-betygsuppsatser", corresponding to today's 60-point thesis.) Looking at the female master students for the five first years, we find several of the pioneering females in the IT area.

During spring 1968, the University published the first four master theses. One of these had female authors: Anita Hellberg and Gunhild Sandström. The title of their thesis was "Informationssystem för styrning av Arbetsmarknadsverket – en redovisning av systemarbetets första etapp". It is interesting to notice that Anita Hellberg in 1973 received her licentiate degree, and that she is the only female IT licentiate in Stockholm University during the period 1966 to 1985. Gunhild Sandström completed her PhD in Lund University, and later became a professor at Lund University.

During the autumn of 1969, again there were four masters' theses in Stockholm, out of which one had three female authors: Karin Gillström, Eva Samuelson, Louise Yngström. The title of the thesis was "Databaser". Of these authors, Louise Yngström has later received her PhD and has become a professor at Stockholm University.

During 1970, the University published 20 master theses. There were in total 35 authors, out of which eight were female. The authors and the title of their theses were as follows.

- Ann-Catrine Appelquist and Ann von Corswant: "Utformning av programbudgetsystem för en ADB-institution"
- Kerstin Holm (and Tomas Montelius): "Studie av användningsområden för en teckenskärm"
- Madelene Hilding: "Registreringssystem för forskarutbildningen – en förstudie"
- Ann-Marie Lind: "Elementär informationsanalys av praktikfallet KOSAB (tillämpning av en vidareutveckling av grundläggande systemeringsmetodik enligt Langefors)"
- Anna-Stina Eskilson, Ewa Lindström: "Datorprogram för lagring och manipulation av systemstrukturer"
- Eva Lindencrona: "Analys av en bokföringsrutin"

In 1971, there were 27 theses presented, four of which had female authors:

- Beila Engelhardt (and PerDanielson): "Några hardware egenskaper hos processdatorer"

- Britt-Marie Lind (and Corneliu Pitulia):” Time-sharing contra remote batch processing”
- Birgitta Gustafsson (and Bengt Bohlin): “Jämförelse mellan olika databassystem som är aktuella för TAD”
- Katrin Sundling: “Några frågeställningar vid övergång från serieminne till direktminne”

In 1972, there were 31 master theses presented. Among the 46 authors, five were female. They are:

- Marie Cederlund: “Undersökning av trånga sektioner i datorsystemet vid Stockholms Datamaskincentral”
- Inger Georgson, Gunnel Lindquist: “Programmeringsmetodik. Problemlösning, flödesplanteknik och modulprogrammering”
- Lena Axlund (and Inge Beiming): “Vilka kunskaper och vilken utbildning bör en god programmerare ha”
- Ann-Margret Svensson:”Några alternativa minidatorbaserade informationssystemarkitekturer lämpliga för IP och institutionen för tiden fram t.o.m. 1975”.

It is interesting to see the titles of these early theses. Some of them are very out of date while others could well be relevant also in 2003. It is not easily possible to see any clear tendencies of female students preferring more or less technical problems or choosing more user or people oriented topics.

In summary, this historical review reveals an astonishing gender unbalance. There were so many men, and so few women. Why? No evident answer has been found. Convention and un-reflected tradition seems to have played a roll. Engineers have by tradition initially been men, and computing seems to have been looked on as a topic of that same type.

5. WHAT IS THE SITUATION TODAY? HAS THERE BEEN ANY GENDER BALANCE CHANGES?

Today, in the beginning of the new century, the number of female graduates from Swedish universities in institutions like “ADB and Systemvetenskap” is still less than 50%. The percentage of female graduates is decreasing: For example from about 45% in 1989 to less than 40% in 1999. The number of female graduates from Swedish University education in the “Electronics and data processing” area has decreased from 26% to 19% during the years 1989 to 1990. The number of female students in higher education (forskarstuderande) is also decreasing at present. In 1989, 41% of the students were women. In 1998, the number had decreased to

26%. In IT related areas the number of female students at the change of the century was less than 20%.

Why is that so? There are many different approaches to understanding the situation. One example can be found in the study "IT in schools", a project financed with about 1.5 billion SEK (less than 200 million US dollars) by the public authority KKS, and with the aim of understanding differences in usage of IT among boys and girls.

In 1997, when the University of Umeå realized that the number of female students in the IT area was only 10%, they started to investigate the situation and search for relevant measures to take. An empirical study showed that the students thought that some of the reasons why female students were not attracted were that

- Teachers assumed computer experience that was not official prerequisites for the courses
- Exercises were often adapted to the interests of the male students
- There were few female teachers or patterns

A number of measures to be taken were proposed. Among these were:

- Stress carrier planning for female doctoral students
- Reward the institutions more for female than for male students exams
- Include more "soft" courses into the educational system
- Introduce specific curricula for female students
- Define mentorship programs for female students

The Swedish government has initiated educational programs outside the universities and outside the public schools to increase the number of females in IT related work. A conclusion from these courses was that the female students tended to choose more "application" oriented than "technology" oriented courses and that the teachers frequently used males as the norms for prerequisite knowledge and expected frames of references.

6. CONCLUSIONS AND COMMENTS

As a young student in Informationsbehandling, I did not personally experience any differences in the areas of interest between my male and female student comrades. The area was new to all of us, and there were no implicit expectance of some gender related knowledge, or any gender differences concerning earlier experience in the area. In general, during these early years, in spite of the gender unbalance, I did not experience much of gender problems, and my impression and feeling is that female and male students at the time were treated as equals. For this, I am grateful to my teachers from that time.

Today, with a long working life experience and more knowledge about gender issues I feel I can find many examples of differences in the prerequisites for male and female university students. After the time that we had received our degrees, often applying for formal positions in the university department, I felt very strongly that the system was not transparent and that decisions were taken on grounds that favored male applicants. In addition, I have a feeling that for the male researchers and teachers, long-term career plans existed – implicit or explicit – but for the females, few such plans existed. If this was true, something had happened during a short period between finishing studies and starting a career. There is reason to analyze this.

Today, thinking back, there is much in this field to discuss with my female colleagues from the early times. This includes:

- Which were your experiences of being female students in the IT area in the 70's? How do you feel today about that time?
- Did you experience the difference in being a student and – having finished studies – and being a competitor for positions?
- In what way do you think that the situation for female students has changed since then?

With my male colleagues, it would be interesting to discuss several questions like:

- Did those of you who later became recognized pioneers in the IT area ever consider gender problems? If so, did you do anything about the situation?
- From your experience, do you think women in general are more interested in the use of technology rather than in the technology itself?
- What would you suggest as the most efficient measures in order to support female students and researchers in the IT area?

Likely, many observers would look forward to answers to gender related questions like these. It is amazing that there is so little documented material concerning this in the Swedish IT field.

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