WOMEN IN SCIENCE, ENGINEERING AND TECHNOLOGY - AN ON-LINE CONSULTATION

POST 133
Report Summary January 2000

The Parliamentary Office of Science and Technology (POST) has recently completed its second on-line consultation, on the subject of women in science, engineering and technology (SET). The exercise aimed to inform the ongoing wider debate about the role of women in SET and to test the effectiveness of an e-mail based on-line consultation.

This POST Report Summary considers the topics that arose during the discussion and the issues raised by the method of on-line consultation.

A draft of the full report was given as evidence to the House of Lords Science and Technology Committee (subcommittee II) inquiry into "Science and Society".

INTRODUCTION

Although there were undoubtedly significant increases in the number of women in science, engineering and technology during the latter half of the 20th century, they are still under-represented compared with their proportion in the general population. In some areas, such as biosciences, as many as 43% of UK university post-doctoral researchers were women in 1997/98. But in physics this figure was only 14%, and 12% in electrical, electronic and computer engineering. In addition, when senior scientific posts are considered, the situation was worse - only 1% of physics professors were women (see **Figure 1**).

The Women in SET on-line consultation was run by POST in collaboration with the Hansard Society and the Women in Higher Education Register. The Athena Project, run by the Committee of Vice Chancellors and Principals (CVCP), co-ordinated an expert panel to focus and inform the discussion.[1]

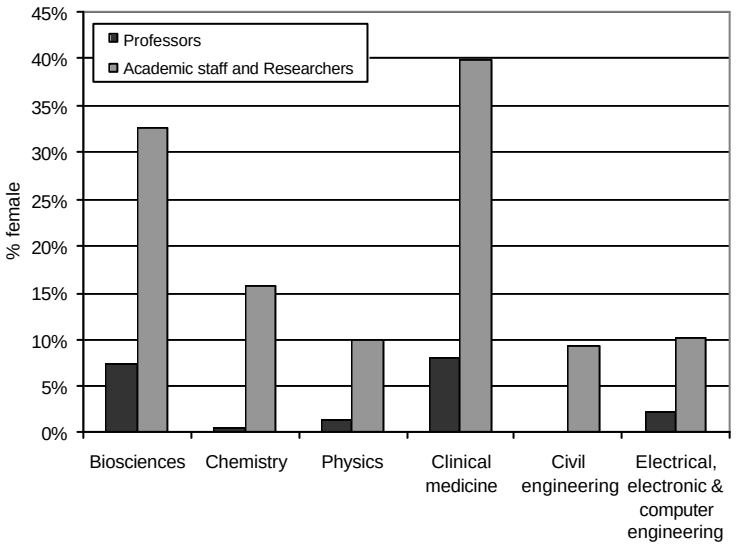
Debate was conducted via e-mail; contributions were also archived and displayed on the World Wide Web. Both the e-mail list and web pages were hosted by the UK Universities' Mailbase system. Any member of the public who had access to e-mail or the World Wide Web was able to join the lists. To ensure that the discussion was constructive and relevant, the lists were moderated - each message was cleared by one of the organisers before it was posted to the list.

The discussion took place over the four weeks from 25 October 1999. Each week was dedicated to a specific theme related to women in SET:

- Week one - **Education**: primary, secondary and higher- the first choices, the first constraints and the first barriers
- Week two - **Career**: fulfilling potential and overcoming frustration
- Week three - **Culture**: does science suffer from its gender imbalance?
- Week four - **Policy**: recommendations and an action agenda.

Discussions in the first three weeks were each introduced by a keynote article from a leading figure in the field. All took a few days to get underway, so the education and careers topics were each extended by a week and ran in parallel with other topics. At the end of each week, a summary was written by the list owners and posted to all list members. The discussion was publicised using several e-mail mailing lists, press releases and personal e-mails. The mailing lists covered several thousand women and men in the academic community. Nonetheless, many participants seem to have found out about the list by word of mouth. The number of members increased substantially throughout the four weeks.

FIGURE 1: PERCENTAGE OF SCIENTISTS IN UK HIGHER EDUCATION WHO ARE FEMALE[2]



[1] The Hansard Society is an independent educational charity which brings together MPs, Peers, academics, journalists, parliamentary staff and others with an interest in the political process from across the political spectrum to promote effective parliamentary democracy. The CVCP's Women in Higher Education Register collects, analyses and disseminates information on women in higher education. It is open to all women working in Higher Education and provides data and analysis for the Athena Project. The aim of the Athena Project is to encourage strategies, promote good practice and offer incentives to improve the access, participation and promotion of women in SET in Higher Education.

[2] Figures from Higher Education Statistics Agency for years 1997/1998

BOX 1: KEYNOTE CONTRIBUTORS

- Baroness Warwick, Chief Executive of the Committee of Vice Chancellors and Principals (week one, education)
- Dr George Poste, then Chief Science and Technology Officer at SmithKline Beecham (week two, careers)
- Dr Phyllis Starkey MP (week three, culture)

The fact that the organisers would present the results of the consultation to members of the House of Lords Science and Technology Committee was mentioned in the publicity. This undoubtedly gave the discussion more weight in the eyes of contributors. The moderator function to bar a person was invoked only once, when an abusive message was sent. A number of contributors had to be asked to shorten their messages, as a (flexible) limit of 500 words per message was set. In the last week, a few contributors were asked to redraft their submissions to ensure they addressed policy recommendations.

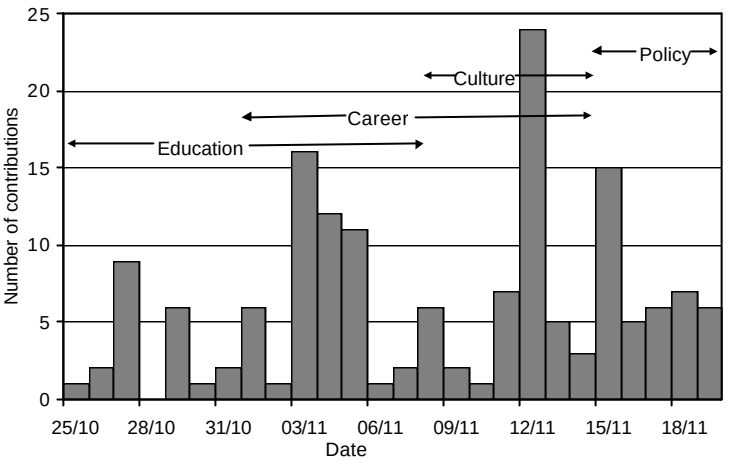
PARTICIPATION

In total, 261 people joined the discussion lists and 67 of these made contributions to the debate. 165 submissions were posted. **Figure 2** shows the number of contributions received each day on the four topics. There was extensive interaction between the participants and the quality of contributions was judged by the moderators to be extremely high. Contributors had a wide range of personal experience to relate on all of the topics discussed, and came from a variety of backgrounds, including MPs, professors, scientists from industry and academia and social scientists. The full archive of the discussion can be viewed at www.mailbase.ac.uk/lists/hansard. **Box 1** lists the authors of the keynote contributions.

As with all on-line consultations, there were many "observers" who registered for the discussion but did not participate. In addition to those signed up to the e-mail lists, members of the public were free to view the archives of the discussion on the web site. The web site received several thousand hits during the debate. Although these cannot be translated into numbers of people viewing the site, it suggests that there were observers following in this way. It also became clear that there was a significant amount of e-mail and debate off-line among the scientific community as a result of the consultation. For instance, the consultation was the subject of an article in *The Guardian* newspaper, which led to broadening of the list membership.

The rest of this report summary considers the conclusions reached during the four weeks of the discussion and the utility of the method. More detail

FIGURE 2: FLOW OF CONTRIBUTIONS



on the topics discussed and technical aspects of the on-line consultation can be found in Annexes A and B of the full report, available from POST (contact details on page 4).

VALUE OF THE EXERCISE

On-line consultation appears to be a useful method of encouraging wider and more interactive participation than is usually possible in Select Committee enquiries. Although the discussion included many prominent figures in the science community, it heard in equal measure from more junior and less outspoken contributors. Academia was disproportionately represented and more contribution from those involved in school-age education and industry would have been helpful - but this probably reflects the wider use of e-mail and the World Wide Web in academia and the means used to publicise the discussion. Publicity targeted specifically at these under-represented groups may increase participation, and running the consultation for longer at a lower intensity could allow those with less continuous e-mail access to contribute.

In terms of method, on-line discussion appears to fall between the face-to-face meeting and the traditional paper-based consultation exercise. More people were able to make their views heard than would be the case at a meeting, and there was more opportunity for considered analysis of the topic and in-depth debate. On the other hand, unlike a traditional consultation, all participants were able to see each other's submissions, respond to or refute points, and become actively involved in discussion.

Those taking part and listening appeared to feel that they had taken a lot from the discussion themselves and formed their own community. Indeed, several participants wrote to say how much they had enjoyed the discussion: **Box 2** shows examples of

BOX 2: POSITIVE FEEDBACK

Members of the Athena Project Steering Group and myself have followed the discussion with interest and welcome the scope, depth and cross-section of views and insights of the contributions. Julia Higgins CBE, FRS, FREng, Professor of Polymer Science, Imperial College, Chair Of The Athena Project Steering Group

Many thanks to all who have contributed to the discussions over the weeks. It has been most enlightening and encouraging. Chris Petrie, Professor of Non-Newtonian Fluid Mechanics, Newcastle University

positive feedback sent to the list. Whether those observing were also impressed is difficult to judge, but very few people left the mailing list during the discussion. This suggests that they thought it worthwhile to read the submissions - sometimes more than ten per day (see Figure 2). The discussion was moderated with a light touch - it may be that no moderation, or more heavy handed moderation, would have resulted in different outcomes.

There were two interesting moments in the discussion when the new medium of communication came into contact with older media. Several contributors regarded the article in *The Guardian* as unfairly reporting the online debate, particularly in its statement that there was a shortage of ideas in exactly how to counter the problem. There followed some discussion about writing to the newspaper and correcting the impression given, although in the event this did not happen.

Towards the end of the debate several contributors reflected upon the quality of the contributions and wondered whether the discussion archive might make an interesting book - perhaps suggesting that new media are not substituting older forms of communication, but providing new tributaries into and from them.

POLICY PROPOSALS

Contributions to the discussion were generally of a very high quality, with a range of experience and points of view. The last week of the discussion in particular brought forward some interesting and novel policy suggestions. Key proposals were to:

- Develop mentoring/ role model schemes to encourage women at school, university and work to continue with science. This would be for Education Authorities, the Department for Education and Employment, higher education institutions and professional bodies to promote.
- Encourage institutions to ensure that they have gender-neutral family friendly working policies, including flexibility in their approach to the working week and contracts of employment; or go further and develop a UK Code of Practice such as the U.S. National Academy of Sciences has in place.
- Develop more sophisticated methods of appointment and promotion, so that criteria other than the number of papers published are assessed. These might include team working, communication skills, human resource management and teaching. The criteria should be systematised and published.
- Re-evaluate the means by which higher education and research is funded, so that co-operation and interdisciplinary work are rewarded and to discourage short-term thinking.
- Gather and review data on the recruitment, progression and retention of women scientists in academia and industry, by discipline, to establish the current position and measure the impact of proposals which are implemented.

It would have been interesting to hear from policy makers regarding the action agenda and policy recommendations.

EFFECTING CHANGE

Although the discussion covered a broad swathe of subjects in some depth, little of what was said was entirely new. There are a large number of groups working in this area, such as the Women's Engineering Society and the Association of Women in Science and Engineering. The Promoting SET for Women Unit in the Office of Science and Technology has been working as a focal point for the community since 1994, stimulating and co-ordinating new initiatives.

The problems are of long standing, and there is a view that solutions proposed in the past would have improved the situation significantly had they been implemented. However, it was suggested that there will not be real progress until the issue of women in SET is at the top of the agenda for those who make policy and influence science. This leads back to the recommendation that those who fund higher education and scientific research introduce a requirement in their assessment exercises that the rate of recruitment and progression of women is monitored.

An action agenda

During the final week of debate the **Women in Higher Education Register** put together a suggested list of action points for higher education institutions, professional bodies and research councils, distilled from the discussion. Details are given in **Box 3**. This

BOX 3: SUGGESTED ACTION AGENDA

Higher education institutions & professional institutions to gather information to compare, to explain and justify the differences in:

- promotion rates, length of time from membership to fellowship
- participation and progression rates of undergraduate, postgraduate, post doctoral and academic faculty, junior and senior
- salaries, nature of contract – fixed term or permanent, resources provided - laboratory space and technical / administrative support for men and women

Involve men in the action and the benefits:

- train them as mentors and members of recruitment/promotion panels
- get their support in identifying and tackling the institutionalised obstacles, unintentional discrimination and insidious behaviours
- develop family-centred policies with flexible working to allow both partners to balance the demands of work and caring responsibilities (elder as well as child care)

Set up networks of women within institutions with positive short term goals to:

- provide role models and support systems
- raise the profile of women - to sit on committees or become department finance directors rather than counsellors
- tell it how it is— success stories and team contributions as well as discrimination and isolation

HE institutions to:

- address the wastage of women between 25 and 65
- provide career and professional development not just for the best women but also for 'the merely very good'
- recognise the increasingly competitive ethos of science and HE reward and funding systems, in particular the Research Assessment Exercise
- develop "get-around" solutions, such as academic age policies rather than chronological age to take account of time out and part time working

HE and the professional institutions should:

Inform themselves of, understand and be aware of the position within their own institution and, on the basis that organisations measure what is important to them, measure their performance and progress in improving their position

Caroline Fox, Project Consultant to the Women In Higher Education Register and the Athena Project

was circulated to various professional institutions. The Women In Science and Engineering Campaign agreed in principle with the idea of such an agenda, but suggested that it should also include points targeted at school children and parents. The response from the Institution of Mechanical Engineers was also positive:

There are many issues outlined in the proposed action plan which the IMechE broadly supports. We would be happy to provide relevant information on our Institution members as required and could help with the identification of role models in industry, particularly of younger members. Martin Northcott, Manager Regional & International Operations, Institution of Mechanical Engineers

The Women in Higher Education Register and the Athena project are currently considering how to take this forward.

CONCLUSIONS

This was the second on-line discussion organised by POST. The first discussion, in July 1998, covered the subject of data protection. Although the contributions to the first discussion were of high quality, of the 94 people invited only fifteen participated and 33 contributions were received in total. The debate on women in SET, in comparison, received 165 submissions. The greater participation in this debate could be due to a number of reasons:

- the discussion was widely publicised, and was not restricted to an invited few
- the topic was of more personal interest to the scientific community
- direct links to a Parliamentary Committee's work
- increasing use of e-mail and the internet

The debate was informed and articulate among a community who are used to e-mail and the World Wide Web. It was a topic high on participants' agendas, and offered the possibility of influencing those making policy. Participants now have some expectation that policy makers will pick up the themes emerging from the debate.

The exercise can be classed as a success in terms of both the method of discussion and the topics raised, and is a useful model for future consultation exercises. The most significant drawback is that the debate was only open to those with access to e-mail. Although this is generally not a problem within the academic and scientific community, other sectors of society may be excluded. However, this difficulty is becoming less significant with the growth of the new media - over a quarter of the UK population are now estimated to have access to the internet.

USEFUL REFERENCES

Full archive of the Women in SET discussion
www.mailbase.ac.uk/lists/hansard
Athena project
www.athena.ic.ac.uk
Women in Higher Education Register
www.where.ic.ac.uk
Hansard Society
www.hansardsociety.org.uk
Promoting SET for Women Unit
www.set4women.gov.uk

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