

ATHENA PROJECT



'MAXIMISING UK ASSETS'

**DEVELOPING AN ACTION AGENDA TO TACKLE THE KEY ISSUES IDENTIFIED BY
ASSET – THE ATHENA SURVEY OF SCIENCE ENGINEERING AND TECHNOLOGY**

**THE ROYAL SOCIETY EQUALITY CHALLENGE UNIT ATHENA CONFERENCE
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Lord Rees of Ludlow

Professor Teresa Rees

Professor Julia King

Professor Peter Main

Professor Lesley Yellowlees

Professor Jocelyn Bell Burnell

Caroline Fox

June 2006

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PREFACE

The focus of the conference was the under-representation of women in science, particularly at senior levels, in higher education. The conference was chaired by Professor Sir David Wallace, Vice-Chancellor Loughborough University and Treasurer of the Royal Society. It brought together Vice-Chancellors, Pro Vice Chancellors, senior managers and scientists from some thirty UK universities. The sections which follow include ¹:

An introduction by Lord Rees of Ludlow, President of the Royal Society, based on his address to conference delegates

Presentations given by

Professor Teresa Rees (Pro Vice Chancellor Cardiff University) and Professor Julia King (Principal Faculty of Engineering Imperial College London)

Two presentations on what SET professional societies are doing, given by

Professor Peter Main (Institute of Physics – Director Education and Science) and

Professor Lesley Yellowlees (Royal Society of Chemistry and Head of Chemistry Department University of Edinburgh)

Key Issues and developing a UK action

The plenary session chaired by Professor Jocelyn Bell Burnell (University of Oxford Astrophysics and Deputy Chair Athena Committee)

Conclusions and future work by Caroline Fox (Athena Programme Manager)

It is hoped that the publication of this conference report and its circulation to:

Vice-Chancellors of UK universities

CEOs of Research Councils and professional SET societies

UK HE and Research policy, funding and quality assurance bodies

will contribute to their awareness of the issues and prompt a review of what further contribution they could make to ensure that UK science benefits from the contributions that could be made by all UK's scientists.

¹ Presentations on work by:

Imperial College London, given by Professor Sir Leszek Borysiewicz Deputy Rector Imperial College London

Southampton University, given by Professor Caroline Thomas Deputy Vice Chancellor University of Southampton

Edinburgh University and its Chemistry department which was included in the presentation given by Professor Lesley Yellowlees

can be found on www.athenaproject.org.uk, together with Case Studies on the work of the three universities (subsequent to the Conference, they all received Athena SWAN recognition awards for their work). Information on the Athena Survey of Science Engineering and Technology (ASSET), the Athena Project, its publications and its ongoing activities can be found at the end of the report

INTRODUCTION FROM THE PRESIDENT OF THE ROYAL SOCIETY

Lord Rees of Ludlow

In December last year I was delighted to be asked to address the conference and to lend my personal support, in the first week of my presidency, to an issue of fundamental importance. I used my welcome address to demonstrate the Royal Society's commitment to addressing the question of 'maximising assets' and to assure conference delegates that this was an area in which I would continue to take a personal interest.

The Society and academia are in partnership over a range of schemes to increase opportunities for women in science; these were the main focus of my comments. But as I made clear to delegates the Royal Society sees 'maximising assets' as a broad issue. This led us, for example, to commission a report by Warwick University *SET and the UK's ethnic minority population*. The report provided more detail than was available previously on the numbers and level of participants in SET, with a breakdown by gender. It caused us to conclude that the complicated issues around participation were not uniquely related to ethnicity.

On the issue of women in academic science I have to pay tribute to the first class work of the Athena programme. In unearthing evidence through its ASSET surveys, in producing best practice guides, in promoting the cause of the SWAN Charter mark, and in other ways, including setting up conferences such as the one in December 2005, the Athena team have made a valuable contribution to improving the situation of women in academic science. They work closely with other key actors in the area, including the ECU, who do important work in promoting the Athena SWAN Charter.

Ten years ago, the Society first took a major step in addressing the issues facing women in academic science, in response to the *Rising Tide* report. It established the Dorothy Hodgkin Fellowship scheme which offers a recognised first step into an independent research career for outstanding scientists in the first few years after their PhD. The scheme is open to both men and women and provides the kind of flexibility and support which is advantageous to both, but is particularly attractive and beneficial to women. For example, recipients are able to hold appointments on a part-time basis or convert them from full-time to part-time and back again to match work and other commitments.

The scheme enables first-class scientists at an early stage of their research career to work for up to four years in UK universities. It covers their salary cost and a contribution to research expenses. 16 awards were made in 2005 from 183 applications. There are currently 62 fellows in post, 58 are women, of whom 10% are working part time, or are on maternity leave. The average RAE rating for host departments is 5, which shows that the fellowship holders are working in top departments. Over the ten years of the scheme, 138 fellowship holders have been appointed. The majority of these remain in academic science, some have gained professorial appointments. 'Leavers' have indicated that the flexibility of the fellowships is something they have valued. The scheme is funded through a mixture of parliamentary grant and the sponsorship of a range of charitable organisations and private companies.

While this scheme is designed specifically for those who require flexibility, the Royal Society's larger University Research Fellowship programme also caters for women, who make up a third of recipients. Since its inception in 1983, 800 fellowships have been awarded and there are currently 300 in post. These fellowships provide up to 10 years funding. Flexibility was also in mind when the RS established the UK Relocation Fellowships in 2004. These aim to help researchers, who wish to move to follow a partner who has moved a significant distance within the UK. The relocating partner does not have to be a scientific researcher. It is expected that the transitional funding which is provided will allow time for the applicant to apply for long-term support or negotiate a permanent position. Nine awards have been made to date, of whom 5 are women.

Through these and our other fellowship schemes, the Society enjoys good relationships with the host universities and this element of partnership is extremely important to the success of the fellowships in terms of support and conditions of service.

Another more recent initiative by the Society has raised the profile of women scientists –the establishment of the Rosalind Franklin Award, kindly funded by the DTI. The award is made to an individual in mid career for an outstanding contribution to any area of natural science, engineering or technology. The recipient of the £30,000 award is called upon to deliver a lecture at the Society and to spend a proportion of the funds on a project relevant to the encouragement of women in SET.

Seeking to ensure that women already in academic science enjoy career development opportunities comparable to those of their male counterparts is the major focus of the conference's deliberations. But we all know that much more has to be done to attract girls and young women into science in the first place. The low number of young women in my physics classes at Cambridge serves to bring this message home to me in a poignant manner. There are two current RS initiatives which we hope will have impact in this area.

First, early in 2005, we published a good practice guide on setting up role model schemes *Taking a Leading Role*. This has been distributed widely. Second, a study on the extent to which research scientists feel able to engage with the public in communicating their science. Once the results are published (Spring 2006), we will have a better idea of the percentage of women scientists who wish to or do already act as role models. This project is co-funded by RCUK and the Wellcome Trust.

Last, the Society's own fellowship. At 4.5%, the percentage of women fellows is unacceptably low, but the situation is improving. We very much hope the steps we are taking will maintain this improvement. Of 564 candidates for election to the fellowship in 2005, 44 (8%) were women, and of the 214 new fellows elected in the last five years, 22 (10%) have been women. The proportion of female fellows now elected is higher than the percentage of female professors in the SET subjects from which fellows are elected. And, although the under-representation of women is more acute in science disciplines, it is a serious problem at senior levels across the whole higher education sector. In subjects excluding SET, women constituted just 15% of professors at UK universities in 2000.

The Society has been delighted to host the Athena team for the past two years and to offer help and support to its two staff and the members of the Athena Committee. I can confirm this commitment will continue through 2007.

SETTING THE SCENE - 4,500 SCIENTISTS CAN'T BE WRONG

Professor Teresa Rees Pro Vice Chancellor Cardiff University

Women in the academy are coming out of the closet. Not only do stories and recollections emerge whenever a group of women academics get together, but experiences and anecdotes are being supplemented by social science data.

Research is burgeoning from the US and Europe. The European Commission has published the ETAN report on women in science, and a report on women in industrial research. The Helsinki Group of 33 European countries are benchmarking national policies and statistics on women and science. In the UK, we have the DTI commissioned Greenfield report on women and science and HEFCE funded studies on equality in universities, as well as a range of quantitative and qualitative academic research projects. And now we have the Athena ASSET surveys – expressing the voices of 4,500 scientists: 4,500 scientists can't be wrong

What does the research tell us?

There is a gulf between women and men in their perceptions of the issues

'Good women' can become invisible!

There is still a gender pay gap

Women remain around 10% of the professoriate in most countries, even though the majority of students now tend to be female

In every country, in every discipline, at every rank in the academic hierarchy, men are chosen disproportionate to their representation in the recruitment pool

What can be done?

We need a major organisational and cultural change in our universities. We like to imagine that universities are liberal, meritocratic institutions, where preferment is by merit. But they are not. Gender is a key organising principle in the labour force of the academy. Networks and patronage remain important influences on their processes. This inhibits the development of excellence and jeopardises our competitiveness.

How can this be done?

By promoting gender equality in the university -we need to modernise our human resource management systems, as well as introducing equal pay. Transparency in recruitment, retention and promotion is vital. Clearly specified criteria are needed. Commitment from the top is vital. Awareness and training are needed, especially for those involved in staff development, recruiting or promoting. Gender proofing new policies and conducting gender impact assessments are vital tools. Management information systems need to be disaggregated by gender and gender equality indicators developed to be used in benchmarking. Dignity at work policies are vital to eliminate bullying and harassment.

Why should this be done?

In the first instance, it's the right thing to do. However, the act setting up the Commission for Equality and Human Rights, which extends the legal obligations of universities in the field of equality, includes a clause that places a responsibility on public bodies to promote gender equality. The act comes into force in 2007. It will oblige universities, as well as funding councils and research councils, to be proactive in embedding equality and diversity policies in the fabric of their organisations, in the ways they operate and in their cultures. This new duty is similar to the one that already exists for race, and is being introduced for disability. It puts the onus on universities to take initiatives.

We are already gaining some experience of this through the stipulation in the RAE that universities must provide a copy of their code of practice on equality. Transparency in who makes the decisions and on what criteria is a strong element of what codes should describe. The RAE, full economic costing and the fixed term workers' directive all focus attention on what universities should be doing for early career researchers, the majority of whom are women. Are they being developed? Are they given access to staff development, training and conferences? The national framework should focus more attention on progression routes for research staff. The European Commission's framework programme insists that the gender dimension of research is addressed and that same sex research teams will need to be justified.

What are others doing?

Leading private sector employers in research and development have already identified the business case for promoting equality. As Astra Zeneca say, 'cloned people produce cloned ideas'. Innovation in research demands diversity. The CEOs of ten major global R&D companies have pledged to work towards ensuring they capture the best brains in research, male or female – even if it means addressing issues such as work life balance, dignity at work and transparency in recruitment.

Where are we now?

The HEFCE funded study of university websites revealed that it was difficult to find their equality policies on them. Most that had such policies had got as far as recognising the existence of 'disadvantaged groups.' The gender duty and other imperatives mean that universities must move beyond the concept that equality is just about addressing direct discrimination. We need to become more sophisticated in our understanding of indirect discrimination and in methods of promoting equality in our processes, policies and practices. This means embedding equality and diversity in everything – from our strategic plans to our annual reports, to our monitoring and reviewing.

It is only by promoting equality that we can be sure that we are promoting excellence.

What next

To be competitive, UK universities need to take gender equality very seriously. Moreover, the new legislation means it is no longer acceptable to assume 'we don't have a problem here'. Universities need to show what they are doing to promote gender equality. This means professionalising human resource management. Some R&D companies have been working on this agenda for some time. If universities are to recruit and retain bright scientists in the future, they will need to move up a gear.

WOMEN IN SCIENCE - WHO'S GETTING THE BENEFITS

The business case for improving women's representation at all levels of science – are UK universities taking the lead or falling behind?

**Professor Julia King Principal of the Faculty of Engineering
Imperial College London**

The UK Government has put forward an agenda for economic growth based on the knowledge economy that involves a commitment to increase the proportion of GDP spent by both government and industry on research and development. Yet, the Institute of Employment Studies predicts that, by 2011, only 20% of the workforce will be white, male, able-bodied and under 45. 80% of employment growth will be attributable to women (who make up 51% of the UK population) and are:

23%	of 'A' level physics students
20%	of physics undergraduates
14%	of engineering undergraduates
11%	of managers in engineering companies
8%	of lecturers in engineering departments
4%	of FTSE 100 executive directors
4%	of FRS
3%	of physical science and engineering professors
3%	of chartered engineers
1%	of FR Eng

It is the UK's failure to encourage more women onto SET career paths, and also to maintain their presence in these positions, that requires serious attention.

The business case for diversity

As John Brock, the Chief Operating Officer of Cadbury Schweppes, pointed out 'a diverse workforce...is the best way to expand into new markets and stimulate new business ideas...that's a significant competitive advantage.' Industry seems to have recognised the value of an experienced female staff.

Lord Browne, Chief Executive of British Petroleum (BP), speaking at a women in leadership conference in Berlin in 2002 remarked 'because the management of the industry has been predominantly white and male and Anglo-Saxon, those people have recruited and promoted in their own image.'

With growing skills shortages in the UK and women's under-representation in SET the 'business case' for diversity becomes clear. The Catalyst study in 2004 reviewed the corporate performance and gender diversity of 355 of the US Fortune 500 in terms of their return on equity and total return to shareholders. It found that 'the strongest performance correlated strongly with gender diversity in the top management team'.

There are encouraging signs from industry with a growing Board level recognition that diversity is a strategic business issue and a number of high level initiatives in science and technology based companies, for example BP appointed a Vice President for Diversity and Shell Oil Inc. now holds specific recruiting events for female engineers at UK universities.

Managing diversity

Industry has responded to the results of research showing that diverse teams are harder to manage than homogeneous groups. Absenteeism and staff turnover are higher because diversity makes for a less comfortable environment, unlike the environments that Lord Browne referred to in BP, where the men have the same or similar family and university backgrounds, and interests. In such environments conversations are easy, 'chummy' and 'clubbish'. It may be competitive, but everyone instinctively knows 'the rules', they share the same sorts of jokes, go to the bar or play squash together after work – social integration comes easily and the environment is naturally supportive.

In a diverse environment there are more misunderstandings, people have different approaches to the same problem, so there is likely to be more disagreement and argument, the challenge is to keep this constructive, because this is the way to find competing solutions to the same problem. But if not well managed it is a more stressful environment. Communication and social integration take more effort, common values and rules have to be established, and the different needs, behaviours and characteristics of team members have to be supported. Team leaders must learn to manage differences of opinion - the very source of the diversity advantage. But the results are worth having, diverse teams outperform on innovation, problem solving, flexibility and decision-making. Appropriate focus and training are required, but the competitiveness benefits are increasingly clear.

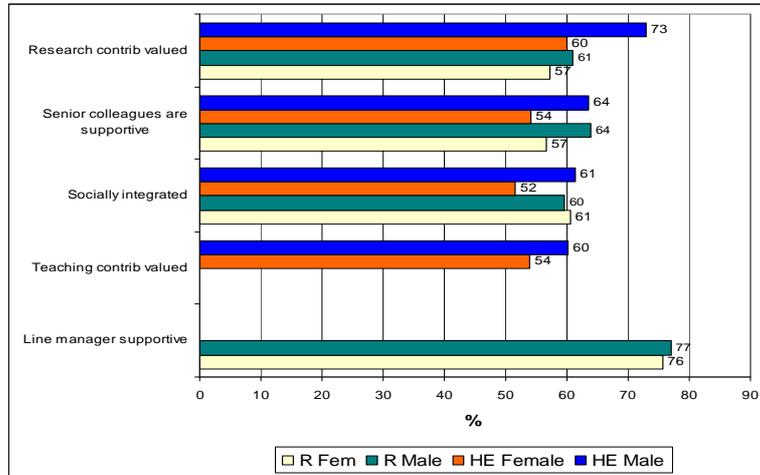
Are universities managing diversity?

There is progress in academia at all levels from undergraduate to professors; however, there is a concern that it is industry rather than HE that is now showing the way. Universities apparently offer a diverse environment but they lack the business imperative that is driving change in industry. That is not to say that things haven't been improving. When I went up to Cambridge in the 1970s as an undergraduate, 16% of all undergraduates were female, with only about 2% in physical sciences, and there were no female academic staff in the departments of physics, chemistry, materials science, engineering or mathematics. Now, Cambridge has around 49% women undergraduates, 10 to 25% in physical science classes, and 24% of the academic staff of the materials science department are women. At Imperial College our fastest growing engineering course is bioengineering with an undergraduate intake of 50% women.

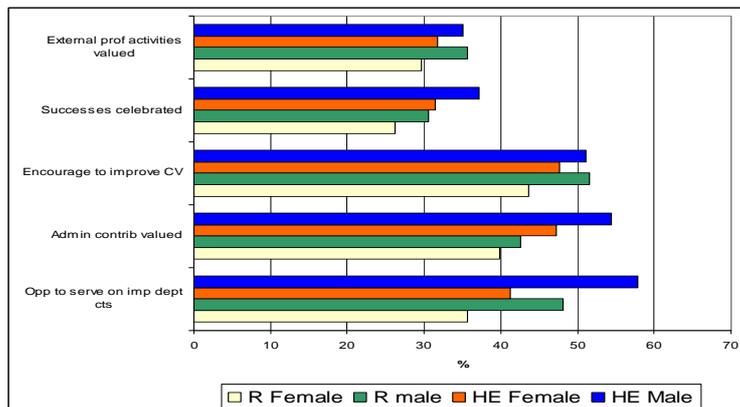
And what does Athena's survey tell us about academe?

The Athena survey of science, engineering and technology (ASSET) compares the career pathways of more than 6,500 men and women in academia and research council institutes in the UK. The survey reveals that differences between women's and men's experiences are more marked in academia than in the research council institutes and that women's experiences are consistently less positive than men's.

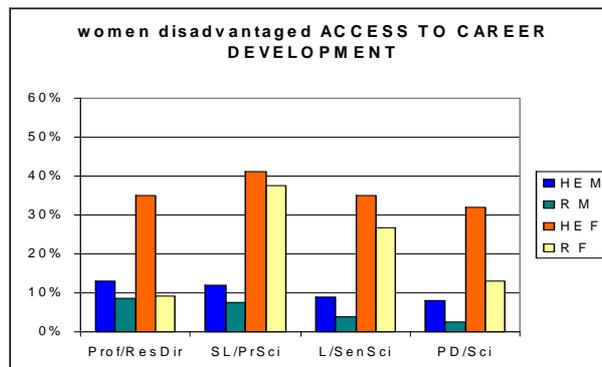
Areas where the majority agreed they were valued or supported (respondents aged 35-50)



Areas where <50% of women agreed they were valued or supported (respondents aged 35-50)



Men in academic positions are much more likely to report that they were encouraged to apply for promotion than their female colleagues. Women feel that they are disadvantaged with respect to access to career development opportunities whereas fewer men recognise this as a problem for their female colleagues.



Men are more visible at key career stages

Visibility – Male/Female Differences
(red indicates differences are statistically significant)

Session chair or specialist/breakout/keynote speaker at conferences

	Prof	SL	Lect	Postdoc
Male	95%	77%	65%	46%
Female	98%	78%	56%	39%

	ResDir	PrSci	SenSci	Sci
Male	87%	85%	66%	43%
Female	91%	91%	57%	43%

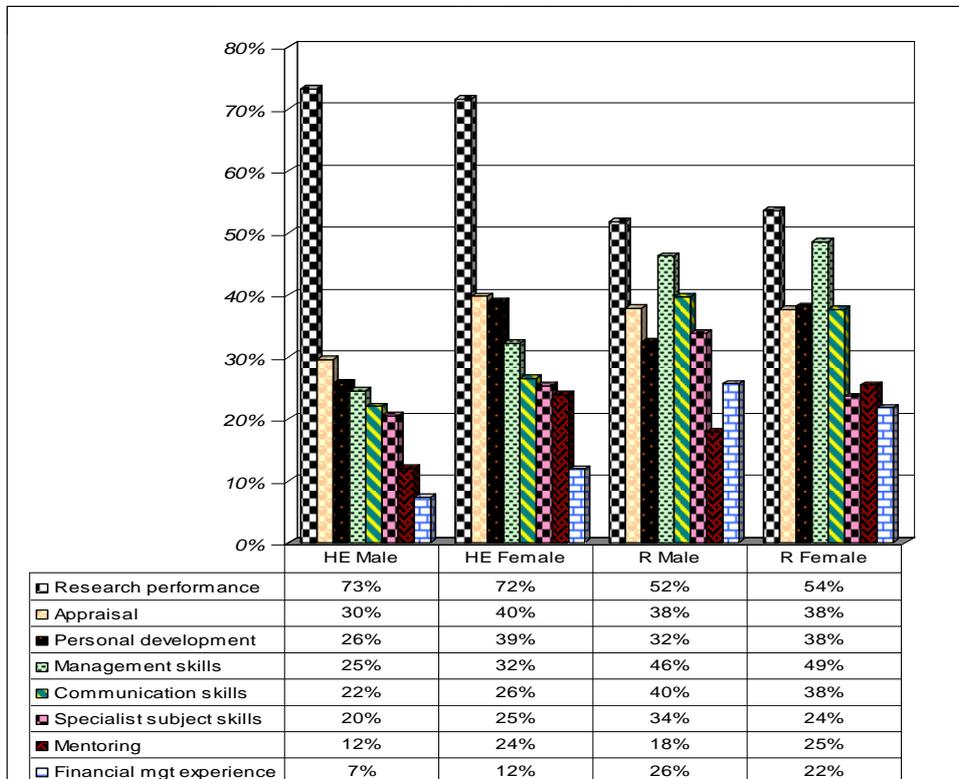
Undertake professional consultancy

	Prof	SL	Lect	Post-doc
Male	71%	61%	46%	33%
Female	55%	47%	32%	16%

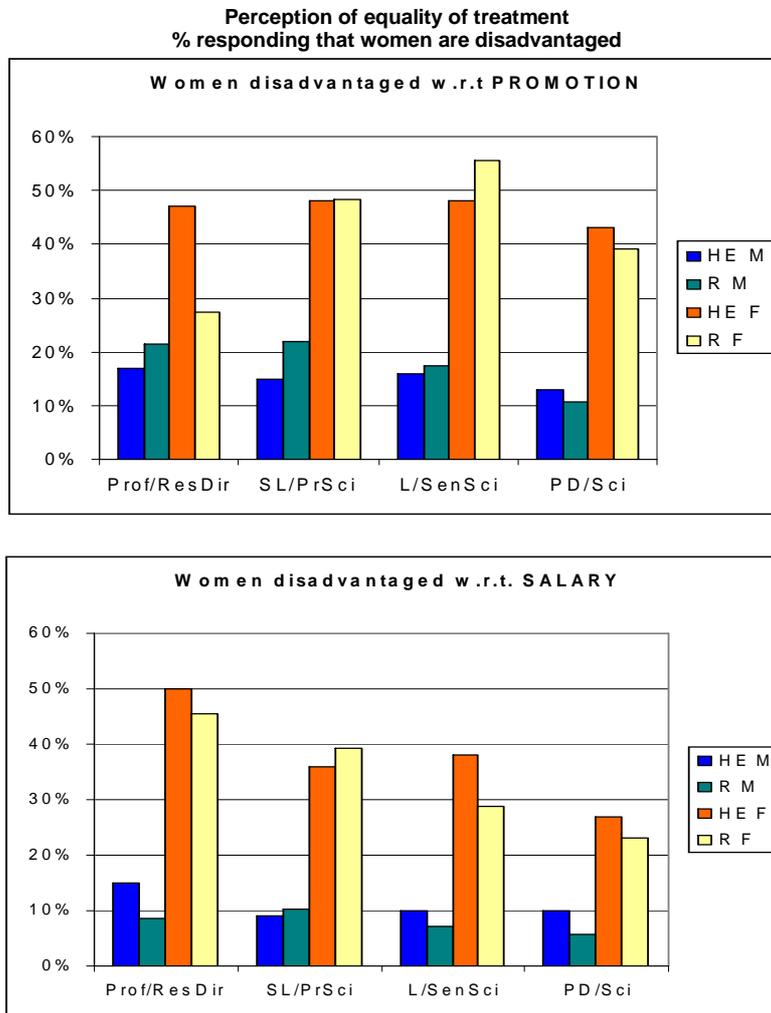
	ResDir	PrSci	SenSci	Sci
Male	54%	44%	28%	10%
Female	36%	42%	25%	5%

In academia, women rank mentoring and personal development significantly more highly in supporting their progression, than do men, whereas the ranking by both sexes in research organisations is almost identical.

Responses to “What will help you progress to your ‘ideal level’?”



Nearly 50% of women in universities feel that they are disadvantaged in terms of salary and promotion, whereas only around 15% of male staff recognise this as a problem for their female colleagues.



Despite the apparent diversity of the academic environment, there is still a need for difference to be effectively managed and supported. Academic research and initiatives such as Athena have been effective in highlighting the benefits of diversity and the management challenges. Industry can see the competitive and financial advantages and is responding. Despite showing the way, academia is being left behind – we must now embed in our universities the best practice that we preach.

Where now and what next?

Athena with support from the UK Resource Centre for Women in SET, the Science Council and from leading SET professional societies will be running its ASSET survey across the SET employment sector in September- October 2006 and will publish its findings in 2007.

FACTORS AFFECTING WOMEN IN UNIVERSITY SCIENCE DEPARTMENTS

Professor Peter Main Director Education and Science Institute of Physics

The lack of gender balance in the physical sciences and engineering is well documented. Only around 20% of A level entrants are female. The small reduction in the ratio at degree entry (both undergraduate and postgraduate) is followed by a more substantial decline in moving into academic posts and progressing through to professor.

The Institute of Physics site visit scheme

Between 2003 and 2005 the Institute of Physics (IOP) offered its women in physics site visit scheme to university physics departments in the UK and Ireland. The basis for the IOP scheme was one operated by the American Physical Society to look at gender friendliness in physics departments. The IOP was asked by the Standing Conference of Physics Professors to do something similar in the UK and Ireland.

The visits were intended to be friendly, advisory and supportive. They were specifically not designed as formal audits, or as an 'accreditation' scheme. The visits to ~40% of physics departments were by invitation only. A confidential written report was sent to the head of departments within two weeks of the visit. The reports highlighted the good practice seen and where criticisms were made, suggestions for improvement and for action were included. Feedback from departments suggested that the majority found the visits helpful. In most cases the reports were circulated to all staff and discussed at subsequent meetings. In some cases however the head of department felt that the team had either been misled or had misinterpreted the situation and the report was not widely circulated.

The report on the scheme 'Women in University Physics Departments' published subsequently, in February 2006, and available on www.iop.org distils the experiences of the visitors, current issues and describes good practice seen on the visits.

The site visits

The panel met Heads of Departments and their departmental managers, admissions tutor, director of teaching, HR representative, and then had meetings with female academic staff (where there were no women physicists at all, the panel met with staff from cognate subjects), male academic staff and with female RAs and PGs and male RAs and PGs. The meetings were followed by lunch with female undergraduates, a laboratory tour and an informal feedback from the panel chair to the HOD.

The data provided by departments

The paperwork, sent in advance by the department to be visited, included admissions statistics, gender disaggregated student numbers, pass rates, staff handbook, names of seminar speakers. The panel of 5/6 members (included 1 man) plus a panel secretary made a one day visit.

Departments often had difficulty producing gender specific data and were surprised by what they saw for example on PhD completion rates, the ratio of female speakers in seminars and undergraduate intakes vs applications. The conclusion was that the majority of departments were not monitoring statistics.

There was a wide variation between HEIs in ratio of female students. Few departments were disaggregating or monitoring data by gender, either staff or student and consequently made incorrect assumptions as to the reasons for the shortage of women. The ratio of women was higher in astronomy, mathematical physics and medical physics than in physics overall and was higher in universities where a higher proportion of the students live at home. In some departments the intake ratio was much lower than the application ratio; probably not due to bias, but female applicants turning down offers and there was a tendency for women post grads to 'cluster' in certain research groups.

Post-doctoral research staff

These were the least supported group. Often they had no induction and no training in teaching. There was wide variation in the way they were chosen and in the way they were appraised. A significant concern was that even successful female RAs did not want an academic career, the reasons were many - the academic career was not seen to be consistent with starting a family, the long hours culture, the average age of academic appointment was ~ 35, the effect of multiple short term contracts, and the absence of a well-defined career structure, of good careers advice and role models.

Bias?

There was no evidence of explicit bias on appointments, however, staff were frequently allowed to air views in secret to the HoD on candidates for appointments, and there were no explicit policies on how to deal with applicant's career breaks. Again at promotion there was no clear policy on career break policies and one of the most common problems found was that of identifying candidates for promotion.

Unconscious bias was seen as a problem in relation to the career guidance and encouragement given to men and women on what is required to get a permanent job and to supervisors targeting students they liked to become postgraduates. Women speakers were under-represented in the programme of colloquia and seminars. This was not the result of active discrimination; the organisers had just not recognised the anomaly.

Career breaks

Generally policies were poor for those taking career breaks, few institutions offered guaranteed reduced work loads for those returning from career breaks. More commonly, some reduction of workload was allowed, but on an informal basis, depending on the head of department. Such arrangements caused some resentment among other staff and corresponding feelings of guilt by the women involved. Childcare facilities were usually thought to be inadequate and, where they were good, did not have enough places. The best matched their hours to those of the university.

However, several departments reported the resignation of women staff. In no case had there been a convincing exit interview and in two cases there was evidence that suggested the individual left because she was not able to reconcile academic duties with child care needs. In the panels' view academia had lost several able women due to their departments' inability to be flexible.

The difference women make in a department

Many of the departments visited had no (or only one) women academics. Departments without women suffered in many ways, for example, the absence of female role models had an adverse impact on student recruitment. Men were usually aware of this but were reluctant to take action.

However, women were often disinclined to get involved because they found the prevailing attitudes so unpleasant. The existence of strong, informal social networks for women was important to a welcoming environment. In some places it was found that men had unconsciously created an uncomfortable atmosphere by being so friendly among themselves.

Departmental management

There was a surprisingly broad variation in the management structures of the departments which resulted in varying degrees of staff participation. The most common complaint was the lack of transparency in the allocation of teaching and administrative duties. The importance of formal, recognised and transparent procedure was not appreciated. For example the roles, membership, and criteria for membership of committees and guidelines on the eligibility and applications procedures for sabbatical leave were not published.

Hope for the future?

Things were clearly improving, not least the number of women at all levels was slowly but inexorably increasing.

The 'best' departments visited had some characteristics in common, for example: a sympathetic head of department (they were all male), the importance of men's participation in family-friendly policies. Where they did not, women felt they were perceived as 'letting the side down' by, for example, taking maternity leave or fitting their hours around the nursery. A high proportion of young staff made a difference, young fathers in particular appreciate the problems and the younger men were generally more sensitive to gender issues. Similarly groups who were multi-cultural and or multi-national were more welcoming for women.

In terms of the difference that the visits have made, their lasting legacy may simply be that departments discussed gender issues openly and frankly, perhaps for the first time

Where now and what next?

The report 'Women in University Physics departments a Site Visit Scheme 2003-2005' is now available from the IOP and is on their website www.iop.org. The IOP is now working with other SET professional organisations on the introduction of a similar site visit scheme in industry. The IOP is also working with Athena and the Royal Society of Chemistry on the production of good practice guidance and the development of performance benchmarks based on this, and other work by all three organisations. The results will be published in 2006 and 2007.

GOOD PRACTICE IN SCIENCE

Professor Lesley Yellowlees Royal Society of Chemistry and Head of Chemistry Department University of Edinburgh

In 2002 women represented 42% of chemistry graduate and 39% of chemists receiving PhDs. This compares with 33% of graduates and 22% of PhDs in 1988. However, within SET, chemistry has one of the steepest declines in the proportion of women in moving from undergraduate (~43%) to professorial level (~4%).

Early work by the Royal Society of Chemistry

The RSC's *postgraduate survey in 1999* showed that women postgraduates were more likely to seek careers advice from careers services, and earlier than men. Equal proportions of men and women said they had received careers advice at the end of three years but that men were more likely to have spoken to their supervisors as their sole advisor. And, a significantly higher proportion of men (~80%) than women (~70%) intended to stay in research in industry or academia after completion

The RSC report *Factors affecting career choices of graduate chemists* which was published in 1999, showed that both men and women had concerns about long hours, low pay and career structure, however it was only women who were concerned about poor working conditions, the emphasis on results rather than process and isolation and segregation. The working environment in academic chemistry was seen to deter large numbers of women from remaining and the structure of departments and the nature of the subject created barriers to women's promotion.

The RSC report *Recruitment and Retention of Women in Academic Chemistry*, published in 2002, showed that the introduction of good management practice had a identifiable impact on the willingness of women to apply to and remain within departments and that the personality, and the personal circumstances of the head of department were significant in determining good management practice. It noted the important role of the institution in ensuring that selection procedures for department heads prevented departments selecting leaders in their own image and that the 'best' departments did not target measures specifically at women.

The strategic messages identified by the RSC

From this work it was clear to the RSC that universities and departments needed to plan to sustain long-term culture change and to take short-term initiatives to improve the immediate position. Both sets of measures had to take account of needs over the working week and over the career trajectory. Action to promote change, if it was to be successful should largely be gender-neutral and should create a better professional and employment environment for men and women.

It also showed the RSC that the problem of increasing the number of women in chemistry and in senior positions was not intractable. However, good practice was patchy and needed to be spread to become the prevailing ethos both in UK chemistry departments and in science departments in general. Good practice was embedded in department cultures, histories and personalities and it would take time to become universal.

Recent work by the RSC and the Athena Project

The rationale for the work undertaken jointly by the Royal Society of Chemistry (RSC) and the Athena Project in 2004 was that both men and women benefit from good practice; however, women in particular were adversely affected by bad practice. The intention was to provide a tool to allow departments to assess themselves for good practice and examples of good practice.

The report, published in 2004, used the chemistry department of the University of Utopia' with its 'open doors and open minds', its 'good practice and good science' making for 'sustainable careers and sustainable departments' to showcase the good practice that was found in many UK chemistry departments.

The University of Utopia

The University of Utopia campus is in a pleasant part of the city, well-served by public transport, with open views and plenty of trees. The campus is a few minutes car ride from some of the best local authority primary and secondary schools and has its own well-regarded day nursery.

The chemistry department occupies a much-adapted building with a welcoming entrance hall. Staff pigeonholes are located outside the recently refurbished common room whose comfortable chairs and free tea and coffee assure good use. The notice board in the entrance hall is kept up to date with photographs of all staff, their office numbers and emails and a note of any significant period when they are out of the department, including the days not worked by part-timers and job-shares.

Photographs in departmental publications reinforce and recognise the success of women at all levels from the mature second year woman student featured in the undergraduate prospectus, through the photograph of the mixed department cricket team on the corridor wall. The department's annual report gives pride of place to the woman professor recently awarded an FRS.

Management changes

Change at the University of Utopia took time. A review in the late 80's recommended the merger of inorganic, organic, physical and theoretical chemistry sections but no action was taken until the university forced the department to make management changes ten years later. Previous departmental heads had the job for life, but now the headship rotates every three years.

The rotation of senior management posts now means that there are at least two academics with experience from whom a new head of department can be appointed. Bearing in mind the coming pattern of retirements younger members of staff are being given administration experience. The department now has an open review and reallocation of duties at the beginning of each academic year.

The results of the last RAE were an unpleasant shock to the department and university alike, but this has proved to be the catalyst for action, bringing together the department's young academics in a campaign for team success. The lower than expected RAE score focused everyone's attention on problems and constraints and what could be done to turn things around.

Transparency in promotion

Issues around promotions within the department had been difficult in the past. Recently the head of department tackled this by producing detailed information on recent promotions and the criteria these candidates met, including grant applications and other successes. This information is now available on the department website along side the university promotion criteria and is featured in the annual open meeting for staff which the head of department holds before the start of each promotion round.

Supporting staff

The department is big enough for good science but not so big that people don't know each other. It has not become sectionalised, and people have time for each other. The younger academics are given a lot of support, but feel they are fulfilling the role of an independent academic. They are encouraged to make decisions and are allowed to make small mistakes. The department gives new lecturers a postgraduate studentship and a start-up grant of £20K over three years.

The recent job-share in one of the administration posts took time to settle down but the department can now see the benefits of two people with different skill sets. Rather than burden the small number of women academics on the staff, the department sent one of their senior administrative staff on a counselling course so that she can support the department's welfare tutor.

Recently one female academic has chosen to go part-time, but the financial saving has been left with her research group to support any difficulties experienced to allow her to return to full time job in the future. The Head of Department works from home when he needs to take his share of child care duties. The age range of the department and their offspring have prompted a thriving cottage industry in 'baby-sitting'.

Utopia or reality?

The University of Utopia may not exist exactly as the report describes, but it does represent some of the progressive good practice implemented by a number of UK chemistry departments. The RSC and the Athena Project hope that their report will help to spread this good practice to other universities. The full report, available via the RSC (www.rsc.org.uk) and Athena websites includes examples of good practice, and a departmental good practice checklist, and proposes three performance indicators for academic departments:

An appointments process that encourages women and men to apply for academic posts at all levels

Department career progression arrangements that encourage women and men to remain in academic chemistry

A departmental organisation and culture that is open, inclusive, transparent and supportive of its staff

What now, where next?

RSC is holding dissemination events in chemistry departments around the UK. Athena and RSC will re-survey departments in 2007 to monitor progress. Hopefully by then a number of chemistry departments will have silver and gold Athena Swan recognition awards

In March 2006 the chemistry department at Edinburgh University received an Athena SWAN recognition award and Edinburgh hopes that a further three schools will apply in 2006 and that the remaining three schools will apply in 2007. Further information on the Athena SWAN Charter and recognition scheme is available on www.athenaswan.org.uk.

The RSC is now working with Athena and the Institute of Physics on good practice guides and performance benchmarks based on this and other work by all three organisations for publication in 2006 and 2007.

DEVELOPING A UK ACTION AGENDA - THE KEY ISSUES

**Plenary Session chaired by Professor Jocelyn Bell Burnell
University of Oxford Astrophysics and Deputy Chair Athena Committee**

Three distinct topics were presented as a backdrop to the plenary discussion.

The Inter Academy Council Report on women in science

The Council is the world wide umbrella organisation for the national academies of science. The report, to be published in spring 2006, is only the third the Council has published (the first two were on Food for Africa and Capacity Building). The report's recommendation will focus on the:

- encouragement, support and celebration of women in science and technology

- encouragement of academies to lead on commitment, good management practices and raising awareness, and also to be aware of research on the factors affecting women's participation in science

- encouragement of academies to use their influence and advice to Governments, to Research and HE institutions to advance the position of women in science.

- empowerment and skill enhancement of women at the grass roots, especially in developing countries

The US National Science Foundation Advance programme

The programme promotes institutional transformation in universities to increase the participation and advancement of women in academic SET. It grants \$150K max. to each university per annum for five years; twenty US universities have been funded in the past three years.

One recipient, the University of Michigan has awarded \$100K to individual departments to support significant transformation in the environment for women faculty. As the introduction to staff development, it uses a small troupe of actors who role play the challenges faced by tenure and hiring committees. The university's recruitment handbook includes FAQs on the retention of female academics and it provides handouts on unconscious bias and prejudice to course members. It provides support for women in SET through networks and careers advice, and discusses with HODs the gender career progression data for their own areas.

Over three years the tenure track hirings of women in SET have risen from 13% to 39%. Science Foundation Ireland has recently established a similar programme to encourage institutional change in universities.

Unconscious Bias

There is growing evidence that when we (men and women) recruit, evaluate, or promote fellow academics we may well display an unconscious bias. The following papers provide the evidence for this. The University of Michigan puts copies of these papers in the packs given to all their Faculty members who attend courses on fair selection, equal opportunities, etc. I am grateful to the University for this compilation.

Wenneras & Wold *Nature* 387, 341, 1997. A study of applications to the Swedish Medical Research Council for post-doctoral fellowships. Female applicants tended to be rated lower than men and so received fewer awards. The paper demonstrates that women had to be 2.5 times more productive than men on several objective criteria in order to be rated as competent as the male candidates.

Goldin & Rouse *American Economic Review*, 90, 715, 2000. A study of the consequences of blind auditions for membership of 8 symphony orchestras. The introduction of blind

auditions (where the candidates perform behind a screen and so were heard but not seen) significantly increased the probability that women were hired or promoted.

Valian *Why So Slow? The Advancement of Women*. MIT Press, 1998. Gender schemas – our implicit hypotheses about sex differences – alter our ability to evaluate women and men without bias. The schema of a woman is incompatible with the schema of a successful professional. Hence, Valian argues, professional women are underrated and tend to fall behind their male counterparts.

Steinpreis et al *Sex Roles*, 41, 7/8, 509, '99. The authors took the same CV and, sometimes with a man's name at the top and sometimes with a woman's, submitted it to colleagues asking whether they would hire this person. Even though the original CV was a woman's, both women and men were more likely to hire the "male" candidate and rated "his" qualification more highly.

Bauer & Baltes *Sex Roles*, 9/10, 465, 2002. This paper studied the effects of gender stereotyping on evaluation of performance. College students tended to rate the teaching of female lecturers more negatively than men's. However this effect was reduced when the students' attention was directed towards specific evidence of a lecturer's performance.

Trix & Psenka, *Discourse & Society* 14(2), 191, 2003. Letters of recommendation (i.e. references) for successful male and female applicants for medical school faculty positions were studied. Letters written for female candidates differed systematically from those of males in terms of length and of the inclusion of language which raised doubts. Letters often spoke of 'her teaching' and 'his research', reinforcing gender schemas.

Heilman et al. *Journal of Applied Psychology* 89(3), 416, 2004. This study was of the reaction to women who succeeded at jobs normally typed as male-gender jobs. Those women who were acknowledged to have been successful at such jobs were less liked and more personally derogated than equally successful men. Being liked or disliked was found to affect the evaluation of their performance and financial reward.

Resources

a) <http://wiseli.engr.wisc.edu/Products/MoreWomen.htm>. Ten pages of references and web URLs covering benefits of diversity, unconscious bias, tips and suggestions, pipeline issues, recruiting and hiring, retention and advancement and work-life balance, all largely with a US slant.

b) The Athena web site www.athenaproject.org.uk includes information on current programmes, reports on findings from Athena's ASSET surveys and Athena good practice reports and case studies

THE KEY ISSUES

This short presentation was followed by a wide ranging discussion during which participants identified the key issues that had emerged during the conference and suggested how best some of them might be addressed.

Addressing the issues - the best way forward

The plenary session identified a number of issues which can best be furthered by bodies such as the HE and research funding bodies and foundations, the professional societies and others responsible for accreditation, recognition and quality assurance, working together on:

- 1 ways of linking funding to targets
- 2 whole-university initiatives (similar to the NSF Advance Programme and the new Science Foundation Ireland initiative)

3 making good practice a requirement

4 gender site visits and good practice checklists (similar to those already developed by the Institute of Physics (IOP) and in the joint work by Athena and the Royal Society of Chemistry (RSC)

5 fair selection for fellowships/membership of professional societies

6 the recognition of the need for positive action

In addition it was recognised that a strategic plan was important and lacking.

CONCLUSIONS

Commentary and Reflection

Caroline Fox Programme Manager Athena Project

Managing diversity

Managing diversity is not easy, but when done well, brings benefits for all, the organisation, its staff, its customers and stakeholders. UK higher education may be falling behind the best of industry in its understanding of the need for, and the management of 'diversity for success' – a lead it cannot afford to lose. Only by promoting equality can universities be sure that they are promoting excellence.

The issues for women are but part of the problem for UK science. However, what can be learnt from the work on gender that is starting to make a difference, may go some way to improving the understanding of the wider problems of ethnicity and disability.

And action which is successful in promoting change will largely be gender-neutral and will create a better professional and employment environment for men and women.

HE - the starting point

The low percentage representation of women at the top of science is unacceptable. Maximising the opportunities for women to contribute to UK science (and to ensure that the benefits to them individually are equal to those of their male colleagues) is of fundamental importance, both to the UK economy and to UK science. Demographic change emphasises the importance of this even more.

What the research reveals:

There is a gulf between women and men in their perceptions of the issues

Good women can become invisible

There is still a gender pay gap

Women remain around 10% of the professoriate in most countries, even though the majority of students now tend to be female

In every country, in every discipline, at every rank in the academic hierarchy, men are chosen disproportionate to their representation in the recruitment pool

What ASSET findings show

women's experience of science employment is consistently less positive than that of their male colleagues

men receive more encouragement to progress their careers and are more visible at key career stages

Nearly 50% of the women in HE feel they are disadvantaged in terms of salary and promotion, whereas only around 15% of men recognise this as a problem for their female colleagues

women in HE rank mentoring and personal development significantly more highly in supporting their progression, than do men (the ranking by men and women in research organisations is almost identical).

HE - how far to go and how to get there?

Bad practice still exists in many SET departments. Good practice is patchy and needs to be spread to become the prevailing ethos in SET departments. Good practice needs to be embedded in department cultures, histories and personalities: it will take time to become universal. A major organisational and cultural change in science and in HE is still required.

The problem of increasing the number of women in SET and in senior positions is not intractable, but requires SET professional societies and SET departments to:

plan to sustain long-term culture change

take short-term initiatives to improve the immediate position

Both sets of measures should take account of needs:

over the working week

over the career trajectory

Work by the Institute of Physics, the Royal Society of Chemistry and the Athena Project in the identification, development, encouragement and dissemination of good practice can be adopted in other SET academic departments.

The IOP and RSC site visits and the RSC/Athena departmental checklists are complementary tools which could be adopted by other SET professional societies working with their university departments.

Work by IOP RSC and Athena has gone a long way towards defining the characteristics of a 'good' department. The work now planned by them will go further to enable departments and their universities to measure and benchmark their good practice.

The way forward - Athena's contribution

Subsequent to the conference the Athena Committee agreed that by the end of 2007, Athena, working with its partners would publish:

a framework women and science strategic plan for HE and research institutions

national targets, performance measures and benchmarks

guidelines on statistics to be monitored and reported by UK universities

further good practice guidance, checklists, examples, and case studies

APPENDIX

THE ATHENA PROJECT

The aims of the Athena Project are: *'The advancement and promotion of the careers of women in science, engineering and technology in higher education (HE) and research and to achieve a significant increase in the number of women recruited to top posts'*. The beliefs underpinning the Athena Project and its work are that:

The advancement of science, engineering and technology (SET) is fundamental to quality of life across the globe

It is vitally important that women are adequately represented in what has traditionally been, and is still, a male-dominated area

That science cannot reach its full potential unless it can benefit from the talents of the whole population and until women and men can benefit equally from the opportunities it affords.

The Athena Project is based at and supported by The Royal Society. The UK Resource Centre for Women in SET provides Athena's core funding; other supporters include BP, Equality Challenge Unit, Institute of Physics, Pfizer, Royal Academy of Engineering, Royal Society of Chemistry, Science Council and The Wellcome Trust.

The impetus for setting up the Athena Project in 1999 was the unacceptably small number of women making it to the top of science. At Athena's launch, Lord Sainsbury, Minister for Science, expressed no surprise that in physical sciences and engineering, women represented only 97 out of 3,092 professors, or that in civil engineering, with 18% female graduates, there were no female professors. However, what alarmed him was that in the biosciences less than 10% of the professors were women, despite the fact that women represent around 50% of biology undergraduates.

The focus of Athena's work programme is to encourage, support, develop, identify and disseminate good practice. This good practice is often simple and low cost; some of the changes in themselves are small but build together to make a difference at organisational and departmental levels. Athena's work has shown that whereas good practice benefits all, men and women, staff and students alike, and the quality of the science that results, bad practice is incrementally more prejudicial to the career progression of women, to those with care responsibilities, and with non traditional backgrounds and / or career paths.

Athena Phase 1 In the first phase of Athena's work (1999 to 2001) the Project encouraged good practice with small grants to twelve universities and five Local Academic Women's Networks (LAWNs). In year one the focus was to build the Project's repute with 'quick wins' - mentoring, networking, and career development programmes. In year two, grants were given to initiatives that tackled the more difficult area - changing the processes, practices and culture of universities and of science.

Athena Phase 2 In its second phase (2002/03) Athena 'recognised' good practice. Its Royal Society Athena Awards celebrated the achievements of seven universities in the advancement of women in SET. In 2003, Athena celebrated its first four years with the publication of Report 22 a comprehensive guide to good practice.

Athena's final phase The Athena Project is now in its final phase (2004 to 2007). ASSET and the use of its findings underpin this stage. By the end of the project the stakeholders (the main professional scientific societies and, most importantly, the universities and research councils who as employers of the science workforce carry the responsibility for good practice) will have the understanding, the informed commitment and the tools to work towards Athena's final target *when the percentage of women at each career level reflects the percentage at the level below (including the undergraduate intake)*.

THE ATHENA COMMITTEE

Dr Nancy Lane (Chair)
Professor Jocelyn Bell Burnell (Deputy Chair)
Professor Susan Gibson
Erica Halvorsen
Brenda McLaughlin
Dr Gill Samuels

Dr Margaret Adams
Professor Lynne Frostick
Professor Wendy Hall
Professor Dame Julia Higgins (Past Chair)
Professor Teresa Rees
Annette Williams

THE ATHENA TEAM

Caroline Fox

Fiona MacLean

ATHENA PROJECT

The Royal Society
6-9 Carlton House Terrace
London
SW1Y 5AG

athena@royalsoc.ac.uk
www.athenaproject.org.uk
www.athenaswan.org.uk

ATHENA PUBLICATIONS

- Report 1** Bolton Institute – Mentoring Women in SET
- Report 2** University of East Anglia – ResNet2000
- Report 3** Imperial College– Might Mentoring Help?
- Report 4** Nottingham & Loughborough Universities – Skill Acquisition & Mentoring in Early Career Stages
- Report 5** The Open University – Beating Barriers and Constraints in HE Careers
- Report 6** Sheffield Hallam University – Developing a Mentoring Training Programme
- Report 7** The 1999 Development Programme
- Report 8** The Athena Project Good Practice Guide 1999
- Report 9** The University of Edinburgh – Bridging the Gap
- Report 10** Heriot-Watt University – The Development and Retention of Academic Women
- Report 11** The University of Luton - Inclusive Committees
- Report 12** The University of Oxford – Encouraging Applications from Women Scientists
- Report 13** The University of Surrey – Moving Up
- Report 14** Local Academic Women’s Networks (LAWNs)
- Report 15** The 2000 Development Programme
- Report 16** The Athena Project Good Practice Guide 2000
- Report 17** New Research on Women, Science and Higher Education
- Report 18** The University of Cambridge – Women in SET Initiative WiSETI
- Report 19** Imperial College– Challenging Culture The Rector’s Committee on Academic Opportunities
- Report 20** Queen’s University Belfast – Addressing the Gender Imbalance at Queen’s University Belfast
- Report 21** University of East Anglia – ResNet 2000 The Maturing Network - a powerful tool
- Report 22** The Athena Guide to Good Practice 1999 to 2002
- Report 23** London Metropolitan University - SWAN Scientific Women’s Academic Network
- Report 24** Loughborough University – Embedding Gender Equality and Diversity
- Report 25** Oxford Brookes University – European Women in Mathematics WEB based Mentoring Scheme
- Report 26** 2003 Athena Survey of Science Engineering and Technology in Higher Education (ASSET) Report
- Report 27** 2004 UK Research Councils and Wellcome Trust Sanger Institute ASSET Report

OTHER ATHENA PUBLICATIONS

- Occasional Paper 1** Bebbington, D. Women Scientists in Higher Education: A Literature Review
- Occasional Paper 2** Bailyn, L. Gender Equity in Academia: Lessons from the MIT Experience
- Occasional Paper 3** New Research Women, Science and Higher Education Conference proceedings 2001
- Joint Report with the Royal Society of Chemistry** Good Practice in University Chemistry departments 2004
- Occasional Paper 4** UK's ASSETs: The Career Progression of 6,500 plus scientists
- Occasional Paper 5** Maximising UK ASSETs – Developing an Action Agenda Conference Proceedings 2005

ATHENA CASE STUDIES

- No 1** Bolton University, Mentoring a regional scheme for women academics in SET
- No 2** Edinburgh University, Career progression a range of complimentary initiatives from 1996 onwards
- No 3** Update on Athena's Local Academic Women's Networks (LAWNs) 2004
- No 4** Leeds University, Career progression- a review of the progression and promotion of women in the biosciences
- No 5** Lincoln University Career progression of women in HE management initiative
- No 6** Oxford University Career progression the university's career development fellowship scheme
- No 7** SET good practice in higher education results from a good practice checklist completed by 28 universities
- No 8** Southampton University – Bronze SWAN March 2006
- No 9** Oxford University – Bronze SWAN March 2006
- No 10** Plymouth University – Bronze SWAN March 2006
- No 11** Bristol University – Bronze SWAN March 2006
- No 12** Sunderland University – Bronze SWAN March 2006
- No 13** Imperial College London - Silver SWAN March 2006
- No 14** Edinburgh University School of Chemistry- Silver SWAN March 2006
- No 15** Edinburgh University – Bronze SWAN March 2006
- No 16** Cambridge University – Bronze SWAN March 2006
- No 17** Nottingham University – Bronze SWAN March 2006
- No 18** University College London – Bronze SWAN March 2006