



Science and Technology Committee

Oral evidence: [Women in STEM careers](#), HC 701

Monday 18 November 2013

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Written evidence from witnesses:

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Members present: Andrew Miller (Chair); Stephen Metcalfe; David Tredinnick

Questions 170-202

Witness: **Rt Hon David Willetts MP**, Minister of State for Universities and Science, Department for Business, Innovation and Skills, gave evidence.

Q170 Chair: Minister, welcome to this afternoon's session. We are a little thin on the ground for all sorts of reasons, with people doing multiple tasks around the building.

We have had a number of really interesting sessions in this inquiry. While we are not seeking to reinvent the wheel, we are trying to find out why things that all of us thought ought to happen have not happened over many years. Why do you think it has taken so long to improve gender diversity in science? What do you see as the Government's role in improving gender diversity in STEM? How would you prefer things to progress—with a stick or a carrot—in achieving goals that we all know are not just ones we ought to be achieving because it is the right thing to do, but are economically the sensible thing to do?

Mr Willetts: This is a very important subject and, as always, we are very keen to contribute to the Committee's inquiry. As to where the problem lies, it is at several stages of the process. For me, it starts back at school. I have always thought that the most shocking and dramatic statistic there is that, looking at girls and boys who get A* at GCSE, only 25% of girls who get A* in GCSE physics stay on to do it for A-level. That is one of the lowest proportions. In biological sciences girls are, if anything, slightly ahead of boys; in maths it is better, but the conversion rate into A-level physics is very low. Although not all engineering courses require an A-level in physics, in terms of going on to do many STEM subjects, physics matters.

When we look at universities, the aggregate figures for female against male students are okay, but when you break them down and disaggregate them there is a clear concentration of women towards medicine and biological sciences, and men towards engineering and some of the physical sciences. Later on, the life of a post-doctoral researcher is pretty tough. I nearly used Hobbes—"poor, nasty, brutish, and short"—but it is tough. They have

to move around on short-term contracts, and, without getting into every kind of gender stereotype, that may be off-putting for some women. We see it at several stages.

On your question of carrot v. stick, we should use everything at our disposal. I believe in carrots in terms of financial incentives. I am very pleased that, for example, with the new teaching capital we were able to attach to it some incentives on gender diversity that I think were novel and I hope will have an effect. There are also prestige or assessment effects. There is a host of different initiatives—Athena SWAN, Juno, Vitae and Daphne Jackson—which universities and employers want to participate in, and they will, I hope, increasingly feel disapproval if they do not.

Q171 Chair: What do you see as the Government's role?

Mr Willetts: Working with the universities, to communicate the value of those crucial facilitating A-levels—there is good news there, as more young women, and people of both sexes, are doing those—and trying to ensure, through things like the Vitae concordat, that there is proper careers advice, and career progression for people doing post-doctoral work. The research councils have followed the excellent lead of the Department of Health and are now asking for evidence that you are doing something like Athena SWAN, as part of a research council grant. As I said, there was my attempt, as part of the teaching capital competition that I announced last month, to link that to gender diversity. Wherever we can link it to an allocation of funding we will, but we have to stay within the bounds of propriety, and, as you know, science funding is allocated ultimately on the basis of excellence. We can push this so far, but there comes a point when they will say, “We have to go for the best particle physicist who comes forward with a proposition, and we are terribly sorry that the team is largely male.” But whenever possible we are using incentives and rewards.

Q172 Stephen Metcalfe: Who is responsible for gathering the data about gender diversity across the whole landscape?

Mr Willetts: Quite a lot of useful data are collected by the Higher Education Statistics Agency—HESA—which I hope we have shared with the Committee, or the Committee has been able to access. I am very happy to send a note if that would help. We have asked the Royal Society and the Royal Academy of Engineering to do more work on this. My understanding is that that is going to be in a series of exercises, and early in the new year, in an exercise led by the Royal Society, we should get a much more synoptic view than we have had before of what is happening and how the different data sets fit together.

Q173 Stephen Metcalfe: Some concern is expressed that the data collected by the HESA are not totally compatible and not in a format that can be easily shared across the UK.

Mr Willetts: I was not aware of that. HESA data should be easily usable. If they are not, I will certainly take up with HESA that they should be more user-friendly and machine-readable.

Q174 Stephen Metcalfe: Are any data collected about what happens to women when they leave STEM, so that we know where they go and what the reasons might be?

Mr Willetts: I think there have been some attitudinal surveys. We have to be a bit careful about what constitutes “leaving STEM”, and that is one of the reasons why the data can be quite hard to pin down. In the past, in my office I have had private secretaries with science degrees. Until recently, I had one who I think had a doctorate and she then came to work for me, the Minister for Science. Is that a shocking leakage by someone who should have given her career to academic research, or is it extremely handy that the Minister for Science has a private secretary with a science doctorate? What constitutes leaving STEM is a moot point.

Q175 Stephen Metcalfe: I accept that, but there is only one Minister for Science. I take it they have not all gone to your office.

Mr Willetts: I was thinking also, if I may say so, of the person after whom this room is named. Would it have been better for the nation if she had stayed as a chemist working for Mr Whippy on their ice cream, or was it better that she became Prime Minister? Was that a leakage from STEM, or did it bring a kind of empiricism from science? We have to be a bit careful.

Chair: Do not invite me to respond to that.

Mr Willetts: I believe there are two members of this Committee who have chemistry degrees. I am sorry to harp on about this, but I get quite a bit of pressure from people saying there should be more scientists in the House of Commons. Is that a leakage from STEM, or is it a good thing?

Q176 Stephen Metcalfe: I take that point, but the higher up you get across the science landscape, the less there are women who achieve senior positions. We must be losing proportionally more women than men, and we need to find out what is behind that.

Mr Willetts: I accept that, and that is why I am a strong supporter of the Daphne Jackson Trust. There are probably still some female scientists who take time out from their careers when their kids are young and find that that has penalised their career advance in the discipline. That was one of the reasons I was very pleased we were able to announce two or three years ago that, for the first time in the REF, there would be proper allowance for maternity leave in the number of academic articles you had to submit for assessment. In this REF, for the first time, if you have been out for any maternity experience, it enables you to reduce by one the number of articles that have to be submitted. As you can imagine, in the old days, that was a barrier to entry; there was no recognition of the pressures that come from maternity.

Q177 David Tredinnick: Having served in Parliament with the person I used to call my right honourable Friend the Member for Finchley, alias Mrs Thatcher, I suggest to you that as a chemist she enormously enhanced the role of women in science by her very presence as Prime Minister.

Mr Willetts: Yes. One person's leakage from STEM may be another person's irrigation of the wider community.

Q178 David Tredinnick: I want to ask you some questions about the UK Resource Centre for Women in Science. It is bizarre, almost extraordinary, that funding was cut in the 2010 spending review. Why did you do it, and on what evidence was it based?

Mr Willetts: It was a tough decision. We had to take a variety of tough decisions to save public money in the summer of 2010. There was a view that some of the work could be done by the Royal Society or the Royal Academy of Engineering and more mainstreamed, which is one of the reasons we have the exercise I was referring to earlier. I was able, at their request, to find some modest further transitional funding. Therefore, I am pleased to report, though I am not completely familiar with this, that they carry on as a social enterprise, because the combination of our transitional funding and other funding they were able to secure means that they still exist as WISE, I believe.

Q179 David Tredinnick: I hear what you are saying, but the UK Resource Centre for Women in Science received about £2.5 million in Government funding annually. According to the brief I have, the Royal Society and the Royal Academy of Engineering combined will receive about £500,000 per year in this spending period. You do not have to be a great mathematician or scientist to work out that there is a substantial reduction.

Mr Willetts: I accept that. I would not disguise that it was a tough public expenditure decision to take. With the financial pressures that we faced in the summer of 2010 across Whitehall, a large number of tough decisions had to be taken.

Q180 David Tredinnick: Given the objective of trying to encourage women in science, do you now regret that decision? Do you think the balance was wrong then?

Mr Willetts: No, I think we had to take that decision. When I look at what is happening with the spread of the Vitae concordat, the importance of Athena SWAN and the work of the Royal Society and the Royal Academy of Engineering, there is still a lot of work under way, so it is not as if we gave up on the cause; we have been very energetic on the cause.

Q181 David Tredinnick: Sharing the same party as you, I am slightly embarrassed at the thought that this Government might be spending less on diversity in STEM careers than the last Government.

Mr Willetts: We are trying to pursue it. If you look at things like our attempt to link the new teaching capital programme I was able to announce to a commitment to Athena SWAN, or something like it, I think we are doing our best in straitened circumstances.

Q182 David Tredinnick: I was at the WISE awards at the Science Museum on Thursday evening. One of the points that came up there was that, while we are trying to increase the number of women in science from 13% to 30% as an objective, the actual number of women involved in engineering is much lower. Have you had a chance to address that issue? Before I

was on this Committee, it looked at some aspects of that. Is that on your front burner at the moment or, to mix my metaphors, is it somewhere out in the long grass?

Mr Willetts: It is a key theme of the report on engineering by John Perkins that we published in the last couple of weeks. When we look at our shortage of engineers, it is clear that the obvious pool of talent we are not using is women. Across the EU, Britain, sadly, has one of the lowest percentages of qualified engineers who are women, so it is a big issue. We have been doing work on it, and that is where the point about the GCSE physics conversion rate matters. Although it is not the case with all courses, quite a few engineering courses do look for people to have A-level physics. For many girls aged 16 who perhaps are focused on medicine and biological sciences, if they do not get a place in medicine, they are taking a decision that will make it harder for them to convert to an engineering course. We are looking at it, and I am discussing it with my colleagues in the DFE.

Q183 Chair: The Perkins report was an impressive piece of work, and we reflected on it the other day. The recommendations in it require some investment on the part of the Government, don't they? Are you going to get that money from the Treasury?

Mr Willetts: We will see how it plays out. We have to maintain fiscal discipline, and there are always masses of priorities, but certainly there is widespread recognition across Government, not just in BIS, that we need to do better on recruitment in disciplines such as engineering.

Q184 Chair: Earlier, you were talking about the REF process. How do you think the gender impact of the REF should be monitored?

Mr Willetts: I am not sure how we will do that. It is one of the issues that the Royal Society and the Royal Academy of Engineering are considering.

Q185 Chair: There are real issues. Earlier you mentioned maternity leave and, yes, there have been some positive steps in that respect. Clearly, it would be illegal, for example, for somebody to select for a redundancy programme a woman because she was of child-bearing age, but historically the process has not, it seems to me, done women any favours. There tend to be undercurrents that disadvantage women in programmes like that. There are also interesting issues around non-research activities. A year or so ago, we did a piece of work on capacity building in the science programme in DFID. One of the interesting observations we made—it did not apply just to women—reflected the fact that people were not getting the credit they deserved because they were not publishing, but at the same time, they were saving lives in distant places. To return to women specifically, how do you think non-research activities in academia should be tangibly rewarded?

Mr Willetts: There are two stages to that. One is the REF itself, which is for the appraisal of research. This time, I hope that the impact measure will help ensure that some of the outreach and communication activity is properly valued for the first time; and, secondly, even if you are not that research-active and not up to the volume of output that the REF looks at, the Vitae researcher development framework is supposed to provide a framework

for career development, aimed not just at women—there is a host of diversity. Part of it is just fair dealing for everyone: proper access to career advice and proper guidance on what you might aim to do next, not simply a hire-and-fire culture within a university or research institute. I think there are two different levels. We are doing a lot. Our HEFCE grant letter covers all the different grant funding going to HEFCE, and I can tell the Committee that we will put into the next grant letter very clear guidance on understanding diversity challenges for HEFCE in its approach to the funding of universities.

Q186 Chair: But it has been recognised that some of the current methods of assessment of academic careers do not reward non-research activities. Therefore, are you going to be saying to the funding bodies that they need to look very closely at their process to make sure that proper account is taken of the impact of their decision making?

Mr Willetts: The research council grant-giving does try to do that, but I undertake that when your report is published I will happily see if there is any more we should do in the light of advice from this Committee.

Q187 Stephen Metcalfe: The Chief Medical Officer, Dame Sally Davies, has made it a requirement of certain National Institute of Health research projects that those applying for funding should have achieved an Athena SWAN silver award. Do you think that could work for all funders, including research councils?

Mr Willetts: I think it was a very good initiative. I know that the research councils are looking to universities to have Athena SWAN awards. This is a challenge for vice-chancellors. There is ultimately the constraint that they have excellence as a criterion as well, but the cultural change that is happening with Athena SWAN, led by the Department of Health, is very useful and valuable, and I support it.

Q188 Stephen Metcalfe: That is not going to work across the whole funding landscape. Is there something more we can be doing that would at least link funding with some kind of gender diversity?

Mr Willetts: I am open to correction, but I believe that for the first time we are now linking this new competitive funding for capital with gender diversity. I do not think the sector has quite appreciated the radicalism of this. Because it is quite a significant pot of money—£200 million of teaching capital—I see that as something that will galvanise the sector. We have the combined impact of Athena SWAN, Juno, Vitae, careers planning and Daphne Jackson. If you put all of that together, quite strong messages are reaching the sector, but, as I said earlier in response to a question from the Chairman, if there are other initiatives this Committee thinks we should be taking, when we get the report I will undertake to consider it very seriously. Clearly, everything is not perfect; we have a serious problem, and, if this Committee has workmanlike proposals, we will happily look at them very sympathetically.

Q189 Stephen Metcalfe: Perhaps one of the ways that could be done would be to expand the Athena SWAN award scheme, which I think is funded by the Equality Challenge Unit at the moment. Are there any plans for the Government to fund the Equality Challenge Unit directly to allow that to happen?

Mr Willetts: I cannot say anything about funding at the moment. There is an issue about the amount of work they are getting. It is part of the problem of success; everybody is so desperate to get an Athena SWAN award that they are quite hard-pressed to get through the volume of work. I cannot make any commitment at the moment, but if they need help, I am sure we would want to try to help, if we could.

Q190 David Tredinnick: Are you content with the Children and Families Bill? I am thinking particularly of the issue of parental leave in academic research careers. Have you had a chance to look at that?

Mr Willetts: The basic principle of the Children and Families Bill, which extends way beyond science and research, is a very good one. It improves entitlement to shared parental leave, and many researchers and others will be covered by it. To qualify for shared parental leave, an employee will have to have worked for the same employer for 26 weeks continuously at the 15th week before the baby's due date. Provided they meet that criterion, we believe that entitlement will help people in the research community.

Q191 David Tredinnick: Are there penalties for universities that fail to stick to legislation on flexible working and working hours, and, if there are, are you satisfied with them?

Mr Willetts: They would be open to legal challenge. We pass these laws and there is absolutely an expectation that people comply with them.

Q192 David Tredinnick: Earlier, you touched on the issue of short-term careers and the problems of women having to move around. You used a rather charming description from a great philosopher which you pulled out of a book. I cannot remember what it was, but there were three points.

Mr Willetts: It is Hobbes' "Leviathan". I probably got it wrong. It is something like "nasty, poor, solitary, brutish, and short".

Q193 David Tredinnick: That is a very good try. I am embarrassed that I did not spot it straight off. From what you said earlier, you think that short-term employment hinders women in STEM. We have had evidence to suggest that is the case. As a result of that, do you think we need to do more to get research councils to offer longer-term grants on fellowships?

Mr Willetts: I fully accept it is a problem. I have had meetings with groups of post-doctoral researchers who are eloquent on it. We have to be careful not to fall into the trap of complete stereotyping. Moving from contract to contract is quite tough if you are a man or a woman, a father or a mother, but it is a problem. The Vitae career development requirements are very good, in that they say that the PI—the organisation employing you

on the contract—has an obligation to think about your long-term interests, advise you on what to do next and help you on that, which has been one of the big omissions in the past. We have always got to get a balance between short and long term, but with things like Royal Society fellowships, which we support financially, there are opportunities to get work done on a much longer time scale.

Q194 Chair: Following on from that, do you think universities are providing sufficient careers advice and guidance to researchers?

Mr Willetts: It is getting better because of Vitae, but I still have horror stories, which I am sure you pick up as well, Mr Chairman, where people do not feel they get the help they need, or are encouraged to think they have a long-term position in a research institute or university department and then, with little notice, find that it is all coming to an end, so I accept there is that problem.

Q195 Chair: You talked about the late Margaret Thatcher. I try to do this with political balance, so I talk about Margaret Thatcher and Margaret Beckett as two people with research science backgrounds. When people leave academia or research posts to go into other careers—particularly those who leave universities—do you think they get the kind of support they ought to? You are absolutely right that other disciplines are enriched by having good scientists in them, my own staff among them. We would be much worse off as a Parliament if we did not have high-quality scientists on our staff. Do you think the universities really get that?

Mr Willetts: I hope they do. As I hope I have conveyed, I am a bit wary of the leaky pipeline model, because it implies that the perfect model is a sealed cylinder where you come in as a 16 or 18-year-old doing science GCSEs or A-levels, and emerge at the other end as a professor of physics or chemistry, and anything that diverts you from that is a failure. I want to see people with science qualifications active across many walks of life. We all have an obligation to make sure we do not use the old-fashioned model that sticking with a single academic career is success and everything else is failure.

University careers advice can always be better, but in all the controversy about careers advice at different stages of the process, I hear fewer complaints about universities' careers advice for their students than I hear about almost every other aspect of careers advice. They probably are doing their best, but if the Committee has other evidence, I will certainly consider it.

Q196 Stephen Metcalfe: I think you touched earlier on the new teaching capital fund of £400 million, £200 million of which comes from the Government and £200 million from universities. How can we use that to boost the retention of women in STEM? Are there tangible links we can make?

Mr Willetts: It is still early days, but HEFCE will be running a competition that will include a request for evidence as to what you are doing on diversity and how the capital would help you do diversity. We have to be a bit careful. We cannot just say, "You need to be Athena SWAN silver." I am advised that it cannot be as straightforward as that.

HEFCE is still constructing the competition, but as part of the bids they will be looking for universities to have bright ideas about how this teaching capital, which is going to be very heavily into STEM areas, will be linked to initiatives—for example, to have more female engineering students. That should boost a university's chances of winning teaching capital.

Q197 Stephen Metcalfe: But at the moment we do not know quite how that will be constructed. It is not a tangible award. It needs to be something else, but that has not been worked up.

Mr Willetts: We know we cannot just say it should be Athena SWAN. We want to promote innovation in universities. We do not want to over-specify, but obviously this teaching capital is for high-cost subjects, which are capital-intensive. There is a logic to what we do, so this will be in areas like engineering and physics where the gender diversity challenge is greatest. If you want extra money to re-equip your engineering school, what on earth are you going to do to try to raise the percentage of women among your engineering students? Come up with your ideas, and we will look at them. I think that is a good approach, but it is early stages and HEFCE are still constructing and designing the competition.

Q198 Stephen Metcalfe: When do you think the work will be done on designing the competition?

Mr Willetts: I would have to drop the Committee a note about the exact timing. I think the first competition will be some time in the spring, but it is better if I send you authoritative guidance, if we have it.

Q199 Stephen Metcalfe: Could you include in that when the first awards will be made, so that we can see whether it is in the academic year starting in September 2014 or in 2015?

Mr Willetts: I think the first is the 2014-15 financial year, but I will check and put it in a note.

Q200 Stephen Metcalfe: The Government recently announced £40,000 for the Daphne Jackson Trust to help develop a fellowship in engineering specifically. How many individuals do you think that would help to fund?

Mr Willetts: I am just looking at my note on the Daphne Jackson Trust. I had better send you a note on how many places it will fund. I cannot immediately answer that.

Q201 Chair: Finally, I want to touch on schools a bit more. You mentioned earlier the A-level physics pipeline. Interestingly, I had a conversation on Saturday with two retired teachers from Havant.

Mr Willetts: Not relatives, by any chance.

Chair: No, I can assure you they were not relatives. We were talking about inspiring teachers. As for schools in my constituency, I went to one this morning as part of Parliament Week, and I had a very challenging scientific question from a young child in the reception class. That school has historically engaged with science-related issues. The trouble they have, as do all schools, is finding time, especially in the primary sector, for people to engage in continuing professional development to help them be in touch with what is happening around them in great advances in science. Do you have any discussions with Michael Gove and the education team about how to improve things there? I think we all accept that there is a gap in the system.

Mr Willetts: Yes, I recognise that challenge. In some of these disciplines the world is moving very fast. If you are a 50-year-old physics teacher, quite a lot of physics has happened since you were studying it at university. We have a kind of STEM group linking BIS and DFE Ministers, which is usually attended by a DFE Minister, among others. I will happily put your particular point on the agenda for our next meeting. I do not know the exact amount of support for CPD, especially for teachers in STEM disciplines, but it is a legitimate point to raise.

Can I go back to Stephen Metcalfe? I have just been handed a note. For the Daphne Jackson fellowship scheme, the extra £40,000 we announced is for a study about how much more they can do on the whole question of someone returning to science after taking a career break. It is not specifically for a set number of fellowships.

Q202 Chair: My question goes right back to the point David Tredinnick raised about women in engineering. When you and I were at Ditchley Park a year or so ago, or a bit more than that, one of the people at the session with us told a wonderful story about a company, where he was a senior director, showing round a group from a local all-girls schools. One of the teachers was overheard to say, “If you don’t work hard at school, you could end up working in a place like this.” To me, that illustrates something that is not typical, but if teachers do not get the opportunity to share in what is happening in the real world today, they will not keep up, will they?

Mr Willetts: I completely agree. I remember that. It was a shocking story.

Chair: Minister, this is a challenging area. We are not expecting any instant answers that will solve it. A lot of people over a number of years have been working hard at this, and a lot of progress is being made, but there are still massive weaknesses in the system. We hope that when we publish our report, you will try to pick out the things that the Government can act on with a degree of urgency. Thank you.

