

## Interview with Professor Winston

### Why did you decide to build the Reach Out Lab?

The evidence is that at least 30% of schools in Britain have totally inadequate science labs and another 30% of schools have science labs which aren't really as good as they should be. That's one reason, but not the only reason.

What we know from evidence again is what mostly turns people onto science in schools is doing practical work, and what happens in schools far too often is that the teacher does a demonstration of the experiment and the pupils watch. That's a totally pointless exercise, in my opinion. It doesn't actually help people doing the science. In my view, kids should be doing dissections on their own, they should be doing explosions; proper experiments which are dangerous but which can be totally controlled. That is a hugely motivating reason to do science. And the other thing that is very consistently found is that an inspirational teacher will make a very big difference.

So, the Reach Out Lab is a laboratory which I set up, it was not a cheap proposition, it cost over 1 million quid, which is really for kids to come in from underprivileged schools which don't have laboratories, but in fact we are finding that children from all over the place want to come whether they have laboratories or not. We employ school teachers, we don't have University employees doing the teaching, very specifically, and I believe that school teachers have the skills that we don't have. They are hand picked and inspirational people and we come in as role models. We have students coming into lab to inspire people of your age.

The real reason for doing all this is nothing to do with the school children at all. It's really to inspire the students here to consider teaching. Because if we have more people from Universities which have very high research and academic records with really good degrees doing science teaching, we think that that will be quite inspirational.

Then, the Reach Out Lab is also rather subtle because it's actually also a research base and I'm an academic and I'm really interested in research. What I'm trying to do is to research what happens to the children who come through the Lab, so we will see them in 5 or 10 year's time and see what they're doing. We will also see what works and what the best way of teaching practical science is. We will research what is happening to the teachers who come in and measure the impact on them and give them the chance to become

researchers and residents here and interface with top world class research teams.

### Can you tell whether the Reach Out Lab is working yet?

No, you can't – it's only been open for two months. We did some pilots in August and it's still not paid for so we are still raising the funding for it.

### Why did you choose Imperial College for its location?

I was an Imperial College professor but I retired in 1995 and they offered me a new chair which I turned down because I was really quite busy – I do huge number of ridiculous jobs! I spread myself really thin. And I thought about, maybe two years or so ago, that maybe the offer was still on the table to become a Professor of Science Society which was a new chair. So, I thought if they are actually going to pay me then why not? So I sit in this office, and have fun, really, being paid to do things which are probably quite useless. So I spend my time with the office door open and undergraduates will come in and talk to me and I dream up projects like this one! This project is really sort of my 'baby', but it's one that I feel quite strongly about.

### Could you tell us some of the things you might do in the Lab?

During half term, for example, we had kids in (7 to 9 year olds) doing kitchen chemistry with their parents. The funny thing was that their feet weren't touching the ground; they were very sweet, actually. So we do quite a lot of work on the floor when it's appropriate.

It is quite astonishing, you know, the other day Alan Sugar came in – I asked him to come and look round – and he couldn't believe that the kids we were teaching were all from ethnic minorities. They were 14 to 15 year olds and they had never actually heard about programming – they had never programmed anything! We got them to built robots and then program them so that they were then able to do a robot Olympics around the room. They work in threes; that's how we have been doing that particular program. Then at the end of the day they would present back what they'd done. We filmed that – we can broadcast to the web from there too, I haven't done that yet but we will do. But what was interesting about that group - Alan was horrified that none of them really knew what programming was about. But what was really a bit grim was that the teachers had to admit that they never did any of this practical work at all in the school and Alan Sugar said, you know, the problem with Britain is that there are no engineers –

there won't be if people can't do these basic tasks. And I think it's fair to say that, I mean, if you were going to study engineering this would be the key university to come to.

**There's a rumour that Science A levels are being made easier. What do you think about this?**

Yes, it's interesting, that, isn't it. Lots of people at the University think that's true. We had a crisis a few years ago in some of the subjects we were teaching, Chemistry was one, where we couldn't fill the courses because we couldn't actually get people with high enough grades we wanted. So we had a debate about whether we should lower the standards of entry or reduce the size of the course and it was interesting that the University decided to lower the size of the course, which cut back its income. We actually thought it was rather important to maintain the standard.

I think there is a general feeling here that A levels in science are a bit easier now. Universities like this are bringing in a lot of overseas students who are *really* bright and who are high achievers and they have different views about what they are doing. And it's an issue, I think, about whether we should be doing that, but that's the route that Imperial's gone down, which is why it's a wealthy University of course. So it's not surprising that the income here at Imperial is greater than Oxford or Cambridge because the research outlook is very competitive.

The question is: should we be training young people who are the competition? Yeah, it's a really curious issue, and I don't know the answer to that. So, I mean, are the A levels getting easier, they probably are, though I'm not sure I could pass Physics A level now!

**It's also been shown that fewer girls are taking Science A-levels now. What do you think about this?**

Well, I think if you looked around the campus, I think you will be impressed by how many women there are. We've got a lot of women doing physics and a lot of women doing engineering and they come in very often because there's a very social context to what we do. So, for example, we've got an engineering project going on in every country in Africa, except one. And women tend to run those because they have the social impetus to do it. We've got engineering projects going on in Tibet, Mongolia, really, all over the world. And a lot of the time our women graduates do it because they see that they're helping people purify water or plough fields using new engineering to do that.

And so that is quite attractive. And I actually think that, absolutely, we have to have as many women in science as possible because one of the problems with science is that it's quite capable of being alienating to the population and having women in science makes it much more responsive to public need and much more *responsible*. I think that it improves ethical standards; I think that there are lots of very good reasons for encouraging women in to science.

One of the charities I run is Women for Women which is a charity where women cycle to raise money for woman scientists so we can get young women into science, maintain really bright people in science and give them enough time out to raise a family because eventually one becomes too old to have a family and that's a real problem and society's not doing enough about that. So I felt that was a lead we could take.

### How did you get to where you are and what do you believe it takes to be a successful scientist?

Well, it's a huge amount of luck, really. To some extent, you make your luck but, I think, for many people, what in general, will make a successful scientist is, first of all, doing something which really interests you; that's very, very important and often underrated. If it's not really interesting, you have to ask yourself whether it's worth doing it or not. Science can be boring too. If you're doing a PHD, 90% will be either boring or repetitive or time-consuming or frustrating and often depressing but there is that 10% which makes it incredibly exciting which is worth all of that. I've been very lucky, really.

I mean, five times in my life, which is more than most scientists have, I've had eureka moments where I've danced round the laboratory with my colleagues. Or it'll be 3' o'clock in the morning and I'll be sitting in the laboratory thinking, 'I don't believe it, this experiment is actually working, it's going to change things.' That's an amazing feeling to have.

Or I remember an occasion when our first patient actually had a successful diagnosis in a genetic screening for an embryo. You know, I don't believe in breakthroughs but it sort of was one – it was the first time IVF had been used for fertile people. It was a totally different approach, it had all sorts of ramifications and when the Lab phoned through and said that Mrs Munday was pregnant, I sat in the Laboratory office for 15 minutes without saying a word to anybody. It was an extraordinary moment and you feel deeply moved actually. It's a mixture of tears, laughter and excitement. It's a very very extraordinary feeling.

So those moments make science worthwhile. And one should recognise that they will happen. I think single mindedness, for some people, is useful and being clever? I don't think that I'm cleverer than anybody else. We're often seen as 'boffins' – highly intelligent, but I don't think we're any more intelligent than lawyers, or anyone else. I think having a feeling that you might do something good is important. I think recognising that your science may benefit people is useful.

### Have you always been interested in science?

Yeah, I mean, I have. From about the age of seven, there was a big part of me that wanted to do English at Cambridge and I did consider doing something totally different because I'm not bad at languages. And then I ended up having a place to do natural sciences but I didn't want to look down a microscope for the rest of my life. I wanted to deal with people, so I ended up doing medicine. And the irony is, first of all, I've looked down a microscope for most of my life and secondly, actually, I was so frustrated with medicine that I gave it up after 4 years and directed in theatre. And then I eventually came back to science. So it was quite a long winded career!

### So we hear you have a new book out called 'Bad Ideas'. Can you tell us a bit about it?

It basically argues that scientists need to have a much greater social awareness and take responsibility for what they do and not trust governments. That actually in fact society is a much better mechanism for getting science trusted but actually there is a problem increasingly at the moment with the attitude towards climate change, for example. But people who have read it seem to find it quite interesting and it seems to be getting reasonably good reviews – we'll see. It's just come out this week and it's got a lot about the history of technology, farming, cities, fire. Writing is a big technology. And the point I'm making is that you never see the point of the time of invasion. What will be the real value of the invasion? And we never see the downside either, which is always much more profound and serious than we expect. And the book has some solutions that I think are worth considering.