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## Ask a Researcher: Professor Jim Ryder

*In this issue of Science Teacher Education our 'Ask a Researcher' interview is with Jim Ryder, Professor of Science Education and Director of the Centre for the Studies of Science and Mathematics Education at the School of Education, University of Leeds.*

Rob: What has your line of research been over the last ten years?

Jim: My work started out being interested in students' understanding of the nature of science. So I started at university level, exploring how university students talk about the nature of science and the different science disciplines and comparing them across these disciplines. That led to how the nature of science might feature in school science education. We designed new teaching materials funded by the Nuffield Foundation where we designed materials for A-level teaching which explicitly focussed on the different aspects of the nature of science. Those materials are still available on the Nuffield website<sup>1</sup>. So that was an interest on the broad theme of curriculum; what we teach in schools, and why. Since then my work has broadened out into being interested in the purposes of science education. There's a phrase that's often used in this area: 'scientific literacy'. So some of my early contributions were to explore, as others have, what do we mean by scientific literacy? I did a literature review on how adults use science in their everyday lives - there are lots of case studies in that area. So that was an interesting theme around this whole area of curriculum and that led on to much more of a policy focussed interest. So I'm now interested in how policy is developed in science education and how policy is enacted in the classroom.

One of my more recent studies, working with colleagues here at Leeds, was looking at science education curriculum reforms - the theme of 'how science works' was part of that. We explored the development of that as a reform, and we worked in many different schools to see how that reform worked through in practice. We worked with teachers over three years exploring their experiences of this new curriculum policy. That's basically what my interest is in now. A lot of things are done to teachers through policy; a lot of people want to change teaching. I suppose my basic research interest is exploring teaching from teachers' perspectives and how they perceive and respond to attempts to change their work.

Rob: And I remember that going on for the last four years?

Jim: That will be about right.

Rob: How do teachers hear about your research?

Jim: In different ways. The work I've just talked about involves teachers from the outset and so in many studies teachers are involved in the study itself. In the study on curriculum reform teachers were the focus within the study. For me, the Association for Science Education has been an important vehicle for communicating with teachers. I've always seen my own academic writing as being for multiple audiences. So I write for education researchers – and it's great if teachers engage with that literature – but I also write for teachers specifically and a journal like *School Science Review* is a great place to do that. So I'm always trying to write about research in something like *School Science Review*. I know that every teacher doesn't read *School Science Review* but I think many do and you often do see the journal in the staff room. So that's one way of engaging with teachers. I think also that universities have an important role in interacting locally and regionally with teachers. At Leeds we're keen to sustain a school-university partnership in different ways; often that's through

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<sup>1</sup> <http://www.nuffieldfoundation.org/teaching-about-science>

initial teacher education programmes, but also post-ITE Masters provision that links with local schools. I do, for instance, sessions on our MA Education and Professional Enquiry programme at Leeds, explicitly on the research that I've done – and teachers on that programme get an opportunity to comment and critique that research within those sessions.

Rob: As I remember, that's always been a strong feature at Leeds.

Jim: Oh, yes. I think the links with schools and with universities has always been important. I think it's important in many university settings, but, yes, that's right and it's something we're keen to try to sustain even within a changing policy environment. I still believe, my colleagues still believe, in the importance to engage meaningfully with local schools around teaching science and the contribution of educational research.

Rob: Which two research studies do you feel have had strong influences on science education in the UK?

Jim: That's a hard one.

Rob: It could be over recent years, it could be over the last two decades.

Jim: There are lots to choose from. I've picked out, not necessarily research studies, but perhaps broader research programmes that have had some influence in the field. For example, that whole set of work which has been occurring for a long time about the purposes of science education. A lot of people have written about that and then what form the school science curriculum might have as a result of this thinking about purposes. One of the big things that's come from that is, of course, there are multiple purposes of science education. I'm thinking of work from the *Beyond 2000* report, and the development of the Twenty First Century Science qualification at GCSE. These are examples that have linked to that research and tried to explore it in practical contexts. How might we build a school science curriculum which is actually responsive to multiple aims? Because those multiple aims will always be there and different people want different things from school science education. I doubt that's ever going to change. So how can the school science curriculum respond to that - effectively to match the diverse needs of students? I think that's been a research programme linked with practical development activity with schools, with teachers, that I think has had an influence in the field, not just in the UK but internationally.

Rob: Do you think that was triggered by the *Beyond 2000* document?

Jim: We did a study that looked at the genesis of one of those curricula reforms and *Beyond 2000* was an important milestone, but it certainly wasn't the starting point for that debate or conversation. You can go way back and find people questioning and probing the purposes of science. *Beyond 2000* recognises this and many of these themes of the multiple aims were recognised way back. It actually recognises the importance of historical studies in our field. So that's one example.

The other example, again more of a broader research programme, is the teaching and learning of specific science topics and subjects in schools. So, how do we go about teaching and learning 'forces and motion' or Newton's Laws, effectively in school settings? There's been a whole set of work over many years that focussed specifically on students' starting conceptions about things like gravity, why objects fall for instance, and then from those research studies, developing teaching and learning sequences. This has been an international movement and has had a strong impact in this field of research, trying to develop teaching and learning sequences that schools and teachers can work with; research-informed teaching of specific science topics. I think that's had some influence in

schools – I wouldn't say it's had a massive influence – it's always interesting to know how teachers respond to those sorts of research programmes. I think that's an active research programme but I think it is important to the science education research community that we include reflection and research on specific issues about teaching science concepts.

Rob: So looking forward from that, which research areas do you think are in need of focussed research at this time and moving forwards.

Jim: Well, I think, for me – and this is a personal choice because it's my own research interest – we spend a lot of money on policy in this country, in many countries. A lot of resources go into curriculum reforms and development of assessment materials - a lot of financial resources, a lot of human resources. I don't think we spend enough time and resources on exploring the impact of those policy initiatives in order to ensure that current and future policy initiatives are more effective. So I think that's an area of educational research that we need to do more work on. An example of that which I'm interested in exploring is teachers' experience of various different attempts to change their work. It might be a policy initiative, a curriculum reform, a teaching and learning sequence that's been developed, a professional development activity that aims to change how teachers work in the classroom. I think we need more research about how a range of different teachers working in diverse settings respond to those different attempts to change their work and - this is the key point - not whether they change or not, but as a researcher I want to understand how and why teachers change or do not change. It's more about the process. I think that if policy makers can understand, more about what's involved in teaching and how teachers respond to change then I hope we can develop policy initiatives that are more effective and are actually more open for teachers to adapt to their local environments. Teachers work in a whole range of different environments and policy wants to change teachers in all environments. I think we just need to recognise that that's something we need to do more research on and perhaps recognise that policy does need to have some flexibility so that teachers can adapt policy initiatives, not ignore or change them necessarily but adapt them, make them work in their local contexts. So that's a whole area of research that I'm interested in and that I think is important.

Rob: Teachers are often encouraged to do action research, not necessarily through universities but even groups of schools may be engaged with that in some circumstances. What are your thoughts about action research and teachers?

Jim: I think it's great that teachers are encouraged and are interested to be engaged in research to inform their practice, I think that's really important as a profession. I also think that it's important for teachers to be given the resources to do that.

Rob: What resources do you think they should be given?

Jim: A range of things. They need to be given time to do it, to provide time in the timetable for teachers to work together to engage with research. I was in Singapore in the past year and they have specific opportunities for all teachers to come out of school, within curriculum time, to work together to engage in research. In Japan, and increasingly in other countries, there's a whole range of activities around 'lesson study' which involves specific time for teachers to engage in research. So time would be one thing. Also I think it's important to recognise that research is a skill, it's something you can learn to do well, and it's something that you can do badly. So I think it's important that teachers have access to opportunities to develop their skills as researchers. That's why I think, going back to the universities-schools partnerships, they have a really important role to play - universities are good places to learn about research. So I think that any forms of school - university links are important. That could be through courses around Masters provision which

include opportunities to do some research with an academic colleague; it could be funded research where teachers and researchers are working together. So I think those sorts of resources are important. I also think that, within the structures of schooling, teachers need to be encouraged to do, to engage with research, and that means, for instance, it's potentially part of promotion criteria, maybe linked to specific roles with universities. I hear about Directors of Research in some school settings. So structures and roles that recognise the value of research within a school setting is also, I hope, going to encourage many more teachers to get involved in research. I think it's a great initiative but teachers need support to engage with it and my work and engagement with teachers has been that many teachers are really keen to engage with research and to use it to inform their practice. So I think this is a really important area for development of our field.

Rob: Thank you Jim.