Biology Education Research

Ginny Page and Michael Reiss

In the UK, where the two of us work, research activity is flourishing in the areas of education and biology. Research in science education is in a healthy state too, having seen significant investment in recent times. However such investment is uneven across the science disciplines. So while there are countries, notably Germany, where biology education research is undergoing a resurgence, this is not the case in many countries, including the UK.

Biology education research does not have the same drivers as education research in other STEM (science, technology, engineering and mathematics) subjects, nor does it currently have the same level of support from public, charitable and private funders, particularly when compared with the physical sciences.

As biology education in the UK is perceived to be 'successful' in terms of the attainment and participation of students of the subject, it receives less attention from public policy makers compared to other branches of science education. Yet biology teachers face many of the same difficulties in terms of the constraints of formal assessment, continual change to syllabuses, and pressures of workload, with additional challenges of often teaching outside their specialism.

Biology research is not only expanding the frontiers of biological knowledge but creating new areas of knowledge, often in interdisciplinary areas. These areas of knowledge are represented by different organisations and individuals whose sometimes disparate views and voices can make it difficult for policy makers, teachers and others to make informed decisions about how to construct a meaningful biology curriculum for students.

In addition, reviews of, and changes to, the science curriculum are too often undertaken in a piecemeal fashion. The organisations responsible for setting tests and examinations have few incentives (and often limited opportunities) to engage with education research and have a tendency to resort to market-orientated priorities in the content of syllabuses and assessments. This threatens some topics in biology (particularly those that are less popular) and some activities (particularly those most difficult to assess). Biology education research could provide a framework within which coherent curriculum development can proceed.

Biological knowledge also forms a part of an understanding of the self and responsible behaviour, of maintaining health and wellbeing, and of environmental citizenship. The extent to which these overlaps in domains of knowledge can be positively addressed in classroom teaching and learning without undue pressure on biology teachers is worth greater research attention, given that physics and chemistry teachers are quite protected in their roles as subject specialists. However, this overlapping knowledge is also a significant and positive opportunity for biology

education to contribute more explicitly to these key areas of a person's physical, emotional and intellectual development from early years through to adulthood.

Failure to invest in biology education research could have significant consequences. As we enter what some have dubbed the 'Age of Bioscience' we are looking at an ever-growing range of complex issues and careers with a foundation in biology. Are we confident that biology education is the best it can be, without looking behind the healthy numbers of teachers and students? While it is indeed reassuring that the UK has a sizable, sustainable school workforce it is disappointing that biology teachers may have fewer opportunities to engage in research as practitioners, as this clearly relies on maintaining an active, academic research community.

In the light of these considerations, the two of us have convened a UK Biology Education Research Group. After our first meeting on 25 September 2009, the initial 45 individuals on the mailing list drew up a list of the following recommendations for how UK biology education research should develop in the future:

- Build better relationships with Awarding Bodies whose work developing qualifications could be informed by work on the curriculum and assessment being undertaken by biology education researchers.
- Unite wherever possible, perhaps under the auspices of the Society of Biology but helped by further meetings similar to this one, enabling education research to form a strong foundation for agreement in the biology education community and for evidence-based issues to be more effectively represented to policy makers.
- Develop a more coherent framework for biology education, acknowledging the large and disparate nature of biological knowledge and biology teacher backgrounds, drawing in expertise on assessment (particularly where that establishes links with Awarding Bodies) and connecting with developments in teacher CPD.
- Collaborate in addressing innovation and development in the 0-19 biology curriculum, learning from the 3-18 science curriculum review undertaken by the Scottish Executive and drawing from research when considering how biological knowledge and skills are developed at the most appropriate times in the development of young people.
- Support the development of research-active teachers from initial teacher training onwards, nurturing their interest in learning from biology education research and recognising that in the reflective practitioner is the beginning of an action researcher. Consider and exploit what positive impacts the development of the Masters in Teaching and Learning (MTL) and increased emphasis on teaching in Higher Education might have on biology teaching and learning in schools and colleges.
- Monitor the changing roles of the biology teacher away from biology teaching, such as the incentives being offered biology specialists to gain additional specialisms in physics and chemistry, and the expectations that biology teachers are able and available to teach not only other science subjects, but also citizenship, PSHE and sustainability.
- Explore to what extent the CPD offered by Science Learning Centres is informed by biology education research, and how teachers who attend the courses might themselves become part of the education research community as a

result of their CPD.

- Engage with the outcomes from the Walport Review[1], the Wellcome Trust as it develops its education programme, and the Society of Biology in its new phase.
- Be ready to engage with existing and particularly new governments on behalf of biology education.
- Repeat this event, perhaps with a more specific focus on the curriculum and undertaking more intensive exercises in groups.

Some of these recommendations are specific to the UK but we would be very interested to hear from those readers of *Journal of Biological Education* as to their relevance outside of the UK.

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[1] The Department for Business, Innovation and Skills have appointed a Science and Learning Expert Group, chaired by Sir Mark Walport, Director of the Wellcome Trust. An Action Plan will be published early in 2010.