Royal Society & British Academy Call for Views: Education Research

Response by the Wellcome Trust

Key points

- Wellcome funds education research through response-mode competitive grant funding, direct commissioning and a small amount of in-house research.
- We increasingly involve end-users in our research, including science teachers, school leaders and policymakers. Much of our work is collaborative, and we often partner with external organisations with aligned interests.
- The education research community should engage in a wide discussion about the cost, benefit and appropriateness of different methodological approaches, including the consideration of the role of evaluation and action research

Introduction

1. Wellcome exists to improve health for everyone by helping great ideas to thrive. Over the next five years, we plan to invest up to £5 billion on research to improve health. We also have a long standing commitment to making inspirational, high-quality science education available to all young people. Supporting teachers and creating a robust evidence base is at the heart of our education work.

What Wellcome funds

2. We fund education research through response-mode competitive grant funding, direct commissioning of research activity and a small amount of in-house research. Over the years, we have increasingly involved end-users – such as science teachers, school leaders or policymakers - in our research. Moving forward, we are committed to doing so as much and as early as possible in the process. We also make research data and findings as freely available and as accessible as possible.

3. The two largest commitments we have made to education research are £3 million for the Education and Neuroscience Initiative and £3.7 million for Science Learning+ (more details on both below). In 2016, Wellcome also made improving science education across the UK an organisational priority over the next five years, including growing the education research base.

4. We welcome the opportunity to contribute to this call - we share the belief that high quality research has the potential to transform education in the UK and beyond. We have enjoyed fruitful collaborations with the Royal Society on a number of projects and believe this could form a solid foundation for further work together.

Our priorities for education

5. **Informal science learning**. We wish to understand the impact of informal science learning experiences, build research capacity and bring the research and practice communities closer together. Our main effort is Science Learning+, a £9 million collaboration between Wellcome, the National Science Foundation and the Economic and Social Research Council.

6. **Education and neuroscience**. We aim to build the evidence base around the impacts of educational interventions informed by neuroscience and help teachers to better connect with this body of knowledge and influence its growth. This work includes the Education and Neuroscience Initiative: a £6 million collaboration with the Education Endowment Foundation (EEF), which is currently funding six research projects to improve our understanding of how neuroscience might benefit classroom practice.

7. **Enhancing and assessing practical skills**. We are interested in better understanding the impact of rich practical science experiences, especially extended project work, on students (as well as others involved, such as teachers or researchers). We are also collaborating with the Gatsby Charitable Foundation and the Nuffield Foundation on a programme of work supporting practical science in schools and colleges. Part of this will involve gathering evidence on the quantity and quality of practical science, as well as investigating the impact that GCSE and A level qualification reform is having on practical work. We also plan to fund research into better methodologies for the assessment of practical science.

8. **Monitoring Science in Schools**

    a. **Science Education Tracker**. Gaining a clear understanding of young people's attitudes towards and experiences of science education is critical to our work. In partnership with the Department for Business, Energy and Industrial Strategy, the Department for Education and the Royal Society, we commissioned a large-scale, representative survey of more than 4,000 14- to 18-year-olds to provide credible baselines and insights that inform policy and practice. We plan to publish in January 2017 and to repeat the survey in 2019.

    b. **Primary Science Evaluation**. We will be launching a major campaign to improve primary science in January 2017. As part of this work, we will be carefully monitoring science in primary schools over the course of the next four years. This monitoring is intended to help us understand what is happening in schools, and should be relevant to other stakeholders.

9. **Other research interests.** We have a number of other research interests, such as:

    a. how to increase student numbers in particular areas of shortage (e.g., bioinformatics)
    b. how to change our language and approach to informal learning experiences so that they resonate more effectively with young people from disadvantaged backgrounds
    c. whether participation in continuing professional development impacts upon teacher retention.

10. The priorities above will guide our work over the next five years. However, we recognise that the education field can undergo rapid and radical change and our research priorities may be influenced by external policy developments. This may include new Government policy, newly published research, ideas generated in partnership with other stakeholders or funders, and how we are progressing towards our goals. Likewise, Wellcome continues to explore new strands of work, some of which may influence our education research priorities.

To what extent do you, or would you, collaborate with other funders who have similar missions?

11. As indicated above, almost all of our work is in collaboration with others. These collaborations involve a wide range of partners, take many forms and occur for different reasons. The collaborations tend to be thematically based, exploiting aligned interests and so, by necessity, they build on a base of information sharing and effective communication.

12. Sometimes partners have aligned objectives and are pooling funds and expertise for greater impact. In other cases, we may have distinct but overlapping aims or different areas of expertise which enable work to be achieved much more effectively in partnership. In some cases, there is collaboration on a single piece of work (e.g., the Science Education Tracker) and in others, a coalition has formed in an area of interest, with different partners progressing different complementary elements (e.g., the practical science collaboration with Nuffield and Gatsby).

Challenges and opportunities in educational research

Engagement between researchers and schools

13. Many funders, including ourselves, are fostering a culture of engagement between researchers and schools. In addition, there is a groundswell of interest from educators themselves in becoming more engaged in research, as characterised by the ResearchEd movement. However, it can still be challenging to truly engage schools and educators from the inception of research, rather than simply recruiting them to participate in trials or to translate research findings. Funders may need to provide time, mechanisms and funding to allow for the co-creation of research proposals.

14. Over 7,500 schools are involved in research funded by the EEF alone, helping to grow their understanding of the research process and the use of evidence.[1] It will be important to avoid trial fatigue if the current level of activity is to continue or grow. Encouraging schools to shape research projects may help sustain their engagement as well as improving the relevance and translation of findings.

Research methodologies and skills

15. There has been a new emphasis in recent years on rigorous, large scale research, not least through the emphasis on randomised control trials (RCT), by the EEF. This has undoubtedly increased the number of researchers with relevant expertise. However, we should not under-estimate the value of other approaches, including the significant amount of small-scale action research being conducted by teachers in classrooms. Mechanisms for how this can be bolstered by the research community and shared more widely should be investigated.[2]

16. Evaluation is an essential element of education research. Our Informal Learning review (2012) discussed the dichotomy between research literature typically published in journals, and grey literature – evaluations of specific schemes typically published on websites. The latter can be useful in understanding implementation issues and driving innovation and can be the only realistic option for small scale projects. In our work, we strive to connect researchers and practitioners better, including sharing evaluations more widely (they are often treated more as an accountability measure).

17. We believe that it would be beneficial for the education research community to engage in a wide discussion about the cost, benefit and appropriateness of different methodological approaches in different contexts, including how to approach research questions for which a standard RCT methodology is not appropriate.

Timescale for evidence gathering

18. Good, robust research evidence takes time to measure and collect. The time lag between formulation of the research question, data collection, validation, review and publication of the evidence can be several years. Yet the timescale for policy change is often shorter than this. We need to develop better mechanisms for identifying and

[1] Education Endowment Foundation, *Five schools win £1m funding to support 1,000 schools in the next year* (EEF, London, 2016), https://educationendowmentfoundation.org.uk/news/five-schools-win-1m-funding-to-support-1000-school-in-the-next-year/)
[2] Education Development Trust, *Evidence that counts: 12 teacher-led randomised controlled trials and other styles of experimental research* (EDT, Reading, 2016, available at https://www.educationdevelopmenttrust.com/~/media/EDT/Reports/Research/2015/r-_EvidenceThatCounts_V2.pdf)

performing research in a timeframe that enables it to more effectively benefit policy making.

Department for Education research funding

19. The Department for Education (DfE) should have sufficient budget to conduct research and robust evaluations to inform its policy development, implementation and monitoring. However, the department's net expenditure on R&D fell by 64% between 2007-08 and 2013-14 (from £39 million to £14 million).[3]

20. Arguably DfE's investment in the EEF endowment of £125 million, to be spent over 15 years, partially offsets this decline in publicly funded research. However, EEF funding is focused on a particular set of priorities quite different from wider departmental research needs. In 2014, we participated in a discussion with DfE about their series of research priority and question papers, of much wider scope than work of the EEF. It seemed that one of the purposes of publishing these papers was to encourage other researchers and funders to generate the research. It would be interesting to explore the extent to which these priorities have been addressed and by which organisations.[4]

Research across the UK

21. Many funders of education research do not cover the whole of the UK but focus on England. Much of Wellcome's education research funding, such as Science Learning+ and Education Neuroscience, is available to recipients across the UK. However, we have found that research on the experience and delivery of education across the country is challenging. Each nation's education system is distinct, arguably increasingly so, and so generalising responses is often inappropriate. In addition, because the devolved nations have relatively small populations, achieving a large enough sample to be representative can be difficult.

22. To elaborate, in 2015, we commissioned Ipsos MORI to conduct scoping research[5] for us on the best methodology to identify and reach a representative sample of young people across the UK for the Science Education Tracker. The differences in the availability of databases containing the relevant details of young people across the UK made us concerned that we would not be able to reach comparable samples. Combined with the need to oversample in the devolved nations, and uncertainty about response rate, we decided to limit the survey to England, at least in the first instance.

Interdisciplinary and collaborative research

23. Educational researchers should not work in isolation. Our two large education funding areas both involve interdisciplinary and collaborative research – which bring new opportunities but also challenges. We have learnt the importance of building in time to foster genuine and productive collaborations between people working in different fields, and find ways for them to meet – physically or virtually. Seed funding can also be helpful.

24. For instance, educational neuroscience (also 'Neuroeducation' and 'Mind, Brain and Education') is a growing interdisciplinary research field bringing together neuroscience, psychology and education, to better understand the learning process and inform classroom practice. There are a growing number of Masters programmes offered in educational neuroscience and a number of new dedicated journals and conferences.[6] Wellcome is also trying to foster relationships and collaborations across these communities. In 2015, we ran an online event which allowed teachers to have

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[3] House of Commons Library, Spending on Research and Development in the UK (21 July 2015, http://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN04223); BIS, *SET Statistics* (2013, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/246231/13-499-set-statistics-2013A.pdf)

[4] Papers published included the following policy areas: Teachers and Teaching and Early education and childcare Assessment, curriculum and qualifications - https://www.gov.uk/government/news/setting-research-priorities-in-education-and-childrens-services

[5] This will be published towards the end of 2016

[6] E.g. the International Mind, Brain and Education Society, www.imbes.org

discussions about learning and the brain with neuroscientists and psychologists. It was visited by 7,000 users over six weeks and our evaluation showed that it gave teachers a clearer insight about what the research could and could not tell them. Researchers benefitted by gaining exposure to the types of questions teachers wanted answers to.

Examples of effective links between researchers, policy-makers and practitioners

25. The Targeted Initiative on Science and Mathematics Education (TISME) provides an interesting example of a number of research projects funded by the Economic and Social Research Council. These were brought together with support from the Gatsby Charitable Foundation, the Institute of Physics and the Association for Science Education to reflect upon their collective findings and relevance to policy and practice.

26. Although we are not aware of whether the impact of this approach has been formally evaluated, it seems that these projects have had a high level of visibility and influence on the thinking of policy makers and practitioners. We have tried to take a similar programmatic approach to Science Learning+ and the Education Neuroscience Initiative from their outset, providing wider networking opportunities, sharing information about the projects as they are progressing, and considering how to build impacts as research comes to fruition.

Ensuring impact of educational research

27. Wellcome is a signatory to the Concordat on Open Research Data,[7] which ensures that research data gathered and generated by members of the UK research community is made openly available wherever possible. We publish educational research that we have directly commissioned on our website and appropriate supporting data on the UK Data Service. Research we fund through grants tends to be published in journals and we strive to make these publications open access. We also encourage more readable summaries of complex research, so it is accessible by the widest possible audience (e.g., infographics[8] based on the findings from our Wellcome Trust Monitor survey), and promote them through a wide range of channels.

28. A key mechanism for ensuring the impact of educational research is to involve teachers and schools from the planning stage of a project. This means that the research can be shaped to uncover insights that are relevant and applicable in the classroom. It helps generate buy-in from teachers and fosters a genuine collaborative partnership.[9]

[7] HEFCE, RCUK, UUK, Wellcome Trust, *Concordat on Open Research Data* (July 2016) http://www.rcuk.ac.uk/documents/documents/concordatonopenresearchdata-pdf/
[8] Ipsos MORI (2016) Wellcome Trust Monitor, Wave 3. London: Wellcome Trust (http://dx.doi.org/10.6084/m9.figshare.3145744)
[9] E.g., see Cultivating Connections: Innovation and Consolidation in the ESRC's Impact Evaluation Programme, April 2013