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The Case for Reinvesting in Science Education Research

A Position Statement for learned societies, funders, and policy stakeholders

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This position paper emerges from a collaborative group of science educators and researchers who came together to critically examine the current state and future direction of science education. The group engaged in sustained dialogue to explore the relationship between policy ambition and the research infrastructures that underpin meaningful educational change in relation to science teaching and practice.

At a moment when science is central to addressing global challenges, from climate change and public health to technological transformation and democratic participation, the paper positions a case for renewed investment in science education research. While recent evidence from England's PISA 2025 results identifies notable strengths in England's science education system, it also reveals persistent challenges in relation to gaps in attainment between pupils of different socioeconomic status. Together, alongside other evidence and a new National Curriculum, these findings highlight a disconnection between the scale of national aspiration for science education and the declining capacity to generate the robust, context-sensitive evidence needed to support it.

Bringing together insights from research, policy analysis, and sector-wide evidence, the paper examines persistent challenges in curriculum design, teacher development, equity, and student engagement. It argues that without a strong and sustained research base, efforts at reform risk becoming cyclical, fragmented, and ultimately ineffective. Particular attention is given to the structural erosion of funding, the weakening of professional development infrastructures, and the implications for teacher expertise and workforce sustainability.

Framed as a call to action for learned societies, funders, and policymakers, the paper advances a set of strategic recommendations aimed at rebuilding the science education

research ecosystem. Central to this vision is a commitment to inclusive, high-quality science education that equips all learners to engage critically with science in an increasingly complex world. In doing so, the paper positions science education research not as a peripheral concern, but as an essential foundation for educational quality, social equity, and informed public life.

1. Introduction: Why Science Education Research Matters Now

Science education plays a critical role in shaping how children and young people understand the natural world, engage with evidence, and participate meaningfully in democratic societies. At a time when science and technology play a key role in responding to current issues science education has never been more consequential. These issues include responses to digital transformation, economic productivity, climate change and public health crises, conceptional and curricular coherence, and equity.

Public attitudes research consistently indicates that science continues to be highly valued by the UK public. The *Public Attitudes to Science* (PAS) survey (Ipsos, 2026), now in its twenty-fifth year, offers one of the most robust longitudinal datasets on public engagement with science. The most recent wave in 2025, based on a nationally representative sample of over 5,000 adults, confirms that science is widely perceived as important to both society and the economy, and that trust in science remains relatively high compared with other public institutions. The UK was found to rank 15th from 68 countries surveyed to determine public trust in science (Cologna *et al*., 2025).

However, this headline optimism masks deeper structural and educational challenges, and this report also acknowledges that despite greater access to information on science, fewer younger people (age 16-24) feel better informed and that their trust and certainty have eroded since the pandemic. Evidence from PAS and related studies suggests that young people's relationships with science are fragile and unevenly distributed. In particular:

- interest in science is shaped early, with school experiences playing a decisive role in whether young people perceive science as relevant, accessible, and 'for people like me'
- enjoyment of and engagement with science declines for many pupils during secondary schooling, particularly at key transition points (e.g., between Key Stages 2–3 and 3–4) with cohorts reporting more ambivalence about studying science, often citing lack of confidence, perceived difficulty, and weak connections to future identities
- participation in science beyond school is strongly correlated with earlier access to high-quality teaching, practical work, and enrichment opportunities
- a systematic decline in enjoyment and engagement with school and science during secondary transition, most acutely in Year 7. Girls and disadvantaged pupils are most affected and decreased engagement predicts poorer attendance and engagement in learning activities.

These patterns are well documented in science education research and are not new. What is striking, however, is how persistently they re-emerge despite repeated cycles of reform. This raises a provocative but necessary question: to what extent have policy ambitions for science education outpaced the system's capacity to understand and enact meaningful change?

While evidence suggests that public trust in science is relatively strong in the UK (Cologna, et al., 2025), public trust in science does not arise spontaneously and we do not disregard the apprehension that a lack of trust in scientists, by even a small minority, may affect considerations of scientific evidence in policymaking. Trust in science is cultivated through sustained educational experiences that integrate pedagogy, curriculum, assessment, and teacher expertise (Archer, DeWitt, and Dillon, 2019). Each of these domains depends on a strong, cumulative science education research base. Yet, at precisely the moment when scientific literacy, critical engagement, and inclusion are most urgently needed, science education research faces growing structural and financial precarity.

2. Where School Science Is and Where It's Going

Recent national reviews reveal a science education system characterised by both ambition and fragility. On the one hand, there is widespread recognition of the importance of science to national priorities. On the other, there is mounting evidence that the system is operating close to its limits. The British Science Association's *State of Science Education* report (2026) highlights:

- persistent challenges, in recruitment and retention difficulties in science teaching, particularly in physics and chemistry
- uneven access to high-quality practical and experimental work
- enduring disparities in participation and progression by gender, socioeconomic background, and ethnicity
- intensifying workload, accountability, and performativity pressures on teachers.

At the same time, the *Curriculum and Assessment Review* (CAR) (2025) signals potential reforms to curriculum content, assessment structures, and educational priorities. While the review reaffirms the centrality of science, it leaves unresolved several long-standing tensions, notably:

- the balance between substantive knowledge acquisition and the development of scientific reasoning
- the educational purpose of practical work beyond procedural competence
- the extent to which assessment regimes distort curriculum intentions
- how curriculum reform can genuinely support equity rather than reproduce stratification.

The CAR's recommendations are ambitious. They call for greater coherence in the primary science curriculum, clearer articulation of progression and depth, increased teaching by specialist teachers, explicit attention to climate change and sustainability, strengthened expectations for practical work, and expanded access to Triple Science pathways. Also, 'for the first time primary aged children will gain vital skills like how to spot fake news and identify misinformation and disinformation, helping them develop the critical thinking needed to challenge what they see and protect them from online harms' (DfE, 2025).

Yet these ambitions sit uneasily alongside current system constraints: Limited numbers of specialist teachers, reduced funding for professional development, and competing resource pressures within schools. Without substantial reinvestment in science education research and infrastructure, there is a real risk that these reforms will remain aspirational rather than transformative.

Critically, curriculum reform without an accompanying research strategy risk repeating a familiar cycle—policy change followed by uneven implementation, limited evaluation, and a gradual return to business as usual.

3. A Shrinking and Fragmented Funding Landscape

Despite the strategic importance of science education, the funding ecosystem that sustains research in this field has eroded steadily over the past decade. This erosion has been incremental, making it less visible than abrupt funding cuts, but its cumulative impact is profound, for example:

- the withdrawal of the Wellcome Trust from science education research funding in 2021, removing one of the few sources of sustained, theoretically informed, and strategically coherent investment in the field
- reductions in Department for Education funding to STEM Learning, constraining national capacity for subject-specific professional development, research translation, and infrastructure that connects research, practice, and policy. These shifts have produced a growing mismatch between the scale of national ambition for science education and the resources available to understand how science is actually taught, learned, and assessed in classrooms (Dyson, 2025).

Science education research is often structurally different from much disciplinary STEM research. It relies on:

- long-term partnerships with schools and teachers
- mixed-methods and design-based research approaches

- iterative development, testing, and refinement of curriculum and pedagogy
- sustained engagement rather than short, isolated project cycles.

Current funding models, which prioritise short-term outputs, narrow impact metrics, and rapid scalability, are poorly aligned with these realities, as reflected by the 47% decrease in government funding for science teacher CPD for example (Dyson, 2025). As a result, research capacity is being lost, programmes are becoming fragmented, and opportunities for cumulative knowledge-building are diminishing. The irony is stark, calls for 'evidence-informed reform' are increasing precisely as the capacity to generate that evidence is weakening.

4. The Purpose and Value of Science Education Research

Science education research addresses foundational questions that cannot be answered by disciplinary science alone. These include but are not limited to:

- how pupils develop conceptual understanding and scientific reasoning over time
- how knowledge, skills, and practical experience interact in learning
- which pedagogical approaches support inclusion, motivation, and progression
- how curriculum and assessment structures shape classroom practice
- how identity, culture, and social context influence engagement with science.

The *Curriculum and Assessment Review* (DfE, 2025) surfaces enduring tensions at the heart of school science, particularly around knowledge, reasoning, and practice. These tensions are not merely technical; they are deeply educational and political, shaping who succeeds in science and who is excluded.

Existing research (Abrahams and Reiss, 2017) shows, for example, that practical work can either deepen conceptual understanding or become a ritualised activity disconnected from learning, depending on how it is designed and framed. Similarly, assessment systems can support progression and feedback or narrow the enacted curriculum and marginalise inquiry.

Science education research provides the conceptual tools and empirical evidence needed to navigate these tensions thoughtfully. Without it, decisions risk being driven by assumption, ideology, or expediency rather than by robust evidence of what supports meaningful learning.

Priority areas for research such as AI and climate change and sustainability must align with the demands of the new curriculum and contexts children and young people are currently living in. While there is still some science education research taking place, this is vastly reduced.

5. Professional Development and Workforce Sustainability

High-quality professional development (PD) is consistently identified as one of the most powerful levers for improving pupil outcomes and teacher retention (Darling-Hammond, Hyler, and Gardner, 2017). Yet evidence from the *Teacher Development Trust CPD Landscape* (2025) paints a troubling picture:

- access to sustained, subject-specific PD remains highly uneven
- much PD is experienced as fragmented, generic, or compliance-driven
- only a minority of teachers report consistent impacts on classroom practice
- opportunities for follow-up, coaching, and collaborative inquiry are limited.

For science teachers, these challenges are intensified by the subject's distinctive demands: practical work, safety and behavioural considerations, rapidly evolving knowledge, and complex conceptual progression. The CAR places renewed expectations on teachers—particularly around practical work, disciplinary understanding, and expanded Triple Science access, without adequately addressing how teachers will be supported to meet them.

Government funding for science continuing professional development (CPD) fell in 2025 by almost £4 million (47 %) (Dyson, 2025) raising significant concerns about the capacity of the education system to address ongoing shortages in specialist science teachers.

Commenting on the cuts, Louis Barson, Director of Science at the Institute of Physics, highlighted the contradiction between the government's ambitions for scientific and technological leadership and its investment decisions. He noted that while then Prime Minister (Keir Starmer) has recently set out ambitious plans for the UK's future in artificial intelligence, an area in which UK-based researchers continue to achieve global recognition, including a recent Nobel Prize in Physics, the government is simultaneously reducing investment in physics education. This comes at a time when England faces a shortage of approximately 3,500 physics teachers.

The reduction in science CPD funding has important implications for science education. High-quality professional development is critical for improving teacher subject knowledge, supporting teacher retention, and enabling teachers to keep pace with rapidly evolving scientific and technological fields. Reduced access to CPD may limit opportunities for teachers to develop expertise in emerging areas such as artificial intelligence, data science, and modern physics, potentially weakening the quality of science education available to young people.

Research is clear that PD quality matters more than PD quantity. Without science-specific, research-informed PD, workload pressures increase, confidence declines, and retention challenges intensify. Investment in PD must therefore be understood as a core component of workforce sustainability, not an optional enhancement.

6. Initial Teacher Education and Early Career Development

Initial Teacher Education (ITE) and early career support are pivotal in shaping teachers' professional identities and long-term practice. Yet science education research has a diminishing presence in these spaces.

There is increasing misalignment between:

- research evidence on effective science pedagogy
- the structural constraints of ITE and early career frameworks
- the realities of teaching science across diverse school contexts.

Early-career science teachers often report limited opportunities to engage deeply with subject-specific pedagogy, diagnostic assessment, or curriculum design. This has consequences not only for classroom practice but also for retention and for the future pipeline of research-engaged practitioners.

Strengthening the integration of science education research into ITE and early career development is essential if the profession is to become more confident, adaptive, and evidence-informed.

7. Recommendations and Call to Action

We call on learned societies, funders, and policymakers to take coordinated, strategic action to strengthen the science education research ecosystem by:

1. recognising science education research as a strategic national priority
2. re-establishing sustainable funding routes that support longitudinal and design-based research
3. investing in capacity-building for early-career researchers and practitioner–researchers
4. strengthening links between research, policy, and practice
5. protecting and enhancing science-specific professional development
6. embedding science education expertise in policy and curriculum reform processes.

Without such action, there is a real risk that curriculum reform ambitions will outstrip the system's capacity to deliver them equitably and effectively.

8. Conclusion

Science education research sits at the intersection of education, science, and society. It shapes how young people understand evidence, how teachers teach, and how the public engages with scientific knowledge.

At a time when science is central to national and global challenges, the marginalisation of science education research represents a significant strategic risk. Reinvestment is not merely about sustaining a research community; it is an investment in educational quality, social equity, and democratic participation.

A renewed commitment to science education research is therefore not optional. It is essential.

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