Sheffield Hallam University | Sheffield Institute of Education

INCREASING TEACHERS' USE OF PEDAGOGICAL RESEARCH

Research summary: **Supporting science teachers to engage with and carry out research**

NFER National Foundation for Educational Research

wellcome

The Wellcome programme

Four hundred and sixty-eight science teachers took part in one of four Continuing Professional Development (CPD) pilots. Each pilot had a different approach to supporting the teachers to engage with, use and/or undertake pedagogical research.

The long-term aim was to improve the quality of science teaching, as research indicates that high-quality teaching is the most important school-related factor in improving pupils' performance.[1]

The research

A concurrent mixed-methods study, undertaken by the Sheffield Institute of Education and the National Foundation for Educational Research (NFER), aimed to extend the knowledge base on how teachers go about using research, how they can be effectively supported to do so and the impacts of their use of research.

The findings presented in this report are drawn from analyses of:

- 198 matched baseline and endpoint participant survey responses assessing change-over-time in research use and science pedagogy
- 80 endpoint participant interviews
- 36 longitudinal interviews with a further 17 participants
- 16 longitudinal interviews with project teams
- 12 observations of CPD sessions
- analysis of Management Information Data.

The full report is available at:
www.shu.ac.uk/sheffield-institute-education-research/projects/research-into-supporting-teachers-of-science

[1] Barber, M., & Mourshed, M. (2007). How the world's best-performing schools systems come out on top. McKinsey & Company.

The projects[2]

Key project characteristics, the provider organisation and number of participants are summarised below:

Journal Clubs
Chartered College of Teaching

208 mixed-phase teachers.

Training for teachers and teacher facilitators.

16 online journal clubs – eight monthly meetings (over two and a half terms) – focused on engagement with academic and professional articles and implementation of research in school.

Critical assessment and classroom implementation tools provided.

Evidence in Action
Behavioural Insights Team

110 secondary teachers.

Created eight research-informed lesson plans to teach Year 7/8 electricity topic and associated teaching and learning resources, made available on the project website.

All plans linked to high-quality, regularly updated research summary sites for teachers.

Four workshops over two terms to support use of the material.

Research-2-Practice
University of Roehampton Consortium

Mixed-phase trainee teachers and their mentors – 116 in total.

Created 20 primary and 20 secondary research summaries and associated lesson plans for a range of difficult to teach topics, made available on the project website.

Initial training for mentors who then supported their mentee to engage with and use the resources.

Project spanned two terms.

Teacher-led RCTs
Education Development Trust and STEM Learning

38 mixed-phase teachers.

Two initial workshops and on-going one-to-one support for teachers to undertake small-scale randomised controlled trials in their classrooms to test the effectiveness of research-informed practices.

Book, videos, StatsWizard for analysis and other supporting resources.

Project spanned three terms.

[2] The table represents the pilots as they were received by participants - all the projects had to adapt their original plans due to the COVID-19 pandemic. All training was delivered online.

Key Findings

1. Impact of the programme on research use and science teaching

Quantitative and qualitative findings indicated that training and supporting science teachers to use, or to undertake, pedagogical research can support better science teaching.

Statistically significant improvements[3] following participation in the programme:

Measure	Effect sizes (Cohen's d)
Confidence in accessing, assessing the quality of, and applying research	0.50 – 0.54 Moderate to large
Using research in practice	0.33 Moderate
Enhanced science pedagogical practices across six measures[4]	0.17 – 0.29 Small to moderate

[3] The study design did not include a comparison group of teachers. We cannot, therefore, say whether there is a causal link between the programme and the observed outcomes.

[4] Measures, e.g. using practical work effectively and using models to support understanding, were based on the recommendations in the EEF's *Improving Secondary Science Guidance Report* (Holman and Yeomans, 2018), with adaptation for primary participants.

2. Accessing, engaging with and transforming research for practice

Few participants accessed research sources beyond those provided by their project.

Depth of engagement, which varied from in-depth critical review to extracting 'snippets' from research summaries, mirrored participants' project intentions.

Engaging with and transforming research for practice were highly inter-related processes, which were supported by structured discussion, questioning, use of critical appraisal and implementation tools, and sharing professional experience with research-interested colleagues.

Where participants were provided with research-informed resources, they were encouraged to adapt these to their context. Changes made related to lesson sequencing, assessment, science vocabulary selected and the design and content of teaching and learning resources. Reasons for adaptation included teacher judgement and preferences, and matching plans and resources to pupils' needs and school requirements. Whether the adaptations might compromise fidelity to the research and lead to less effective practices did not appear to have been considered.

> "I feel more confident in being able to understand trials."

> "I now know things I should be looking out for in terms of what makes good research compared to poorer research."

> "An understanding of cognitive theory, retrieval practice, spacing, and metacognition, have all come to the forefront of my practice."

> "To embed research... I'm facilitating a collaborative approach towards planning and sequencing lessons."

3. Teachers' use, conduct and brokerage of research in school

Participants who implemented research ideas or research-informed resources in their school applied a 'plan, do, review' cycle. This was supported by discussions with project and school colleagues, project gap tasks, implementation tools, and, in one project, mentoring.

Participants brokered research use by colleagues by initiating collaborative discussions focused on translating research, adapting research-informed resources, and planning implementation.

Easy-to-use research-informed resources were valued by teachers and led to faster implementation.

Participants' use/conduct and brokerage of research was enhanced when there was a culture of collaboration in schools and teachers were encouraged to experiment with their practices.

Implementation of learning from the projects was more widespread in schools where collaborative lesson and curriculum planning were well-established.

> "The way the project's broken down has made it a lot easier to bring other staff in."

4. Effective research brokerage by CPD providers

Teachers' engagement with, and use of, research was enhanced when the CPD was tailored to the teachers' career stage, phase, role, interests and the time they had available to participate in CPD, and implement or undertake research in school.

CPD design and delivery features found to support research use

An integrated CPD package, including training, high-quality resources and one-to-one support, that:

- scaffolds research engagement, translation, implementation and/or undertaking research – this was particularly important for trainee teachers
- is compatible with school curricula, the National Curriculum and the pattern of the academic year.

Training /meetings that are held regularly, easily accessible and flexible.

Opportunities for discussion with 'research-engaged' project peers.

Regular opportunities for support (e.g. in workshops, meetings and drop-ins) and swift, comprehensive answers to queries and concerns on a one-to-one basis.

Project content that is relevant to both phases in mixed-phase CPD.

5. Research-informed resources

Teachers found research-informed resources most useful when they were provided as an easy-to-adapt package of lesson plans for a sequence of lessons for a difficult to teach topic, which were accompanied by teaching and learning resources and linked to research evidence.

> **"It's given me a better way of accessing research - having websites and the links provided that are already vetted and looked at in terms of how much it's going to support your teaching."**

In the projects that brought together researchers and experienced teachers to produce research-informed resources, the process was most effective when:

- equal weight was given to researcher and teacher knowledge
- topic (e.g. teaching electricity), subject-specific (e.g. teaching physics or science), and generic pedagogical research were brought together
- there was regular communication and collaboration to share knowledge about the research and the school context.

Conclusions

Supporting teachers to engage with and carry out pedagogical research has the potential to improve the quality of science teaching.

There is no 'one-size fits all' type of CPD that best supports teachers' research use – instead a broad **'research-use CPD offer'** is required, so that teachers can access CPD tailored to their career stage, phase, role, interests and available time.

Research use is dependent on a receptive school culture.

Implications

Teachers' use of research could be increased by:

Policy-makers, funders, and other national organisations creating the conditions that support effective research brokerage, including:

- supporting the further development of differing forms of research-use CPD and testing at scale
- orchestrating and investing in the production of high-quality research-informed resources - bringing together researchers, experienced teachers, and curriculum developers
- ensuring that policy decisions and their implementation support sustainable research-use cultures in schools.

Initial Teacher Education, Early Career Framework and CPD providers, and curriculum resource developers taking account of this and other research on how teachers go about using research in the design of programmes and resources.

Senior and middle school leaders fostering a collaborative culture where teachers have opportunities, time and autonomy to experiment with research-informed practices and undertake pedagogical research.

A research agenda that includes:

- assessing the relative effects of different forms of research-use CPD, and any differential long-term effects due to the depth of research engagement promoted
- gathering trainee teachers' perceptions of, engagement with, and use of research and any specific support they may require to increase their use of research.

All stakeholders need to consider – 'What is a research-informed teacher?' Answering this question is key to designing effective support.

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