Physics Research in School Environments
A template programme of deep engagement with schools

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INDEPENDENT RESEARCH PROJECTS
Small minority of students
Only sometimes supported by “mentor” from university/industry
Benefits to students and teachers

RESEARCH IN SCHOOLS
Independent research projects based around current scientific research
Sometimes actively supported by researchers
Variety of different formats emerging

OUTREACH
One-off interventions → no impact
Repeat interventions → no impact?
Students enjoy science BUT not part of their identity

Context

ASPIRES 2
science and career aspirations: age 10-19
Physics Research in School Environments (PRiSE)

To raise students’ Physics (STEM) aspirations PRiSE aims to:

• Increase awareness of current research with 14-18 year-old students
• Enable students to develop their understanding of how research works
• Provide a framework for students to develop their own independent research (in collaboration with active researchers)
• Affect teachers through sustained deep engagement over several years

Potential to feed back into research
Getting the Right Mix of Schools

Similar programmes often cater simply to most privileged

**We ensure a wide range of backgrounds:** income, race, gender

Underserved schools feel the project has value, they are equal and competing with those more privileged

Success independent of background
Structure & Support

Project structure
- Students in groups of 4-6
- Start with prescribed activity
- Different independently motivated projects

Resources
- Student/teacher written guides
- All necessary software/equipment
- Videos & online “how to” guides

Good practice
- Continual (~ fortnightly) reminders to teachers

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Probability school still involved

Probability school drops out per stage

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Kick-off workshop  Student guide  Teacher guide  Online resources  Researcher visits  Researcher commns.  Comments on work  Overall

Positive (Essential)  Positive (Helpful)  Negative
Impact on students

Confidence in scientific topics/methods

Students’ experience

Students’ skills development

Legend:

Teachers
Students
Both

Preliminary evidence of lasting impact 2 years later
Impact on teachers


- Positive (Definite)
- Positive (Planned)
- Negative

Most schools do multiple years
Independent of all school/area metrics

Dropout mainly due to:
- Teacher turnover (~21% year\(^{-1}\) in UK)
- Poor engagement / communication from teacher
- Individual schools’ culture?

I am now more aware of what our students are capable of - not just listening to visiting speakers but being actively engaged in real-world research!

— Teacher
Impact on researchers

Student’s work can result in publication (small minority)

It was a very rewarding experience which allowed us an insight into the research conducted at University level. This helped us to develop crucial skills needed in the next years of our studies. It was truly amazing to hear how significant the event we found was and that it will be forming the basis of a proper scientific paper.

— Student from Eltham Hill School

Main benefits are more qualitative

Skills development

Broader / reframed understanding

Changing (research/engagement) practice

Challenging preconceptions of students’ potential

“very pleasantly surprised about the quality of work… significantly above what I had expected to be possible from sixth form school students”

Prof Richard Nelson

Ideally programmes embedded within research groups shared amongst academics, research/support staff, and PhDs
Summary

Programme of independent projects for 14-18 year-old students linked to current research supported by active researchers

• Template for projects which can be adopted by others
• Evaluation of impact on students, teachers, researchers
• Important elements for consideration and good practice

See website for

• Overview of programme’s structure/projects/resources
• Summary of current evaluation data/analysis
• 2017 evaluation report of 2 pilot years
• Space Weather paper on space sounds project & students’ unexpected scientific results

Paper on programme’s development and outcomes 2017-2019 forthcoming

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