





How Does Open Research Impact Student Outcomes? A Big Team Science Review and Evidence Synthesis



Dr. Madeleine Pownall
School of Psychology, University of Leeds
@maddi_pow
M.V.Pownall@leeds.ac.uk

Background

- Open scholarship broadly refers to the belief that research should be transparent, rigorous, reproducible, replicable, accessible and inclusive
- Sometimes referred to as open science or open research
- Progress has been promising
 - Pre-registration 
 - Registered reports 
 - Open data 
 - Open science badges 

(Although see [Crüwell et al., 2022](https://psyarxiv.com/729qt), <https://psyarxiv.com/729qt>)

- These principles should be embedded into research training to be meaningful

Open and reproducible scholarship: who cares?

- **Argument 1** [good for science]: if students are not trained in using open scholarship tools, progress will grind to a halt **...assuming that students are all “the next generation of scientists”**
- **Argument 2** [good for students]: open scholarship tools offer *pedagogical* benefits to students **...acknowledging that most students will not go on to have a career in research**

How to implement open science in teaching

- **Option 1** [level: easy]:
Make it as simple as possible to implement
Open educational resources, how-to guides, clear guidelines



- **Option 2** [level: difficult]:
Articulate the benefits clearly and customise for local contexts
i.e., what will embedding this approach achieve?



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PEDAGOGICAL POINTS TO PONDER

Embedding Open and Reproducible Science Into Teaching: A Bank of Lesson Plans and Resources

Madeleine Pownall¹, Flavio Azevedo², Alaa Aldoh³, Mahmoud Elsherif⁴,
Martin Vasilev⁵, Charlotte R. Pennington⁶, Olly Robertson⁷, Myrthe Vel Tromp⁸,
Meng Liu⁹, Matthew C. Makel¹⁰, Natasha Tonge¹¹, David Moreau¹², Ruth Horry¹³,
John Shaw¹⁴, Loukia Tzavella¹⁵, Ronan McGarrigle¹⁶, Catherine Talbot⁵,
Sam Parsons⁷, and FORRT¹⁷

¹ School of Psychology, University of Leeds

² Institute of Communication Science, Friedrich Schiller University

³ School of Psychology, University of Sussex

⁴ Department of Psychology, University of Birmingham

⁵ Department of Psychology, Bournemouth University

⁶ School of Psychology, Aston University

⁷ Department of Psychiatry and Experimental Psychology, University of Oxford

⁸ Institute of Psychology, Leiden University

⁹ Faculty of Education, University of Cambridge

¹⁰ School of Education, Johns Hopkins University

¹¹ Psychology Department, Notre Dame of Maryland University

¹² School of Psychology and Centre for Brain Research, University of Auckland

¹³ School of Psychology, Swansea University

¹⁴ School of Psychology, De Montfort University

¹⁵ Cardiff University Brain Research Imaging Centre, Cardiff University

¹⁶ Department of Psychology, University of Bradford

¹⁷ Framework for Open and Reproducible Research Training, Germany

Madeleine Pownall <https://orcid.org/0000-0002-3734-8006>

Flavio Azevedo <https://orcid.org/0000-0001-9000-8513>

Alaa Aldoh <https://orcid.org/0000-0003-1988-0661>

Mahmoud Elsherif <https://orcid.org/0000-0002-0540-3998>

Martin Vasilev <https://orcid.org/0000-0003-1944-8828>

Charlotte R. Pennington <https://orcid.org/0000-0002-5259-642X>

Olly Robertson <https://orcid.org/0000-0002-7333-0903>

Myrthe Vel Tromp <https://orcid.org/0000-0002-2076-5348>

Meng Liu <https://orcid.org/0000-0001-8323-2699>

Matthew C. Makel <https://orcid.org/0000-0002-3837-0088>

Natasha Tonge <https://orcid.org/0000-0001-7670-7901>

David Moreau <https://orcid.org/0000-0002-1957-1941>

Ruth Horry <https://orcid.org/0000-0003-3105-3781>

John Shaw <https://orcid.org/0000-0003-3190-6772>

Loukia Tzavella <https://orcid.org/0000-0002-1463-9396>

Ronan McGarrigle <https://orcid.org/0000-0003-1704-1135>

Catherine Talbot <https://orcid.org/0000-0001-9353-8990>

Sam Parsons <https://orcid.org/0000-0002-7048-4093>

Correspondence concerning this article should be

addressed to Madeleine Pownall, School of Psychology,

University of Leeds, 29 Carisbrooke Road, Leeds, West

Yorkshire LS16 5RU, United Kingdom. Email: M.V.

.Pownall@leeds.ac.uk

Review of open research impact

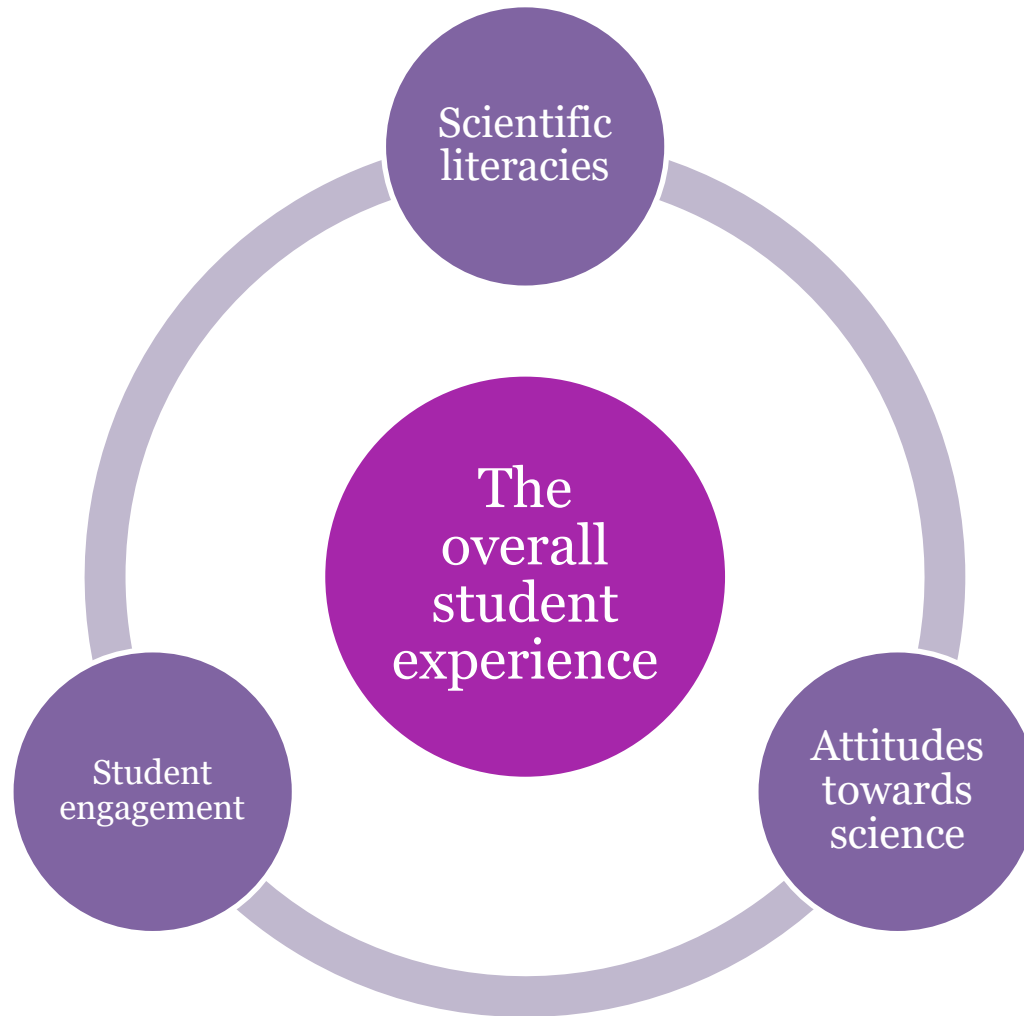
- Team Science approach (75 collaborators world-wide) to review and synthesize the evidence that investigates the impact of embedding open and reproducible scholarship
- Systematic review + backward and forward citation searching + grey literature

Search criteria:

1. The paper discusses **open and reproducible scholarship** in the context of Higher Education
2. The paper specifically mentions the **impact** of open and/or reproducible science on **student outcomes**.



What impact does open and reproducible scholarship have on ‘the student experience’?



Impact 1: Scientific literacies

- **“Scientific literacies”**: knowledge, skills, competencies, and attitudes related to both scientific culture and ‘doing’ science
- Pre-registration aids understanding of statistics ([Blincoe & Buchert, 2020](#))
- Teaching about FAIR (Findability, Accessibility, Interoperability, and Reusability) data can lead to more positive appraisals of open research ([Toelch & Ostwald, 2018](#))
- Replication studies with students can promote hands-on research training ([Jekel et al., 2020](#))
- Reproducing analyses with open data can enhance understanding of research methods ([Smith et al., 2021](#))

Impact 2: Student engagement

- **“Student engagement”**: enjoyment of learning, motivation, future research behaviours, concentration, efforts, interest
- Providing hands-on training with real and messy data can make research more exciting ([Fank & Saxe, 2012](#))
- Collaborative Team Science approaches to dissertations can enhance comfort and creativity with the process ([Button et al., 2020](#); [Pennington et al., 2022](#))
- Working in partnership can enhance feeling of ‘being a researcher’ ([Ryan., 2020](#))
- Open Educational Resources can improve the accessibility of research itself ([Çetinkaya-Rundel & Ellison, 2021](#))

Impact 3: Attitudes towards science

- **“Attitudes towards science”**: perceptions of science, trust in science, feelings towards particular practices
- A one-hour lecture on the replication crisis negatively impacts students trust in science ([Chopik et al., 2018](#))
- Training students on questionable research practices can reduce trust but help students to identify QRPs ([Sacco & Brown, 2019](#); [Sarafoglou et al., 2019](#))
- Introducing students to open research can promote positive perceptions of it ([Hanna et al., 2021](#))
- Open scholarship can enhance critical reflection on the scientific literature too ([Olsen et al., 2019](#))

However,...

- We noted that the **quality** of pedagogical evidence is not (always) robust and methodologically rigorous
- A lot of the literature discusses Open Educational Resources which, while aligned, is not entirely related to open research itself
- We need to embed our open scholarship values in pedagogical research itself
- Also, a lot of the best “data” doesn’t ever make it to the literature (student evaluations etc). How do we incentivise sharing of pedagogical tools? [**step 1: share case studies of best practice**]

A point to leave you with...

- A lot of this presentation has come from a very positive perspective
- However, 'open research' itself has a lot yet to do
- Qualitative open research (see upcoming Special Issue of British Journal of Social Psychology!)
- The accessibility, inclusivity, compassion, and constructiveness of open scholarship has been called into question (see 'broken science', [Whitaker & Guest, 2020](#))

Thank you for
listening!

Dr Madeleine Pownall
M.V.Pownall@leeds.ac.uk
@maddi_pow