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

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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)

- These principles should be embedded into research training to be meaningful
• **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?
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 ‘bropen science’, Whitaker & Guest, 2020)
Thank you for
listening!

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