How Computational Tools and a Culture of Openness Supported the Collaboratively Authoring of a Text

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**Objectives**

Like scientists and historians, educational researchers aim to do work that is useful and trustworthy. We want for findings from our work--based on qualitative and quantitative analytic approaches--to be the result of a systematic process that educators or policymakers find value in. Lately, there has been a lot of conversation about how *reproducible* research is (National Research Council, 2018). The objective of this work is to explore the topic of reproducibility through the lens of what has been termed *open education science* (van der Zee & Reich, 2018) in the context of a design-based effort to collaboratively write an open text.

**Perspectives**

The topic of reproducibility has been the topic of conversation among psychologists (Zwaan, Etz, Lucas, & Donnellan, 2017), but also of scholars in, for instance, special education research (Cook et al., preprint). To these and other authors, reproducibility is closely tied to the issue of how open the entire research process is--from the planting of the seeds for an initiative for a project to sharing the findings in (open) venues. Thus, scholars have started to talk about *open education science* as a tenet of work in education that is trustworthy and impactful. This work considers reproducibility from the perspective that it is a consequence (and part) of a broader set of open education science practices.

**Methods and Data Sources**

A design-based project aiming to develop *design guidelines* (Edelson, 2002) relating to open education science was carried out. The data sources are open and available to the public and to us contributors: the text and accompanying information are available here: <https://github.com/jrosen48/data-science-in-education/>. In particular, each of these three data sources were analyzed to generate the design guidelines: a) an issue discussing whether grade books counted as ‘in-scope’, b) planning documents and their changes reflecting changing goals for the text, and c) a chapter illustrating characteristics of literate programming.

**Results**

Because the text was open the involvement of individuals from a myriad of roles in education (i.e., administrators, data analysts, teachers, and researchers) were able to contribute to the book. Results highlight how the topics include in the text were the result of input from individuals with different expertise into what data science in education is and visions of what a useful text would contain. Through valuing openness and the use of computational tools (literate programming, an open-source package for writing books, and version control), the work was possible and efficient, though not without challenges discussed as part of the presentation.

**Scholarly Significance**

This presentation highlights the potential of open educational science. Less writing on the topic has highlighted parts of open science other than reproducibility, including ideals such as collaboration, welcoming contributions from newcomers (and the public), and an overarching aim of making the writing process and product widely-used. As this work aims to show, work that is open to the public has implications in terms of both the tools and culture surrounding reproducibility and open science are taken up by those involved in educational research.

**References**

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