OPEN SCIENCE BRIEF

BRIEF 7: JULY 2023

To help inform the special education research community, these briefs feature information on prominent open science practices. Content comes from our series of short articles in the DR newsletter, Focus on Research, as well as additional content developed by DR members.

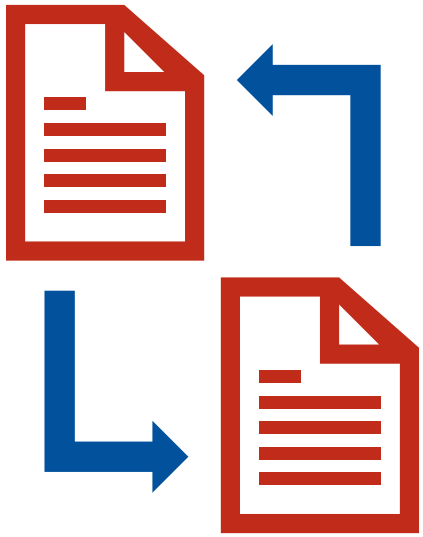
DIVISION FOR RESEARCH

MATERIALS SHARING

Within special education, there have been increasing calls for open-science reforms due to their potential for strengthening the trustworthiness of research, addressing the replication crisis (Makel et al., 2016; Travers et al., 2016), and bridging the research-to-practice gap (Cook et al., 2018). This article is a continuation of a series in this newsletter focused on prominent open-science practices. In this article, we discuss the practice of **materials sharing**. Despite its similarity to open data, the open sharing of materials has received considerably less attention. Here, we discuss the mechanisms for implementation, the benefits of sharing, and potential obstacles and limitations regarding open materials.

What is Materials Sharing?

Materials sharing, or open materials, is the process of making study materials publicly available to others, licensed in a way that allows others to edit, revise, and build on the original work. As a practice, open materials support opportunities for study replication and increase access to research-based materials for practitioners. A wide variety of materials can be shared across quantitative, qualitative, and single-case research, including researcher-created outcome measures, fidelity checklists, survey instruments, data collection forms, interview protocols, intervention materials and implementation procedures, training procedures and manuals, social validity measures, positionality and reflexivity statements, data analytic plan, and deductive or inductive codebooks.



Primary Benefits of Open Materials

Materials sharing has many benefits to both researchers and practitioners. Sharing research material such as interview protocols, survey instruments, treatment fidelity protocols, and researcher-generated assessments enables other researchers to reuse the materials in their own research (Miguel et al., 2014; Molloy, 2011). Early career researchers may particularly benefit from shared materials, as well as any researchers seeking to conduct independent replication studies where using identical materials is necessary. Open materials can also be refined and repurposed by researchers to fit

their unique needs. O'Brien and colleagues' (2019) survey, which they developed to examine the working conditions of special education teachers of students with emotional or behavior disorders, is a good example of shared mate- rials that can benefit researchers (available as supple- mental material on the website of Exceptional Children, https://mfr.osf.io/render?url=https%3A%2F%2Fosf.io%2Fgwzth%2Fdownload). This survey is now accessible for others who want to replicate their work or refine and/or adapt the instrument to survey other sub- groups of special education teachers.

Material sharing can also directly affect practice. Many special education researchers develop and empirically evaluate "homegrown" interventions, instructional materials (e.g., reading passages), and assessments (e.g., curriculum-based assessments) that are not commercially available and thus are not readily accessible to special education practitioners. The lack of availability of research-validated programs, materials, and assessments is unfortunate and likely contributes to the research-to- practice gap. By making these materials open and accessible to all, we increase the likelihood that our research will have a direct impact on the people we are dedicated to serve—special education professionals and children with disabilities.

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Openly sharing materials is not a purely altruistic endeavor. Similar to the published study, open materials can be listed on authors' vitae and can garner citations, providing researchers with another means to demonstrate their impact. Further, allowing teachers and other school personnel to access instructional material for free can lead to professional development opportunities for researchers and facilitate recruitment of schools as future research partners.

Potential Obstacles and Limitations

Van Dijk et al. (2020) noted that open materials are "likely the least complicated and time consuming of the open science practices" (p. 9). Nonetheless, there are obstacles and limitations to consider. Perhaps the largest obstacle is the time required to share all relevant original materials in a study. Researchers must format all materials for uploading, provide clear explanations for unfamiliar researchers to use the materials, select a license, and upload materials. These tasks all take time. Van Dijk et al. recommended planning for sharing from the start of a project (e.g., selecting a repository at the outset so materials are created in acceptable formats) to streamline the process.

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Additionally, determining whether materials can be copyrighted and shared, and if so, the appropriate level of copyright, presents an obstacle to overcome.

Not all products can be shared, such as copyrighted assessments and interventions. If researchers have made adaptations to such materials, the adaptation, but not the original instrument, could be described in detail as shared materials. In some instances, materials need to be copyrighted and distributed under the same conditions as the original copyright. It is also important to remember that licensing cannot be changed once selected. For example, if you select CC-BY as the license for the material, others can freely adapt the materials. If you later decide you would rather not allow others to adapt the materials in their published work, you cannot decide later to change the license to CC BY-ND, which does not allow for adaptations or derivations.

How to Share

Materials sharing is relatively straightforward and can be separated into two phases: (a) preparing materials, and (b) sharing materials. During the preparation phase, researchers must first review materials they would like to share for potential copyright conflicts. Authors should be especially vigilant when sharing materials adapted from other authors and in complying with institutional or funder guidelines. We recommend consulting with a librarian or copyright specialist at one's institution when guidelines are unclear. Next, authors must format their materials so that they are accessible. This can be done by clarifying the purpose of each document and including additional directions, procedures, and definitions to ensure materials are understood and applied correctly by other users. Lastly, authors must choose a copyright license. A copyright license is a legal document that communicates the rights of the owner to other users and can be applied to a variety of materials (e.g., text, images, multimedia). Copyright establishes intellectual property, and the license chosen specifies how others may use and adapt the copyrighted material. Creative Commons is a frequently used provider of copyright licenses that offers six different forms in addition to an open-use license (CC0; see Figure 1). It is important to note that a copyright license builds upon extant copyright regulations attached to the material. In other words, if you are the creator and rights owner of the material, you may copyright the materials as you see fit. If you are reusing modifiable materials from another rights owner, you must comply with the existing copyright license.

When sharing materials, authors must first decide where they would like to share their materials. Authors often select an online data repository or use the supple- mental materials option provided by many journals. Utilizing the journal option is convenient and easy to locate for readers, as hyperlinks to the materials are included at the end of the manuscript. Online repositories are also effective as researchers can often link the entire study workflow and all materials through a corresponding digital object identifier (DOI). For example, the Open Science Framework (OSF) allows authors to share each stage of the research process, including preregistrations, shared materials, and preprints. On the OSF, authors have complete control over how they share their work. Because each project and document is assigned a unique DOI, authors may choose to share entire projects or individual materials. Lastly, after selecting a platform for materials sharing, authors should upload their materials and add the DOI as a product to their vitae.

RESOURCES for OPEN MATERIALS

- Repositories for sharing materials: www.figshare.com
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Note. Creative Commons licenses from least open to most open.

REFERENCES

Cook, B. G., Lloyd, J. W., Mellor, D., Nosek, B. A., & Therrien, W. J. (2018). Promoting open science to increase the trustworthiness of evidence in special education. *Exceptional Children, 85*(1), 104–118. https://doi.org/10.1177/0014402918793138

Makel, M. C., Plucker, J. A., Freeman, J., Lombardi, A., Simonsen, & B., Coyne, M. (2016). Replication of special education research: Necessary but far too rare. Remedial and Special Education, 37(4), 205–212. https://doi.org/10.1177/0741932516646083

Miguel, E., Camerer, C., Casey, K., Cohen, J., Esterling, K. M., Gerber, A. ... van der Laam, M. (2014). Promoting transparency in social science research. *Science, 343*(6166), 30–31.

Molloy, J. C. (2011). The open knowledge foundation: Open data means better science. *PLoS Biology, 9*(12), e1001195.

O'Brien, K. M., Brunsting, N. C., Bettini, E., Cumming, M.M., Ragunathan, M., & Sutton, R. (2019). Special educators' working conditions in self-contained settings for students with emotional or behavioral disorders: A descriptive analysis. *Exceptional Children, 86*(1), 40–57. https://doi.org/10.1177/0014402919868946

Travers, J. C., Cook, B. G., Therrien, W. J., & Coyne, M. D. (2016). Replication research and special education. Remedial and Special Education, 37(4), 195–204. https://doi.org/10.1177/0741932516648462

van Dijk, W., Schatschneider, C., & Hart, S. A. (2020). Open science in education sciences. Journal of Learning Disabilities. Advance online publication. https://doi.org/10.1177/0022219420945267

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