Scholarship Learning Community (SLC)

Learning Community Title | Open Science in Practice: Tools and Workflows for Transparent, Reproducible Research

Facilitator | Vahid Alizadeh, School of Computing

Learning Community Short Description | This learning community will explore the implementation of open science practices across disciplines. We will meet monthly to learn about pre-registration, open data repositories, reproducible analysis workflows, and transparent reporting standards, with participants developing practical skills to transform their research processes to align with open science principles.

Learning Community Full Description | Open science – an approach to research that emphasizes transparency, collaboration, and reproducibility – has rapidly become a cornerstone of modern scholarship across disciplines. By allowing others to reuse data and methods and by promoting rigorous methodologies, open science practices accelerate discovery and enhance the trustworthiness of research findings.

This learning community will investigate how to implement open science practices across diverse disciplines, developing practical skills and workflows that enhance research transparency and reproducibility. We aim to learn about the core components of open science including pre-registration, open data management, reproducible analysis workflows, and transparent reporting standards, with emphasis on practical implementation strategies tailored to different research contexts.

This topic is critically important as academia faces a reproducibility crisis across multiple fields, with studies suggesting that a significant percentage of published findings cannot be reliably reproduced. Funding agencies, journals, and institutions are increasingly requiring open science practices, making these skills essential for contemporary researchers. Additionally, open science approaches can accelerate knowledge advancement by enabling more effective collaboration, reducing duplication of effort, and allowing researchers to build more confidently on existing work. Despite these benefits, many researchers lack practical knowledge about implementing open science workflows in their specific disciplines.

Our activities will combine conceptual learning with hands-on implementation. We will begin by establishing a shared understanding of open science principles and their benefits. Each month, we will focus on different aspects of open science practice, with community members researching specific tools or methodologies beforehand and demonstrating their application. All participants will experiment with implementing these approaches in their own research between meetings and discuss their experiences, identifying discipline-specific adaptations and challenges.

This learning community would interest faculty across disciplines who want to enhance the transparency, reproducibility, and impact of their research. It would be particularly valuable for

those conducting empirical research, those mentoring graduate students in research methods, those preparing grant applications for funders that prioritize open science, and those interested in contributing to solutions for the reproducibility crisis. No prior experience with open science practices is required, making this accessible to those new to these concepts while still offering value to those with some experience seeking to deepen their implementation.

Learning Community Calendar of Activities | The community will meet monthly for 90-minute sessions. Between meetings, participants will experiment with open science tools and approaches, applying them to their own research contexts. Each session after the initial meetings will be led by one or two community members who will research and present on specific open science practices.

Tentative schedule:

<u>September</u>

Initial Meeting and Foundations of Open Science: Discuss the reproducibility crisis and open science movement, and establish community goals and expectations. Participants will share their current research processes and concerns about implementing open science. We will establish common ground by reviewing core open science principles (e.g. open data, open access, reproducibility standards) and examining why openness benefits scholarly work.

<u>October</u>

Pre-registration and study planning: Exploration of pre-registration platforms (e.g., OSF, AsPredicted), development of pre-registration templates, and discussion of discipline-specific adaptations. Participants will draft a pre-registration for a current or planned study.

<u>November</u>

Open data sharing, management, and protocols: Best practices for data documentation, anonymization, and sharing. Exploration of data repositories (e.g., Dataverse, Zenodo, OSF) and data management plan development. Discussion of sensitive data considerations.

<u>December</u>

Reproducible analysis workflows: Introduction to literate programming approaches using tools like R Markdown, Jupyter Notebooks, and Quarto. Version control with Git/GitHub. Hands-on practice implementing reproducible workflows.

<u>January</u>

Transparent reporting standards: Exploration of reporting guidelines (e.g., CONSORT, PRISMA, ARRIVE) and their adaptation across disciplines. Practice in implementing comprehensive methods documentation and results reporting.

<u>February</u>

Open access publishing and preprints: Navigation of open access options, preprint servers, and copyright considerations. Discussion of strategies for making research openly available while managing publication requirements.

<u>March</u>

Skip this month due to quarter end/start and spring break.

<u>April</u>

Containerization and computational reproducibility: Introduction to tools like Docker and Code Ocean for ensuring computational reproducibility. Discussion of approaches for preserving software environments and dependencies.

<u>May</u>

Open materials and protocols: Strategies for sharing research materials, protocols, and code. Exploration of platforms for materials sharing and collaborative development of research protocols.

<u>June</u>

Final meeting: In the final meetings, SLC members will refine the Open Science Implementation Guide, incorporating feedback from outside readers (we may circulate a draft to a few colleagues or library staff for input). We will also assemble a curated online resource hub that contains all the useful links, tool documentation, example projects, and references gathered during our year-long exploration, ensuring these materials remain available to the broader academic community. Finally, we will reflect on lessons learned and discuss how to maintain momentum beyond the SLC – for instance, identifying opportunities for future cross-disciplinary collaborations or continuing an informal open science interest group at DePaul.

Learning Community Outcomes | Each participant will transform one of their existing or planned research projects to incorporate open science principles, creating a portfolio that demonstrates implementation across the research lifecycle. This portfolio will include:

1. A pre-registration or registered report for a research project

2. A comprehensive data management plan and example of properly documented dataset

3. A reproducible analysis workflow using appropriate tools for their discipline

4. Documentation of transparent reporting practices implemented in their research

These materials will be compiled into an "Open Science Implementation Guide" that will be shared with the DePaul community. The guide will include sections for different disciplines,

providing concrete examples of how open science principles can be applied across diverse research contexts. It will feature step-by-step tutorials for key open science practices, annotated templates that others can adapt, and solutions to common implementation challenges identified through our learning community experience.

Additionally, the community will develop and deliver a workshop for the ORS Lunch & Learn series, introducing key open science concepts and demonstrating practical approaches that faculty across disciplines can implement. This workshop will be recorded and made available as an ongoing resource for the DePaul community, accompanied by a curated collection of discipline-specific open science resources.