Lessons learned from teaching a hands-on Publish My Protocol course
Why do we need a culture of open methods sharing?

We can’t reproduce findings if we don’t know what was done

There are large communities for open data and open code, but open methods have attracted very little attention

Researchers may be more likely to reuse or adapt methods than data
Where are the methods...?
Plan to replicate 50 high-impact cancer papers shrinks to just 18

2% of experiments with open data
70% of experiments required asking for key reagents
69% of experiments needing a key reagent original authors were willing to share
0% of protocols completely described
32% of experiments the original authors were not helpful (or unresponsive)
41% of experiments the original authors were very helpful
Different readers have different needs

Overview:
Study design & methods

Information needed to assess scientific rigor, risk of bias

Details needed to reproduce experiments

Readers | Location
--- | ---
All | Methods section of the paper
All | Methods section of the paper
Some | Protocol repository or methods paper

Standvoss et al, bioRxiv, DOI: 10.1101/2022.08.08.503174
Challenge: How can we encourage Berlin scientists to deposit protocols?

Rene’s ideas
1. Deposit protocols and eat chili on a rainy day in Berlin
2. PLOS One Lab Protocols article

We decided to try option 2
The Experiment: Publish My Protocol Course

**Goal:** Participants deposit a protocol on protocols.io & prepare an accompanying Lab Protocols article to submit to PLOS One

**Why protocols.io?**
- Allows authors to create an open, living protocol that can be versioned or forked to track the evolution of methods over time, both within and across labs
- Protocols are high quality, OA methodological shortcut citations
- Authors get credit for their methods development work in the form of a peer reviewed publication

**Why PLOS One?**
- PLOS One is the only journal that offers this format
**Sidebar:** See our preprint to learn how to use methodological shortcut citations responsibly.

Looking for protocol in 1997 paper: "as described in (x) et al '96". Finds '96 paper: "as described in (x) '87." Finds '87 paper: Paywall.

**BioRxiv**

**Taking shortcuts: Great for travel, but not for reproducible methods sections**

Kai Standvoss, Vartan Kazezian, Britta R. Lewke, Kathleen Bastian, Shambhavi Chidambaram, Subhi Arafat, Ubai Alsharif, Ana Herrera-Melendez, Anna-Delia Knipper, Bruna M. S. Seco, Nina Nitzan Soto, Orestis Rakitzis, Isa Steinecker, Philipp van Kronenberg Till, Fereshteh Zarebidaki, Tracey L. Weissgerber

doi: https://doi.org/10.1101/2022.08.08.503174
Registration: Lessons learned

Scope

- Some registrants wanted to publish clinical study protocols (different format)
- A few were writing systematic review protocols (should be on PROSPERO, not protocols.io)
- The “Lab protocols” title is misleading, as some participants had re-usable, step-by-step protocols that weren’t lab based

Misaligned incentives: At least one participant withdrew after their supervisor advised them not to take the course because the paper wouldn’t count for their thesis
The protocols...some examples

**The Lab**
- Organoids
- Surgical protocol for live neuron imaging in mouse brains

**The Field**
- Isolating fly eggs from horse manure

**The Clinic**
- Using laughter as an intervention in COPD patients

Some participants were depositing protocol collections, rather than single protocols.
Course structure

The Plan

Jan 6: Introducing & planning, RRIDs
Jan 13: Deposit protocols
Jan 20: Prepare the Lab Protocols article
Jan 27: Integrate feedback
Feb 3: Unfinished business
Course structure

The Plan
Jan 6: Introducing & planning, RRIDs
Jan 13: Deposit protocols
Jan 20: Prepare the Lab Protocols article
Jan 27: Integrate feedback
Feb 3: Unfinished business

The Reality
Jan 6: Introducing & planning, RRIDs
Jan 13: Deposit protocols
Jan 20: Deposit protocols
Jan 27: Deposit protocols
Feb 3: Deposit protocols
Feb 24: Extra class to get feedback on everything before the Feb 28 deadline for the Lab Protocols article special collection
Expectation vs. reality...?

**Expectation:** Participants would start with complete protocols; upload them to protocols.io in a week

**Reality**
- Some participants were still developing their protocols
- Many participants who came in with complete protocols realized that there were gaps which would be difficult for others to follow -> used time between classes to further develop & clarify their methods, take pictures, etc.

**Conclusion:** Many scientists may be working with pseudoprotocols
Conversations with PIs/supervisors were an obstacle for almost every participant

**Participants**
- Early career researchers who were passionate about doing rigorous & reproducible science

**PIs**
- Many were unaware of protocol repositories, didn’t understand the advantages compared to traditional methods papers
- Fear that sharing previously undisclosed methods would leave them exposed or place them at a competitive disadvantage
- Had reservations about PLOS One
Published protocols

PLOS ONE

Generation of full-length circular RNA libraries for Oxford Nanopore long-read sequencing

Steffen Fuchs, Loïla Babin, Elissa Andraos, Chloé Bessiere, Semjon Willier, Johannes H. Schulte, Christine Gaspin, Fabienne Meggetto

Published: September 7, 2022 • https://doi.org/10.1371/journal.pone.0273253

State-of-the-art analytical methods of viral infections in human lung organoids

Morris Baumgardt, Maren Hülsemann, Anna Löwa, Diana Fatykhova, Karen Hoffmann, Mirjana Kessler, Maren Mieth, Katharina Hellwig, Doris Frey, Alina Langenhagen, Anne Voss, Benedikt Obermayer, Emanuel Wyler, Katja Hönzke

Published: December 20, 2022 • https://doi.org/10.1371/journal.pone.0276115
Refining our approach: The plan (starting soon...)

1. **Add “Write My Protocol”:** Train participants to write reusable step-by-step protocols

2. **Working group format**
   - Combine “Write my protocol” and “Publish my protocol” participants
   - Onboarding 2-3 times per year

3. **Flipped classroom**
   - YouTube videos: Learn the basics
   - Biweekly virtual work sessions: Ask questions, get feedback, work on protocols
   - Teams channel: Asynchronous discussion
BIH/Charité users now have premium access to protocols.io, sponsored by QUEST
What else can we do?

Reward methods development work

- List deposited protocols on CVs
- Give graduate students credit for deposited protocols
- Adapt reward systems to incentivize protocol depositing

Convince additional OA journals to offer the “Lab Protocols” article format

Protocol hackathon event

Ask PIs to designate an early career researcher (ECR) to deposit an established protocol

- ECRs using methods previously established in the lab may not have enough ownership over these methods to deposit them. More senior people who developed the methods may not have time to deposit the methods.

We need a better understanding of what makes protocols reusable
Soliciting input (coming soon)...

PRO-MaP: Promoting Reusable and Open Methods And Protocols

**Aim:** Recommend actions that 4 stakeholder groups can take to facilitate reporting of detailed methods and reusable step-by-step protocols in life sciences publications

- Researchers
- Institutions
- Funders
- Publishers & editors

**Preprint and consultation sessions coming soon:** Solicit input on draft recommendations
Thank you!