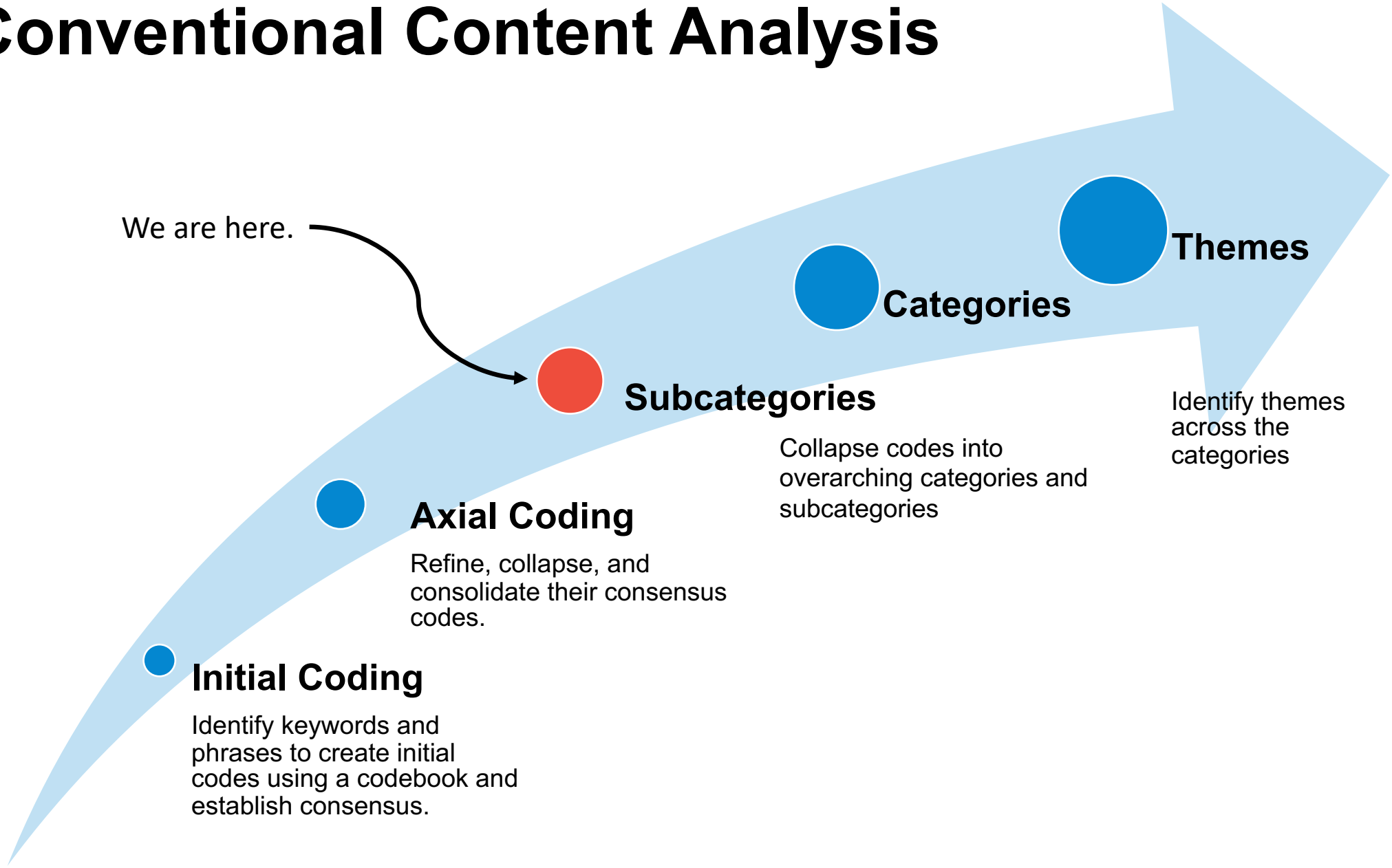
Conventional Content Analysis



Open Science Practice Definitions

Preregistration

The practice of documenting the research plan, study design, hypotheses, and/or analyses prior to data collection and submitting it to a registry. Pre-registration separates hypothesis-generating (exploratory) versus hypothesis-testing (confirmatory) research.

Self-Archiving

(Green Open Access)

The act of making a version of a manuscript legally and freely available online on a lab/personal website or in a repository. The version may be the submitted, accepted, or published version of the manuscript, depending on publisher policy.

Gold Open Access

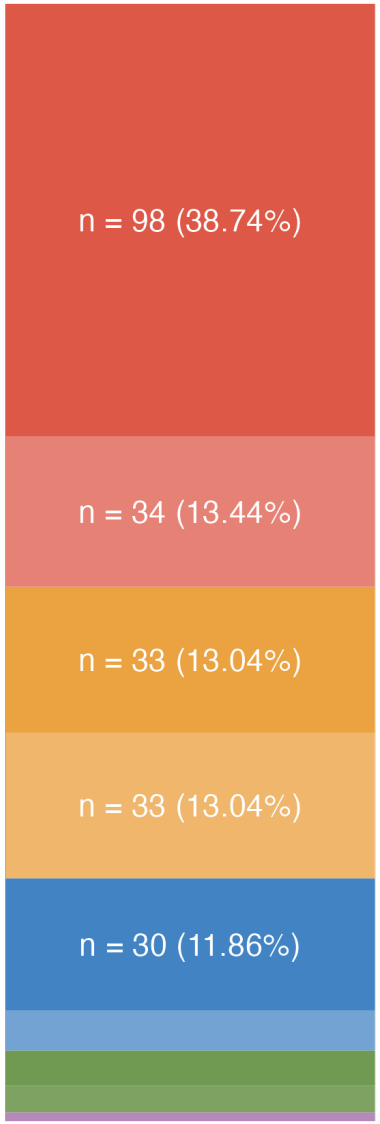
Unrestricted public availability of a research paper on the internet through formal publication systems (e.g., Open Access Publishers). Gold open access indicates that researchers paid money to the publishers for them to make their work available online through open access.

Open Data

Unrestricted public availability of research data and/or any resource necessary for the collection of this data (methodology, protocol, software packages, etc.), generally through online repositories.

El Amin et al., 2022

Perceived Barriers & Facilitators: All Professors



Subcategory	Examples
Resources (or lack thereof) were the most common subcategory of barrier/facilitator for engaging in OS practices. Resources related to **time, money, institutional support,** and **complexity.**	**B:** *There's a big learning curve and time commitment associated with figuring it all out.* **B:** *The amount of work that you put into this need also to be supported by resources.* **B:** *This should be a straightforward thing. But there's all these things that make it difficult to actually implement.* **F:** *My current university is a subscriber to some of the gold open access options for certain journals, and so publishing through those is easier because the university picks up the tab.* **F:** *We paid for open access for one of my articles, and it came from our department's budget, because my chair was just very supportive and just wanted, really valued me being able to have this as part of my publishing record.*
Attitudes towards OS practices was a common barrier. Attitudes related to the **perceived (lack of) benefit**, **fear** or **anxiety**, **competition,** and more.	**B:** *It's not clear to me what the payoff is at this point for science or for my career.* **B:** *It does also have this sinking cost in in your, in your tenure track* **B:** *I just don't wanna get sued for sharing my own work*
Study Components were often a barrier or facilitator. These related to **formatting requirements, (lack of) analytic flexibility**, **identifiable data,** and **data sharing permission.**	**B:** *I haven't figured out how to [share code] efficiently, because my code is always a slew of comments to myself that I don't necessarily want… accessible to everyone.* **B:** *My plan A probably isn't going to work out. You know. How do I shift away from something if it's preregistered and written in stone?*
Expectations, Policies, & Regulations related to their **university**, **IRB**, or the **NIH** often was a barrier/facilitator.	**B:** *I tried to [self-archive] on my department website, but was told that I had to adhere to a particular format that didn't allow for publications to be posted on there.* **F:** *I think the NIH is changing to require data sharing, so I think that'll be a good facilitator. Anyone who has funding will be forced to.*
Training & Knowledge of how to engage in OS practices was common facilitator/barrier.	**B:** *I don't know what I'm allowed to [self-archive], and I like...every journal has different rules.* **F:** *The NIH also accepts preprints now in biosketches and whatnot.*

Working with Others (n = 9, 3.56%), **Inequality** (n = 8, 3.16%), **Personal** (n = 6, 2.37%), & **Past Experiences** (n = 2, 0.79%)

Perceived Barriers & Facilitators: R1 vs. Non-R1

R1 and Non-R1 expressed similar barriers related to **Resources**. However, they differed in the perceived facilitators.

- Both groups identified having a **central** resource would be beneficial, in addition to **financial resources** and **institutional support**. However, R1 professors identified additional facilitators such as **step-by-step guides** (n = 2) to engage in a practice and having **students** in their research lab (n = 1).

> **R1:** *Like a website… something like that would be really good… It'd be one place to go to reach a lot of resources.*

R1 and Non-R1 differed in their **Attitudes** toward OS practices.

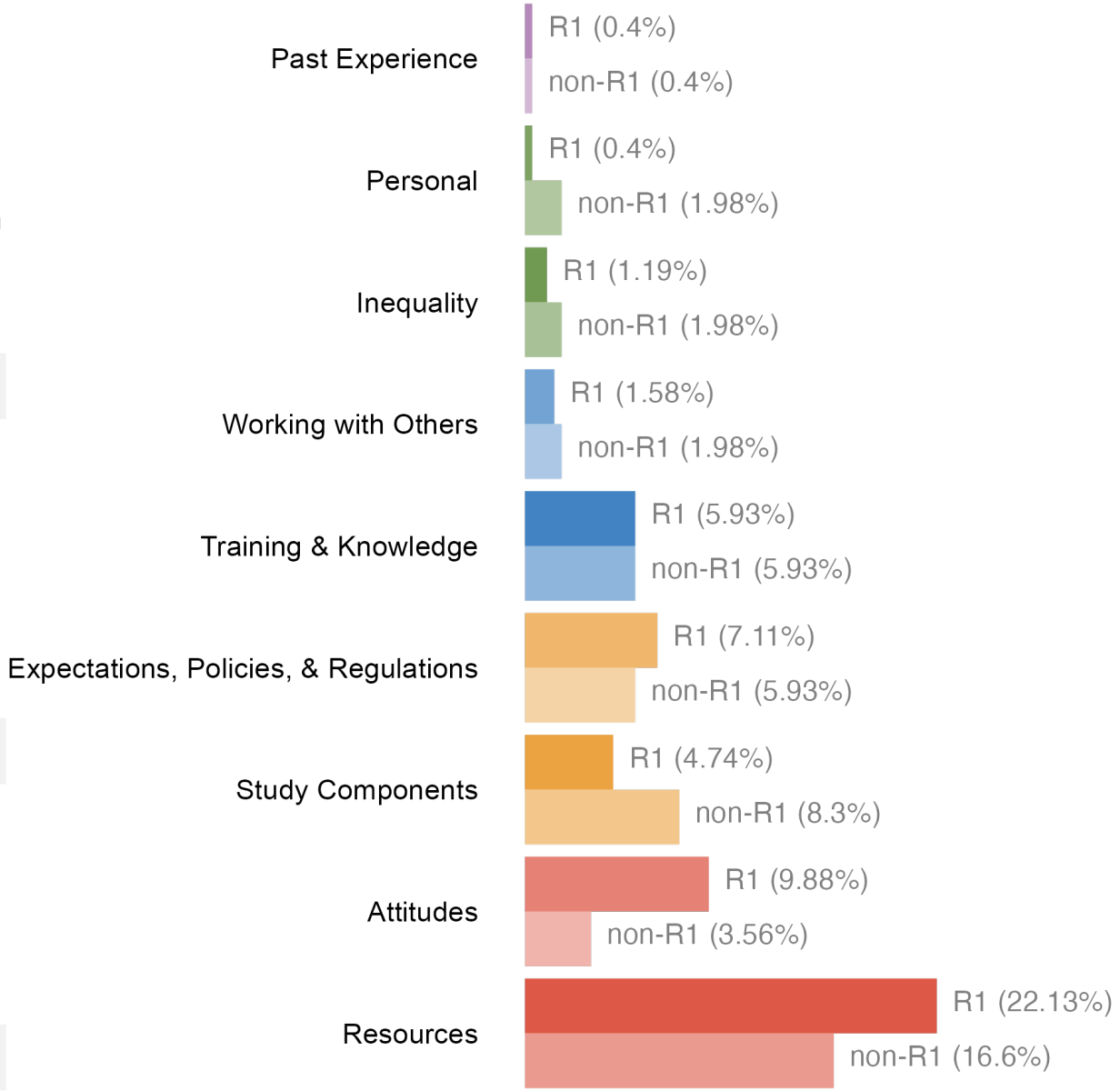
- More R1 professors expressed skepticism about the benefits (n = 7) of engaging with OS practices, often regarding it as a potential waste of resources (n = 3). A smaller number of Non-R1 professors (n = 1, n = 1) shared these concerns, particularly in the context of open access publication fees.

> **R1:** *I really think the gold open access is losing its pull because it's like, why bother if NIH accepts a preprint as evidence.*

Non-R1 professors identified more barrier/facilitators around **Study Components**.

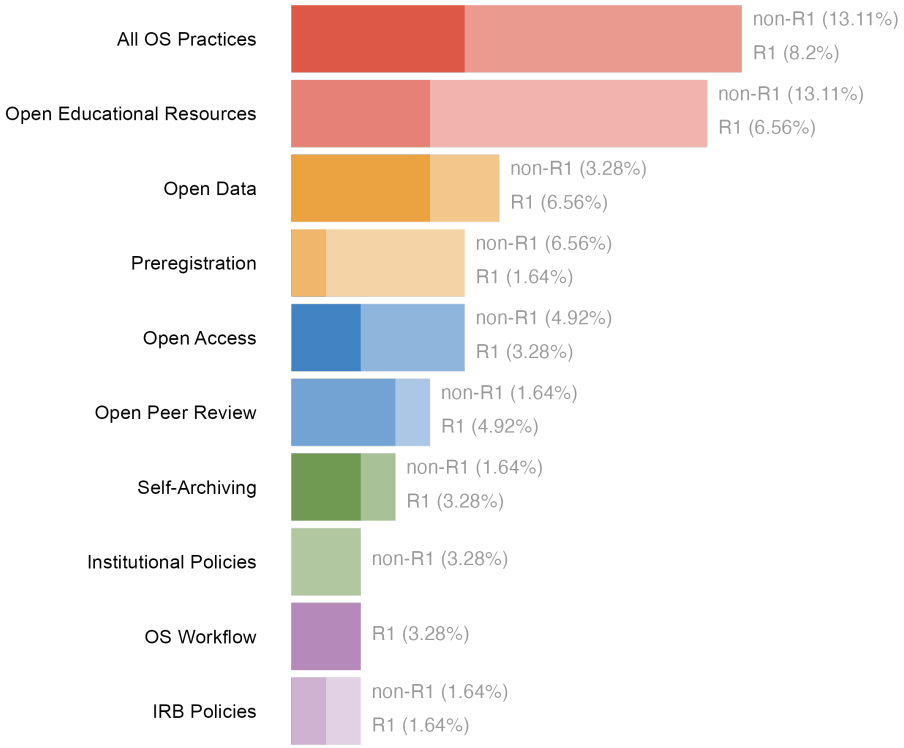
- Non-R1 professors were concerned about preregistration locking them into their analysis plan, not allowing them to change methods if needed (n = 5), while R1 professors did not express this concern (n = 0).

> **Non-R1:** *[I am] concern[ed] that my methods and analysis plan will need to shift between preregistration and publication*



Learning Preferences: What & How

What I Want to Learn About…



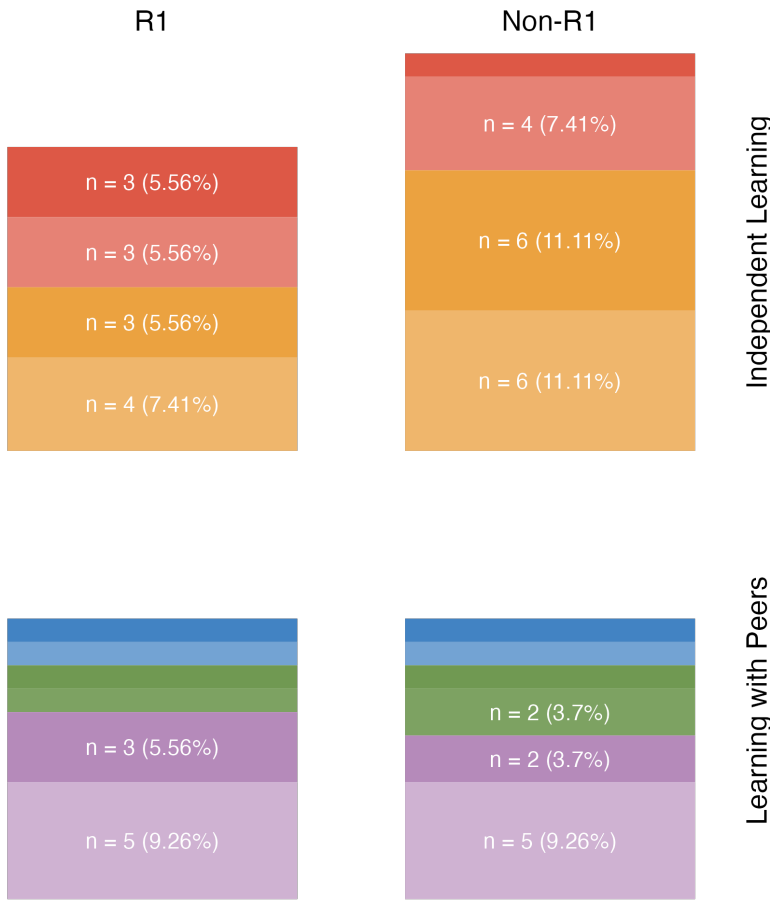
The OS practices with most interest included **Open Educational Resources** (n = 12; primarily Non-R1), **Open Data** (n = 6), **Preregistrations** (n = 5), and **Open Access** (n = 5). Although, many indicated they want to learn about them all (n = 13).

How I Want to Learn About…

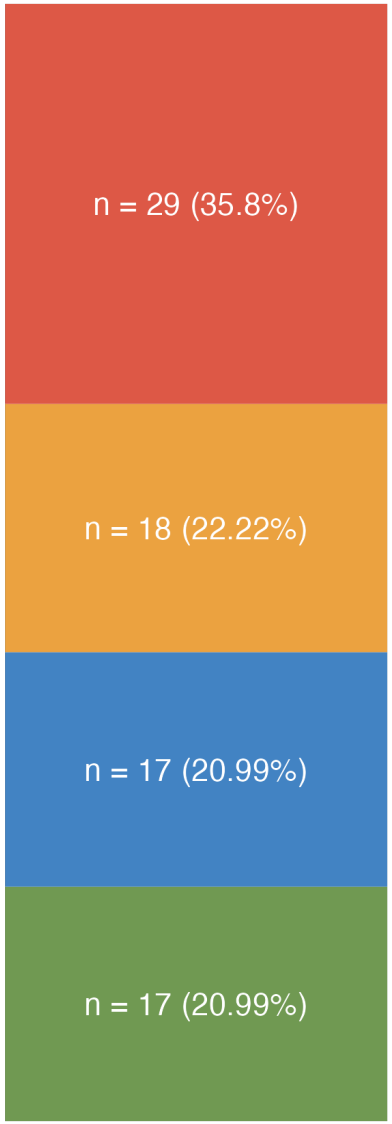
Two subcategories of learning preferences emerged: **Independent Learning** & **Learning with Others**.

Independent Learning preferences consisted of **Videos** (n = 10), **Easily Accessible** (n = 9), **short** (n = 7), and **websites** (n=4).

Learning with Others included preferences such as **Interactive** (n = 10), **Workshops/Webinars** (n = 5), **Conference Presentations** (n = 3), and **Working Groups** (n = 2), **Point of Contact** for questions (n = 2), and being **held accountable** (n = 2).



Perceived Impact of OS: All Professors



Subcategory	Examples
Career related benefits were identified as the largest potential impact of OS and included: help them **find collaborators** (n = 5)**,** impact their **teaching** (n = 5), offer some kind of **advantage** (n = 4), reach a **larger audience** (n = 4), help with **promotion & tenure** (n = 4), get **more citations** (n = 3), and be **more confident** (n = 3). However, others were **doubtful** that OS practices could help them (n = 2).	**R1:** *[Open science] gets us out of our silos. So it allows us to be more collaborative, which is very important, and it allows for also more interdisciplinary practices to happen as well.* **Non-R1:** *I use some some researchers who have put their their research data on online as a teaching tool like for case studies. So you know, it gives me access to better better teaching cases.* **Non-R1:** *But I think for me, I actually find [preregistration] a huge advantage because it really gets you set up to get ready to go.* **Non-R1:** *being able to do research that is, secondary data analysis would be really helpful for me to grow as professional and… make tenure.* **R1:** *[Open science] gives me confidence and increases the reproducibility of my own research.*
Improving the Research Process was another subcategory of perceived benefits and included getting **larger samples** (n = 7), **more research** (n = 5), more **publications** (n = 2), and more time (n = 2).	**R1:** *In our field we tend to have fairly small N studies just because of accessibility of research participants… the more that we share things openly, particularly data in that sense, it's easier to combine results from different studies to sort of answer, maybe different questions than we could answer individually in our little, you know, silos.* **Non-R1:** *I think I'd publish more with open data*
Impact on Others was another common perceived benefit of OS, and included reducing the **research-to-practice gap** (n = 6)**, benefits to research consumers/stakeholders** (n = 4)**,** encourage others to **support research** (n = 3), and have a positive **impact on the community** (n = 2).	**Non-R1:** *I would hope [open science] would also facilitate research getting to practice more quickly as clinicians could locate things without cost to themselves.* **R1:** *I've benefited from other people posting their things online. // I've definitely looked at other people's code and taken pieces of code.* **Non-R1:** *If your work is more readily accessible to the people who are directly affected by it, then that influences their perception of you, which influences their willingness to support your future research.*
Quality of Research was the final subcategory, and included increased **accessibility** (n = 5)**,** increased **transparency** (n = 5), increased **research reproducibility** (n = 3), and **increase researcher accountability** (n = 2)**.**	**Non-R1:** *[Open science] increases the accessibility, transfer, and replicability of science.* **R1:** *It seems like adding these extra steps of making what you do available to other people could improve the rigor of your own work.* **R1:** *I think [sharing code will] make the research more reproducible as well, because, even though it takes time… that code is gonna be more reproducible because you really had to think about presenting it to another audience to look at and use.*