

Open Practices of Early Career Researchers

A Qualitative Study on Research and Teaching Behavior

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Abstract

Many researchers have a positive attitude towards open science and are motivated to apply them. However, applying them requires a change in one's daily practices. Different factors might challenge a behavioral change. The introduced study wants to get deeper insights into the reasons and influences that lead early career researchers to apply open practices in their daily research and teaching work. The participatory design let ten participants choose open practices they wanted to learn and adapt in either research or teaching scenarios. The study accompanied them and collected their positive and challenging experiences via diverse methods like interviews, diary entries and workshops. This paper introduces the study design and preliminary results.

Keywords: open science practices; early career researchers; research behavior; user study

1 Problem and research question

Open science practices are the visible impact of the open science movement, which aims at opening up research and educational processes. As those practices are part of a researchers' work, many studies investigate researchers' attitudes towards open practices and their actual behavior. Topics investigated are data sharing and open data (Scherp, Siegfried, Biesenbender, & Breu-

er, 2020; Ünal, Chowdhury, Kurbanoglu, Boustany, & Walton, 2019), changes in open access publications (Bosman & Kramer, 2018; Piwowar et al., 2018), the influence of policies, e.g., in open education (Bossu & Stagg, 2018), and the influence of research communities and one's personality (Kim & Nah, 2018; Linek, Fecher, Friesike, & Hebing, 2017).

Research shows that many researchers have a positive attitude towards open science (Kramer & Bosman, 2016), although the understanding of openness differs in detail (Levin, Leonelli, Weckowska, Castle, & Dupré, 2016). However, it seems that open science practices are not yet adapted by many researchers. This discrepancy motivated the following study. Our assumption is that although researchers are motivated to apply open practices, they face challenges in adapting them to current research behavior.

This study investigates potentials and challenges of open science practices that early career researchers experience within their research and teaching in higher education. The participatory approach aimed at letting participants choose open practices they want to learn and apply, and afterward let them report on their experiences with those practices. Moreover, the study did not intend to set up an experimental design, but wanted open practices to be applied within the daily work of participants.

The following research questions will be answered in this contribution:

- Which open practices did early career researchers choose to test for which reasons?
- Which experiences did they make?

Section 2 introduces the method and study design. Section 3 discusses preliminary results and study limitations.

2 Method

2.1 Design

The study applied a participatory qualitative design and aimed to accompany participants for at least six months. The experience of open science practices was left to the participants. The participants chose practices related to aspects of openness in research and teaching, which they wanted to learn and explicitly apply within their current work. The design included an onboarding

workshop where participants chose their open practices. After this workshop, participants were prompted to write diary notes to tell about their progress of applying the new practices and personal experiences they gained with them. After this phase, participants joined a final workshop to discuss experiences among all participants. Due to Covid-19, this final workshop was held online.



Fig. 1 User study approach and time line of processes

2.2 Target group

The target group consisted of early career researchers from educational research, i. e., PhD candidates or Postdocs with a low academic age, professors

were excluded. Educational research is an interdisciplinary field, where dynamics and influences of open practices within diverse sub-fields like psychology, sociology and pedagogical research can be investigated and compared. The behavior of early career researchers is worth investigating as they are an important driver for establishing new research practices within a community. On the one hand they are motivated to become part of an established research community and gain scientific reputation. Thus, they might adopt traditional research practices that are not yet open practice. On the other hand, early career researchers are aware of digital technologies and possible open practices and might be willing to apply those (Tenopir et al., 2016). This group is in a challenging position to decide whether to apply accepted practices or change their behavior.

2.3 Adaptations made

In the first participant recruitment phase in spring 2019, we found five researchers who agreed to participate. As we aimed at having more participants, we started a second recruitment phase in autumn 2019, where we found five additional participants. Not all researchers stayed until the end of the study and engaged in diary notes. Participants were asked to engage during several months, and the experiences we got back were not satisfactory due to different reasons (participants said they had not time or forgot to make a diary entry). Thus, we slightly adapted data generation. We decided to do another interview with each participant and let them talk about their experiences, i.e., we did open interviews at the end of the study guided by the leading diary entry questions.

One participant did not answer any requests after the first interview and left the study in the second phase. Two other participants stepped out of the study when their jobs and work tasks changed and they were not able to engage in the chosen practices. Seven participants finished the study. The main data analysis is based on seven participants, although we included the interview and questionnaire data from all participants. The full process of the study design is shown in Figure 1.

2.4 Limitations

The qualitative study gives deeper insights, but is not representative for early career educational researchers in a discipline. Participants were researchers

with a positive attitude of and willingness to learn about open science. Thus, the study cannot contribute any reasons for not trying to apply open practices. Choosing diary entries seemed appropriate to directly let participants reflect on experiences. However, to get more entries and feedback, more explicit prompting would have been needed.

3 Results and discussion

Preliminary results of the first phase participants were summarized in an earlier paper (Heck & Brimiouille, 2019). The discussion of the second workshop, attended by five participants and two project team members ended in a summary report that discusses some relevant factors of open practices in research and teaching (Heck et al., 2020).

Table 1 shows all participants' demographics. All participants worked either at a German university or a research institution. Only one participant did her PhD as external candidate and worked part-time for a company. She opted out of the study when she changed jobs.

Table 1: Demographics of participants

#	Gender	Degree	Year of PhD degree/ start of PhD	Field of research
1	f	Postdoc	2019	education
2	m	Postdoc	2018	math didactics
3	m	Postdoc	2016	school education
4	f	PhD candidate	2019	education
5	f	Postdoc	2018	education
6	m	PhD candidate	2018	media education
7	f	Postdoc	2014	special needs education
8	f	PhD candidate	2013	education
9	f	Postdoc	2008	German philology
10	f	PhD candidate	2014	social sciences

Table 2 shows the answers from a short questionnaire on facets of open science and participant's awareness and knowledge of them. The answers

show a high interest in open educational practices, which is reflected in the scenarios the participants chose to apply.

Table 2: Participant answers on open science facets

Open science facets	Answers by participants ($n = 8$)		
	I heard of ...	I have experience with ...	I'd like to know about ...
open access	5	4	3
open data	4	2	5
open source	2	4	5
open peer review	2	0	7
open methodology	1	1	7
citizen science	5	1	2
open educational resources	3	5	4
open educational practices	4	0	8

The personal experiences of the participants are quite diverse – except one participant, who had not heard about open science before, the other participants heard about open science via colleagues or on workshops. The ideas of open practices differ slightly (compare Levin et al., 2016), e.g., one participant stated that open practices means not being predefined by theories but instead being open to different research approaches.

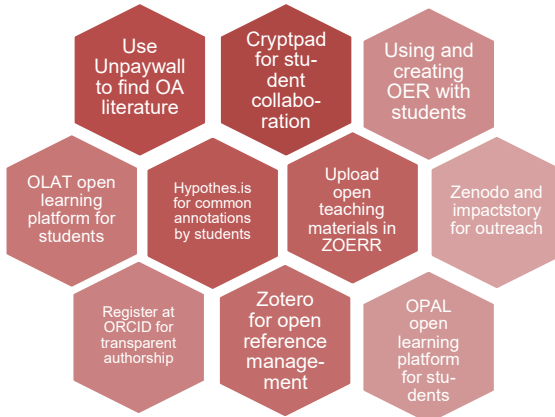


Fig. 2 Selection of open practices by participants

In most cases, participants heard of single aspects of open science like shown in Table 1. One reason is their different working tasks. For example, researchers, who are concerned with quantitative studies that generate research data reported to have heard about pre-registration and data sharing. Other researchers are in a phase where they focus on teaching and wanted to learn more about openness in education. Moreover, we could detect great differences in the participants' knowledge and use of digital tools to make resource openly available or allow collaborative editing. Two participants have more profound knowledge and engaged in open science projects, like creating open educational resources.

Open practices were discussed within the workshops and participants got shown examples on how to apply those practices with exemplary tools and services (see report on Wikiversity)¹. Each participant chose two to five open practices and Figure 2 shows a selection of those.

First results on the motivation and goals of adapting open tools and first experiences given in the diary entries during the study are summarized in Table 3. The reasons for testing open practices show two main aspects. Open driver is facilitating working and collaboration. The other driver is more ideological, e.g., participants want to apply more inclusive tools.

Table 3: Motivation and first experiences of participants for using open tools

Motivation and goals for participants to replace proprietary tools and use open online tools like pads and literature reference tool	Experiences
be more independent	strength: open tools allow location independency and are free of costs
allow for better outreach and transparency of work flows	constraint: technical difficulties with tools → lack of ease of use
improve student communication and train student to articulate themselves	challenge: students ask for more training on tools
improve collaboration among colleagues	opportunity: high acceptance among colleagues

Participants stated that the chosen digital tools were appropriate for their purpose. One participant introduced Zotero to his colleagues and reported that after a first reluctance, they accepted the new tool to share references

1 <https://de.wikiversity.org/wiki/OPER>

more easily. However, introducing online spaces for students to communicate and write collaboratively, like online pads or wikis, was more challenging in practice, as students appreciated the idea, but asked for more support to use the tools more effectively. Technical difficulties like unavailability of a service tool, are still common and narrowed the motivation to apply the open tools. Moreover, the lack of technical infrastructure was difficult: One participant gave a seminar and wanted her students to apply digital tools to commonly and synchronously write and edit texts. However, her lecture room only had one plug socket and “in the late afternoon the students’ notebooks went out of power”.

Besides those practical technical and infrastructural challenges, participant admitted that practices like applying new tools with students are more time consuming. Moreover, applying new practices need a commitment to test and implement them, like experiences with colleagues show. Convincing colleagues to rethink their practices is difficult as currently incentives are missing. However, one participant reports that he got positive feedback from his colleagues as open science expert and enables of new practices. He sees a main challenge in getting federates in one’s direct environment, who support each other in applying open practices.

Being asked about further adopting the new open practices tested after the project phase, participants answered differently with regard to the specific practices. It got obvious that practices they can adapt on their own like register one’s ORCID are easier to keep, whereas any practices where colleagues or students are involved are more complex. Applying open practices depends on the concrete context and situation and might change within different teams, research projects, and especially within education where lecturers teach diverse courses with different study levels like Bachelor and Master. Furthermore, participants stated that they are responsible for work tasks, for which they do not need open practices or open practices known are just not adaptable for those tasks. This reason was as well mentioned by the participants, who opted out of the study. Their work tasks changed and they just did not know, how they could apply any open practices in the new context. It stresses the relevant factor that open practices need to be valuable and bring a concrete benefit in a work task, like facilitate reference sharing or common text editing. The remaining participants stated they are now aware of options to apply open practices and will try to implement them as often as they can, internalizing the motto “as much openness as possible” (Heck et al., 2020).

4 Conclusion

The first conclusions of the project are:

- a) RQ1: Changing one's behavior comes with small steps. Participants chose to apply small practices like single tools in specific contexts. The reasons show that participants wanted to either facilitate specific tasks in research and education, or apply practices like using open source tools because they are free of costs and more inclusive.
- b) RQ2: Overall, open practices are being experienced as useful to improve tasks in research and foster student activities. The context and benefit for all people involved are crucial to apply them. There are still technical challenges and reluctance of other people that narrow the motivation to fully apply the new practices in the future.

In the future, we are planning a comprehensive evaluation of the results with a special focus on the potentials and challenges of open practices among early career researchers with regard to their disciplines and communities.

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