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Editorial

Bootstrapping the Open Science culture: The fellowship approach

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8 Perspectives on Open Science

The relevance of Open Science is beginning to be recognised and taken seriously by many institutions.However, research conditions often do not match Open Science principles. The establishment of Open Science policies, the development and expansion of corresponding infrastructure, as well as institutional and financial support contribute to conditions that favour the implementation of Open Science. However, there is a lack of targeted incentive and reputation systems to convince more scholars to pursue Open Science. And there is (still) a lack of competencies and routines for integrating open practices into one's own research work.

In 2016 Wikimedia Deutschland e. V. launched the Open Science Fellows Program. This program opened up a framework for learning about and trying out the methods and tools of

Open Science. With its interdisciplinary orientation, it offered a space for experimentation and discussion to learn from each other and make Open Science practical.

With the Open Science Fellows Program, Wikimedia Deutschland, the Stifterverband, the Volkswagen Foundation, and other scientific partners promoted open knowledge in research to improve the exchange of knowledge and cooperation between research and society. In each program year, experienced mentors supported up to 20 fellows from different scientific disciplines in making their work more open. The central aim of the program was to promote the gradual increase of open scholarship and to spread further the principle of collaborative work and knowledge sharing along the lines of Wikipedia. It supported the fellows over a period of eight months and consisted of four components: qualification, mentoring, financial support, and visibility and networking (Behrens et al. 2022).

After five rounds of the program, we can look back on over 90 projects that have illuminated Open Science in all its many facets and perspectives. In order to reflect on our gained knowledge and experiences, and to share insights, the idea for this collection was born and initiated by Open Science fellows and mentors.

The call for contributions to this special issue was primarily announced via the Fellows Program network, i.e., mailing lists and personal contacts. However, fellows and mentors did invite further colleagues, who participated in individual contributions. As such, the submitted contributions are only a snapshot of the work done within the program and the 90 individual projects. However, the papers do discuss relevant issues and synthesise potentials of open practices as well as challenges and hurdles in actively living them.The insights generated in these contributions can be valuable for those who want to contribute to opening up research and higher education and to fostering open practices.

The individual contributions cover a wide area of Open Science topics, covering scholarly work from perspectives such as open data, reproducibility and replicability, knowledge in/equity, open educational practices and open participatory formats.

Steinhardt and Kruschick (2022) give practical advice on knowledge in/equity and on how qualitative researchers can acknowledge equity within their research. They refer to the statements by Wikimedia and its community, which discuss aspects of knowledge in/equity within the Open Science movement. The authors discuss three main factors relevant for knowledge in/equity: the meaning of equity within research and knowledge production, the acknowledgement of those who contribute to knowledge production, and data accessibility and re-usability. Steinhardt and Kruschick share their experiences and practical handling of these factors based on two projects from the Open Science Fellows Program. Both projects show that open research is not only about the final research publication being disseminated openly, but already starts with the research design and process, where ethical aspects`and the inclusiveness and acknowledgement of study participants should be considered. Both projects show that the Open Science movement and ideas on open research itself have evolved from a narrower technical perspective concerned with digital

information accessibility to a broader perspective including research practices and researchers' attitudes towards them.

Fischer et al. (2022) approach challenges to open data from a practical perspective and with a focus on researchers who collect personal data, e.g. in qualitative studies. They discuss the practices, processes and challenges that come with sharing research data in a fair and reproducible way, based on the resources and support that already exist on research-data management. The article introduces the meaning and characteristics of open research data. It also provides steps for sharing data, referring to relevant issues in data management, data collection and data infrastructures. Based on this guidance, the authors discuss the impact of open data from three levels: societal, disciplinary and for individuals. They conclude with their personal statement that opening up data should be viewed as a default and therefore contributes to clear guidance for scholars who want to enter the field.

Investigating how practitioners implement concepts of open educational practices (OEP) in the classroom was the starting point for the autoethnographic study that Fahrer et al. (2022) describe in their paper "From Theoretical Debates to Lived Experiences: Autoethnographic Insights into Open Educational Practices in German Higher Education". They conduct a literature review to map explicit concepts of OEP, where they come up with four international and multi-perspective papers that study concepts of OEP. The authors reflect their own educational practices, i.e., their practical adaptation and implementation in learning and teaching scenarios, based on the concepts and outcomes of the chosen papers. The authors identify four core topics in their autoethnographic reflections: the role of open educational resources in OEP, participation, personal values and limitations by structures and institutions. Overall, they conclude that, in debates on OEP, "more emphasis should be placed on the contexts in which academic teaching is embedded." (Fahrer et al, 2022). The four papers on which their reflections are based are a valuable source of inspiration and a good starting point for improving one's own open teaching practices.

Rahal et al. (2022) analyse 12 Open Science Fellow Program projects regarding reproducibility and replicability (R&R). R&R are core Open Science criteria that aim at making research processes understandable, retraceable (reproducible) and repeatable (replicable), for instance with delivering open and transparent documentation of scientific processes. Due to the epistemic diversity of academic disciplines, the understanding of R&R and its concrete processes varies across disciplines. The authors qualitatively analyse projects from different disciplines, which focused on three main aspects of R&R: providing supporting infrastructures, improving methods and data, and clarifying via education and science communication. Based on their analysis, the authors contrast proven R&R practices to questionable, yet common, research practices. Although researchers face different challenges and stages of open practices regarding R&R in their disciplines, Rahal et al. (2022) emphasise the willingness and efforts of the project fellows to improve R&R processes in their disciplinary contexts. As such, they conclude that "when knowledge about open science practices [...] is systematically taught and applied, these QRPs [questionable research practices] may dramatically reduce over time, ensuring that mostly trustworthy findings find their way into the literature" (Rahal et al. 2022.

Keller et al. (2023) analyse four select Open Science Hardware (OSH) from the Fellowship project. They conclude that OSH, as an alternative to a commercial setup, not only reduces the costs, but also increases the educational value. Moreover, they elaborate that the nature of OSH increases the adaptability for specific needs and thus enables working scientists to repurpose OSH, which fosters scientific progress. Another problem that OSH solves is the limited availability of commercial scientific equipment in several global regions. Thus, OSH improves knowledge equality per se. Overall, the authors conclude that the performed OSH projects have had a significant impact, and funding schemata like the Fellowship project should be established to continue with the successful model.

Kruschick and Schoch (2023) discuss the meaning of knowledge equity and its role in Open Science, while drawing parallels to the concept of feminism. A relevant aspect is that knowledge is always embedded in power relations, which can lead to liberation, but also to domination. Moreover, knowledge and power are interdependent. Knowledge equity, in contrast to equality, acknowledges individual perspectives and contexts and should be a main aim within the Open Science movement. One area where knowledge equity within Open Science becomes relevant is science communication: “Science communicators need to be aware and develop strategies of how to reach marginalized groups” (Kruschick and Schoch 2023). Overall, the Open Science movement needs to become aware of knowledge equity. Reflecting on the Open Science Fellows Program, the authors argue that the disciplines of arts and humanities as well as qualitative research have been undermined in the program. As research discipline and practices differ and marginalization dynamics change over time, the authors call on researchers and institutions to reflect on knowledge equity in their area to be able to “actively work towards a more equitable academia and science” (Kruschick and Schoch 2023).

Serbe-Kamp et al. (2023) present two examples of how Open Science elements can be used in Citizen Science and discuss the resulting challenges, benefits and lessons learned. The projects "ERGo! An Entomology Research Tool to raise awareness of biodiversity protection" and "Die Datenlaube. A Citizen Science initiative for regional knowledge curation" represent a maximum comparison in the following aspects: natural vs. social sciences; involvement of students vs. citizens; and top-down vs. bottom-up. Through the comparison, the authors succeed in showing why Citizen Science can benefit from Open Science, e.g., in terms of transparency, equality, inclusion, extension of use and social embedding.

The starting point of Fahrenkrog et al. (2023) is that, if we want to achieve that scientists live an Open Science culture, the social practices of sharing, collaboration and communication are essential. Of course, this also applies to learning, for which methods and formats are necessary that enable participants to engage in exchange with others, to network, to compare perspectives and, moreover, to move away from a strong orientation towards content, towards a shared, collective and collaborative process-oriented engagement. The authors provide a structured overview of four open and participatory learning formats: hackathons, book sprints, barcamps and learning circles. Using practical examples, they address concrete processes, working methods, possible outcomes and challenges.

We would like to thank all those involved, who have shaped the program through their perspectives and commitment, made it visible and further developed it together with us during this time. We look back on wonderful years, in collaboration with people who have made science in all its facets more accessible and more tangible. Every single commitment has made a significant contribution to the success of this program and thus to opening up science — thank you very much!

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We wish you an exciting read!

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