From theory to practice: An empirical study on communities of practice at the intersection of science, civil society, and the arts

Ines Weigand

Abstract: The understanding of science and the knowledge landscape has undergone a continuous paradigm shift from science as an exclusive authority and institutionally protected space for the production and validation of knowledge with a high degree of autonomy, to more open and social models in which institutionalised science engages with non-scientific actors in a collaborative, reflective and transparent manner. This requires the development of interdisciplinary and participatory research and learning practices that integrate multiple perspectives and epistemologies, as advocated by the Open Science movement. Alongside these theoretical debates and reflections, communities and collectives that explore and practice new ways of learning and understanding are emerging internationally. With do-it-yourself and do-it-together biology, as well as bio-hacking, bio-making, and bio-art, there is an emerging landscape of life science initiatives with parallels to the Open Source movement, which features free software principles, hacking practices, and the potential to democratise and open up academic knowledge. This paper presents initial findings from interviews with 10 Communities of Practice in this field, analysing their knowledge practices and cultures. It concludes with an outlook theorising how academia can participate in these knowledge ecosystems, focusing primarily on the role of participatory and practice-based design research.

Keywords: open science, citizen science, communities of practice, open knowledge, science-art relations, situated knowledge, situated learning

1. Introduction

a) Complex problems and the need for new ways of knowledge production

Complex problems such as climate change and biodiversity loss are among the most pressing challenges of our time. These issues are characterised by

an unmanageable number of interacting factors that make objective and definitive answers as impossible as analysing the problems from a single perspective or discipline (Rittel & Webber, 1973). Because individual disciplines produce fragmentary views of reality, interdisciplinary and transdisciplinary approaches are required, integrating scientific disciplines with knowledge produced by non-scientific actors. This insight, and the consequent **need for transdisciplinary knowledge production and learning practices**, is now widely accepted in the scientific community, as reflected in the range of publications, discussions, and research on the subject, such as those compiled by Thorsten Philipp and Tobias Schmohl (2023) in *Handbook Transdisciplinary Learning*.

The **critique** of how **science produces** and **constitutes knowledge**, and thus a conception of reality, has not only been triggered by the recent realisation of anthropocentric climate change. This critical school of thought challenges the ontological separation of nature and culture as conceived by the academic disciplines of the natural and cultural sciences, calling for more holistic concepts that take into account the interaction between these spheres. But the critique goes back even further to the twentieth century, when the **exclusive authority** and **institutionally protected** way in which science **produces, legitimises, and validates knowledge** was criticised and the pure **objectivity** of science was questioned. Instead, the practice-philosophical turn, including feminist philosophers such as Donna Haraway, emphasised the role of **socio-cultural influences** and **practice** in producing knowledge. This included an understanding of "science and theory not as the opposite of practice, but as doing science and uncovering its power relations and hidden mechanisms" (Langemeyer & Zimpelmann, 2023, p. 248). Further concepts, such as that of **situated knowledge**, as described by Donna Haraway in 1988, emphasise that knowledge becomes effective in situated local contexts; it is always socially mediated and should be critically explored in relation to the context in which it is produced (Haraway, 1988).

Thus, the traditional ways of producing knowledge through academic disciplines, their respective epistemologies and exclusively within academic institutions have been increasingly challenged and concepts such as Michael Gibbons' **Mode 2 of knowledge production** (1994) have gained popularity. This mode describes an alternative concept of knowledge production that goes beyond the traditional academic framework and recognises different forms of knowledge. In contrast to the traditional Mode 1, which is hierarchical, disciplinary, homogeneous and strongly academic,

with a clear separation between scientific professionals and social actors, Mode 2 is **transdisciplinary, heterogeneous,** and **anti-hierarchical**. It takes place in an **applied context** and involves **non-academic actors** in the knowledge production process (Gibbons et al., 1994) with a **rhizomatic** and **network-like structure** (Nowotny, 1999). In this context, science "does not stand outside society and distribute its gifts of knowledge and wisdom" (Gibbons et al. 1994, p. 22) nor can it be seen as an autonomous space separate from the rest of society. Rather, these spheres are interdependent; non-scientific modalities of knowledge production are combined into scientific knowledge as a result of transdisciplinary cooperation.

The concern to make the institutionalised boundaries of science more permeable has been put into practice by the **Open Science movement**, which aims to make science more **open, transdisciplinary and application-oriented** and to promote collaboration and dialogue with knowledge practices outside of science, as described in Mode 2 of knowledge production. While there is no precise definition of the term that reflects the diversity of activities and perspectives of Open Science – it is more of an umbrella term that encompasses "a multitude of assumptions about the future of knowledge creation and dissemination" (Fecher & Friesike, 2014, p. 17) – there are some characteristic commonalities of Open Science collected and structured in a 2014 literature review authored by Fecher and Friesike: first, concerns about the exclusive infrastructure of science and efforts to open up and share technological resources (e.g. collaboration platforms and tools); second, a commitment to expanding access to knowledge creation beyond professionals (e.g. citizen science); and third, considerations of alternative impact assessments (e.g. peer review); and finally, advocacy for expanded access to knowledge itself (e.g. open access, intellectual property rights) and for collaborative research (e.g. open data).

This brief overview highlights a significant shift in how we understand the knowledge landscape and the role of science. Traditionally, science and academia operated as exclusive authorities with a high degree of autonomy, serving as institutionally protected spaces for the production and validation of knowledge. However, this paradigm has evolved towards more open and collaborative models, where science actively engages with non-scientific actors and incorporates their knowledge. This new approach emphasises collaboration, reflection, and transparency in scientific practices, requiring transdisciplinary and participatory forms of research and learning practices that integrate multiple perspectives and epistemologies.

b) Practicing the debate: new ways of learning and understanding

Alongside these ongoing theoretical debates, reflections and analyses, communities and collectives are emerging around the world to explore and practice new ways of learning, understanding and being to address life science-related anthropogenic challenges. With **do-it-yourself** and **do-it-together biology, bio-making** and **bio-hacking**, but also through the integration of artistic and design approaches, there is an emerging landscape of life science-related initiatives with parallels to the **Open Source movement**, which features free software principles and hacking practices as well as the potential to **democratise** and **open up** life sciences and biotechnology (Delfanti, 2013). The Community Biotechnology Initiative considers its common purpose as follows:

> Fundamentally transform life sciences & democratize biotechnology to inspire creativity and
> improve lives by organizing life science change-makers and bioenthusiasts to build an inclusive global
> network, cultivate an accessible commons of knowledge and resources, launch community labs and
> projects, and enable local educators. (The Community Biotechnology Initiative, 2018, Statement of Shared Purpose 3.0, para. 2)

While the Community Biotechnology Initiative (2018) has already defined itself as a movement by identifying its shared purpose and values, further initiatives and collectives can be found in the broader field of creative biology, biotechnology, and ecology that build open learning environments that blur the boundaries between disciplines and actors. This includes initiatives such as the Floating ~~University~~, a NatureCulture learning site in the heart of Berlin that revolves around a water retention basin, or DIY Hack the Panke, a collective that explores Berlin's Panke River using transdisciplinary methods. New languages of practice are being tested here, a "practice that negates the institutional way of doing things, challenges the need for unified transparencies of meaning, elaborates on processes of making and thinking together and frees spaces in the city to do so collectively" (Karjevsky, 2019, abstract). These initiatives can be classified as **Communities of Practice (COP)**, defined by Etienne and Beverly Wenger-Trayer (2015) as a group of people "who share a concern or passion for something they do and learn how to do it better by interacting regularly" (p.2). In this way, these communities situate knowledge production and

learning in the context of **social relations**, highlighting the **importance of communities** in the production and negotiation of knowledge. In doing so, they translate the principles of **collaboration** and **openness** into the **production and distribution of knowledge, infrastructure**, and **resources** that transcend traditional academic boundaries.

This paper is dedicated to such COP and draws on insights from interviews that were conducted with 10 COP over nine months within the Research Group Design, Diversity and New Commons at the Weizenbaum Institute and the University of the Arts in Berlin. This research group explores and develops **new forms of transdisciplinary and interdisciplinary research** that integrate different actors and knowledge cultures into the research process through **design methods**. As described, transdisciplinary and participatory forms of research and learning practices that integrate multiple perspectives and knowledge cultures are seen as essential to support new approaches to tackling societal and environmental problems.

What kind of learning and research practices and environments already exist beyond academia? What characterises their practice, and how can academia fruitfully interact with them? The paper aims to contribute to this discussion by exploring the **ecosystems** that these COP build and analysing their **knowledge cultures, (infra)structures** and **practices**. It also aims to raise awareness within academia of existing practices and communities that are outside academia and therefore may not be seen.

2. Method

To explore these questions, 10 interviews were conducted with COP. The focus was on the motivation, agenda and history behind the projects, the understanding and role of communities and networks, and practices and methods that proved valuable or challenging. The interviews lasted between 45 and 60 minutes, took place with one or two people at a time, were recorded and transcribed Clean Verbatim, and were finally coded thematically using qualitative content analysis according to Mayring (2022). The interviewees were the initiators or directors in eight cases, and members of the projects in the remaining two. This was because the groups were often self-organised in organically growing networks without strong hierarchies; there was not always one person who could be identified as the director or head of the group.

All the interviewed COP are challenging academic structures of knowledge production and dissemination by pursuing an activist agenda by opening up and democratising processes of knowledge creation and dissemination, involving multiple actors, perspectives and epistemologies in a low-threshold collaborative learning process. All communities were dedicated to the life sciences (i.e. they worked with biological or ecological knowledge, issues and materials, and related anthropocentric challenges). Representatives of the following initiatives were interviewed:

1) Open Wetlab of the Waag Futurelab: A laboratory for bio-design, bio-art and do-it-together biology in Amsterdam, the Netherlands, that explores biotechnologies and their impact on society and ecology.
2) Top e. V.: An association around an open lab in Berlin that reimagines the laboratory as a shared space and aims to demystify biology and radically lower the barrier to participation in modern bioscience, enabling everyone to innovate and explore through do-it-yourself biology.
3) WoeLab: A free laboratory for social and technological innovation in Lomé, Togo, addressing various urban issues such as waste management, as well as food and energy resources, using a collective approach.
4) Art Laboratory Berlin: A research platform in Berlin that bridges the gap between science, art, design and the public, offering various formats of citizen science.
5) Floating e. V.: A self-organised space and group that revolves around a water retention basin in Berlin, the Floating ~~University~~, where practitioners from diverse backgrounds meet to collaborate, co-create and imaginatively work towards the future.
6) Mediamatic: An art centre in Amsterdam, the Netherlands, that focuses on nature, biotechnology and art+science in an international network and organises lectures, workshops, and art projects for the general public.
7) Symbiotic Lab: A collective in Berlin that works through design and art to make ecological issues and concerns accessible, focusing on aesthetic and participatory approaches.
8) OpenLabBrussels: A lab at the Erasmus Brussels University of Applied Sciences and Arts in Belgium that regularly opens its doors to allow anyone interested in biomedical sciences to set up research projects, making biotechnology as accessible as possible to a diverse audience.

9) DIY Hack the Panke: An art-science collective that uses transdisciplinary methods to explore Berlin's Panke River with the public, co-organised with Art Laboratory Berlin.
10) MY-CO-X: A Berlin-based interdisciplinary art-science collective of artists, architects and fungal biotechnologists that enables an artistic-scientific discussion about the future social significance of fungi.

The initiatives were linked in various ways, creating a network of collaboration across national borders and institutions. For example, the citizen science project Mind the Fungi, a cooperation between the Institute of Biotechnology at the TU Berlin and the Art Laboratory Berlin between 2018 and 2020, extended scientific research with artistic and design-based research and worked on the development of new ideas and technologies for fungal and lichen-based materials (Art Laboratory Berlin, 2020). They involved various actors from the COP, such as Regine Rapp and Christian de Lutz (Directors of Art Laboratory Berlin), Vera Meyer (co-initiator of MY-CO-X, in the project in her role as Head of Applied and Molecular Microbiology at the TU Berlin), Fara Peluso (member of DIY Hack the Panke), and Alessandro Volpato (member of Top e. V.). Given this network configuration, the selection process of the communities was often guided by their mutual collaboration. Often, one interview led to another by following up on projects they had undertaken together.

Although the communities differed significantly in some respects, such as the extent to which their practice was informed by critical theory, how closely they were linked to academic structures or how strongly they pursued the idea of a laboratory, the interviews revealed some underlying common principles of their work. To identify them, the content was coded following inductive category formation based on Mayring's (2022) qualitative content analysis. The interpretative categories that emerged are outlined in the next chapter. The relationship with academia is described first followed by a more detailed discussion of the principles of their work. Finally in the conclusion, the findings are placed in a theoretical context, and an outlook is given on how these communities and academia might work together and what role participatory and practice-based design research can play in this.

3. Empirical study

a) Relationship with academia and its institutions

The relationship between the initiatives studied and the institutionalised academic world proved to be complex and ambivalent, both in terms of the focus on academic knowledge itself and the interaction with the structures of the academic system. While academic knowledge is an important basis for many of the projects, and many of the interviewees had an academic background or even worked in academia, all projects were characterised by a desire to break out of academic structures.

Frustration was expressed by the COP regarding the funding system behind academic knowledge, which directs and disciplines research and decides what counts as research or science in general and what does not: "The struggle is related to the pressure to produce results that appeal to funders and institutions [...] It's the way of what kind of output you consider valuable to be output in general" (T. Peeters, initiator of OpenLab-Brussels, personal communication, November 20, 2023). There was also criticism of the linear, categorising and structured division of work and methods required in funding project proposals, which contrasted with the open-ended and process-oriented work of the communities. Role conflicts were described in relation to both funding and the academic structures themselves, the categorisation of which “scientists” and “non-scientists” had previously failed to capture: "What defines the citizen scientist? If an artist leads a workshop through the forest to get materials for the scientists [...] does that count too?" (C. de Lutz, Co-Director of Art Laboratory Berlin, personal communication, March 11, 2024). Other organisations recognised the need for academia to differentiate itself from other methods and actors behind the term citizen science, problematising the authority to define citizen science: "Science comes from academia, but from our point of view it's do-it-yourself science, the initiative comes from yourself, so we don't have the problem of defining citizen scientists or citizen science – academia has the problem of defining it" (A. Volpato, member of Top e. V., personal communication, July 10, 2023).

Another issue related to the relationship with institutions was also the dependence on academic institutions for equipment and technology that was donated or borrowed from institutions as it exceeded the financial means of the projects and initiatives.

b) Crossing borders: transdisciplinarity and art-science collaborations

All initiatives highlighted transdisciplinary collaborations, especially those involving artistic and design approaches and methods – that is, collaborations that go beyond the use of artistic approaches to science communication (e.g. information visualisation) but are conceived as an epistemological practice. Different aspects were identified as benefits. In one respect, the ability of the arts to critically reflect and question knowledge introduces a more social and personal view of the conditions and consequences of scientific knowledge and shifts the boundaries of science to include political and activist perspectives: "Artists look at working with living matter in a fundamentally different way, their interest often goes to the ethical, whereas in science, because there are high expectations of science, it has to move forward" (L. Evers, Head of Open Wetlab and Make programme at Waag Futurelab, personal communication, November 24, 2023). The same applies to an experiential and sensual approach to issues. An experience-based and self-reflexive approach cannot be achieved with purely scientific procedures, the latter blocking access to certain types of knowledge. Artistic and design approaches have been able to make knowledge tangible and experienceable. For example, the temperature-insulating properties of fungal materials could be experienced directly through designed artefacts, which could only later be proven by scientific methods. In addition, the freedom of artistic approaches to take unconventional paths and the permission to have a personal research position to work on and explore issues was valued: "Artists are allowed to have a personal research position and way of working, whereas science is bound to more methodological ways of producing knowledge" (L. Evers, Head of Open Wetlab and Make programme at Waag Futurelab, personal communication, November 24, 2023).

Another obstacle to cooperation between the arts and sciences could be observed in differing ideas about working standards. Conflicting ideas about methods, work processes and the measurability of results can be debilitating as these factors have an impact on the funding of projects. To obtain project funding, working methods, work and project plans, and measures and milestones often have to be described and defined in detail in advance in applications, which contradicts the open, experimental and critical approach of artistic work.

The lack of institutional interfaces between science and art was cited as a further obstacle. This deficit requires a particularly high level of personal motivation and effort on the part of those involved as well as an active

search for suitable actors to collaborate with: "They were completely off the radar of the scientific community because art and design publish in their journals or in their media and exhibitions" (V. Meyer, co-initiator of MY-CO-X, personal communication, November 10, 2023).

Other challenges mentioned were related to semantic issues, such as finding a common meaning of vocabulary to avoid misunderstandings and promote effective communication.

c) Co-creation, community learning and networks

The communities and networks that expressed the underlying principle of co-creation and engagement with others were seen as essential to the initiatives. Most of the initiatives were based on emerging or existing communities. These groups formed organically over time, usually based on individual projects and collaborations that led to further plans and projects, often resulting in the formation of whole ecosystems of actors. Informal bottom-up networking was successful, while top-down approaches to 'force' a community or network often failed. It was notable that the language used to describe these processes of networking and self-organisation repeatedly drew on biological and ecological terminology, reflecting the organic dynamics of the structures, agendas, and concerns that the communities were dealing with.

Diverse and non-hierarchical collectives, where the group rather than the individual comes to the fore and takes the lead, were described as enriching:

> To work in a collective where you hand over responsibility [...] suddenly everyone brings their own ideas or everyone is always thinking along with you, which suddenly opens up possibilities that weren't even on your radar before. If you only do it from one discipline, you miss things. (V. Meyer, co-initiator of MY-CO-X, personal communication, November 10, 2023)

It was also seen as valuable if the community participants themselves came from different backgrounds and were willing to combine and share these experiences. These backgrounds need not be disciplinary and could represent other dimensions of diversity, such as different age groups. Some of the initiatives, such as the SymbioticLab or DIY Hack the Panke, also extended the traditional community or actor concept to non-human actors

and explored approaches to giving them a voice in their processes, for instance integrating the Spree or Panke rivers in Berlin as actors.

Within the communities, the common agenda and ways of working together were negotiated in ongoing processes of dialogue. Again, the fluid and organic nature of constant change and negotiation within the communities – as well as the testing of new constitutions – was emphasised, including spatial aspects such as the water retention basin in the Floating ~~University~~, the Spree for the SymbioticLab or the Panke River in the DIY Hack the Panke project. The constant transformation of the group and the network was concomitant with a transformation of the space and its actors.

d) Openness and accessibility: do-it-yourself and do-it-together

As the academic world is often criticised for its inaccessibility, the issue of access and openness plays an important role in the initiatives. The COP attempted to create openness by making their structures, processes and places transparent and freely accessible (i.e. welcoming to participate in the projects and join the communities), thus following a do-it-together approach. In addition, most of the COP had a strong focus on participatory activities, such as workshops, meet-ups, exhibitions, and lectures, to encourage public involvement in project discourse. Some projects, such as the Waag Futurelab, offer course formats, such as the BioHack Academy, where individuals can learn how to design, grow, and extract biomaterials using only Open Source hardware.

The do-it-yourself approach was also emphasised; many initiatives provided low-threshold access to scientific topics, contributing to the demystification of scientific knowledge:

> That's why I started this, to make biology accessible to more people. I never did a PCR [Polymerase Chain Reaction] when I was at school, and they still hardly do it. I think that's crazy. I think they should be able to do it when they're 16. (T. Peeters, initiator of OpenLabBrussels, personal communication, November 20, 2023)

The do-it-yourself approach also played a role in keeping costs down and strengthening self-empowerment and independent as well as self-directed learning: "I think that's the value of do-it-yourself biology [...] it shows you the possibilities to get involved and also if you can open something up

and build it yourself, you own it" (T. Peeters, initiator of OpenLabBrussels, personal communication, November 20, 2023).

e) Situating the practice: site-specific and practice-based work

The COP were characterised by their practice-based, material-oriented, and site-specific work. On the one hand, site-specific and space-specific work expressed itself in the evaluation of the site as a place of interest, in which conditions, situatedness, and materials were salient. Common space was also seen as important; in common places, different activities can take place side-by-side, and actors could connect with and be inspired by one other: "Co-working space where people share their knowledge, this is very important to also have co-working spaces to share knowledge, not only experience but also different kind of knowledge" (M. Gapševičius, member of Top e. V., personal communication, July 10, 2023).

It was mentioned that the location should be neutral and not be primarily populated by one discipline or one institution:

> We know that universities have to follow certain structures, but what if members of a team decide to work in less closed environments? Then I think the opportunities are interesting and innovative, therefore it is possible. Of course, protocols and rules shouldn't be excluded, especially in a scientific environment and when working for the safety of everyone, but it is also worth considering those invisible structures that people create among themselves. (F. Peluso, member of DIY Hack the Panke, personal communication, November 13, 2023)

Practice played an important role for the communities as they sought to bridge theoretical discourses with material realities, emphasising the importance of working with the materials themselves to bring theories to life:

> They [the philosophers] do it in the theoretical but they haven't come back to the practical [...] in the case of Haraway I think it's really strong because I don't think she builds enough on her biological background. So sometimes when she writes about it, she's talking about something that doesn't quite make sense on the scientific side. And so, there's this interesting split. They're talking about science, but from a meta-level, and they're not really doing it anymore. [...] And the artists we've worked with, on the one hand, they're really interested in the posthumanism and new materialism [...] but they also go into the labs [...] The work they

make has to function. (C. de Lutz, Co-Director of Art Laboratory Berlin, personal communication, March 11, 2024)

Practical experience can therefore be seen as essential for community knowledge building.

4. Discussion and outlook

As described previously, in light of the complexities of our time, there is a growing demand for recognition of and collaboration with **different forms of knowledge** and **knowledge production**. This paper began by exploring reflections and concepts that challenge and extend traditional notions of scientific knowledge production, starting with the practice-philosophical turn that emphasises the roles of **socio-cultural influences practice** in producing knowledge. Concepts such **as Mode 2 of knowledge production** and the **Open Science movement** were additionally introduced. These concepts critically reflect how science produces knowledge and thus a construction of reality. They aim to open the exclusive, disciplinary, and linear structures of scientific knowledge production by seeking more **trans-disciplinary, open, anti-hierarchical, social,** and **heterogeneous modes** of **knowledge production, research** and **learning environments**. A central principle is the appreciation of other forms of knowledge beyond the academic system and bringing academic knowledge more into dialogue with non-academic actors and social contexts.

The interviews with the 10 concrete COP showed that most of these aspects applied to the lived practice of these collectives. They were characterised by **heterogeneous groups of actors** with **different knowledge backgrounds** who came together to share their knowledge in **situational contexts** beyond academia and negotiated their agendas **autonomously** and **democratically.** In doing so, they put into practice **contemporary theories of knowledge production** and tested **new forms of methodologies** that go beyond traditional academic disciplines to include, among others, artistic and design approaches and methods. By involving places, collectives, and even non-human actors such as the Spree or the Panke rivers, the communities **locate, situate**, and **negotiate** their knowledge, combining **knowledge production** with **social** and **sustainability aspects**. Their **open** and **experimental** way of working, as well as the freedom to create their own working spaces, where no paradigm has been established, was described as enriching and important for their activities. Inclusivity

and accessibility were created at different levels: the **openness** and **accessibility of the communities and sites** to interested parties, **do-it-yourself** and **do-it-together** approaches as well as **artistic methods**, and the provision and publication of knowledge under **open licenses** and **protocols**.

However, the very aspects that are described as positive also pose difficulties in terms of working with academia. **Funding structures** create challenges as they do not support the open, fluid, and hybrid ways in which the COP work, instead demanding a planned methodological approach, rigid roles, measurable and evaluable outcomes, and usability of results. This puts pressure on communities to institutionalise themselves in some way. Furthermore, the **inaccessibility of academic spaces,** such as laboratories, and the lack of **recognition as an independent form of knowledge production** beyond the function of transfer and dissemination were mentioned as challenges.

How can these barriers and obstacles be overcome now that they are conscious and articulated? How can collaboration between academia and these communities be mutually fruitful, and what is the responsibility of academia to ensure that this happens?

The network-like structures of the communities form an open knowledge ecosystem that can be understood as a "metabolism of knowledge" (Meyer & Rapp, 2020), reminiscent of the rhizome metaphor of Mode 2 of knowledge production. As described, such networks cannot simply be established and designed from the top down; they require sensitivity, time and forms of cultivation, as well as personal commitment to organic growth. Academia should see itself as part of this knowledge metabolism if it is to continue to meet the demand for openness and inclusiveness. The mutual encounter should take place in a respectful dialogue at eye level, by integrating **do-it-together practices** and by leaving space for an agenda that is not framed only by academia. This also requires the creation of **opportunities for funding** and **collaboration**, as well as **access to academic facilities** such as laboratories. Academia must recognise and acknowledge that this landscape is not neutral; rather, it is shaped by power dynamics that influence various positions within these structures. It must also clarify its role by **reflecting on the standpoint** from which it speaks.

Integrating **different perspectives** and **epistemologies**, emphasising the **role of practice,** and developing new types of **transdisciplinary knowledge networks** has always been part of **design research**, as it has always interacted with other disciplines and actors and mixed their methods and knowledge cultures (Mareis, 2014). As an "emerging discipline or trans-dis-

cipline" (Joost et al., 2016, p. 7), design can build bridges between knowledge cultures and epistemologies and democratise the process of knowledge production by involving multiple actors in research through do-it-together practices. These aspects can also be found in **space offers**, such as the **Berlin Open Lab,** initiated by the University of the Arts Berlin in cooperation with the Technical University Berlin, that serves as an **experimental space for transdisciplinary research** at the intersection of **technology, society and art**, located on the Campus Charlottenburg. With its project space **Critical Inquiry + Design,** the space is a "transdisciplinary and trans-university terrain that attempts to blur the boundaries of theory and practice, academia and activism, and science and civil society" (Christensen & Conradi, 2024). In doing so it explores new forms of knowledge production that share the means and values of the communities interviewed and aims to integrate a variety of perspectives beyond academia into research, strengthening the role of practice to open up new avenues of transdisciplinary understanding. Further research builds on these aspects by exploring how practice-based design research methods can integrate critical theory and scientific knowledge cultures, making them accessible through a personalised experiential learning approach.

References

Art Laboratory Berlin. (2020). *Mind the Fungi*. https://artlaboratory-berlin.org/de/forschung/mind-the-fungi/

Christensen, M., & Conradi F. (2024). *Design/Research*. https://conradichristensen.eu/

Community Biotechnology Initiative. (2018). *Statement of Shared Purpose 3.0.* Global Community Bio Summit 2018. https://www.biosummit.org/statement-of-shared-purpose

Delfanti, A. (2013). *Biohackers: The Politics of Open Science*. Pluto Press.

Fecher, B., & Friesike, S. (2013). *Open Science: One Term, Five Schools of Thought.* RatSWD Working Paper, No. 218. Rat für Sozial- und Wirtschaftsdaten (RatSWD). https://hdl.handle.net/10419/75332

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. (1994). *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies.* Sage Publications.

Haraway, D. (1988). Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective. *Feminist Studies*, *14*(3), 575–599. https://doi.org/10.2307/3178066

Joost, G., Bredies, K., Christensen, M., Conradi, F., & Unteidig, A. (Eds.). (2016). *Design as research: Positions, arguments, perspectives*. Birkhäuser.

Karjevsky, G. (Ed.) (2019). *VOILÀ, IT'S NOT FLOATING AND IT'S NOT A UNIVERSITY!: A conversation between members of a non-institution*. Floating ~~University~~. https://floating-berlin.org/voila-its-not-floating-and-its-not-a-university/

Langemeyer, I., & Zimpelmann, E. (2023). Mode 2. In T. Philipp & T. Schmohl (Hrsg.), *Handbook Transdisciplinary Learning* (pp. 245-257). Transcript Verlag.

Mareis, C. (2014). *Theorien des Designs zur Einführung*. Junius Verlag GmbH.

Mayring, P. (2022). *Qualitative Inhaltsanalyse. Grundlagen und Techniken* (13. Neuausgabe). Beltz.

Meyer, V., & Rapp, R. (Eds.) (2020). *Mind the Fungi*. Universitätsverlag der TU Berlin. https://doi.org/10.14279/depositonce-10350

Nowotny, H. (1999). *Es ist so. Es könnte auch anders sein*. Suhrkamp.

Philipp, T., & Schmohl, T. (Eds.). (2023). *Handbook Transdisciplinary Learning*. Transcript.

Rittel, H.W.J., & Webber, M. M. (1973). Dilemmas in a General Theory of Planning. *Policy Sciences, 4*(2), 155-169. https://doi.org/10.1007/BF01405730

Wenger-Trayner, B., & Wenger-Trayner, E. (2015, June). *Communities of practice: a brief overview of the concept and its uses.* https://wenger-trayner.com/introduction-to-communities-of-practice/