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METHODS FOR INTER- AND TRANSDISCIPLINARY RESEARCH AND LEARNING BASED ON PAULO FREIRE

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The Semantics of Transformation: Conceptual Work for Inter- and Transdisciplinary Research based on Paulo Freire's Approach to Literacy[1]

Abstract *As collaborative and boundary-crossing forms of research, inter- and transdisciplinarity hold great potential to reframe and rename phenomena or problems that cannot be fully understood within individual perspectives. Nevertheless, a common problem within heterogeneous teams is creating mutual understanding of different concepts, perspectives and bodies of knowledge. This is particularly the case when tackling highly normative subjects, as is the case within sustainability sciences. In this contribution, we analyse the principles and practices behind Paulo Freire's approach to literacy and explore their potential to develop integrative methods for conceptual work in inter- and transdisciplinary research. We identify three principles in his epistemology (words as generative, knowledge as dialogue and naming as political) and discuss how they address not just technical, but relational and political dimensions of conceptual work. We use the example of creating a joint glossary to illustrate how the principles can be operationalised.*

Keywords *Knowledge integration, mutual understanding, dialogue, sustainability, normativity*

1. Introduction

The practice of inter- and transdisciplinary research involves revisiting, resignifying and redefining concepts and terminology (Klein 2017). However, collaboration across disciplines poses significant challenges, such as finding common ground when different logics and languages are involved, as well as achieving mutual understanding for the different ways

of framing and naming the envisioned phenomena or problems (Boix Mansilla et al. 2016; Pennington et al. 2016b; Freeth/Caniglia 2019). Thus, conceptual work requires not only exchange and clarification of terms, but a process of negotiation of meanings (Roux et al. 2006; Jeffrey 2003; Bergmann et al. 2012; Klein 2000).

Despite its importance, conceptual work remains an underestimated task (Strasser et al. 2014). Even large projects with a focus on integration do not necessarily incorporate conceptual work explicitly into research design (Hoffmann et al. 2017). To the authors' knowledge there has not yet been an extensive elaboration of formalised methods for conceptual work in the literature of inter- and transdisciplinarity. This can be due to various reasons. One is that the theoretical conceptualisation and methodological development of conceptual work is not considered necessary because it happens informally (Jeffrey 2003). Another is the relative youth of inter- and transdisciplinary research, still in the process of defining its own epistemological and methodological principles and foundations (Frodeman et al. 2017; Regeer/Bunders 2003; Bergmann et al. 2012; Lang et al. 2012). Yet another is that the task as such is unfeasible within the prevailing research paradigms, due to its normativity.

Normativity is an inherent challenge of cross-disciplinary research, both for interdisciplinary research seeking to integrate disciplinary approaches, and transdisciplinary research bridging the science-society interface (Klein 2017). This is particularly the case for sustainability science, with explicit normative goals at its core (Dixon/Fallon 1989; Spangenberg 2011; Boda/Faran 2018). Calls for transformative research point out the need for approaches that pay attention to normative aspects such as participation, reflexivity and power relations (O'Brien 2011; Schneidewind et al. 2016; Fritz/Meinherz 2020). This requires integrative epistemological approaches as well as new method development (Wiek/Lang 2016). In this paper, we explore the potential of Freire's approach to literacy as a form of inquiry that can provide the epistemological foundation for conducting transformative conceptual work and developing research methods for this purpose.

We draw attention to a very basic practice of conceptual work that was established by Paulo Freire as an approach to literacy, one that considers

literacy as an ability "to read and to write the world" (Freire/Macedo 1987: 34). Within Freirean thought, words are the point of departure for individual and collective transformation. It is through words that we name the world, engaging in a collective act of meaning making through dialogue: in naming the world, we make it accessible, and define our relationship to it. Freire's literacy project started with the rural population of his native Brazil, under conditions of political oppression, and was purposed to return a 'voice' to the oppressed of the world (Gerhardt 1993). His transformative approach has informed Participatory Action Research (Fals-Borda 1987; Knapp et al. 2019) and is also situated amongst key transformative learning theories (Taylor 2008). He has had a wide influence on Latin American thought and pedagogical approaches (Gadotti et al. 2003) and has strongly influenced development work and discourses (Gadotti/Torres 2009). However, references to Freire's work are an exception within German- and English-speaking sustainability transformation discourses (O'Brien 2011) and principles of his work are yet to be systematically incorporated into collaborative scientific research practices.

The objectives of this paper are threefold. First, to advance the systematisation of conceptual work in inter- and transdisciplinary research, particularly in highly normative fields such as sustainability. Second, to demonstrate how Freirean epistemology and methodology can inform method development that supports the transformative ambitions of conceptual work. Third, to contribute to a broader discussion of method development within cross-disciplinary research.

The paper is organised as follows: we first attempt to formalise conceptual work, by exploring the role of concepts in research, and outlining challenges and characteristics in inter- and transdisciplinary research. This allows us to identify dimensions of conceptual work and elaborate a working definition. In the following two sections, we focus on Freire's approach to literacy: first, we identify three epistemic principles and discuss how they might inform the implementation of our working definition of concept work. Then, we describe how he realised his approach in the format of culture circles and illustrate how this may be translated into a glossary process within an interdisciplinary team. We follow with a discussion on method development in cross-disciplinary research and conclude

by outlining potential and limitations for future research. This research is designed to address the needs of inter- and transdisciplinary scholarship in the field of sustainability science. Because of this focus, it also speaks to the broader research community interested in cross-disciplinary ventures.

2. Formalising conceptual work

In the following, we sketch out the role of concepts in research across several disciplines and draw out the main discussions and open questions around the relationship between concept, method and research. We then bring our focus to inter- and transdisciplinary research in the sustainability arena, in particular the relationship between concepts and integration methods. We draw from this literature to elaborate a systematic overview of the integrative functions of conceptual work within this field, and propose a working definition.

2.1 The role of concepts in research

The concept of 'concept' has so far eluded a clear cross-disciplinary definition (Jackendoff 1989; Malt et al. 2010). In textbooks that introduce the practice of qualitative research, there seems to be a general consensus about the fact that concepts are a fundamental part of theory building (Bhattacherjee 2012: 10; Corbin/Strauss 2015). However, their exact function tends to remain vague. The traditional way of conceptualising concepts as building blocks of theories has been contested (Bergdahl/Berterö 2016), and the aforementioned authors argue against the use of concept analysis (Rodgers/Knafl 2000) within their field of nursing as legitimate or useful for theory building, advocating instead for a focus on method. Interdisciplinarity, as a particular form of research that crosses disciplinary boundaries (Klein 2017), adds further challenges to the role of concepts within knowledge production, some of which we explore below. It also opens up a breadth of novel lines of investigation, which allow us to apprehend concepts as an interdisciplinary phenomenon *per se*. Cognitive science, for instance, provides insights into the nature and function of concepts by integrating linguistic, psychological, philosophical and neurological

perspectives (Margolis/Laurence 1999). Several theories of concepts have been developed, all of which call for further investigation (Murphy 2016). For instance, the relationship between concepts and words is far from clear, as is the word-world relationship (Malt et al. 2015). Given the vast amount of knowledge and uncertainty regarding the concept of concepts, it may seem futile to attempt to systematically define the role of concepts within cross-disciplinary research. In the midst of this, cultural theorist Mieke Bal makes a provocative proposal for conducting interdisciplinary research within the humanities, claiming that it "must seek its methodological basis in concepts rather than methods" (Bal 2002: 5). Concepts that travel between disciplines ("traveling concepts" in the author´s words) are better suited to take over the central role of method, in order to approach the problem to be solved. Bal´s proposal merits that we at least consider conceptual work within cross-disciplinary research as being of interest.

In inter- and transdisciplinary research, integration is generally understood as a central epistemic attribute which requires methodological development (Pohl et al. 2008; Defila/Di Giulio 2015; Pennington 2016a). Conceptual work is positioned as type of integration method by Hirsch Hadorn and Jäger (2008) and Bergmann et al. (2012). For Bergmann et al. (2012: 50), "constant conceptual work regarding core terms and concepts" is essential. However, the literature indicates that in both inter- and transdisciplinary research, conceptual work requires not only exchange and clarification, but a process of negotiation of meanings (Roux et al. 2006; Jeffrey 2003; Bergmann et al. 2012). There seems to be a consensus about the need to foster mutual understanding in both interdisciplinary (Eigenbrode et al. 2007; Jeffrey 2003; Jones/Macdonald 2007; Bracken/Oughton 2006) and transdisciplinary research (Roux et al. 2006; Antrop/Rogge 2006; Vilsmaier et al. 2015; Tress et al. 2005). However, reviews of integration methods (Frodeman et al. 2017; Bergmann et al. 2012; Adler et al. 2018; Eigenbrode et al. 2007) seem to indicate that further methodological development is necessary to be able to integrate such requirements into conceptual work, particularly in its pedagogical or relational and political dimension. In sustainability settings in particular, including the normative dimension is key for the proper clarification and operationalisation of concepts (Zanotti et al. 2020).

2.2 Integrative functions of conceptual work in inter- and transdisciplinary research

Methods in cross-disciplinary research can be considered "systematic, repeatable procedures of pursuing research objectives" (O'Rourke 2017: 278) in service of specific needs and purposes that are highly contextual and can refer to either a specific procedure or family of methods. We understand conceptual work as a family of methods with the purpose of supporting knowledge integration through mutual understanding. In order to better understand the opportunities and challenges of conceptual work, we draw from Bergmann et al. (2012) to identify three integrative functions or dimensions for conceptual work: technical, pedagogical or relational, and political (Table 1).

The technical dimension refers to the integrative function of concepts in the elaboration of theory and method development within research processes, and is mostly concerned with clarifying meaning, producing joint definitions, and defining new concepts. For instance, in interdisciplinary ventures, the use of specialised concepts or jargon may require clarification early on in the work of a research team (MacMynowski 2007; Stevens et al. 2007; Caruso/Rhoten 2001). We may find that the same word is used by a number of different theories and disciplines, with different meanings (Bracken/Oughton 2006; Tress et al. 2005). For instance, the term "resilience" in relationship to sustainability is widely used within engineering, ecology and policy as both a concept, tool, and framework (Zanotti et al. 2020). The opposite case is when different terms are used across disciplines to refer to the same topic (Jeffrey 2003: 548). Thus, some advocate the need for a common language (Caruso/Rhoten 2001) or for elaborating a glossary of terms (Antrop/Rogge 2006; Pohl/Hirsch Hadorn 2008).

The second integrative function we identify is pedagogical or relational. Bergmann et al. (2012: 52) characterise conceptual work as a recursive learning process. This allows us to conceive of conceptual work beyond the parameters of a mere technical exercise, rather as a form of social learning, with potential for developing mutual understanding across contextual and cultural differences, and negotiating values and worldviews that can contribute to a wider process of co-creation within research. Indeed, beyond clarifying terminology, conceptual differences often also

uncover different theoretical foundations and epistemologies (Jones/Macdonald 2007; Miller et al. 2008; Lélé/Norgaard 2005), values (Lélé/Norgaard 2005) and worldviews (Eigenbrode et al. 2007) across disciplines and individuals. Thus, the (apparently) simple exercise of generating a joint glossary within a team may be challenging (Freeth et al. 2019), and even if achieved, may require further integration work (Antrop/Rogge 2006).

The third integrative function is political. The authors refer briefly to how disciplines acquire a political dimension when defining concepts, and how this can generate competition within disciplines (and, we would add, amongst stakeholders) over such power of definition (Bergmann et al. 2012: 55). For instance, Vilsmaier et al. (2015) and Wang et al. (2019) describe how cultural differences coupled with unequal power relations constituted (language) barriers in transdisciplinary projects.

2.3 Conceptual work: A working definition

In this paper, we define conceptual work as the collaborative process of clarifying the meaning and use of concepts across disciplines and epistemic cultures, developing mutual understanding and balancing power inequalities amongst participants in order to support knowledge co-creation. Conceptual work is embedded within a wider normative vocation of knowledge integration. The purpose of conceptual work is to develop working concepts that serve as anchors for iterative processes of collective meaning making, rather than to come up with final definitions for concepts. For conceptual work to be transformative, it must include a communicative and political dimension, in addition to the technical function of clarification. This requires cognitive, as well as relational and emotional skills.

3. Paulo Freire's epistemology: identifying three principles for conceptual work

In the following, we discuss three principles that are central to Freire's epistemology: conceptual work as generative, knowledge as dialogue, and naming as political. We discuss how these principles incorporate normative dimensions into knowledge, and the implications for conceptual work.

Integrative functions of conceptual work	Goals	Challenges	Attributes	Available approaches & techniques
Technical	Defining concepts: Clarify meaning Joint definitions New concepts	Precise meaning: Across disciplines Technical vs. colloquial language	Theory building Methodological development	Reaching agreements Joint discussions Elaboration of glossaries
		Vague or metaphorical meaning		Mapping Identifying boundary objects
Pedagogical / Relational	Mutual Understanding Knowledge co-creation	Contexts Values Worldviews	Recursive learning process	Identifying core concepts Linking them
Political	Equal access to the problems under study	(Disciplinary) competition over power to define terms	Legitimacy and leverage to define terms	Open-minded discussions

Table 1: Integrative functions of conceptual work in inter- and transdisciplinary research
Source: Own design inspired by Bergmann et al. 2012: 50-64

3.1 Words as generative

An important feature of Freire's epistemology are "generative words" (Freire 2009/1969: 106–109). As a key element of his approach to literacy, generative words represent the linguistic universe of participants. Thus, through the investigation of the generative words of a particular community, which is the subject of research, we gain proximity to the situational

reality, i.e., the existential situation, of this community. Freire was seeking to avoid the "banking model" of education (Freire 2005/1970: 72), where educators, administrators or researchers impose their reality and worldview upon students or those being studied. Instead, because generative words are defined by the criteria of normative relevance (see 3.2) they encode the worldviews of those to whom this linguistic universe belongs. The significance of wanting to maintain this situatedness[2] brings us back to Freire´s ontology of humans as beings in the process of becoming: "Human beings are because they are in a situation"[3] (ibid.: 109, italics original). By considering ourselves as being in a situation, we have the possibility of becoming. If we remove the human from the situation, we are, from a Freirean perspective, dehumanising by objectifying, as the vocation of becoming cannot happen in a vacuum, but in and with the world (ibid.: 44, 84-85).

What can this mean for boundary-crossing research? Let us consider a concept as belonging to the linguistic universe of a certain community. Part of performing conceptual work involves two elements: (i) the acknowledgement and exploration of the worldviews that the concept belongs to, and (ii) the acknowledgement that the same concept might signify different worldviews, according to the situatedness of the different communities or people involved. Rather than approaching the potential difference of understanding and worldviews as a challenge to overcome, we can approach it with epistemic curiosity. This epistemic curiosity (Freire/Macedo 1995: 382), helps us to avoid adopting a banking approach of knowledge, and initiating instead a dialogue where new knowledge can be co-created (Baraúna Teixeira/Motos Teruel 2009). By constructing a linguistic universe formed by a diverse group of people, we allow for all worldviews to be present. In this way, we approach reality by bringing the language, with all its normativity, into theoretical investigation.

3.2 Knowledge as dialogue

In his main oeuvres, "Pedagogy of the Oppressed" (Freire 2005/1970) and the "Pedagogy of Hope" (Freire 2014/1992), Freire describes the process of knowing, the epistemological process, as a dialogue between situated subjects, mediated by the world (Freire 2005/1970: 88). According to Freire, it is in dialogue that we have access to what is knowable. He describes authoritarian modes of education (the banking model) and colonial rela-

tionships as anti-dialogical, in that one party imposes, delivers, transposes, and transfers information onto another party, which is expected to assimilate this knowledge as if it were an empty vessel (ibid.: 72). In his approach to knowledge, which can be argued is both dialectical and dialogical[4] (Rule 2011) both parties acquire knowledge jointly through mutual curiosity about their different perspectives. This dialogue finds reference and confirmation in concrete, existential situations (ibid.: 109), from which we draw our personal experiences – where the personal experiences occur – and find a place to test and confirm or reconsider assumptions and beliefs.

How do we develop methods that enable dialogue as understood by Freire? Freire himself identified a priori conditions (love, humility and hope), as well as conditions that are constituted during the actual process of dialogue (trust and critical consciousness) (Freire 2005/1970: 90–91, 2008/1974: 40). The almost metaphysical quality of his a priori conditions presents a challenge when it comes to translating them into concrete, formalised methods for academic contexts. We will thus be focusing on the process of dialogue itself, and how this process can be supported methodologically through design and facilitation.

3.3 Naming as a political act

Freire approaches the act of reading and writing the world as a collective investigation in order to understand the world. In this conceptualisation, investigation or research is no longer the privilege or activity of the few educated elite, but the birth right of all (Freire 2005/1970: 88ff., 108). It also becomes a responsibility, as no one can "pronounce" the world for another (ibid.: 88ff.). In his radical transcending of the teacher-student, researcher-researched, theory-practice dichotomies, research presents itself as a still systematic, yet deeply transformative practice.

In contrast to the tradition of normal science, which transformative inter- and transdisciplinary research attempts to transcend, Freire's pedagogy integrates the normative dimensions of knowledge production, in line with post-normal science (Funtowicz/Ravetz 1993). The situatedness of the knower is central to any investigation of the world. This is not however, an ode to subjectivity, or a form of subjectivism (Freire 2005/1970: 50). Instead, objective knowledge is accessed by distancing oneself from one's own situatedness while maintaining the situatedness as reference point;

that is to say, by taking a step back from the situated self, we can observe ourselves in the world. This step back provides a vantage point from which to observe reality objectively. Thus, it is the capacity to observe the situated self that generates objectivity. However, in contrast to the scientific method, we don´t remove ourselves from the subject of study in an objectifying act. Instead, we remain part of it, as what we are observing is ourselves in our particular existential situation. This space between the self situated in the world, and the (collective) observation of it (of our situated selves in it), is the space from which what Freire refers to as "critical consciousness" (Freire 2005/1970: 95) can emerge. In other words, it is the space from which transformative potential can be realised. In a Freirean reading, this situatedness of the subject, which can be observed as an objective reality affecting the subject rather than a limitation inherent to the subject, is deeply political. However, having acknowledged the political nature of knowledge creation, and identified the space of possibility for liberation and transformation, addressing the issue remains an abstract pursuit. It is necessary to turn to the concrete methodology and method behind Freire's literacy approach, to operationalise this transformative potential.

4. Translating Freire's method: from culture circles to a generative glossary

Freire's literacy approach was carried out in "culture circles" (Souto-Manning 2010) where illiterate adults participated. However, Freire was reticent to provide static methods for others to follow, fearing that it would turn into the mechanistic, banking model of education he was attempting to deconstruct (ibid.: 18). Across his work, it is rare to find a step-by-step procedure of how he actually conducted his literacy work. Instead, he offered a blueprint for personal and social change, to be reformulated and applied in different contexts. However, in order to make Freire´s approach more accessible, Gadotti et al. (2003), Heidemann et al. (2010) and Souto-Manning (2010) have compiled useful overviews of this blueprint. In the following we draw on these and on Freire´s original work (Freire 2005/1970, 2009/1969), and present his method as simultaneously (i) a sequence of iterative steps and (ii) core 'moments' in his approach to literacy. We then

provide an illustrative example of how this might be translated into a conceptual work method in an interdisciplinarity research team.

4.1 The method as five iterative steps

The first step before initiating a culture circle, is investigating the "thematic universe" of participants (Freire 2005/1970: 96–105), formed by their "generative themes and words" (Freire 2009/1969: 106). Through the particular sayings and words of a community, the exploration of the thematic universe aims at identifying the complex of interacting themes that are inherent to the "human-world relationship" (ibid.: 85). This is done in order to gain a holistic understanding of the often constraining situation that people find themselves in, defined as "limit situations" (ibid.: 99). Once the thematic universe has been investigated, a number of "generative words" is selected. These are chosen according to their syntactic relevance (for alphabetisation purposes) as well as semantic relevance (i.e., the intensity between the word and the object it designates), and pragmatic significance for the community (referring to how it relates to a social, political or cultural reality; ibid.: 108). They are called "generative", in the sense that they allow for the generation of new realities.

Selected generative words are then "coded" (usually by the literacy team, or with participants) into representative formats (such as pictures, images, drawings, photographs), which represent existential situations for the given community (ibid.: 109). For instance, drawing an image of the existential situation of "construction work" in order to work with the generative word "tijolo" (brick) (ibid.: 112).

Then, within the cultural circle, participants decode the coded existential situation presented to them, by engaging in dialogue to analyse the possible themes that can be identified within it. For instance, the "construction work" image is presented and explored. This is the "problem posing" phase (Souto-Manning 2010: 37), in which participants begin to question their existential situations. After the pictorial representation has been collectively explored from all possible angles, the generative word that had been coded into the image is presented as a word to participants without the object: "tijolo". This process has helped establish the semantic relationship between the word itself and the object it refers to (Freire 2009/1969: 111).

The word is then decoded into its phonetic parts (ti-jo-lo), from which participants are encouraged to build new syllabic combinations leading to new words, which can then again be coded into images and discussed, as an iterative process (ibid.: 112).

What results from this process, following the problem posing, is the overcoming of "limit situations" (Freire 2005/1970: 99ff.) in which students learn not only how to read and write words and texts, but also how to read and write the world and contexts (Souto-Manning 2010: 17).

4.2 The method as three moments

The main imperative of Freire's pedagogy is transformation through conscientisation, or awareness (Freire 2005, repr. 2017/1970: 137). Catalysed by the critical unveiling, the process described above is intended to lead to transformative action – that is, the culture circles are not intended just as a mechanical process of alphabetisation, but to be places for political action, as people come together to discuss their socio-historical circumstance as subjects (Freire 2009/1969: 106). This motion of coding and decoding the world can also be understood as three distinct "moments": naming, representing, and renaming the world (Souto-Manning 2010: 17).

The point of departure is that of humans as beings in the world. As cultural beings with the capacity for meaning making, situated in a concrete socio-historical situation, we find ourselves in a world that has been named, i.e., a particular thematic universe. In the second moment, the generative words and themes are coded into a graphical representation of a concrete existential situation. In doing so, we are no longer just 'in' the world, but can start to speak 'about' the world, which is not just any world, but the world that concerns us, containing our generative themes and words. The distancing afforded by the coding-decoding allows for critical analysis, which delivers agency back to the subject. Through this critical analysis between objective and subjective, concrete and abstract, individual and collective signifying, we access the third moment, which is about renaming. Once we become aware of the patterns that shape our circumstance and behaviour, the question of whether to accept them or not becomes an act of choice and this choice is the exercise of freedom to which Freire refers. In this moment we enter the space of possibility of being "with the world" (Freire 2009/1969: 111).

Returning to the concept of 'brick' as an example, conversation topics that this word raised at a particular cultural circle were: urban reform, urban planning and the relationship between different types of reform (ibid.: 148). This ascribes a political – and transformative – nature to the method, as it concerns itself with an act of questioning the status quo. Thus, a word that has been critically examined in this way then becomes a "true word" (Freire 2005/1970: 87), as we do not just use it from a place of unconscious tacit agreement, but instead from a collective critical reflection sourced from and validated by our personal practices. Freire's culture circles reclaimed the right to name or "pronounce" the world (ibid.: 88). Thus, this use of true words in the world was considered inherently transformative.

4.3 Designing a generative glossary within an interdisciplinary team

The graduate school "Processes for Sustainability Transformation" involves 12 PhD students from six disciplinary perspectives and five different institutes within the Faculty of Sustainability at the Leuphana University Lüneburg. It aims to integrate several disciplinary perspectives on sustainability transformation processes in the food and textile sector over a three year timespan. With this aim, a process for creating a joint glossary was designed and then facilitated by one of the PhD students (first author of this article), following Freirean principles. The process was comprised of a first phase of five two hour sessions over four months, and a follow up phase with three sessions a few months later. The sessions resulted in identifying about 40 key words for the team, co-defining about 15 terms, and publishing them as a series of one pagers as the first written output of the three year project. Some of the terms co-defined are: trust, reflexivity, scaling, niche, and change agent. Published one page definitions can be found on the team's web page.[5]

The process of joint concept definition brought the group together and helped generate synergies and mutual understanding. The Freirean principles were incorporated, for instance, by adding the 'generative' element to the concepts. This was achieved by asking participants themselves to bring the terms to be defined, and then jointly deciding on which ones to work on, rather than having the concepts pre-defined by the facilitator or

project leaders. Whoever brought a concept that the group then agreed to define, was responsible for the co-elaboration of a definition. In this way, other participants could contribute openly with their perspective, without feeling too attached to the outcome. Likewise, the person responsible for a concept could be open to receiving different perspectives, without the need to compromise. The outcome became a definition enhanced by various disciplinary perspectives. Several structural elements seemed to contribute to this. For example, a speed-dating format with rotating one-on-one conversations was helpful to maintain dialogue, rather than debate. The conversations around each concept became increasingly rich towards the final sessions, sessions in which students included their personal field-work experiences. Furthermore, Image Theatre (see Raule in this issue) was introduced in two of the sessions as a method to include the image-word coding and decoding element. These sessions brought forth deeper layers to the conversation, as the assumptions underlying the definition – what can be described as the 'status quo' of the concept – were re-examined, similarly to the process described in Freire's culture circles.

5. Implications for method development within cross-disciplinary research

New methods are both the result of epistemic and paradigm changes, and catalysers of paradigm change (Hesse-Biber/Leavy 2010). Thus, to consider method development requires reflection on the epistemological background that will inform the method. These questions come to the foreground, particularly when we address boundary-crossing forms of research. Inter- and transdisciplinary research, for instance, have emerged as fields for both method innovation and epistemological reflection (Defila/Di Giulio 2015; Regeer/Bunders 2003). However, it is hard to identify criteria for defining what makes a method particular to cross-disciplinary research (O'Rourke 2017), and how to devise methods that respond to new requirements, such as supporting integration and transformation.

In this paper, we point to normativity as a key element that both hinders cross-disciplinary method development and can infuse it with transformative potential, particularly when it comes to sustainability science, due

to its inherently normative nature. Throughout this exploratory work, we have illustrated how Freire's approach to literacy can provide the required epistemological basis from which to develop integrative methods, in particular for conceptual work. In considering his approach to literacy, we encounter a non-disciplinary approach that takes situated knowledge as the point of departure. We identify generativity as a principle that allows for the incorporation of normativity into method development. It is close to the concept of 'emergence' as used in method innovation (Hesse-Biber/Leavy 2010). In both cases, the focus is on the creation of knowledge in the moment, in its particular context and presence, rather than pre-determined through assumptions of conditions and variables. Furthermore, by defining knowledge as realised through dialogue, we point towards the necessary collective nature of conceptual work, as well as the non-static quality of definitions. Finally, by acknowledging the political nature of knowledge co-creation, we emphasise the need to consider the role of power relations as part of method development and implementation.

A major challenge to incorporating the quality of generativity or emergence into method development is that of how to provide a blueprint that can be reproduced by other practitioners in different contexts, yet still maintain its transformative potential. The growing discourse on the need for knowledge transfer within inter- and transdisciplinary research (Lang et al. 2012), stands in contrast to critiques of methodism (Frodeman et al. 2017). Nonetheless, we contend, with Huutoniemi (2014), that methods can be used as heuristic devices if used appropriately. We have attempted to do so by presenting Freire's literacy approach from a multi-dimensional perspective: as three epistemic principles, as a sequence of five steps, and as three transformative moments. This multi-level approach provides the means for re-inventing the approach to fit the needs of the context. With the glossary example, we offer a glimpse of how to translate Freire's approach into a tangible method for conceptual work.

Finally, by defining the method itself (in this case conceptual work) in terms of integration of normative dimensions (identifying its technical, relational or pedagogical and political functions), it is possible to provide a reference against which transformative potential can be evaluated. Thus, we can now attempt to assess the glossary process in terms of our working definition of conceptual work. For instance, as a tangible

output, the collective definitions of the glossary indicate that concept clarification was successfully achieved. The sessions themselves provided a rich environment for mutual understanding, learning and co-creation. We dare to suggest here that this was enabled by the design of the sessions, geared towards encouraging dialogue rather than debate, as described in 4.3. This is consistent with the literature on collaboration and integration, which attests that attention to design is crucial (Pennington 2016a; Knapp et al. 2019). As for the political dimension, it is hard to assess an equalising effect on power imbalances, due to the relative homogeneity of participants' status (most of them PhD students). The Image Theatre work appeared to instigate 'aha' moments that led to deeper understanding of the topic, and perhaps was supportive of developing critical consciousness (for instance, with understanding the nature of trust and transferability). Whether we consider this transformative action or not is up for discussion. On the whole, we suggest that the process of co-definition and co-creation of concepts within our glossary process contributed to creating a culture of collaboration within an academic setting. Given the documented difficulties of working together in academic teams (Freeth/Caniglia 2019; Antrop/Rogge 2006), this can be considered, in itself, as a form of transformation.

6. Outlook and further research

Almost 20 years ago, Mieke Bal proposed that concepts play an important role in the practice of crossing disciplinary boundaries, perhaps maybe even to substitute for the role of methods (Bal 2002). Today, conceptual work as a type of integration method for inter- and transdisciplinary research is still in its early stages of development. An effervescent activity around concept research in the field of cognitive sciences, controversy over method in the nursing arena, and a vibrant community researching collaboration for boundary-crossing research, points to exciting new research in this field, as well as the need for further conceptualisation and systematisation.

The conceptual work we elaborate on in this paper is not intended to provide static, directly transferable methods; but rather, to contribute to an arsenal of tools that enable joint meaning-making, learning and knowl-

edge co-creation in heterogeneous teams in order to enhance and broaden disciplinary perspectives, as well as integrate different types and ways of knowing. Broadly speaking, our findings indicate that Freire's approach to literacy can offer valuable contributions to the practice of conceptual work in cross-disciplinary research. Limitations of space and time only afforded a superficial broaching of Freire´s work, as of conceptual work. Further research and empirical data is necessary to explore the viability and effectiveness of translating his principles into specific methods, such as the glossary process presented here. Further research in how the act of naming through Freire´s process enacts agency, and on the relationship between naming, language, identity and politics, could provide depth and help understand processes of mutual understanding and knowledge co-creation within research teams.

Freire asks us to consider the act of literacy as a highly political one. His approach to literacy requests participants to be engaged in a co-creative process and thereby to acknowledge the situated and political nature of performing conceptual work. With this article, we showed that this also holds true for boundary-crossing research. We can consider conceptual work in inter- and transdisciplinary research as a form of literacy per se, as we become familiar with new epistemologies and their corresponding worldviews, ways of thinking, acting and being.

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2 The original translation in this volume uses the term "situationality" (Freire 2005/1970: 109).

3 The Spanish translation is: "Los hombres son porque están en situación" (Freire 2005, repr. 2017/1970: 136). The grammatical structure of both Spanish and Portuguese has two words for being (ser y estar). The implication is that, through being in a situation (of space and time: estar), it is possible for humans to 'be', existentially (ser).

4 While Freire's ontology is dialectical in that it sees knowledge as generated through the transcending of oppositions, his pedagogy is strongly dialogical

5 Processes of Sustainable Transformation 2020: http://post.achievingsustainability.com/project-outputs/glossary-of-terms/, 9.9.2020.

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Abstract *Als kooperative und grenzüberschreitende Formen der Forschung bergen Inter- und Transdisziplinarität ein großes Potenzial, Phänomene oder Probleme, die in einzelnen Perspektiven nicht vollständig verstanden werden können, neu zu strukturieren und zu deuten. Dennoch besteht innerhalb heterogener Forschungsteams häufig das Problem, ein wechselseitig Verständnis für unterschiedliche Konzepte, Perspektiven und Wissensbestände zu entwickeln. Dies ist insbesondere dann der Fall, wenn stark normative Themen behandelt werden, wie dies in der Nachhaltigkeitsforschung der Fall ist. In diesem Beitrag analysieren wir Prinzipien und Praktiken, die Paulo Freires Ansatz zur Alphabetisierung zugrunde liegen, und untersuchen ihr Potenzial zur Entwicklung integrativer Methoden für die Begriffsarbeit in der inter- und transdisziplinären Forschung. Wir diskutieren*

drei Prinzipien – Wörter als generativ, Wissen als dialogisch und Benennung als politisch – und erörtern, wie diese nicht nur technische, sondern auch relationale und politische Dimensionen der Begriffsarbeit betreffen. Am Beispiel der Erstellung eines gemeinsamen Glossars veranschaulichen wir, wie die Prinzipien operationalisiert werden können.

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