analyses provide the basis for perturbations and consequently for an iterative refinement of the product or service. The creation of a prototype is only a first step in the establishment of an innovation.

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Interacting with the Envisioned Future as a Constructivist Approach to Learning

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> Upshot • I introduce and discuss an advancement of the idea of "learning from the future" called "interacting with the envisioned future." Further, this approach is put into the context of the target article and the perspective of radical constructivism.

« 1 » In §14, Markus Peschl et al. argue that approaching an understanding of innovation cannot be gained through "projecting and extrapolating the past into the future." Instead, they follow the idea of "learning from the future" as it was proposed by C. Otto Scharmer and others.

"Learning from the future as it emerges"

« 2 » Roughly speaking, classical learning theories argue that we learn from our past experience and adapt accordingly to cope with the future (for an overview see Kolb 1984).

« 3 » Breaking with the view on learning as strictly and solely connected with our past experiences and with the belief that the future is a forward projection of the past, Scharmer (2001, 2007) and others (Greenleaf 1977; Jaworski 1998; Scharmer & Kaeufer 2013; Senge et al. 2005) proposed an alternative learning approach called "learning from the emerging future." It proposes sensing the very moment by "connecting with the source of one's best future possibility and of bringing this possibility into the now" (Scharmer & Kaeufer 2010: 25f). At its core, this is about learning "from a reality that is not yet embodied in manifest experience."[1] It is the awareness of the very moment and the observation of what is going to emerge right now that are the key elements for generating new knowledge (Scharmer calls this phase "presencing").

« 4 » However, if we consider Scharmer (2007: 52, 211, 467) carefully, it is clear that he is talking about sensing the future possibilities that want to emerge from a *present* perspective.

"Interacting with the envisioned future"

« 5 » What I want to advance in my commentary is slightly different from Scharmer's approach, though. It is not about sensing the future as it emerges, thus from a present point of view, but about reporting from a future "as-if" perspective. Or, put differently, subjects should narrate as they would already (inter)act in their envisioned future. This is done by a method that has been called "interacting with the envisioned future" (Kragulj 2014: 38f). This means using the power and flexibility of imagination that we humans have and mentally "pre-experiencing" hypothetical future scenarios and personal events (Szpunar 2010: 143). Or, as Hume puts it, it is the "[l]iberty of the imagination to transpose and change its ideas" (Hume 1958: 10).

« 6 » Using "mental time traveling" (Suddendorf & Corballis 2007), subjects actively construct and interact with a mental model based on their imagination capacity. This ability enables them to create mentally an environment that suits their beliefs and ideas. In these circumstances, we are, for instance, able to solve problems ahead of their existence. In general, it offers flexibility in novel situations. This is a "generative process" (Suddendorf & Corballis 2007: 301) of cultivating a picture of the future the subject envisions living in.

« 7 » The fundamental idea of this approach is to be somewhat detached from today's circumstances (and its restrictions, boundaries and impossibilities), which enables us to shift thinking to come up with visionary and creative results transcending current boundaries. The narrative result enhances our base of knowledge upon which we can act in the present. The focus on the active creation of an imagined future seems to be a more active way of "liberat[ing] themselves from the past ('letting go')" than is done in the target article by "enter[ing] individually into an 'empty space' of listening and opening up to what wants to emerge" (§53).

« 8 » Clearly, this approach is not about predicting the future, which is impossible. Rather, it is about adapting to and pre-experiencing a desired "as-if" scenario from which we can derive conclusions for today's acting (Jack et al. 2013) and thereby shape the future as far as possible in the individual's sphere of action.

Application

« 9 » Our "interacting with the envisioned future"-approach is distinct from commonly used scenario techniques (Chermack & Lynham 2002; Konno, Nonaka & Ogilvy 2014), which put enormous effort into dealing with uncertainty measured against a future to come independently from the actions the agent takes. These planning techniques and their relation to constructivist learning theories have been discussed by Thomas Chermack and Louis van der Merwe (2003).

« 10 » Our strategy has a different emphasis. It is a method for explicating tacit dreams, wishes, desires and so forth as if they had become true and thereby generating a picture of the desired personal future from which knowledge can be derived in order to act accordingly in the present.

1| Cf. Scharmer's presentation "Presencing: Learning from the future as it emerges" at the conference "On Knowledge and Innovation" in Helsinki, Finland, in May 2000, available at www.ottoscharmer.com/docs/articles/2000_Presencing.pdf

« 11 » This learning method has been used successfully in terms of inferring needs that underlie descriptions of envisioned views on the future (Kaiser, Fordinal & Kragulj 2014; Kragulj 2014) as well as in knowledge-based vision development processes (Kaiser, Feldhusen & Fordinal 2013; Kaiser & Fordinal 2010b; Kaiser & Fordinal 2010a; Kaiser & Feldhusen 2011).

« 12 » In the target article's context of innovation, the tool described might help to anticipate future demands and properties of innovative products or services that have to be met in the future. An illustrative example is given in a recent book on robotics, in which many (technological) demands are derived from a narrative description of a future usage of innovative technology that, under today's technological limitations, cannot be fulfilled (Trappl 2013).

« 13 » To sum up, our method enables people to think "outside the box" (i.e., to transcend today's boundaries mentally); thus, to consider solutions unrealizable today that, however, contain the very essence to pursue today to develop applicable solutions for the future. Within the process framework of the target article (§§48–57), "learning from the envisioned future" might be an alternative tool for the procedure described in §53, i.e., to come up with radically new knowledge leading to innovation.

Constructivist perspective

« 14 » A key feature of this alternative learning strategy is to have subjects embed their wishes, dreams, fears, concerns and so forth in their imagination and to put those "into action." By doing this, people create meaning. Peter Senge argues that…

> "our mental models determine not only how we make sense of the world, but how we take action […] It's therefore crucial to examine one's mental models before planning improvement actions." (Senge 1994: 82)

« 15 » It is clear that those future scenarios are not about an experiencer-independent reality to come, but rely on the agent creating and experiencing them. We emphasize that it is the active construction of the individual that likely helps to guide the selection of actions in the present in order to shape and come closer to the desired state of affairs.

« 16 » Consequently, it is obvious that this future episode remains hypothetical and cannot be judged by the criterion of "truth" in advance. However, in the framework of radical constructivism, the criterion of truth as it is traditionally used by philosophers is rejected (Glasersfeld 1998: 23). Rather, the knowledge derived from imagination should be evaluated in terms of its viability and coherence, which fits our approach:

> "Simply put, the notion of viability means that an action, operation, conceptual structure, or even a theory, is considered 'viable' as long as it is useful in accomplishing a task or in achieving a goal that one has set for oneself." (Glasersfeld 1998: 24)

« 17 » In this sense, the interaction with the individual's imagination can, analogously to Piaget's proposal, "be considered [as] a tool in the organism's adaptation to the world as it is experienced" (in Glasersfeld 2001: 39). The crucial aspect of our learning approach is that the individual adapts according to the experience rooted in an (attractive) imagination rather than according to past experience.

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Authors' Response:
Challenges in Studying and Teaching Innovation: Between Theory and Practice

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> Upshot • This response focuses on the following issues, which summarize the points made by the commentaries: (i) further reflection on and details of the methodological framework that was applied to studying the proposed design of our innovation course, (ii) the issue of generalizability of the findings for teaching innovation (in this context the question of generic or transferable skills will become central), and (iii) finally, more precise explanation of what we mean by "learning from the future as it emerges."

Introduction

« 1 » Studying subjective knowledge construction and intersubjectivity in innovation processes raises several (methodological) issues and questions. How can we deal with the challenges and tensions between radical constructivist theory, research, application, and practice? Is it possible to study the subjective agent in his or her interaction with others systematically, and if so, can these insights be transferred to a more general level of (theoretical) explanations? We will address these questions by discussing the issue of teaching and research, as well as subjectivity and intersubjectivity, within the context of our research design and methods. We argue whether and how empirical results obtained by grounded theory can be generalized.

« 2 » Furthermore, many aspects of the research setting, as well as the didactical setting, and the course content touch upon the issue of generalizability. We will discuss the issues of studying innovation in the context of our course design in comparison to other university courses and their (theoretical) approaches. We will further elaborate on the transference of insights, theories, or skills into other areas apart from (teaching) innovation, as well as transferring radical constructivist approaches to teaching into other institutions and contexts.