

Transformative Learning: Methodological and Conceptual Prerequisites for Future-oriented Skill-building

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Abstract

The current era, characterized by rapid digitalization, globalization and environmental issues, poses unique challenges and opportunities for both the educational sector and professional development. Increasingly, the research community calls for future-oriented skills as well as attitudes and values as underlying implicit concepts in order to meet the needs of today's complex demands. These skills and implicit concepts include responsibility, inclusiveness, reflexivity, anticipation, data literacy or digital and interdisciplinary working. Some of them are based on facts and are therefore teachable, while others seem to be a matter of personal attitude and socialization and are therefore difficult to convey. In this paper we suggest educators to change their specialized knowledge-teaching settings into transdisciplinary learning contexts [1] and thus enabling transformative, situated, experiential and informal learning. We provide theoretical examples in which these didactic methodologies seem to be effective in order to impart these skills and reinforce the underlying implicit concepts. We will dive deeper into these arguments during the conference, while participants are encouraged to discuss the various elements that influence the concepts in the context of transdisciplinary learning.

Keywords: Transformation of education, transdisciplinarity, transformative learning, situated learning, informal learning, lifelong learning, higher education, future-oriented skills, implicit concepts

1 Introduction

Digital networking, collaboration, and information sharing are fundamental in today's learning and work environments, driving the need for versatile skills beyond specialized knowledge [2]. Such skills include for example data literacy, reflexivity, anticipation, and an innovation-focused mindset, along with implicit values like responsibility, accountability, and social justice [3].

This paper argues for a move from traditional knowledge transfer to transdisciplinary and experiential learning across institutions and organizations, essential for addressing today's complex learning and work contexts. Our analysis explores transformative learning, integrating transdisciplinary and experiential aspects, where individuals change their worldviews by questioning their beliefs and designing new approaches [4].

Transdisciplinarity, which overcomes disciplinary boundaries, is key to this transformative process and promotes innovative ways to handle complexity [5]. Our study aims to contribute to the discussion on learning methodologies, especially considering the rapid changes transforming educational and professional fields. The current description of needed skills, learners' concepts, learning strategies, and influencers is preliminary and based on literature. It lays groundwork for the ongoing project Beyond Disciplinary Boundaries, where additional skills and concepts will be further explored, analyzed, and interpreted contextually.

2 Literature review

In order to respond to the escalating complexities of our contemporary world, the pedagogical paradigm of the 21st century is increasingly characterized by an emphasis on future-oriented competences [6]. The umbrella term "21st-century skills" encompasses a broad range of skills, including critical thinking, problem-solving, digital or interdisciplinary collaboration, data literacy and many more. These skills permeate disciplinary knowledge boundaries, extending transdisciplinarily into our personal, educational,

and professional activities. This initiates a shift that requires not only teachable facts and learnable competencies, but also individual implicit concepts that learners need to acquire in their learning and working environments. In the following, theoretical didactic foundations are presented that could be suitable for conveying these skills and promoting corresponding concepts.

The effectiveness of learning environments in fostering the required skills and concepts hinges on learners' pre-existing conceptual frameworks [7]. Shaped by learners' past experiences and education, it is important that these frameworks enable, rather than hinder, the learning of new knowledge and skills [8]. Therefore, it is incumbent upon educators to strengthen the foundational constructs that sustain students' long-term development, facilitating the acquisition of future-oriented skills and concepts. In this paper, we refer to **implicit concepts** as a conscious orientation towards values and ethical norms, principle-based attitudes, inner orientations, perspectives and positioning or individual commitments that learners should ideally have and which also underlie the profitable application of future-oriented skills.

It is already evident from this list that these aspects can hardly be taught in a traditional learning setting, but rather emerge from a reflective process and are highly bound to the individual instance of the learner. This is simultaneously one of the basic characteristics of **transformative learning**, in which learners critically reflect on previous assumptions, perspectives and knowledge sets, validate them against new contexts and replace them if appropriate [4, 9].

In response to this need for a more integrated, holistic and reflexive pedagogical approach, **transdisciplinary learning contexts** have emerged as a viable didactic path [10]. This approach underscores the importance of situated, experiential, and informal learning by promoting transdisciplinary collaboration and thus disrupting traditional silos of knowledge, methodologies, and competencies, and thereby creating avenues for the exploration of skills or concepts that are typically confined to specific disciplinary contexts.

Prominent theorists like Dewey and Kolb have underscored the importance of **experiential and situated learning** in this context. Dewey advocated for learning through interactions with practical experiences involving social processes and situational references, fostering reflexive thinking [11]. Kolb expanded on this idea, introducing a transformative process where reflection on experience allows abstract concepts to emerge. These concepts are actively applied in different contexts, producing new experiences in an ongoing cycle driven by the learners' transformation competency [12]. Through this process, situated learning becomes a cooperative venture within a community, working together on a common situation. Consequently, the diverse perspectives, experiences, and levels of knowledge can effectively promote **informal** and learner-driven learning, which we assume being beneficial for strengthening implicit concepts.

3 Concept

The ongoing "Beyond Disciplinary Boundaries" project is developing learning materials that support this transdisciplinary approach. The aim is to identify and convey initial skills and implicit concepts through putting transformative learning for a continuous reflexivity at the center. This will be achieved by fostering experiential, situated and informal learning supported by collaborations with educational institutions, businesses, and non-industrial organizations. Specialized knowledge will thus be transferred to transdisciplinary learning contexts in which learners can foster the required skills and implicit concepts. The starting point of the project are questions such as

- What competencies and implicit concepts are necessary for future-oriented learning and working contexts?
- How can these competencies be aggregated into cohesive learning modules that promote transdisciplinary learning, and what teaching methods are effective in doing so?
- Are there any potentially detrimental concepts, and what factors influence these implicit concepts?

This paper identifies and evaluates the relevance of learning methods and initial implicit conceptual frameworks that can be helpful in promoting sustainable future-oriented skills, education and work situations within a transdisciplinary approach. As the project progresses, we expect to gain further insight into learners' underlying implicit concepts and aim to identify more of them.

It should be noted that not all-encompassing (partly very complex) contents can be conveyed. Rather, the transdisciplinary learning setting is used to initiate a process of transformative learning through continuous reflection processes and thus to reinforce the implicit concepts underlying the sustainable development of learners.

4 Discussion

In order to sustainably equip learners for changing demands, it is necessary to identify the required skills and strengthen the underlying implicit concepts that are useful in a transdisciplinary learning environment [13]. The following section therefore describes the initial skills and supportive concept approaches and discusses limitations of a transdisciplinary approach.

4.1 Mapping the content to be covered through a transdisciplinary approach

There are a variety of skills and implicit concepts that reveal opportunities and navigate learners through the challenges of our time. It is hardly possible to classify them in terms of priority, application or relevance on a general level. Therefore, concrete use cases in particular educational and working examples form the starting point here.

Data Literacy and digital skills

In our digitally connected world, many activities leverage digital or AI-based technologies, which heightens the need for skills like data literacy, digital collaboration, learning and networking [14]. The rise of these technologies leads to a larger, more diverse user base. While these technologies often provide easily accessible entry points, they frequently lack sufficient support for beneficial, correct, or appropriate usage.

Integrating learning demands for these skills into transformative and transdisciplinary learning models can help learners interpret AI outputs, understand digital functionalities, keep up with recent developments, and manage various data types securely. Learners are also better prepared to anticipate and manage potential risks, while nurturing a solution-focused mindset and adaptability essential for lifelong learning [15]. The transdisciplinary approach promotes innovative thinking, agility, and collaboration within interdisciplinary teams [16].

However, it is equally vital to instill implicit concepts when interacting with digital and AI technologies. Respect, responsibility, accountability, reflexivity, social justice, diversity, rational and ethical decision-making, critical thinking, and collaboration are crucial to mitigate negative impacts like discrimination, bias, and manipulation. These attitudes not only contribute to a healthier and more productive learning environment [17] but also aid personal development and foster a more equitable and sustainable society [18].

Finally, this systematic approach is transferable to other learning contexts, allowing required skills and implicit concepts to be adjusted according to their relevance or adding new ones.

Education for sustainable development

The demand for sustainable development calls for skills and underlying implicit concepts such as sustainability and analytical thinking, adaptability in the face of change, openness for collaboration or intercultural sensitivity. Rieckmann and others claim networked, anticipatory and critical thinking, normative, cooperation and problem-solving competence [19] while Steiner and Posch point out "creativity, social competencies and specific communication skills" [20; p. 877].

Our suggestion regarding methodological approaches goes in line with these of others. UNESCO for example mentions learner centered, action and reflection oriented, transformative and exploratory approach [21], while Steiner and Posch propose a transdisciplinary method that supports mutual learning based on realistic scenarios. In such a situated and experiential learning process, learners "are self-responsible [...] decide which tools to apply" [20; p. 877] and thus learn how to make informed decisions, reflect critically on the demands of other groups and undertake sustainable actions.



4.2 Critical perspective and limitations

Transformative learning, while promising, is not without its challenges. One of the most fundamental issues is the need to set aside theoretical allegiances and incompatibilities to allow new questions to emerge and evolve [22]. This is particularly pertinent in the context of transdisciplinary learning, where different disciplines may have distinct theoretical frameworks and methodologies. However, it is essential to maintain a balance between embracing new perspectives and preserving the integrity of individual disciplines. The risk of analytical dilution, where the depth and specificity of disciplinary knowledge are compromised, is a significant concern [22].

In addition to these theoretical challenges, there are also practical issues to consider. Implementing a transdisciplinary approach in learning environments requires significant changes in curriculum design, teaching methods, and assessment strategies. It also requires a shift in mindset among educators and learners, who may be accustomed to traditional disciplinary boundaries. Furthermore, the effectiveness of transdisciplinary learning is contingent on the quality of collaboration and communication among different disciplinary experts, which can be challenging to achieve in practice.

Despite these challenges, the potential benefits of transdisciplinary learning in fostering future-oriented skills and implicit concepts are significant. However, more research is needed to further understand the dynamics and implications of this approach. Future studies should focus on exploring effective strategies for implementing transdisciplinary learning, assessing its impact on learners' skills and accompanying concepts, and addressing the challenges and limitations discussed above.

5 Conclusion

The digital and globalized era presents education and professional development with unique challenges and opportunities. Greater than ever is the need for future-oriented skills and values, such as data literacy, reflexivity, anticipation, critical and innovative thinking. Transdisciplinary and transformative approaches to learning have emerged as promising methods for fostering these demands. However, implementing these strategies in educational settings is not without obstacles.

By providing examples, we point out that in transdisciplinary learning environments, learners can work on their conceptual frameworks and foster required skills sustainably.

However, challenges arise in the need to set aside theoretical allegiances and incompatibilities to allow for the emergence and evolution of new questions. Moreover, significant changes in curriculum design, teaching methods, and assessment strategies would be necessary when applying transdisciplinary approaches.

Nevertheless we apply these strategies in our ongoing project "Beyond Disciplinary Boundaries" with the aim to foster transdisciplinary and transformative learning for developing future-oriented skills and underlying concepts. Additional research will accompany our work to comprehend the dynamics and implications of this strategy and to contribute to the ongoing discourse on learning methodologies and their role in shaping the future of learning and work. As noted before, the results of this analysis should be interpreted with caution as it is grounded in theory rather than empirical data for the time being.

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