

BEYOND SUSTAINABILITY: DESIGNING A REFLECTIVE SELF-ASSESSMENT FRAMEWORK FOR HIGHER EDUCATION

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Abstract

Educational responses to ecological challenges have traditionally been guided by sustainability, green values, and circular economy discourses. While these frameworks have played a crucial role in mitigating environmental harm, they remain insufficient for achieving deep systemic transformation. The next step - a paradigm shift beyond these established approaches - is regenerative thinking. Importantly, regenerative thinking does not replace sustainability or circularity; rather, it builds upon these foundations to move past harm reduction toward actively restoring, renewing, and enabling the flourishing of ecological and social systems. In higher education, advancing this shift is particularly critical, as universities shape the knowledge, values, and agency of future professionals who will lead regenerative practices. This study addresses the question: How can students reflect their regenerative thinking? It focuses on the development of a reflection tool that supports students in reflecting on their learning processes and the adoption of regenerative perspectives. Narrative methodologies are employed to capture participants' lived experiences and connect them with relevant theoretical frameworks. Data were collected during a Regenerative Research Camp involving 9 participants (2 international and 7 from Finland) and analyzed using inductive content analysis. Building on existing models of sustainability learning and reflective assessment, the study proposes a conceptual framework to inform the design of the reflection tool. The aim is to advance pedagogical practices in higher education by supporting learners in developing regenerative mindsets that enable them not only to sustain but also to actively regenerate ecological, economic and social systems.

Keywords: *Regenerative thinking, self-assessment, higher education.*

1. Introduction

Regenerative thinking refers to a paradigm shift that moves beyond sustainability's focus on minimizing harm toward actively enhancing the capacity of social-ecological systems to renew, adapt, and thrive through holistic, place-based, and systems-oriented approaches (Bellato et al., 2022). In the work of Lopes Cardozo et al. (2025), regenerative thinking further emphasizes inner and relational transformation - cultivating care, reciprocity, and co-creation so that educational and social practices contribute to the long-term flourishing of interconnected human and more-than-human systems. As regenerative thinking gains prominence as a framework for addressing global socio-ecological challenges, educators are increasingly tasked with equipping learners to navigate complexity, uncertainty and interdependence (Beresford-Dey, 2025; Stein et al., 2024). Regenerative education emphasises systems awareness, iterative and transformative learning and the capacity to contribute meaningfully to the well-being of social and ecological systems (Bellato et al., 2022; Lopes Cardozo et al., 2025). To support learning reflection has emerged as a critical practice to enhance students' ability to internalize regenerative concepts, monitor their learning processes and transfer new insights into real-world contexts; however, our review of recent literature suggests an emerging gap for reflection and assessment of students' regenerative thinking, highlighting the need for developing practical tools in this field. Recent scholarship discusses self-assessment and metacognitive awareness as pedagogical strategies that can support deeper forms of learning and foster more intentional, self-directed engagement (Panadero, 2017; Tuononen, Hyytinen, Räisänen, Hailikari, & Parpala, 2023). Previous research demonstrates that structured prompts can be used as a pedagogical strategy to support metacognitive awareness and encourage students to evaluate their understanding foster clearer awareness of cognitive processes, leading to improved conceptual integration and long-term retention (Panadero, 2017). This is particularly relevant for regenerative thinking, which

requires learners to develop the capacity to understand system dynamics, question underlying assumptions and engage in continuous, adaptive inquiry (Wooltorton et al., 2022).

Metacognition and self-assessment strengthens learner autonomy (Gholami, 2016; Tuononen et al., 2023) a competency increasingly recognized as foundational for sustainable and transformative education systems. International policy frameworks highlight that empowering students to take ownership of their learning is essential for cultivating agency, resilience and responsible action in complex contexts (UNESCO, 2022). Within regenerative education, this sense of agency is aligned with the broader aim of nurturing individuals who can critically reflect on their decisions and their impacts on interconnected human and natural systems. Recent empirical findings indicate that reflective practices enhance students' ability to apply theoretical knowledge in authentic tasks, including problem-solving, design processes and collaborative projects (Hoang, Hepburn, Morawska, & Sanders, 2025).

The aim of this article is to develop a self-assessment tool for students to support the evaluation of regenerative learning modules by facilitating structured self-assessment and reflection processes. To date, no commonly adopted tool exists for assessing regenerative thinking; therefore, prior to this article, a comprehensive literature review was conducted to identify key elements of regenerative thinking, which informed the conceptual grounding of the tool. The initial development of the reflection tool followed a deductive approach, with the literature review providing the theoretical foundation. Deductive content analysis is a systematic approach in which analysis is guided by existing theory or prior research, allowing data to be examined for patterns, themes, or categories aligned with pre-established concepts and enabling the testing or refinement of theoretical frameworks (Sarajärvi & Tuomi, 2017). The key elements identified through the literature review subsequently informed the design of the reflection tool.

2. Methodology

The organization of a regenerative thinking research camp for PhD students, researchers and educators created a natural and contextually grounded opportunity for data collection. The research camp included 18 participants, comprising four international and fourteen Finnish attendees. Of these, nine participants were subsequently interviewed, including seven from Finland and two from Europe. The European participants were interviewed via Microsoft Teams, which provided automatic transcriptions. Four Finnish participants were interviewed in person, while three provided written responses to the research questions via email.

Participants reported not being aware of any criteria for assessing learning in regenerative thinking. This underscores the urgent need for tools supporting students' learning and teachers' evaluation of regenerative frameworks.

We presented the participants with questions derived from the literature review. Data was collected through semi-structured interviews. Participants were invited to reflect on their understanding and experiences of regeneration through a series of guiding questions:

- What does regeneration personally mean to you, and would you like to share any insights regarding regenerative thinking?
- Which principles or aspects do you associate with regeneration and how do you apply regenerative principles in your own life?
- Did you gain any new insights about regeneration during the Regenerative Camp seminar, or did your understanding of regeneration change because of participants in the camp?

The interview data proved sufficiently rich to warrant complementing the deductive approach with an inductive analysis. Inductive content analysis was particularly appropriate for this study because the dataset contained detailed and conceptually dense material derived from participants' nuanced accounts of their knowledge-related practices. This depth and complexity required an analytic approach that allowed categories to emerge from the data rather than being constrained by predefined coding structures. Inductive analysis provided the methodological flexibility necessary to fully leverage the richness of the dataset and develop insights grounded in participants' lived experiences (Alvesson & Kärreman, 2001). By engaging closely with participants' expressed experiences and situated narratives, inductive analysis supports the development of categories that capture subtle and multi-layered dynamics, producing findings that are empirically grounded and sensitive to the context in which knowledge activities unfold (Easterby-Smith & Lyles, 2011).

The data-driven analysis proceeded in three main stages: first, the data were reduced; second, they were clustered; and finally, theoretical concepts were constructed. The analysis followed the framework for data-driven content analysis outlined by Sarajärvi and Tuomi (2017). Interviews were transcribed, thoroughly read, and key elements were identified using color coding. These elements, identified through deductive analysis, were subsequently used to refine and interpret the research questions. The elements in this dataset comprised a holistic worldview, systems thinking, care, and place. An additional category,

“Other”, was included afterwards to capture significant expressions that did not fit within the existing categories but were closely related to them. The analysis advanced by initially listing simplified expressions, followed by identifying similarities and differences among them. Simplified expressions were then grouped into subcategories, which were subsequently combined into higher-level categories. Finally, the higher-level categories were synthesized to form overarching conceptual constructs. Consequently, the whole analysis can be characterized as an abductive content analysis.

3. Results

An overview of data-driven content analysis is presented in Table 1. The first column of the table introduces categories identified from the deductive analysis. In total, the interview yielded 108 expressions related to these categories. The second column presents examples of reduced expressions from the interviews matching the categories. The process then proceeded in identifying similarities and formulating subcategories from the reduced expressions. The third column introduces the main categories created from inductive analysis. Finally, the fourth column combines these main categories under a unifying concept.

Table 1. Data-driven content analysis overview.

Deductive analysis categories	Examples of reduced expressions from interviews	Main categories	A unifying concept
Holistic worldview	Small actions are having great meaning	Worldview and meaning	Holistic worldview
	I have wanted to do right or do correctly in terms of nature.	Ethics and responsibility	
	I can see globe's connections inside the ecosystem. And there is a lot related to human responsibility, because taking responsibility creates ability to make a change.	Interconnectedness	
	I think regeneration is all about finding harmony in different parts of life and feeling connected with others.	Harmony	
Systems thinking	To me, regeneration is fundamentally connected to the idea of humans as part of nature and its systems. Regeneration makes living-systems thinking easier to understand.	Regenerative understanding	Regenerative praxis
	...we're not just trying to create something regenerative after the research is done, but that we're actually providing tools for improvement. To me, it was an incredible idea - that we're essentially trying to leave the research subject in a better state than it was when the research began.	Regenerative practice	
Care	I've been reflecting on love in the context of work life - by love, I mean caring for others, including colleagues, and for the work itself, wanting to nurture and show concern.	Care as relational practice	Nurturing as a practice
	...it's important to think about how nature's well-being contributes to the well-being of people.	Well-being and regeneration	
Place	It's all about focusing on the place and context, especially when we actually start doing something. You can't improve a place to live if you don't first see what it's really like and what it needs.	Contextual and place-based awareness	Meaningful place-related relationships
	I try to respect the place where I am acting or exploring something and give back value to it. More like these theoretical terms like contributing to debates on ecofeminism or environmental justice or anti-spacism or anti-techno-centric evolutions. Those are things I can give back.	Integrated human-environmental engagement	

A tentative framework for self-assessment of regenerative thinking is presented in Table 2.

Table 2. Example of reflective questions derived from content analysis.

Main categories	Example self-assessment questions
Holistic worldview	Q1: In your own life choices, how do you consider your personal, community or planetary boundaries?
	Q2: How is ecological, social and economic perspective translated and integrated into your personal life?
Regenerative praxis	Q1: In what way are you part of nature and its systems in your daily life?
	Q2: How do you integrate your nature-positive life choices into your living system?
Nurturing as a practice	Q1: How do you cultivate deep listening and dialogue?
	Q2: How do you see belonging into the community? How does nature contribute to your own wellbeing?
Meaningful place-related relationships	Q1: How do you describe your own, important place (e.g. your own living area, grandparents' house, cottage, important area to you etc.), what does it mean to you?
	Q2: How do you connect yourself, people and nature in your own surroundings?

4. Discussion

Traditional sustainability approaches, while beneficial, are often argued to have limitations in achieving transformational change. Regenerative thinking, which emphasizes restoration and renewal, offers a more ambitious framework. Our aim was to develop a reflection tool for students. The tentative tool has been developed by drawing on the literature on regenerative thinking as well as from inductive analysis of collected interview data. Based on these sources, we identified the preliminary key dimensions of regenerative thinking. The rich content collected indicates that additional dimensions could be identified, but this was beyond the scope of the present study. However, we wished to present these preliminary results to the regenerative educators and scientific community for further discussion and development. This work is based primarily on inductive analysis of observations, and future research could strengthen it through a more extensive deductive engagement with the literature. The reflection tool presented in Table 2 is not yet complete, but here we outline its most important categories and examples of reflection prompts that can be utilized.

5. Conclusions

This study highlights the significance of developing reflection and assessment practices that meaningfully support the integration of regenerative thinking in higher education. While the preliminary reflection tool designed in this research shows promise for enhancing both student reflection and pedagogical coherence, the findings indicate that the tool requires further development, systematic testing, and subsequent refinement. The preliminary development process demonstrated the potential of a dual-purpose tool that supports students in evaluating their own decisions and their impacts on interconnected socio-ecological systems, while also providing teachers with complementary insights into student learning. However, further empirical validation is needed to determine how effectively the tool functions in practice and how it might be improved to better support the development of regenerative mindsets. In addition, future research would benefit from the development of a dedicated evaluation tool for teachers, enabling educators to systematically reflect on and assess their pedagogical approaches to regenerative learning. Such parallel assessment instruments could strengthen alignment between teaching intentions and learning outcomes, thereby further supporting transformative, systems-oriented approaches to sustainability and regeneration in higher education.

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