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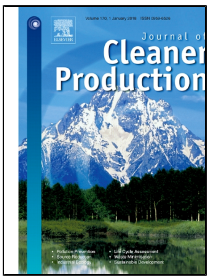

Transdisciplinarity in higher education for sustainability: how discourses are approached in engineering education

Gemma Tejedor, Jordi Segalàs, Martí Rosas

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Transdisciplinarity in higher education for sustainability: how discourses are approached in engineering education

Gemma Tejedor, Jordi Segalàs & Martí Rosas

University Research Institute for Sustainability Science and Technology. UPC – Barcelona-Tech Campus Nord - Edifici TG, planta S1. C/Jordi Girona, 31. 08034 Barcelona. Spain

gemma.tejedor@upc.edu, jordi.segalas@upc.edu, rosas@mmt.upc.edu,

Corresponding author: gemma.tejedor@upc.edu

Abstract

Sustainability issues, as unwanted results of not fully respecting natural cycles, are widely recognized as wicked problems, which should not be thought of as problems to be solved, but rather as "conditions" to be managed, as if they were a chronic disease (Seager et al., 2011). There exists a general agreement on the need to reform scientific expertise by developing new ways of knowledge production and decision-making able to cope with the challenges sustainability poses. In this sense, transdisciplinary aspects of sustainability are acknowledged as a transformational stream of sustainability science.

Transdisciplinarity is considered a competence for sustainability in technological curriculums. Nevertheless, engineering education professionals tread on unfamiliar ground when entering transdisciplinarity approach, as it includes social sciences and humanities perspectives. Advancing sustainable engineering science requires creating new long-term, participatory, solution-oriented programs as platforms to recognize and engage with the macro-ethical, adaptive and cross-disciplinary challenges embedded in professional issues.

Meanwhile, individual university professors and researchers take a step forward to try out innovative experiences in their classrooms to deal with complexity and reach holism in fostering knowledge in different ways. This paper analyses first what is being done and how is it being focused, and second, What are the strategies for and purposes of implementing transdisciplinary experiences in engineering higher education.

Assuming that distinct patterns of definition of transdisciplinary exists, the authors collated transdisciplinary initiatives in engineering education for sustainability from Thompson Klein (2014) *discourses on transdisciplinarity*: transcendence, problem solving and transgression. They also explored how practical constraints imposed by a classroom context, highlighted the limits of transdisciplinarity, and offered suggestions on improvements, which could be implemented. Balsiger (2014) proposes four *varieties of transdisciplinarity* (soft, hard, inclusive and reflexive) to identify ways for moving from one type to another as circumstances change, in terms of stakeholder's collaboration and knowledge integration possibilities.

The methodology consisted in literature review of articles published in relevant journals in the field of sustainability, which focussed on transdisciplinarity approaches in engineering education. We have analysed how the different initiatives fit in Klein's *discourses on*