

Proposal Information of Contribution 1048**ID: 1048****30. Environmental and Sustainability Education Research (ESER)****Symposium***Alternative EERA Network:* No alternative network applicable (Rejection if submission does not fit the first choice NW).*Keywords:* Key Competencies in Sustainability, Assessment, Higher Education for Sustainable Development, Assessment Instruments**Assessing Key Competencies In Higher Education For Sustainable Development: Insights From The Deployment Of Innovative Instruments***Chair:* **Matthias Barth** (Leuphana University)*Discussant:* **Marco Riekman** (University of Vechta)

The future needs change agents equipped with key competencies in sustainability to collaboratively address the challenges we face (Wiek, Withycombe, & Redman, 2011). While education programs have emerged at various levels focused on teaching for these competencies, there is as of yet no sufficient way to assess whether these programs are achieving their objectives. Traditional methods of assessment are generally seen as inadequate for measuring the more multi-dimensional and performance oriented competencies (Frey & Hartig, 2009). Therefore, new approaches are needed and much exploratory work in this direction has begun (Hartig, Klieme, & Leutner, 2007). While cases have been published on attempts to assess the impact of novel teaching and learning methods for the development of key competencies in sustainability, the focus has typically been on the pedagogical approaches and program design and little to no robust efforts have been made to comprehensively develop reliable and valid assessment instruments.

In order to carry out this needed task, Barth (2009) proposed a set of necessary steps. First, that the specific characteristics of the key competency construct be considered. Second, that the key competencies chosen for measurement have a strong theoretical and conceptual foundation. Third, that they be operationalized and described in detail. Fourth, that the balance between assessing the individual components versus the interactions between those components needs to be explicitly considered. Finally, he advises that it is "imperative to define and to empirically verify relevant competency levels and their effects on action in different context, and to test the adequacy of different approaches."

This symposium brings together some of the leading efforts in assessing key competencies in higher education by building on the 2017 ECER symposium "Assessing Learning Outcomes of Education for Sustainable Development." Contributors will present their efforts to develop robust and valid instruments for the assessment of key competencies and explore their generalizability for sustainability in higher education. Some of the specific questions to be explored include:

- What innovative approaches might be effective in assessing complex multi-dimensional constructs like key competencies in sustainability?
- What processes are effective for the development of robust and valid instruments for assessment of key competencies in sustainability in higher education?
- How practical are these instruments? E.g. are they generalizable to other programs; able to be deployed with minimal resources; fit into course schedules, etc.

The questions will be explored in different international and institutional contexts within higher education. This symposium will offer a clear contribution to our understanding of the current state of assessment of key competencies in sustainability. The diverse set of contributors from the United States, Germany, Spain and the United Kingdom offers not just an overview of the current state of the field but a critical reflection of where it stands and the identification of key gaps in knowledge for future investigations.

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Presentations of the Symposium*Papers in Symposium:* 4*National Perspectives:* 4**How Much Can Be Learned About Student Development Of Key Competencies In Sustainability Through Brief, Online Assessments****Aaron Redman** (Leuphana University), **Arnim Wiek** (Arizona State University)*National perspective:* United States

Despite the clear need, the published record on assessment of key competencies in sustainability is so far quite limited. One of the more coherent efforts was the case study approach deployed over several years by Remington-Doucette and colleagues (Remington-Doucette, Hiller Connell, Armstrong, & Musgrove, 2013). The more common approach has been more along the lines of a self-assessment (Savage, Tapics, Everts, Wilson, & Tirone, 2015) and while some are quite critical of its usefulness and validity (Sandri, Holdsworth, & Thomas, 2018), others think that self-assessment can be useful if carefully developed (Galt, Parr, & Jagannath, 2013; Khaled et al., 2014). Interviews, focus groups, reflections and assessment of class work are some of the other ways that researchers have attempted to assess the competencies among their students. For this research an online multiple choice instrument was developed specifically focused on the key competencies in sustainability as described by Wiek and colleagues (2011). This assessment was designed to be fairly easy to implement and require minimal time from students (average was ~30 minutes). Students were recruited from a range of programs and educational levels in order to understand the range, scope and potential of this approach to compare level of competence development. In addition a sub-set of students who were participating in a course targeting the key sustainability competencies took the assessment before and after. Results suggest that this approach provides insight only to a crude level of competence development and more so at the group/cohort level rather than the individual level. It is therefore insufficient for measuring changes as might be expected for the course of a semester. Future directions and possibilities will also be discussed.

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‘Innovation Learning’ In ‘Sustainability Innovation Labs’: Assessing Students’ Professionalization In Network Consultancy

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National perspective: Germany

The Sustainable Development Goals are intended to provide direction to political, administrative, societal and economical strategies. Design-ability in open systems of innovation (Weber 2018) then becomes one of the core elements of higher education for sustainable development by seeking to develop relevant approaches for sustainability and ‘innovation learning’ within regional platform strategies. ‘Innovation learning’ for sustainability offers potential for professionalization and social change (Weber, Heidelmann & Klös 2018). Involving higher education students in real, context based learning offers new opportunities in the field of experience and design oriented learning (Singer–Brodowski 2016). Systematically interconnecting university and region by sustainability labs (Feurstein et al 2008) opens up a liminal space between university and region for design-ability learning and it’s assessment. Our project financed by the German Council for Sustainable Development within the program ‘Culture of Sustainability’ addressed regional circuits of nutrition and in a two semester program interconnected university and regional innovation. By three sustainability innovation labs (2018/2019) we involved university and regional stakeholders like the university canteen, producers, suppliers, providers, regional politics and administration, students as users of a sustainable university canteen as well as recycling. In those regional platform strategies, students acted as organizers and facilitators of the innovation labs. Our program learning assessment was realized by a qualitative empirical research design. In a longitudinal approach (Brake 2018) we used image based interviews and group discussions at the beginning, within the process and at the end of the program. Assessing students’ professionalization in 10 waves, we follow the process of learning and the process of organizing and realizing the labs. In our presentation we discuss the potentials of a qualitative assessment within organizational education professionalization for sustainability (Heidelmann & Weber 2018).

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Round With Two Sides: Using Dialogue To Assess Educator Competences And The Intention To Apply Them.

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National perspective: United Kingdom

This research investigates an approach to learner assessment being used on an EU-funded project, A Rounder Sense of Purpose (RSP), that developed a competence framework for education for sustainable development (ESD) educators based on the UNECE (2011) competences. This framework and plans for assessment were presented at the preceding symposium ECER in 2017. In assessing ESD competences there is a contradiction between highlighting learning outcomes that competences seek to impart and the desire to encourage learners to think for themselves. This double bind is highlighted by Shephard et al (2018) whose review of selected literature on competences identifies an important distinction between (i) the obligation on the part of learners to achieve pre-determined learning outcomes and (ii) the aspiration that learners will wish to use their new competence in the way that it was intended. The research approach being piloted in the RSP project is based on peer assessment of vertical and horizontal dimensions of learning and dialogue (Wegerif 2011; Vare 2018). To date this has encouraged students to present their own emergent views and actions, i.e. what they wish to do. Subsequent trials of this approach are focussed on specific aspects of the competence framework, i.e. what they are obliged to learn, while emphasising that learning is rarely, if ever, limited to one competence at a time. This paper will explore the extent to which engaging in the teaching and assessment of this way has enabled learners to (a) better comprehend the integrated nature of this (and any) set of competences and (b) explore for themselves the double bind inherent in ESD competences.

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Teacher Training For Secondary Education: An Approach To The Evaluation Of Competencies In Sustainability

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National perspective: Spain

For more than a decade different initiatives have been promoting the incorporation of Sustainability in the curricula at all educational levels, especially in the training of teachers. In particular this has included specification in the curriculum of key competences for Sustainability, included in the regulations for the preparation of university study plans. In this context, the authors have sought that the initial training of secondary school teachers include among their goals the acquisition of key competences for Sustainability as well as increasing attention to achieving the Sustainable Development Goals (SDGs). To contribute to this end, planning instruments have been established for the inclusion of Education for Sustainability as well as for monitoring and evaluating the intervention actions and the results of the acquisition of the competences that are to be promoted, the focus of this research paper. Among the capacities that future teachers must master, is the Programming of their subject, starting from the established official curriculum, or Base Curricular Design, with the concretion in the center, attending to the guidelines of the department and the characteristics of the class group. This Didactic Program has four levels of timing: the annual, the quarterly (with the partial evaluation), the biweekly (with the teaching units) and the diary. The study has been carried out with teachers in the Master's Degree in Secondary Education Teaching in the specialties of Drawing (in their own subjects such as Plastic, Visual and Audiovisual Education, Audiovisual Culture, Technical Drawing, Art Drawing,

Design ...) and Socio-cultural Services and the Community, in the stage of Vocational Training (Formative Cycle of Sociocultural and Tourist Animation, in the matter of Animation and Cultural Management). For the evaluation of the competences acquired by the teachers involved the competences for Sustainability and the SDGs have been linked in the analysis of an educational institution by the students during their practicum period, in which they must be addressed skills such as observation, analysis and critical assessment of the teaching reality. Then, the design of an educational visit with the students and a Teaching Unit with activities in coherence with the EDS was carried out, elaborating evaluation instruments, such as rubrics, checklists, estimation scales, observation records, anecdotes.

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