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DECODING SUSTAINABLE COMPETENCIES AND DIDACTICS IN DESIGN EDUCATION

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ABSTRACT
Designers face a world needing help to create sustainable solutions for complex systems. Some researchers stress that many European design graduates still finish their studies with a narrow concentration in design skills and lacks competencies to cope with the complex reality [20].
As such it becomes central *how* the designers are prepared to meet complex problems. In this way, the *what* and *how* they are taught becomes essential. But it also becomes central if the educators have the right competencies and didactic understanding to teach the students sustainability competencies [12] [13] [20]. Finally, as competencies are descriptive for a person's capability of acting, competencies do not ensure *action* of the intended competency. The use of entrepreneurial didactics in Education for Sustainable Development is therefore essential [6].
The article uses data from two R&D projects, asking what competencies students need, which they miss and how they can improve their competencies working with sustainable challenges; the Design for Change Course (DFC) at VIA Design and research performed during the Decoding European Creative Skills (DECS) [1] project, adapted to the DFC course in 2019. It also asks how the educators could improve their Education for Sustainable Development (ESD) competencies.
The findings from this study shows a need for change in both the educational didactical approach to ESD education as well in terms of interacting and developing the students' competencies. It also shows that very few educators in the immediate vicinity felt capable of or competent to teach in Educations for Sustainable Development.

Keywords: Design education, design for social & sustainable innovation, entrepreneurship, design didactics, education for sustainable development

1 INTRODUCTION

In 2017 UNESCO described Educations for Sustainable Development as an integral part of World Goal 4 (Quality Education). In this manner, all educational institutions should encourage the development of sustainability competencies. The UNESCO addresses transformational learning content and outcomes, pedagogy as well as the learning environment [13]. But, teaching at design-schools is still very often shaped by silos and many of the educators are not aware of these emancipatory, competence-oriented didactics. A change from knowledge based to competence-based learning in Sustainability Education is needed to transform the educational system. [7] [13] [21] [22]. Success in acquiring sustainability competencies extends beyond memorization and requires educational institutions to provide new in-formal learning settings [8] [9] [10] [11].

1.1 Methodology

The DFC study was performed to discover if and how VIA Design and the collaborators in our Design for Change course could apply service design for sustainable development methods and how the competencies could improve in order to enhance the collaboration and innovations made. Done over a four-year action research study of four DFC courses at the length of between 7 and 9 weeks, from 2014 – 2018. The studies are based on in-depth case study of collected data using a number of qualitative and ethnographic methods to support the research objective and consisted of three types of data: transcribes from qualitative semi-structured interviews, observation notes, and documents and various objects from the course.

1.2 Framing key sustainable competencies

A definition of competences relies on an interlinked complex of knowledge, skills, and attitudes that enables the performance of successful tasks and problem solving. [16] The ESD discourse has presented eight key competencies of particular importance for thinking and acting in favour of sustainable development: 1. Systems thinking competency, 2. Anticipatory competency, 3. Normative competency, 4. Strategic competency, 5. Collaboration competency, 6. Critical thinking competency, 7. Self-awareness competency, 8. Integrated problem-solving competency [10] [12] [13]. If ESD courses and elements are only defined by lecturers it is still very unlikely students will feel the urge of commitment to work on SDG challenges, research shows. Didactic approaches to ESD reflect the latest trends in trying to develop "participatory" or "democratic" approaches combining active student involvement with empowerment [5] [22]. In 2019 the three-year EU-funded project "A Rounder Sense of Purpose" presented 12 key competencies for Education for Sustainable Development [15].

The field of Sustainability Driven Entrepreneurship is emerging and could provide an insight into what competencies are needed to make the students act as global sustainable citizens. Bieberhofer et al., (2018) has made an explorative study on sustainability competencies to extract what competencies are needed and to make students capable of creating individually based sustainable actions and thereby act as sustainable "citizens".

By comparing the five sustainability key competencies from Wiek et al. (2011) they found it crucial for the entrepreneurs to understand the complexity of the present economical and complex production transformation processes into a sustainability driven paradigm. Bieberhofer et al., (2018) stressed the "*reflection on norms and values as the most "distinctive element in Sustainability Driven Entrepreneurship (normative competency*". Finally, Bieberhofer underlines the need for expanding personal development processes of students and the establishment of new settings for the personal reflection of opportunities. The educator needs to understand the importance of didactics.

1.3 The educator and the sustainable competencies

Vare and Scott (2007) described two sides of ESD: 1: ESD1 *"promoting informed behaviours and ways of thinking"* and ESD2 as: *"building capacity to think critically about and beyond sustainable development concepts".* Vare & Scott (2007) propose the combination of the two in using transformative learning didactics is inevitable, based on dialogue to engage learners, which in turn can lead to sustainable change.

But, as the SDG's offer the educator content and context for ESD 1, they do not develop educators carrying sufficient competencies to generate critical for ESD 2 [11]. In 2018 the Rounder Sense Purpose network presented a matrix of 12 competences using the same columns as the UNECE framework. The RSP competence-table proposes a progress which the educator could follow:(a) Integration—using knowledge from different dimensions, looking at interconnections and cause-effect relationships (b) Involvement—building this understanding into their personal sense of commitment (c) Practice—combining the two stages above in their practical work as an educator (d) Reflection—evaluating the process and results of their work, assuming responsibility, and taking decisions before repeating the process in an iterative learning loop [14].

1.4 Empirical setting: findings from the DFC course

The evaluation of the course showed gaps in the students' competencies concerning.

1. Systemic Understanding. The discovery of how a Business or Municipality is organized, interconnected, the importance of its values and virtues as well as the co-creational approach involving expert-users(citizens), NGO's and legislation was overwhelming to some students. **2. Interpersonal competencies.** The students often faced internal problems in the design-teams to deal with, regarding leadership and positions in the process as well. This could also be addressed as a lack of collaborative competencies.**3. Normative competencies.** Understanding limitations and regulations deriving from personal, organizational or legislative sources or institutions were often discovered far too late in the design-process. **4. Self-awareness and critical thinking competencies.** The basic of the process, the worldviews and beliefs, self-perception and underlining training in this showed to be crucial to some students. But the students performed well when using their well-trained action- and opportunities competencies [6]. As they are students deriving from the Design, Entrepreneurship and Innovation Speciality they have had a lot of training in seeing opportunities, markets and possibilities as well as

they have well developed competencies for strategic and anticipatory actions, innovative thinking and iterative approaches to the process.

1.5 Findings from using the Decoding Creativity Tool

DECS1 poses questions on the 21st Century design student's competencies and the "gaps" discovered between the research findings and the wishes to encompass future social, technological and environmental challenges and has the notion that creativity is a multidimensional construction connected to many other competencies and not an autonomous or isolated skill. The methodology identified a list of ten competencies and 20 dimensions of these, which have been used to create a radiograph on the model, -related to the creative process.

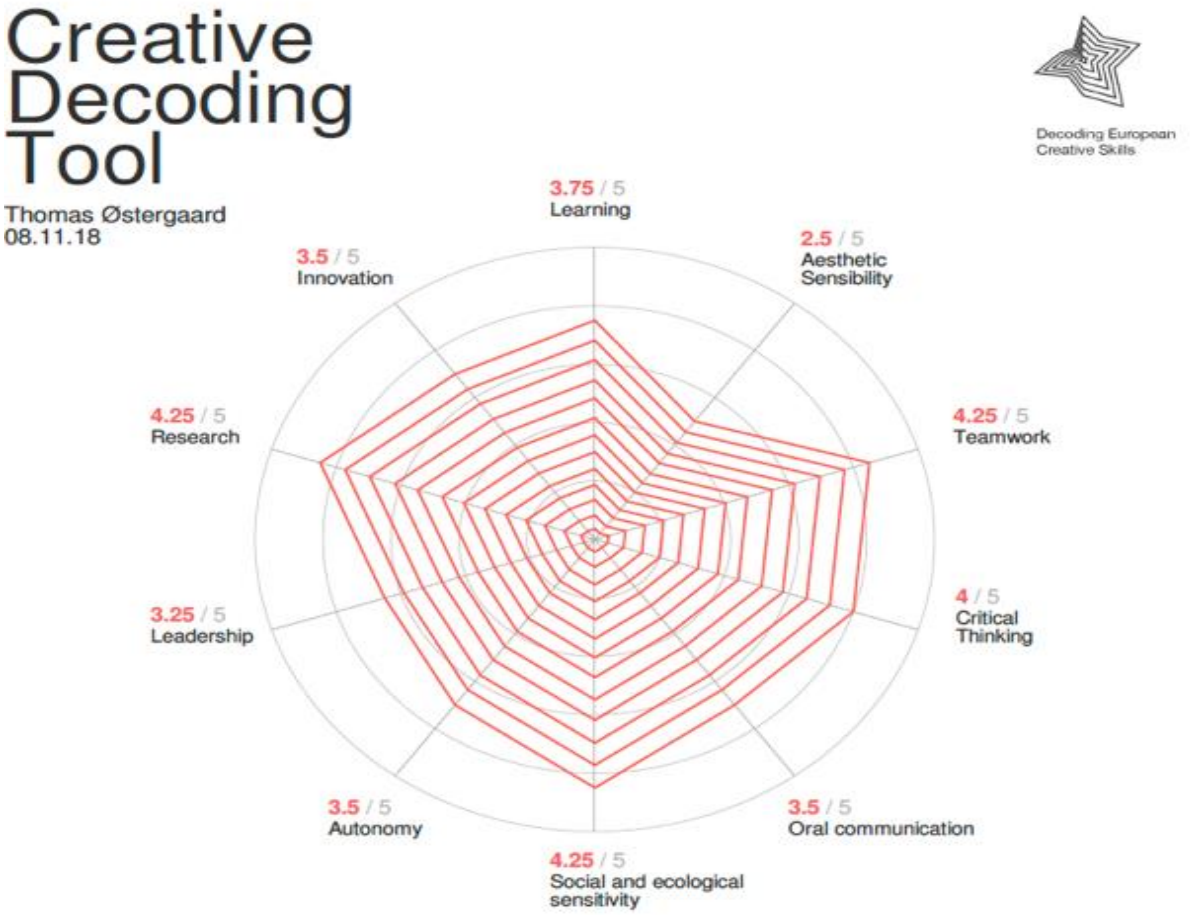

Figure 1. The radiograph on the behavioural models related to the creative process from the DCT applied

By doing so, the researchers created "The Creative Competencies Dictionary" and thereby invites the designers to self-reflection and insight into the practice and skills for design in the creative process giving the teachers of design and helping the students to understand or even improve their own creative competencies. By adding the CDT and using the Dictionary as a theoretical backdrop the teachers should have a tool to discover individual gaps and potentials of the students' competencies as well as their work behaviour and thereby providing a self-assessment tool for universities to use also in developing

[1] The Decoding European Creative Skills, DECS is a co-funded project by the Creative Europe Programme of the European Union lead by ELISAVA, School of Design & Engineering together with Fachhochschule Salzburg University of Applied Sciences and Eindhoven University of Technology. The aim of the project has been the mapping and categorization of "different creative skills that may define the know-how of current designers and designers-to-be. Cortinas, Esparza and Martinez-Villagrasa, (2018)

educations for specific sectors. To the Professionals the tools can be used to detect and work on the progression of improving competencies within the company, when hiring or developing employee-strategies and personal development tools. Finally, the DECS project and the CDT provides new knowledge – a common language (grammar and a dictionary) and research on the creative competencies of designers across disciplines and challenges across Europe.
As such, the DECS project, provides a vocabulary, a method for construing the 10 competencies and a relatively non-curricular informal tool for a continuing personal development proposes elements of the informal, "experiential learning" - developing a life competency - using intellectual, sensory as well as emotional responses in the assessment of the individual and the group in the process. The DCT also gives a method to reflect on earlier experiences and the individual evolution of competencies. But as the vocabulary and the DCT-tool is a mixture of both knowledge based and experiential learning methodology it does not quite meet the sustainability focused standards of the eight UNESCO competencies. On the other hand, as the DCT tool is a powerful competency development facilitator, it suggests a useful combination or use of the "regular" design competencies, such as "Learning", (curiosity + knowledge internalization), Critical Thinking, (questioning + proposing), Oral Communication, (planning + charisma) Autonomy, (self-management + initiative) and of course Social and Ecological Sensitivity, (awareness + compromise) in a sustainability context. In a SE view, the DCT tool could help enhance the design-students self-awareness in relation to the UNESCO proposed competencies and add aesthetics and material-knowledge and science to the ESD competencies.

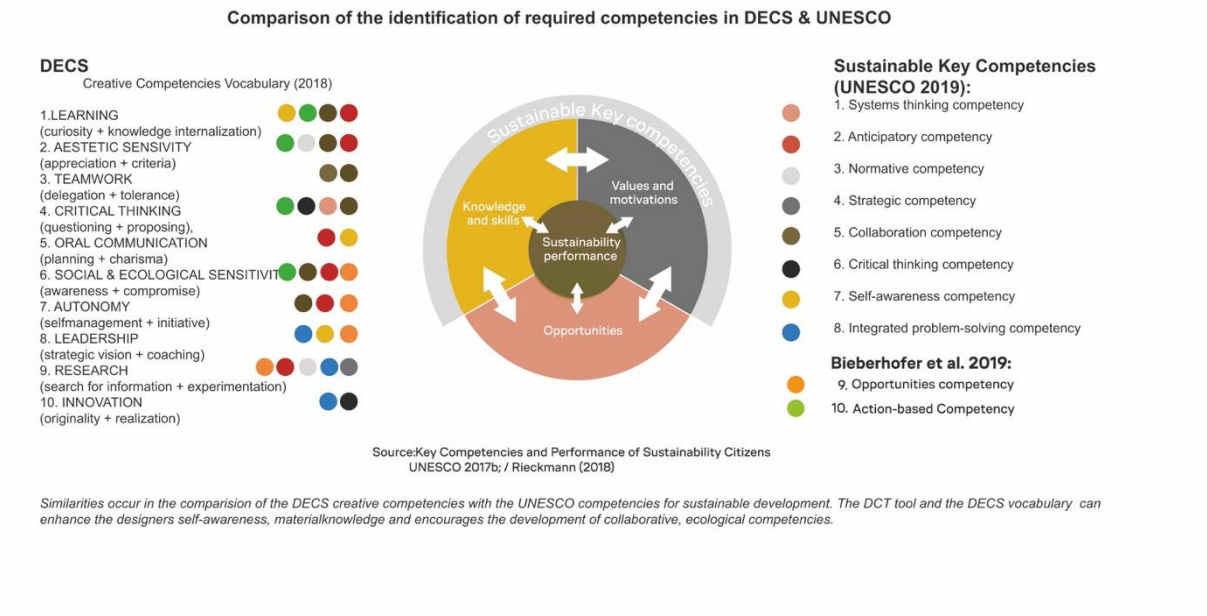

Figure 2. Comparison of the identification of required competencies according to DECS & UNESCO

2 FINAL FINDINGS

In 2019 eight students were introduced to the DCT tool during the Design for Change course. It was used as a vocabulary and reflection-frame repeatedly for their performance and development as they were introduced to UNESCO's eight competencies, using Wieks (2011) framework and the RSP model. 89% of the students found the DCT-tool estimated they improved their understanding of the use of their own creative competencies in Education for Sustainable Development. Before entering the course only 18% assessed they had the competencies to handle complex, sustainable or social challenges. After having used the DCT tool and finished the source 68% of the students described themselves as *more competent to work in ESD's*. But when making a survey amongst 25 fellow educators only 32% of the educators found they had sufficient competencies to teach Educations for Sustainable Development. And this could be one of the reasons why the students felt insecure to work in ESD's.

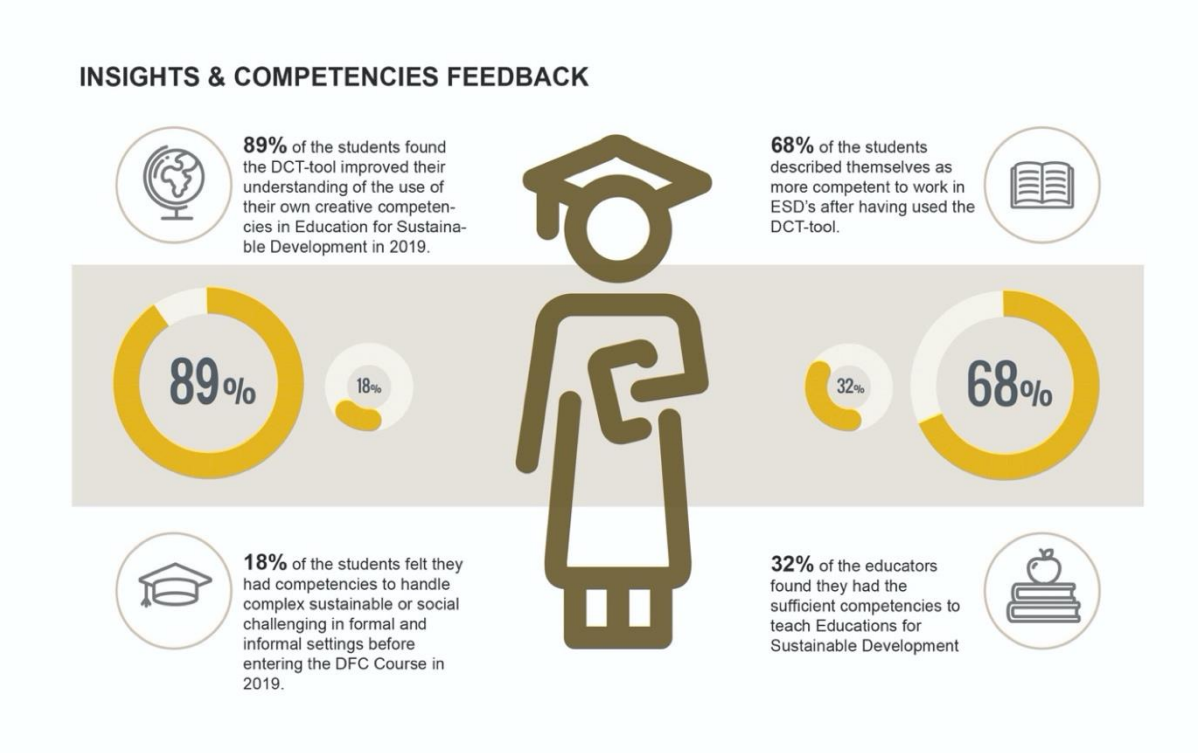

Figure 3. Conclusions of the study

3 CONCLUSIONS & PERSPECTIVES

The first findings from this study showed gaps and a need for change in both the educational didactical approach to the DFC course as well in terms of interacting and developing the students' competencies. It also showed that very few educators in the immediate vicinity felt capable of or competent to teach in Educations for Sustainable Development. There is an anomaly between the wishes for the future of education from UNESCO and the real educational world which we need to address in research, practice and learning. The DECS project has provided insight in how educators can establish a new processual dialogue and transformative vocabulary between the students and the educator when working in ESD's and some improvements of the behaviour and competence-development could be read from the first research made, using the DCT-tool.

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