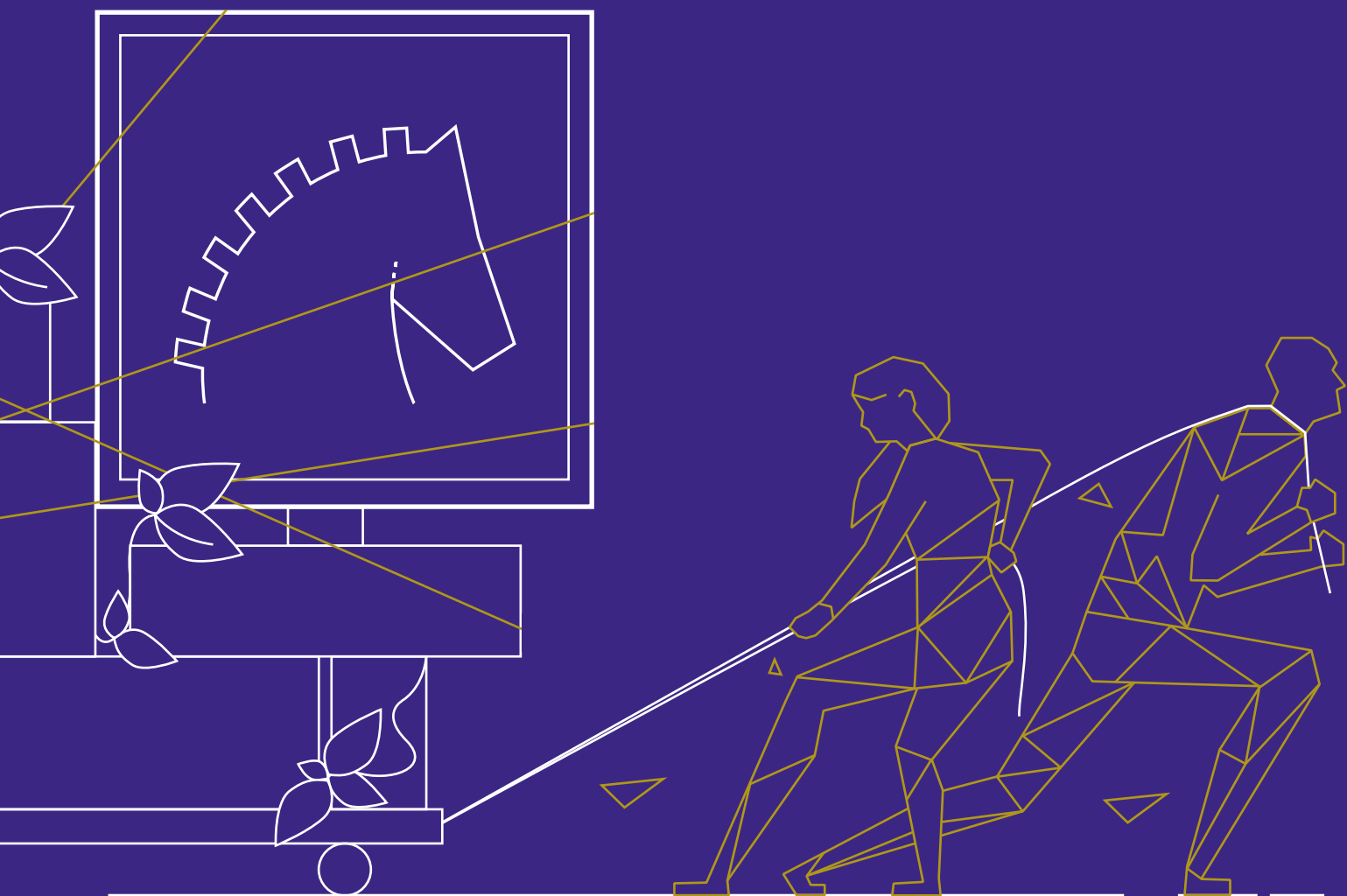


Synergie

FACHMAGAZIN FÜR DIGITALISIERUNG IN DER LEHRE | #07



NACHHALTIGKEIT



Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

NACHHALTIGKEIT

Nachhaltige Digitalisierung oder
digitale Nachhaltigkeit (in der Lehre)

Open
24 HOURS

74

RUBRIK ÖKOLOGIE

Circadian and eutark reduction of the energy trace of a digital school

„It may be the case that the strongest eco-value of circadian and eutark devices does not reside in energy savings per se, but rather in habits these devices would help to reinforce and amplify.“



UNTERWEGS

I wish I were a Dutch student—student perspectives on the peer-to-peer exchange with the Netherlands

„Three days in November 2018, 17 university representatives from all over Germany, three Dutch cities and uncountable impressions – a peer-to-peer exchange on digitalisation in higher education.“

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NACHHALTIGKEIT

Bildung für nachhaltige Entwicklung als Öffnungsprozess für einen virtuellen Hochschulraum?

„Nachhaltigkeit lernen heißt die Welt als ganze Gestalt in den Blick nehmen und die individualisierten Nebenwirkungen von Forschungs-, Produktions- und Konsumprozessen auf Mensch und Natur abbilden zu können.“



RUBRIK INFRASTRUKTUR

Der Einfluss der Digitalisierung auf die Wissensgenese im Kontext einer nachhaltig-gerechten Entwicklung

„Eine nachhaltige Entwicklung erfordert eine Neuorganisation der Wissensbestände und ihrer Verfügbarkeiten. Dabei geht es im Kern auch um ein neuartiges Verständnis einer Beteiligung an der Wissensgenese.“

Improving students' competencies in sustainability science through the integration of digital teaching and learning in higher education

ALEXA BÖCKEL

DIGITALCHANGEMAKER

When I was just a little girl, I asked myself, what will I be. Will I be the savior of the world? Will I be a politician? I already knew that I want to change the current system, but I was only guessing what kind of superpowers I would need to save our planet. Let's be honest, we all know that we live in a world in which the planetary boundaries are dangerously exceeded (Rockström et al. 2009). And we cannot deny, that we have work for a transformation because we are the main driver for the ship navigating across the limits of our planet earth. Sustainability scientists have even given this phenomenon a name, it's called the Anthropocene (Crutzen 2006). After school, I found out that it is possible to study sustainability or environmental science. Hence, there are universities that want to unleash the potential of humans and empower them for tackling sustainability challenges (Stephens, Hernandez, Román, Graham & Scholz 2008).

Another discovery I made was the idea of "change agents for sustainability" and I immediately thought: "How great is that? I want to be a climate warrior!" But how do you become such a change agent? What are your superpowers? The magic is called "competencies for sustainability" and the goal of sustainability related study programs is to equip students with knowledge, skills and the intention to change the default system (Hesselbarth & Schaltegger 2014). In the last

years, I had the chance to be part of such a program at Leuphana University Lüneburg. I studied Environmental Science in my bachelor's and proceeded with a master program in Sustainability Science. The main idea of these programs is to not only provide students with information but to follow the principles of experience-oriented and problem-based learning (Barth & Burandt 2013).

Meanwhile, I started to understand the possibilities of digital teaching and learning in the student working group #DigitalChangeMaker from the Hochschulforum Digitalisierung. Suddenly, I realized that the potential that is concealed in digitalization of higher education is not fully exploited for the overarching goal and the deepest leverage point: Creating a paradigm shift of the current system (Meadows 1999). Thus, I want to explore how digitalization can help students develop their superpowers for change based on key principles and the idea of situated, constructivist learning (Barth & Burandt 2013).

Competencies for change agents

Transferring the definition of a change agent from the management perspective to a more holistic approach, change agents are actors that deliberately tackle social and ecological problems to put sustainability into societal practice and to contribute to a sustainable development of the economy, society and nature (Hesselbarth & Schaltegger 2014).

Their superpowers called 'competencies for sustainability' are described in several frameworks (for example De Haan 2006; Lozano, Merrill, Sammalisto, Ceulemans & Lozano 2017) and are synthesized in Wiek, Withycombe and Redman (2011). They describe the key competencies as systems-thinking competence, anticipatory competence, normative competence, strategic competence, and interpersonal competence. So, what do these abstract terms actually mean?

Change agents need the ability to analyze complex systems with interdisciplinary perspectives, across geographical borders and include quantitative and qualitative data while examining the system's dynamics and its characteristics (**systems-thinking competence**). This is why I had to study a broad variety of disciplines (for example chemistry, ecology, management, politics) combined with international problems and contrary claims from different stakeholders. To be open, I wasn't always happy about that. Standing in a laboratory and experimenting with toxic substances was never my dream life, but now I'm able to understand system dynamics and their drivers from a lot of perspectives.

That is accompanied by the **anticipatory competence** which contains future-oriented creativity without losing the systematic understanding and the ability to integrate uncertainty. Useful methods for

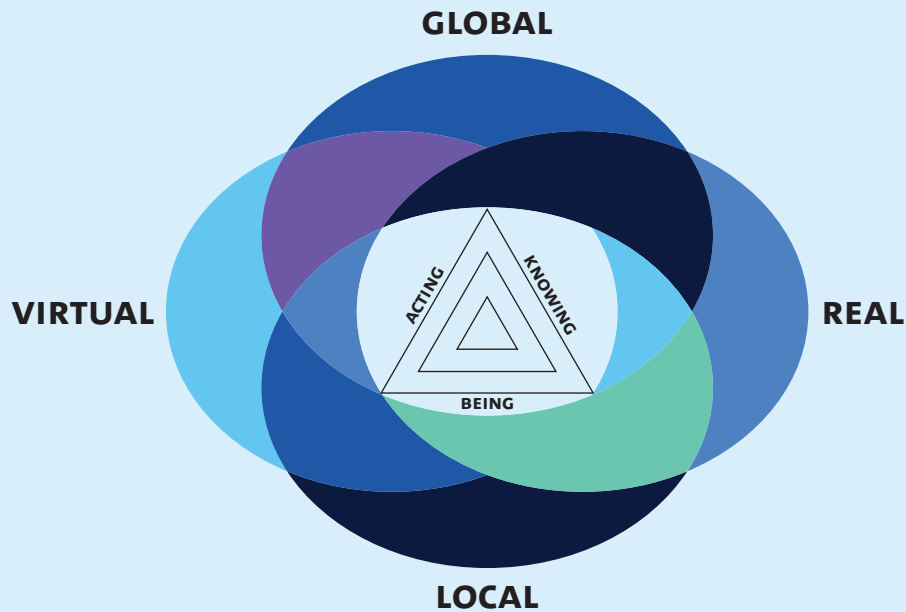


Figure 1: Caniglia et al. 2018.

example simulation and scenario analysis play a central role as well as risk-related perspectives. The realization of these scenarios and visions demands **strategic competence** to design and implement transitions and governance aspects. At Leuphana University Lüneburg, transdisciplinary projects are an essential part of our curriculum. And with transdisciplinary, we refer to the integration of knowledge from society that are not part of the scientific bubble (Lang et al. 2012). Therefore, the environmental students are confronted with real-world problems from real-world people and we can experience the consequences of our actions in projects.

The **normative competence** refers to the knowledge of different values, principles and goals and the required sensitivity which results from ethical and justice issues. With the aim of creating a shared undertaking, **interpersonal competence** is necessary for collaboration, negotiation, leadership, empathy, trans-cultural thinking and managing diversity. Students are sometimes not a fan of group work and being forced to reflect. I had to leave my comfort zone several times, facing my own negative impact and to question my behavior. Fortunately, to change your own behavior is also part of your educational training in sustainability. How can the process appropriation of competencies be supported by digital tools?

Potential of digitalization for sustainability education

Reading the Synergie Magazin, we might agree that digital teaching and learning inherits potential. But why is it especially important for sustainability education? Barth and Burandt (2013) stated that the intercultural perspective, interdisciplinary communication, knowledge generation and process and project management are among others essential elements of sustainability education. I experienced, that the diversity in knowledge of my fellow students is high and online courses in the first semesters can provide them with basic information on theory to create a shared level to start from. Further, the seminars often include group work as we must train our interpersonal competency. Therefore, we need a communication and project management platform that protects our data and facilitates mutual learning processes. An online wiki can help to create shared knowledge above disciplinary boundaries and to train systems-thinking competency by linking different topics. In the context of international collaborations for example the Global Classroom, the students can collaboratively work on projects with partner universities for being sensitized to different perspectives and cultural differences. For this, video communication and flexible learning rooms that can be adapted to the situation are required (for

instance recorded/live lectures from the partner university, video communication in groups of several students) (Caniglia, John, Bellina, Laubichler & Lang 2017).

In the following, I give one example of a course format that integrates digital teaching and learning methods in a particular field of sustainability science. It is built upon courses that were part of my study program at Leuphana University Lüneburg and are developed further.

Sustainable entrepreneurship as an example

Sustainable entrepreneurship is a prominent topic in sustainability science. The concept makes use of business opportunities while acknowledging planetary boundaries and solving sustainability problems (Shepherd & Patzelt 2011). I always liked these courses as they provide you with formal knowledge about the theory of sustainable entrepreneurship as well as the opportunity to gain hands-on experience on how to develop business models. Hence, the described approach integrates blended learning, design thinking, pitch training and communication on online platforms in an international context. For this course, it is vital to collaborate with an international partner university to enable the students to deal with different contexts and values (related to normative and interpersonal competencies).

GLOBAL CLASSROOM

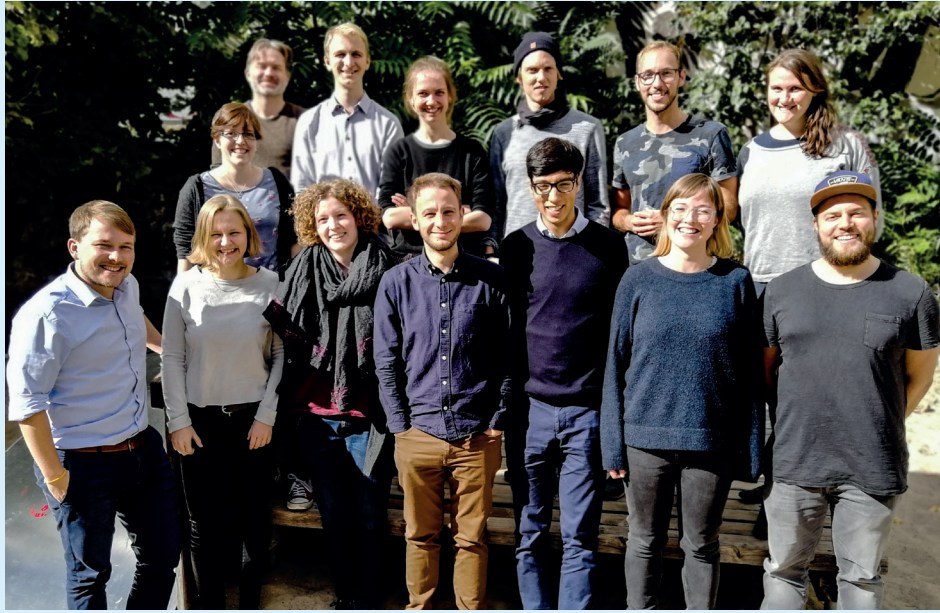


Figure 2: Digital Changemaker.

At the beginning of the course, the students have to take part in an online course on the theory of alternative forms of entrepreneurship (social and sustainable entrepreneurship, ecopreneurship). This includes criteria and frameworks for assessing sustainability in business models. The platform for online learning must provide a function for discussing theories with their global peers to be sensitized for different perspectives. This element finishes with a short, written test in which the students have to apply the criteria and the framework on case studies of business cases (for example Viva con Agua, Bridge & Tunnel).

The second part consists of presence workshops. In these workshops lasting for at least two days, the students are lead through a design thinking process. During the first day, they have to develop a deep understanding of the globally relevant problem they want to tackle in a small group (systems-thinking competence) applying the systems theory of Donella Meadows (2008). In the second day, they create ideas of how to solve these problems guided by design thinking principles and with the aim of developing a business idea.

The third part of the course is characterized by the further development of the business idea to a business model. In this sequence, digital communication and pro-

ject management platforms can help the students to improve their communication skills and their anticipatory and strategic competencies. They have to set up a milestone plan and create a vision for their business. It is necessary that they are encouraged to build in iterative processes for the reflection of their sustainability impact.

The last part of the course is about the presentation and reflection of their business models. The students are provided with online tutorials on pitch trainings on how they should present their business models and the assessment of their sustainability impact. During the last session, the students meet in person to hold their presentations in front of their local peers while they are videoconferencing with their global peers. After each presentation, the local and the global group reflects upon each other's sustainability impact and whether they have integrated global interconnections and interdependencies.

This course is only an example, but the principles can be applied to different topics. The necessary elements are local and offline group work, international context, the understanding and analysis of real-world problems and the development of possible solutions while keeping in mind different interests (Caniglia, John, Bellina, Lang, Wiek, Cohmer & Laubichler 2018).

Don't forget your principles

Even though the digitalization of higher education has a lot of advantages, the main disadvantage has to be included in any steps taken: the ecological footprint of data and hardware. We have to take into account the increase of technical devices that are necessary for teaching and the amount of energy that is necessary to run the devices and servers on which the data is stored. Resources as rare earths are needed for other transformations for example in the energy sector and in infrastructure. Further, global justice takes a crucial role in digitizing higher education. If we talk about digital education for sustainability, we cannot abandon our sustainability principles while pretending to fight for it.

When I was just a little girl, I asked myself, what will I be. At this point, I know what I am: A #DigitalChangeMaker trying to accelerate education for sustainable development by integrating digital teaching and learning. We need to use every opportunity to make people reflect upon their actions and equip them with knowledge, tools and skills to solve sustainability problems.



BEITRAG ALS PODCAST

<https://uhh.de/mvbig>



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Ausgabe #05: Demokratie

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