Part I: Conceptual and Methodological Background

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Chapter 1. Fundamental Insights about Teaching Formats in the Area of Sustainability and Responsibility

1.1. FROM LEARNING OBJECTIVES TO RESPONSIBLE BEHAVIOUR – AN OVERVIEW

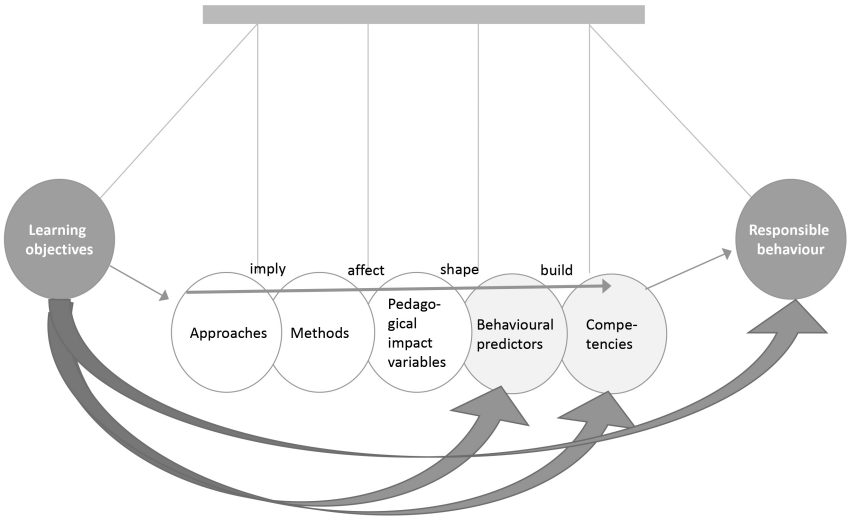
The teaching formats described in this book are related to courses that directly thematise sustainability, sustainable development or concepts related to sustainability (such as circular economies), to the ethical foundations of sustainable or responsible behaviour (business ethics, corporate social responsibility) or to topics that include sustainability or ethical issues (such as sustainable finance). In the following the term ”teaching for sustainability” will be used and with this it will be referred to all teaching formats that deal with (business) ethics, (corporate) responsibility and/or sustainability. The focus in this book is on higher education teaching in business and economics, but examples of courses in other disciplines (e.g. Facility Management, Nutrition) that integrate sustainability and responsibility issues in order to enable students to behave responsible as citizens or in the role of decision takers in the discipline in question will also be provided.

The evaluation of effectiveness requires a clear definition of the outcome that should be obtained. Outcomes in the area of teaching and learning are usually formulated as learning objectives. Learning objectives may refer directly to a desired behaviour (behavioural learning objectives) and/or to predictors of a potentially desired behaviour (e.g. attitudes, values, knowledge, intentions, or competencies) (UNESCO, 2017, see also Figure 1–1). Variables such as attitudes, values, knowledge, and intentions can be derived from behavioural models. Competencies can be understood as a – functionally linked – pattern of these variables; they include cognitive, affective, volitional and motivational elements (Rieckmann, 2012; Wiek et al., 2011). Key competencies are especially important for the intended (responsible) behaviour (Wiek et al., 2011).

There is a far-reaching discussion about the effectiveness of teaching and the role of different pedagogical approaches and methods for the attainment of goals. In this book approaches and methods are distinguished, with methods being more specific than approaches: while pedagogical approaches ”represent the general character or guiding principles of designing learning processes”

(UNESCO, 2017, p. 54), methods are ”needed to facilitate the learning process” (UNESCO, 2017, p. 54). Hence, teaching (learning) approaches[1] usually imply the use of certain methods; vice versa, the same method may be suitable for different teaching approaches. Behind these methods and approaches, important features were identified by the authors of this chapter that seem to drive the effectiveness of teaching and learning, as, for example, “student participation” as a feature of the pedagogical approach of “active learning” and the method “in-class role-play”. These features are termed as “pedagogical impact variables” (see subchapter 1.3 “The Role of Pedagogical Approaches and Methods for Teaching Effectiveness”). Figure 1–1 summarizes the path between learning objectives and (responsible) behaviour.

Figure 1-1: From learning objectives to responsible behaviour



Source: Own illustration

1 Many researchers in the field pinpoint on the role of student-centered learning and suggest talking rather about learning instead of teaching approaches.

1.2. GOALS AND OBJECTIVES OF TEACHING FOR SUSTAINABILITY AND RESPONSIBILITY

A wide array of outcome variables have been proposed as potential objectives or goals of teaching in the area of sustainability and responsibility. In line with Medeiros et al. (2017) it can be distinguished between goals relating to behaviours and its organizational results and goals relating to variables that drive behaviours and decision making, such as affective responses, increase of knowledge or attitudes. Studies testing the effectiveness of ethics teaching suggest, for example, moral awareness, moral reasoning (Wynd & Mager, 1989), cognitive competence (Ritter, 2006), attitudes (Jewe, 2008) and values (Allen et al., 2005) as potential outcome variables of teaching. Similarly, studies dealing with effects of sustainability related teaching use outcome variables such as sustainability consciousness (Boeve-de Pauw et al., 2015), attitudes, values and/or intentions (Haski-Leventhal et al., 2022). Several researchers highlight the importance of competencies for sustainable behaviours and distinguish a number of key competencies that potentially enable learners to take decisions that contribute to sustainable development (Lozano et al., 2017; Rieckmann, 2012; Wiek et al., 2011).

Within this book, the authors suggest defining learning objectives taking into account behavioural goals, but also goals relating to behavioural predictor variables and competencies. They agree with the UNESCO (2017) that the ultimate goal of (higher) education for sustainability is to empower students to act, also in complex situations, in a sustainable manner for achieving "environmental integrity, economic viability and a just society, for present and future generations" (UNESCO, 2017, p. 7). Individuals should become "sustainability change-makers" and contribute to the attainment of the sustainability goals formulated by the United Nations (UNESCO, 2017).

Effective teaching requires, however, a clear understanding of the drivers and enablers of responsible behaviour and a definition of corresponding objectives. The UNESCO (2017) proposes specifying learning objectives relating to three domains: the cognitive, socio-emotional and behavioural domain. These are connected to eight key competencies for sustainable decision taking: systems thinking competency, anticipatory competency, normative competency, strategic competency, collaboration competency, critical thinking competency, self-awareness competency and integrated problem-solving competency (Rieckmann, 2018; for definitions see chapter 2 "Describing Teaching Formats – the Framework"). As argued above, the authors suggest taking into account not only competencies, but also behavioural drivers in the definition of learning objectives. Building on the theory of planned behaviour (Ajzen, 1991) and other behavioural models for ethical and sustainable behaviour (e.g. the value-

belief-norm theory (Stern, 2000; Stern et al., 1999)), the authors have identified a number of variables that potentially drive responsible behaviour and that could be influenced by teaching and learning. The authors have tested their influence with a sample of more than 1000 students and results highlighted the importance of knowledge, awareness, attitudes, values, affects and norms on behavioural intentions, which represent a predictor for the behaviour itself (Ajzen, 1991). While knowledge and awareness are variables that refer to cognitive aspects, the other variables except behavioural intention have a socio-emotional character. Assigning the model variables to the dimensions of learning objectives suggested by UNESCO (2017) hence allows closing the loop and hereby supports the suggested dimensional framework.

1.3. THE ROLE OF PEDAGOGICAL APPROACHES AND METHODS FOR TEACHING EFFECTIVENESS

In the context of teaching for sustainability, as introduced in the beginning of this chapter, the use of innovative pedagogical approaches and aligned methods is considered to be of high importance. Often encountered statements ,such as the following, point to the relevance that is attributed to their implementation:

> *"One of the main difficulties is that education for sustainability is different from education in traditional disciplines because of its broad-based and multi-disciplinary content. And this means that teaching and learning of these contents require new approaches and different formats"* (Eizaguirre et al., 2019, p. 4 based on Aktas et al., 2015; Cortese, 2003; Sibbel, 2009).
>
> *"If the world demanded that decisions be made in fundamentally different ways, then it followed that we should educate students in quite different ways as well"* (Kurland et al., 2010, p. 459).
>
> *"Integrating aspects of sustainability cannot be realized without thinking very critically about the re-structuring of didactical arrangements. This re-orientation requires ample opportunity for staff members and students to embark on new ways of teaching and learning."* (Wals & Jickling, 2002, p. 228).

In literature, pedagogical approaches such as active and collaborative learning (Evans, 2019) as well as experiential learning (Lozano et al., 2017) and methods in line with those approaches such as collaborative real-world projects (Heiskanen et al., 2016; UNESCO, 2017) have been highlighted as being suitable for teaching for sustainability. Furthermore, various studies are investigating the effectiveness of implementing these pedagogies in teaching practice, often in the form of case studies (e.g. Ayers et al., 2020; Baden & Parkes, 2013; Boru, 2017; Heiskanen et al., 2016; Konrad et al., 2020, 2021; Mintz & Tal, 2013, 2018; Molderez & Fonseca, 2018), but also in the form of more

general studies (e.g. Lozano et al., 2019) or meta-studies (e.g. Medeiros et al., 2017; Waples et al., 2009) (see also Tables 1–1 and 1–2 for an overview). Overall, those studies confirm the meaningfulness and usefulness of applying these approaches and methods in higher educational practice and therewith substantiate the necessity to integrate them more widely and more often in higher education teaching for sustainability.

Such a broadened integration requires, first of all, an increased awareness of higher education lecturers that teach in relevant areas as well as of persons in charge of program development and course design for the existence and effectiveness of the different pedagogical approaches and methods; in addition, such a development can be strongly supported by sharing practice-oriented descriptions of how these approaches and methods can be implemented in Higher Education Institutions in reality.

Based on this, the present book shall contribute to fostering a broadened integration of innovative pedagogies in higher education teaching for sustainability by

- raising awareness for the existence and usefulness of several teaching approaches and methods and thereby awareness for the importance of implementing them in general and by
- giving a practice-oriented overview on different teaching formats/courses[2], which are applying those approaches and methods and which were conducted in different regions of the world, in a way that enables readers to implement the formats within their own institutions or contexts.

Although focused especially on the area of higher education, this book can also be of relevance for trainers working in the corporate context, for teachers of high schools as well as for other educators being active in the context of education for sustainable development.

The book has focused especially on the teaching approaches presented in Table 1–1 and the teaching methods introduced in Table 1–2. In those tables definitions for the teaching approaches or respective methods as well as exemplary studies indicating their effectiveness can be found. It shall be noted here that the tables do not present exhaustive lists, meaning that they do not introduce all teaching approaches as well as all teaching methods used throughout the whole book, but rather represent the core pedagogies. Therefore, in some chapters of the book further approaches and/or methods will be introduced.

2 Within this book, the terms “teaching format“ and “course“ are used interchangeably.

Table 1–1: Overview of teaching approaches

Teaching approach	Definition	Studies indicating effectiveness
Experiential learning	Experiential learning means that "instructors promote learning by having students directly engage in, and reflect on personal experiences" (Slavich & Zimbardo, 2012, p. 573). Examples of experiences are projects, internships, community work, or field trips (Djonko-Moore & Joseph, 2016, p. 1; Gazley et al., 2013, p. 559).	Backman et al., 2019; Baden & Parkes, 2013; Hockerts, 2018; Mittelstaedt et al., 1999
Collaborative learning	Collaborative learning means that "individuals in a social constellation (e.g., group, team, or community) within a physical and/or virtual environment interact on the same or different aspects of a shared task to accomplish implicit or explicit shared and individual learning goals" (Strijbos, 2016, p. 302).	Felgendreher & Löfgren, 2018; Mulder et al., 2015; Pappas et al., 2018; Walker & Seymour, 2008; Zhou et al., 2019
Active learning	Active learning "require[s] the educator to privilege the learner's participation over his or her own declarative knowledge of the subject" (MacVaugh & Norton, 2012, p. 74). "The core elements of active learning are student activity and engagement in the learning process" (Prince, 2004, p. 223).	Delaney & Coe, 2008; Izzo et al., 2006; Mintz & Tal, 2013, 2018; Segalàs et al., 2010
Self-directed learning	Self-directed learning is "a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (Knowles, 1975, p. 18 as cited in O'Shea, 2003, p. 63).	Hermes & Rimanoczy, 2018; Leary, 2012
Inter-/Trans-disciplinary learning	Interdisciplinary learning describes a learning situation "that involves the study of a particular topic by drawing on knowledge from several disciplines at the same time", being "concerned with the links and the transfer of knowledge, methods, concepts, and models from one discipline to another" (Greig & Priddle, 2019, p. 3). Transdisciplinary learning additionally "requires students to analyze, synthesize and harmonize their connections into a coherent whole that lies beyond the culture of any single discipline, and is therefore emergent" (Greig & Priddle, 2019, p. 3).	Annan-Diab & Molinari, 2017; Heiskanen et al., 2016; Walker & Seymour, 2008; Woo et al., 2012
Lecture-based learning*	Lecture-based learning is a teacher-centered approach, characterized by lecturers delivering instructions and contents to students as passive listeners (Leary, 2012).	Bielefeldt, 2013

* Although lecture-based learning does not represent an innovative teaching approach, it is included in the list here, as it is often seen as an important addition to innovative approaches used in teaching practice (Baeten et al., 2013; Bielefeldt, 2013; Carpenter, 2006).

Table 1–2: Overview of teaching methods

Teaching method	Definition	Studies indicating effectiveness
Group discussion	Group discussion "is a free verbal exchange of ideas between group members or teacher and students" (Sajjad, 2010, p. 10), "a give-and-take dialogue that encourages students to enrich and refine their understanding" (Alvermann & Hayes, 1989, p. 306). It can involve the whole class (whole-group discussion) or separate groups within the class (small-group discussion) and take place in written as well as oral form (Jahng et al., 2010).	Dellaportas, 2006; Mayhew & Murphy, 2009; Piasentin & Roberts, 2018
Debate	A debate is an activity which involves "two groups of students put[ting] forward opposing arguments on an issue" (Cotton & Winter, 2010, p. 47).	Healey, 2012; McWhirter & Shealy, 2020; Piasentin & Roberts, 2018
Gamification	Gamification is the practice of using game design elements (e.g. points, badges, leaderboards, storylines), game thinking and game mechanics in non-game contexts to motivate participants (Al-Azawi et al., 2016, p. 133).	Gatti et al., 2019; Meya & Eisenack, 2018; Santos-Vilalba et al., 2020
In-class role play	In-class role plays (e.g. Board Meeting Game) are an active learning and teaching technique, considered to be a part of interactive simulation whereby participants act out the role of a character in a particular situation following a set of rules (Dingli et al., 2013; Rao & Stupans, 2012).	Chen & Martin, 2015; Maier et al., 2007; Schrier, 2015
Virtual reality simulation	Virtual reality simulation is an "artificial representation of a real world process by the means of Virtual Reality technology to achieve educational goals via experiential learning". It "allows the visualization of data in three dimensions and provides interactive functionalities that reinforce the feeling of immersion into a computer-generated virtual world" (Davis, 2015, p. 65).	Earle & Leyva-de la Hiz, 2021; Jagger et al., 2016; Sholihin et al., 2020
Case study	Case studies are "written summaries or syntheses of real-life cases that require students to tease out the key issues involved and to identify appropriate strategies for the resolution of the 'case'. ... A 'case' should be a complex problem written to stimulate classroom discussion and collaborative analysis, and be a student-centered exploration of realistic and specific situations." (Alt et al., 2020, p. 62).	Bagdasarov et al., 2013; Bielefeldt, 2013; Cagle & Baucus, 2006; Tejedor et al., 2019
Service-learning project	A service-learning project (for the community) is a method where "students engage in activities intended to directly benefit other people, where the activities are integrated with learning activities in an intentional and integrative way that benefits both the community organization and the educational institution" (Hayes & King, 2006, as cited in Lozano et al., 2017, p. 8).	Halberstadt et al., 2019; Martínez-Campillo et al., 2019; Molderez & Fonseca, 2018; Weber & Glyptis, 2000

Teaching method	**Definition**	**Studies indicating effectiveness**
Sustainability-related consulting project	A sustainability-related consulting project is a "learning by doing" method where students work on solving real business and environmental [or rather sustainability-related] problems by developing practical recommendations for a real organisation (Segal & Drew, 2012, p. 1). In their role as consultants, students assist with diagnosing the client's situation and finding and implementing solutions (Butler, 2018, p. 1-4).	Bielefeldt, 2013; Konrad et al., 2020
Sustainability-related research project	A sustainability-related research project is a student's own scientific endeavor to answer a sustainability-related research question (under the guidance of a faculty mentor) that can take the form of primary empirical research, secondary data analysis, or meta-analysis (Rutgers University, n.d.).	Brundiers & Wiek, 2013; Ceulemans & Severijns, 2019; Luederitz et al., 2016
Self-reflection task/ exercise	A self-reflection task/ exercise is an activity that "provide[s] opportunities for students to reflect on [i.a.] personal roles, attitudes, and responsibilities in relation to a range of sustainability issues" (Cotton & Winter, 2010, p. 47). Reflection, in this case, can be defined as "the process of internally examining and exploring an issue of concern, triggered by an experience, which creates and clarifies meaning in terms of self, and which results in a changed conceptual perspective" (Boyd & Fales, 1983, p. 100).	Anderson, 2012; Ayers et al., 2020
Interdisciplinary team teaching	Interdisciplinary team teaching is a method that allows "having specialists in different fields [to] help students explore... topics from two or more distinctive disciplinary perspectives" (Lozano et al., 2017, p. 7).	Keeley & Benton-Short, 2020; Little & Hoel, 2011; Walsh & Davis, 2017
Vision-building exercise	Vision-building exercises are foresight exercises (Filip et al., 2005) "such as future workshops, scenario analyses, utopian/dystopian story-telling, sciencefiction thinking, and forecasting and backcasting" (UNESCO, 2017, p. 55). They are "interdisciplinary studies that aim at envisioning possible, probable, or desirable futures" [and] ... "are meant to address complex societal issues" (Filip et al., 2005, p. 203).	Kearney et al., 2013; Wade & Piccinini, 2020
Field trip	A field trip is "an activity that serves educational purposes and occurs outside of the classroom at a location other than on the campus at which the course is regularly taught" (The University of Rhode Island, n.d.).	Putz et al., 2018; Stern et al., 2008
Outdoor, nature-related experience	Outdoor, nature-related experiences represent "a method of teaching and learning that emphasizes direct, multisensory experiences; takes place in the outdoor environment; and uses an integrated approach to learning by involving the natural, community, and individual environments" (Gilbertson et al., 2006, p. 6).	Palmberg & Kuru, 2000; Zelenika et al., 2018

Teaching method	Definition	Studies indicating effectiveness
Arts-based teaching and learning method	An arts-based teaching and learning method (e.g. theatre, drawing exercise, music-based exercise) is a method, which applies the "purposeful use of artistic skills, processes, and experiences as an educational tool to foster learning in non-artistic disciplines and domains" (Boston University, The Center for Teaching and Learning, n.d.).	Comer & Schwartz, 2017; Molderez & Ceulemans, 2018
Flipped classroom	Flipped classroom "attempts to 'flip' the typical structure of a course such that the presentation of concepts (traditionally achieved through in-class lectures) is presented outside class, whereas class time is reserved for working on problems or assignments (i.e., in-class 'homework')." (Peterson, 2016, p. 10).	Buil-Fabregá et al., 2019; Foster & Stagl, 2018; Kwon & Woo, 2018
Peer-teaching	Peer-teaching refers to "an acquisition of knowledge and skill through active helping and supporting among status equals or matched companions" (Topping, 2005, p. 631).	Asikainen et al., 2021; Kwak & Price, 2012
Lecture*	Lecture is "a method of teaching by which the instructor gives an oral presentation of facts or principles to learners and the class usually being responsible for note taking, usually implies little or no class participation by such means as questioning or discussion during the class period" (Good & Merkel, 1959, as cited in Kaur, 2011, p. 10).	Bielefeldt, 2013

* Although lectures do not represent an innovative teaching method, they are included in the list here, as they are often seen as an important addition to innovative methods used in teaching practice (Baeten et al., 2013; Bielefeldt, 2013; Carpenter, 2006).

In addition to these teaching approaches and methods, a set of so-called pedagogical impact variables was developed and utilized within the book as introduced above (see Table 1–3 for a list of the variables and their definitions). These pedagogical impact variables capture important features and characteristics of the different pedagogies recommended for teaching for sustainability in literature, as explained previously and additionally highlighted in Table 1–1 and Table 1–2. They are included in this book because they help to identify and explain the pedagogical drivers of the effectiveness of single teaching formats, as teaching approaches and methods partly overlap and single teaching formats, in general, are combinations of several teaching approaches and methods.

Table 1–3: Overview of pedagogical impact variables

Pedagogical impact variable	Definition
Degree of student participation/ activeness	The degree of student participation/ activeness describes how much opportunity students have to be active and to engage in the learning process (based on Prince, 2004).
Degree of student collaboration/ group work	The degree of student collaboration/ group work describes how much opportunity students have for working/ interacting in social constellations (e.g. group, team, community) to solve shared tasks (based on Strijbos, 2016), hereby enabling mutual learning and co-production of knowledge.
Degree of student emotional involvement	The degree of student emotional involvement describes the degree of focusing on non-cognitive/ affective dimensions of learning, relating to values, attitudes, and behaviours (based on Shephard, 2008).
Degree of inter-/ transdisciplinarity	The degree of inter-/ transdisciplinarity describes how much opportunity students have to transfer and recombine concepts and methods from different disciplines and create holistic solutions beyond single disciplines when exploring sustainability topics (based on Greig & Priddle, 2019).
Degree of student (self-)reflection	The degree of student (self-)reflection describes how much opportunity is given to students to critically reflect on their knowledge, experiences, assumptions, beliefs, values, personal roles, attitudes, or responsibilities in relation to sustainability issues (based on Cotton & Winter, 2010; Svanström et al., 2008).
Degree of experience of real-life situations	The degree of experience of real-life situations describes how much opportunity is given to students for collecting firsthand experiences in real-world settings focused on solving actual sustainability problems/ challenges (based on Brundiers et al., 2010).
Degree of nature-related experiences	The degree of nature-related experiences describes how much opportunity is given to students to have direct, multisensory experiences in the outdoor environment (based on Gilbertson et al., 2006).
Degree of stakeholder integration	The degree of stakeholder integration describes how much opportunity is given to students to identify stakeholders and their demands, to interact with them, and to consider their expectations in finding solutions within tasks during the course work (based on Plaza-Úbeda et al., 2010).
Degree of integration between theory and practice	The degree of integration between theory and practice describes how intensively theory and practical elements cohere/ interact (based on Woo et al., 2012).

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