Engaging and Empowering Students to Contribute to Sustainable Development Through Developing Interdisciplinary Teamwork Skills

Elli Verhulst, Heidi Rapp Nilsen, and Bjørn Sortland

1 INTRODUCING EDUCATION FOR SUSTAINABLE DEVELOPMENT

Most current environmental problems, as well as many current societal challenges, require a shift towards sustainable development (SD). Higher education has historically played a role in transforming societies, by educating decision-makers, leaders, entrepreneurs, and academics, and serving the public good (Lozano et al., 2013). Regarding sustainable transitions, higher education institutions (HEIs) have a significant role to play

E. Verhulst (✉)

Department of Industrial Economics and Technology Management, Faculty of Economics and Management, Norwegian University of Science and Technology (NTNU), Trondheim, Norway

Engage Centre for Excellence in Education, Trondheim, Norway
e-mail: Elli.verhulst@ntnu.no

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in making such transitions happen (Lambrechts et al., 2019; Zhou et al., 2020). An increasing number of universities have been engaged in incorporating and institutionalizing SD into their systems, including initiatives targeting education, research, and outreach, as well as campus operations (Verhulst & Lambrechts, 2015; Weiss et al., 2021a).

One important mission for higher education is to equip students with competencies that engage and empower them to contribute to SD (Lambrechts et al., 2013). A competency thereby implies more than the acquisition of knowledge and skills; it involves the mobilization of knowledge, skills, attitudes, and values in order to meet complex demands (UNESCO, 2018). In Education for Sustainable Development (ESD), an increasing amount of attention goes into defining and working with competencies for SD in higher education (Barth et al., 2007; Wiek et al., 2011). Based on the work of leading researchers in the field, Rieckmann (2018a) presents eight key sustainability competencies for the UNESCO report on *Issues and Trends in Education for Sustainable development*. The key competencies are *system thinking competency, anticipatory competency, normative competency, strategic competency, collaboration competency, critical thinking competency, self-awareness competency*, and *integrated problem-solving competency*. The Norwegian National Committee for Cooperation with Agenda 2030 (2020) takes these eight competencies as a starting point, but also includes *creativity competency* as well as adding a transdisciplinary perspective to the collaboration competency. Next to these "generic competencies for SD," disciplinary knowledge will continue to be important as the raw material from which new knowledge is developed (UNESCO, 2018). Brundiers et al. (2021) developed and refined a framework, building on the key competencies synthesized from the literature. In their work, they not only present the competencies agreed upon among experts, but also include a three-dimensional model linking key competencies in sustainability with basic academic competencies and discipline-specific knowledge. Based on a number of key themes for sustainability,

H. R. Nilsen • B. Sortland

Department of Industrial Economics and Technology Management, Faculty of Economics and Management, Norwegian University of Science and Technology (NTNU), Trondheim, Norway
e-mail: heidi.r.nilsen@ntnu.no; bjorn.sortland@ntnu.no

topical knowledge on sustainability is adapted to each field of study, for example, sustainable materials in architecture and design, or sustainable business models in business.

The UNECE Strategy for Education for Sustainable Development (2005) proposes a list of 19 key themes for sustainability. Among others they include poverty alleviation, democracy and governance, human rights, gender equity, production and consumption patterns, environmental protection, natural resource management, and biological and landscape diversity. The strategy emphasizes the need for holistic approaches to address such diverse themes in ESD (UNECE, 2005). Today, the UN Sustainable Development Goals (SDGs) provide 17 fields of action for sustainability. The SDGs include clean water, improving health, quality education, and reducing climate change. They were adopted by all United Nations Member States in 2015 as part of the 2030 Agenda for Sustainable Development (United Nations, 2015). Rieckmann (2018b) proposes thematic priorities for ESD based on the SDGs as well as learning objectives within each of these priorities which will "*enable learners to understand key themes, relate to them on an individual and group level and play an active role in promoting sustainability development within these areas.*" The themes being prioritized are climate change, biodiversity, sustainable production and consumption, global justice, disaster risk reduction, and poverty reduction.

Universities need to develop learning environments with educational practices that enable students to develop the competencies that are necessary for sustainability (Zhou et al., 2020). A combination of different pedagogical approaches is thereby needed to develop competencies for SD (Lozano & Barreiro-Gen, 2021). However, one common denominator is that the learning methods must be interactive, participative, action- and research-oriented, and thereby actively involve students in acquiring and processing new knowledge, skills, and a change in attitude (Verhulst & Van Doorsselaer, 2015).

Different scholars propose a range of student-activating learning methods (Ceulemans & De Prins, 2010; Lambrechts et al., 2013; Verhulst & Van Doorsselaer, 2015). These were recently collected in Lozano and Barreiro-Gen (2021). An excerpt from the overview includes *brainstorming; group discussion; group or personal diaries; internships; solving real community problems; problem- and project-based education; Socratic method; case method; debate; and reflexive accounts.*

In order for ESD to get integrated into and practised in higher education, it is important to embed competencies for SD, sustainability knowledge, and student-active learning approaches into higher education curricula. This is another focus area within ESD, illustrated by the vastly growing number of case studies that lift the integration of sustainability in HEI curricula to a strategic level. In a recent study, Lozano and Barreiro-Gen (2021) present 15 HEI case studies, from 12 countries on 4 continents, which provide insights into how sustainability is incorporated in the HEI curricula. They document which competencies are being developed, in connection with the pedagogical approaches that are used to develop these competencies. A meta-study from Weiss et al. (2021a) analyses 131 international cases and presents six patterns of curriculum change processes ranging from *(1) collaborative paradigm change* through *(3) top-down, mandated institutional change* and finally to *(6) limited institutional change*. This and other studies shed light on the drivers and barriers to the implementation of ESD (e.g. Leal Filho et al., 2018; Weiss et al., 2021b). Most of the available cases focus on the curriculum of specific, disciplinary study programs. Moreover, a few curricular initiatives are available that reach out to all students at an HEI in order to develop competencies for SD. Coops et al. (2015) and Aktas et al. (2015) describe two examples of a university-wide course on sustainability: one in Canada and one in the USA. Both courses, which are at the Bachelor's level, aim at crossing the traditional silos of existing disciplinary curricula in higher education.

In this chapter, we present the case of a university-wide interdisciplinary Master's level course, adding valuable insights to the current literature on ESD. We outline how the course incorporates sustainability and how it connects to strategies on different levels at the HEI. Although the course did not originally set out to be a sustainability course, it incorporates sustainability in a variety of ways, including through the development of sustainability skills and the application of interdisciplinary knowledge. Since 2020, this course has gained relevance, as competencies for sustainability are now part of this HEI strategy.

2   How the University-Wide Course Experts in Teamwork (EiT) Engages Students for Sustainability

In the following paragraphs, we describe the background, context, learning outcomes, and pedagogical approaches of our case study, the Experts in Teamwork (EiT) course, to illustrate how knowledge, insights, and

skills are conveyed to students and teaching staff. Simultaneously, we explain how sustainability is integrated in EiT: the level of competencies for SD, the pedagogical approaches, as well as related knowledge on various sustainability themes. The course is being developed over a period of 20 years, as a strategic initiative on interdisciplinary teamwork, launched and supported by the university board. Throughout this period, sustainability has become more explicitly present in EiT, thereby supporting the goal of the Norwegian University of Science and Technology (NTNU) to integrate sustainability in all its curricula in the near future.

Background on Experts in Teamwork

Experts in Teamwork (EiT) is the name of a Master's level course with a focus on interdisciplinary teamwork. EiT is compulsory in all programs of study at a Master's level at NTNU. In EiT, students get mixed across all faculties at the university and work in teams of five to six students, each coming from a different discipline.

EiT was initiated in 2001 within the Master of Science program (MSc), with the initial objective to help students acquire interdisciplinary understanding, develop teamwork competencies, and foster interpersonal communication skills needed for work life (Veine et al., 2019). Due to a decision made by the university board in 2002, EiT was extended to all Master's programs at NTNU. This extension, broadening the program to include students from the social sciences, the humanities, architecture, and medicine, brought with it large pedagogic and organizational challenges and was, therefore, spread over several years (Sortland, 2005). The Experts in Teamwork Academic Section—within the Faculty of Economics and Management—has the overall responsibility for organizing the course.

The EiT course runs every spring semester. Since it involves over 3000 students yearly, the students are divided into more than 100 classes. In the spring semester of 2022, there were 118 classes with a total of 3200 students participating. Each class can be regarded as a separate EiT course, but all the classes use similar learning methods and have the same expected learning outcomes. What differentiates the classes from one another is that each has its own broad interdisciplinary theme related to societal issues or work life. Each class is further divided into five to six interdisciplinary student teams that are supervised by a member of the academic staff and two assigned learning assistants. This teaching team carries the responsibility

for facilitating the project work and team process for their students. EiT has a study load of 7.5 ECTS (one-fourth of a semester) and runs over 15 complete workdays. Each faculty is responsible for organizing a given number of classes, corresponding to the number of students that are registered for the course (Sortland et al., 2021). Of the classes 80 per cent are Norwegian speaking, while 20 per cent have English as a common language.

The Experts in Teamwork Academic Section runs an annual training program for the EiT teaching staff before the start of each teaching period. This training is intended to provide academic staff and learning assistants—coming from all faculties—with the skills in experience-based teaching and facilitation necessary to build an effective, productive, and confident teaching team for each EiT class. It is especially important that the teaching team collaborates well, as their goal is to facilitate student development of teamwork skills. By training the academic staff in student-active learning methods, the teacher training represents a significant contribution to the pedagogical development of teaching staff at the university.

The Experts in Teamwork Academic Section at NTNU initiated a Nordic higher education network founded by Nordplus. The objective of the Nordic Experts in Teams Network is *to train students to utilize their academic competency in interdisciplinary settings, nationally and internationally, to reach enhanced project outputs.* This is achieved by focusing on teamwork skills, that is, increasing the students' awareness of how they contribute as collaborative members in a team. The network currently includes eight HEIs in Norway, Sweden, and Denmark, and additional partners including trade unions, industry organizations, and secondary educational institutions (Nordic Experts in Teams Network, 2021). The main aim of the network itself is to exchange experiences on the educational aspects of similar courses, the organization of similar courses, and the development of new pedagogical methods that enhance interdisciplinary teamwork skills for students. Another aim is to encourage research across HEIs. These efforts have led to the establishment of the bi-annual conference, "Interdisciplinary Teamwork Skills for the 21st Century" or *Its21*. This conference provides a platform where participants in the network, as well as other educators and researchers, can join to inspire each other and work together on major pedagogical and organizational challenges arising in university-wide courses, with a focus on interdisciplinary teamwork skills.

In 2021, the Experts in Teamwork Academic Section received the prestigious award for quality enhancement in higher education, granted by the Norwegian government, for its continuous achievements to innovate, actualize, and improve the course since its inception, and its efforts to educate students at NTNU to develop interdisciplinary teamwork skills and become change agents for sustainable development.

Expected Learning Outcomes and Competencies for Sustainable Development

Each member of the interdisciplinary team may initially have different perspectives on the problem at hand and may be accustomed to different problem-solving methods. The intention in EiT is that students, by working together, will develop valuable attitudes and skills related to interdisciplinary teamwork. By solving a problem that challenges their area of expertise, they will be trained to use their subject skill to contribute to the mutual problem-solving process. Through this process students will be exposed to the challenge of interdisciplinary communication, will learn to operate within an interdisciplinary environment, and will benefit from interdisciplinary interaction and collaboration.

As mentioned, the overall expected learning outcomes and methods are the same in all EiT classes; however, these exist in the context of a broad theme for each class defining the project work. These learning outcomes reflect which competencies the students are expected to develop throughout the EiT course, divided into knowledge, skills, and general competencies, as presented in Table 1. Several of the learning outcomes of the EiT course have a direct connection to competencies for SD. Table 2 shows competencies for SD in higher education, as presented by the Norwegian National Committee for Cooperation with Agenda 2030 in the university sector (National Committee for Cooperation with Agenda 2030, 2020), alongside the intended learning outcomes of EiT (Sortland et al., 2021). The overview indicates a major focus on the development of the *transdisciplinary collaboration competency* as well as a focus on the *creativity competency* and *self-awareness competency* in EiT. These three key competencies are interrelated and encompass the ability to interact constructively and empathetically in a team with people from different professional backgrounds; the ability to come up with creative solutions based on interdisciplinary collaboration; and the ability to reflect on roles, motivations, and emotions.

Table 1 Expected learning outcomes of EiT (Sortland et al., 2021)

Knowledge	K1—Students have gained knowledge about group processes and are familiar with key concepts and prerequisites for good teamwork.
	K2—Based on experience from the team, students can describe the prerequisites for good interdisciplinary teamwork.
	K3—Students have insight into how their teamwork is influenced by their own behavior patterns and attitudes, as well as those of others.
Skills	S1—Students can apply their academic learning in cooperation with people from other subject areas, jointly define problems and find solutions to them.
	S2—Students can apply fundamental group theory and concepts to describe their own specific collaborative situations.
	S3—Students can reflect on their teamwork and analyse the way that the group communicates, plans, decides, accomplishes tasks, handles disagreements, and relates to professional, social, and personal challenges.
	S4—Students can provide constructive feedback to individual team members and to the team as a whole and can reflect on feedback from the team.
	S5—Students can take initiatives (actions) that encourage cooperation, and they can contribute to changing patterns of interaction to create more productive, constructive, and social collaboration in a group.
General competency	G1—Students have extended their perspective on their own specialized knowledge in their encounter with skills from other disciplines. They can communicate and apply skills they have developed in their own field in collaboration with students from other disciplines.
	G2—Students can collaborate with people from other disciplines, and they can contribute to realizing the potential of their combined interdisciplinary expertise.

Several central scholars refer to the collaboration competency as the interpersonal competency necessary in each step of the problem-solving process (Brundiers et al., 2021, p. 21; Wiek et al., 2011, p. 211). Brundiers et al. conclude by using "the term transdisciplinary research methods as shorthand for methodologies facilitating collaborative research between academics and practitioners with action research being one of them. Interdisciplinarity refers to collaborative research among academics from different disciplines" (2021). Section "Student-Active Learning Methods" will go into more depth as to how these competencies are operationalized in different learning methods.

It is likely that the EiT course also implicitly supports other competencies. This support would depend on the theme of the class, as well as the composition of each team regarding academic and personal qualifications.

Table 2 Key competencies for Higher Education for Sustainable Development (HESD) (National Committee for Cooperation with Agenda 2030, 2020) and expected learning outcomes of EiT

Key competency for HESD	Definition of key competencies for SD	Expected learning outcome of EiT
Systems thinking competency	The ability to recognize and understand relationships, to analyse complex systems, to think of how systems are embedded within different domains and different scales, and to deal with uncertainty.	
Anticipatory competency	The ability to understand and evaluate multiple futures—possible, probable, and desirable; to create visions for the future; to apply the precautionary principle; to assess the consequences of actions; and to deal with risks and changes.	
Normative competency	The ability to understand and reflect on the norms and values that underlie actions; and to negotiate sustainability values, principles, goals, and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge, and contradictions.	
Strategic competency	The ability to collectively develop and implement innovative actions that promote sustainability at the local level and further afield.	
Transdisciplinary collaboration competency	The ability to learn from others and to transcend the traditional boundaries of discipline or profession; to understand and respect the needs, perspectives, and actions of others (empathy); to understand, relate to, and be sensitive to others (empathic leadership); to deal with conflicts in a group; and to facilitate collaborative and participatory co-creation for problem solving.	K1, K2, K3, S2, S5, G1, and G2
Critical thinking competency	The ability to question norms, practices, opinions, and established theories; to reflect on values, perceptions, perspectives, and actions; and to take a position in the sustainability discourse.	
Creativity competency	The ability to combine anticipatory, transdisciplinary collaborative, and critical thinking competencies to be innovative and to think creatively about solutions to complex problems.	S1

(*continued*)

Table 2 (continued)

Key competency for HESD	Definition of key competencies for SD	Expected learning outcome of EiT
Self-awareness competency	The ability to reflect on roles in the local community and (global) society; to continually evaluate and further motivate actions; and to deal with feelings and desires.	S3
Integrated problem-solving competency	The overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive, and equitable solution options that promote sustainable development, integrating the above-mentioned competencies.	

This is currently being investigated in research projects at NTNU. One can be critical of the strong focus on the three key competencies, the weighting of the competencies, and how this offers sufficient support to empower and engage students to work with sustainability. However, it is not realistic to expect one course to cover all nine competencies. Moreover, it is important to emphasize that this course is part of the overall curriculum for all Master's programs at the university and that one should take a holistic view on how competencies for SD are integrated within each of the separate study programs.

Student-Active Learning Methods

The EiT course combines different interactive, participative, and action-oriented teaching approaches. The main learning methods are project-based learning, experiential learning, reflection, and working with real-world challenges. These methods actively involve students in developing interdisciplinary teamwork skills, while simultaneously engaging them to contribute to complex challenges, in many cases, related to sustainability (more on this in "Knowledge on Various Sustainability Themes"). Several of these pedagogical methods are highly relevant for the operationalization of competencies related to collaboration and self-awareness (Wiek et al., 2015) and are carried forward in a study from Lozano and

Barreiro-Gen (2021) to support the development of interpersonal relations and collaboration skills.

EiT represents interdisciplinary project work at the Master's level in which both the interdisciplinary project work and the cooperative team process are focal points. The assignment should challenge each student within their area of expertise. Each student is responsible for the know-how from their own area of expertise and for contributing to the mutual problem-solving process. Through **project-based learning** the students are trained in interdisciplinary communication and in how to operate in an interdisciplinary environment. The teaching approach is also **experience based**. A key aspect of the learning process occurs when different situations arise across disciplines. Students develop collaborative teamwork skills by reflecting on these situations throughout the project. Team members perform **reflection** activities both as individuals and together as a team. These reflections are facilitated by teaching staff as well as with a variety of exercises that focus on writing reflections; giving and receiving feedback; and creating an environment where the students feel safe and secure to talk about the relationships within the team. Within the project work, the student teams define their own project based on relevant **real-world challenges** from civic and work life. Moreover, in many of the EiT classes, student teams are encouraged to cooperate with external partners. This kind of collaboration can support students to reflect on how their project is valuable to society. In addition, it offers inspiration and provides relevant knowledge, as well as presents the opportunity to discuss how the project can benefit others.

Knowledge on Various Sustainability Themes

The EiT course consists of more than 100 classes where the overall topic of each class is characterized by a broad theme related to societal or environmental issues, including challenges from work life. The overall topic requires engaging students from different subject areas, motivating them to work together, and forms the basis for a meaningful project defined by the student teams. There has been a steady increase in the number of classes where the academic staff have related the overall topic to a sustainability theme. In 2019, this was valid for more than half of the classes in the course. At the same time, based on the preferences received from the participating students, there is a clear tendency among students to prioritize classes with a sustainability-focused theme.

This development has happened without being explicitly called for by the Experts in Teamwork Academic Section, or any other unit at NTNU. Still, upon seeing this development, the Experts in Teamwork Academic Section has developed learning material to facilitate this evolution, both for the teaching staff and for the students. The learning materials are in the form of videos and exercises and are included in one of the teacher training modules (Sortland et al., 2021, p. 146).

Since 2018 NTNU has committed itself, strategically, to achieve the UN 17 SDGs. The SDGs are therefore now explicitly recommended as an appropriate theme in EiT (Sortland et al., 2021, p. 16) and may have had a significant influence on the EiT teaching staff in formulating the theme of their EiT classes. With their complex yet concrete formulations, the SDGs are especially suitable for interdisciplinary cooperation. Examples of class themes in 2022 are "Creating value from waste," "Climate-neutral, inclusive, beautiful & sustainable Nyhavna," and "Hydrogen in transportation for a safe and sustainable future."

All of the class themes are presented on a webpage before the beginning of the semester, and the students are allocated to their villages according to their preferences and the requirements of the classes for certain background competencies. About 90 per cent of the students are normally granted a place in a class they have chosen as their first or second priority. The classes may have external partners that relate to the theme, and these partners may act as users or recipients of the student work.

3   Experts in Teamwork as a Strategic Initiative for Sustainability in Higher Education

In this section, we describe how EiT is intertwined with sustainability strategies for education and research in the university. We also discuss strategic and practical challenges that arise when organizing a university-wide initiative like EiT. This includes the influence on the development of EiT by the COVID-19 pandemic.

Sustainability at NTNU

The NTNU vision of "knowledge for a better world" states that "*knowledge and technology development create opportunities for increasing sustainable value creation and finding answers to major challenges*," whereby the

university "*will contribute actively towards achieving the UN Sustainable Development Goals through its strength: our competency in science and technology combined with academic breadth and interdisciplinarity*" (NTNU Board, 2018). The university aims to fulfil this vision through its core tasks: education and learning environment, research, art, innovation, dissemination, and outreach. This whole university approach has been indicated as essential for embedding sustainability in HEI (Leal Filho et al., 2018).

Within the research context, this has led to NTNU strategic research areas 2014–2023: NTNU Health, NTNU Oceans, NTNU Sustainability, and NTNU Energy. Moreover, in the spring of 2021, an internal call for proposals was launched for research projects on *interdisciplinary research on sustainability*. This initiative emphasizes the need for a better systemic understanding related to transformative changes in society, which would require collaboration across disciplines and sectors. It has led to 9 interdisciplinary sustainability projects, involving up to 50 academic staff from all faculties at NTNU, and allows for 44 PhD candidates to contribute to these research projects.

Within the field of education, efforts were recently made in the form of two large projects "Future Technology Studies" (FTS) and "Future Humanities and Social Sciences Studies" (FHS) that ran from 2019 to 2021. The projects focused on how NTNU technological, humanities, and social sciences studies should be shaped in agreement with technological developments, societal challenges, and needs from business and work life from 2025 onwards (Fremtidens Teknologistudier, 2022, p. 3). The projects resulted in a description of needed competencies of NTNU future candidates, recommendations for how these can be operationalized into future studies at the university, and several pilot projects that tested out specific aspects that were raised in the projects. Both the FTS and FHS projects emphasize the importance of integrating key competencies for SD in all study programs at NTNU, as a basis for knowledge related to understanding and managing sustainability challenges. The projects adopt UNESCO's eight key competencies (Rieckmann, 2018a) in an adapted version for higher education (National Committee for Cooperation with Agenda 2030, 2020). This has led to the formulation of NTNU's vision for FTS to "*educate candidates who can and want to contribute to a better world and a sustainable future*" (Fremtidens Teknologistudier, 2022, p. 10). Collaborative competency and innovation are to be integrated at all levels of the education programs and include reflection on the

usefulness and ethical aspects of a project, as well as interdisciplinary collaboration across NTNU campuses.

The Faculty of Economics and Management functions at the intersection of technology, economics, and management. This combination makes it possible for it to become a key factor in societal development. The vision of the faculty is to be a united one built of "strong units" and "strong connections." The faculty aims to "create sustainable value, starting from first ideas towards implementing these to reach a better society," thereby emphasizing the importance of technological development (Economics and Management Faculty board, 2018). To strengthen its efforts towards sustainability, the faculty appointed a Vice-Dean for Sustainability in the summer of 2021. Up to now, this has led to concrete plans being created within research and education. For example, as part of the annual plan for 2022, the faculty will map how sustainability is currently integrated in all of its study programs. This is a first and important step in being able to strengthen sustainability in the educational portfolio of the faculty. Interdisciplinary collaboration is advanced as one of the selected priorities for the faculty for 2018–2025, with the goal to *develop students' skills in interdisciplinary teamwork through learning activities across subject areas and professions.*

EiT's Contribution to Sustainability

It is worth mentioning that interdisciplinary collaboration is called out explicitly on different strategic levels at the university: as a priority area in NTNUs and the strategy of the faculty for 2018–2025, as well as an important competency in the projects on future studies at the university (FTS and FHS). Both FTS and FHS state that interdisciplinary collaboration will be a competency that allows candidates to contribute actively and constructively to a sustainable future for Norway and the world.

The EiT course helps to fulfil the NTNU vision by providing a platform for student experience-based learning in ways that provide insight into the prerequisites for effective, innovative, and productive groups. Through its increasing size, its expected learning outcomes, and its joint training of teaching staff, EiT is constantly evolving while, at the same time, representing the largest educational project for NTNU. Through skills that promote collaboration competency through project work in teams, EiT helps students to utilize their disciplinary knowledge in interdisciplinary collaboration. This will improve the likelihood that they will find solutions

to complex issues. In this way, EiT provides an important contribution to fulfilling the NTNU vision of "Knowledge for a better world."

Research at the Experts in Teamwork Academic Section includes a focus on how interdisciplinary collaboration in projects can lead to increased sustainability and how it can support sustainable innovation (Nilsen, 2020). This is also happening as part of, and in cooperation with, the initiative of the university on interdisciplinary research on sustainability.

The EiT course has undergone continuous development since its inception, including extensions of and improvements to its teaching materials, in the form of written materials, online courses, and videos. It has also developed a teacher training which now targets more than 300 teaching staff yearly. Based on our expertise and experience, the Experts in Teamwork Academic Section is also involved in several educational development pilot initiatives within FTS and FHS: projects that focus on (a) connecting the aims and challenges of studies of the future (FTS and FHS) with a cluster of EiT classes that will gather ideas and proposals from a student perspective, (b) the integration of competencies for SD in technology study programs, and (c) the integration\\ of interdisciplinary collaboration skills within minors on sustainability and digitalization that will be at the Bachelor's level at the university.

So far, EiT is a compulsory course in all programs at the Master's level, but there is no equivalent at the Bachelor's level. The pilot offers the opportunity to test how collaborative competency can be integrated at the Bachelor's level. Moreover, interdisciplinary competency, as one of the key competencies for SD, is aimed at becoming integrated in all future studies at the university, including at the PhD level. The Experts in Teamwork Academic Section is coordinating the development of a future PhD course on interdisciplinary collaboration for sustainability, aimed, at first, at PhD candidates in the university initiative on interdisciplinary research on sustainability.

Growing attention for sustainability and competencies for SD, including interdisciplinary collaboration, on various strategic levels, helps to highlight the contribution that EiT can make to competency, knowledge, and pedagogy. EiT thereby contributes to three of the competencies for SD and a combination of student-active learning methods. Disciplinary knowledge on the other hand is provided by the teaching staff, who represent the different faculties and departments at the university. A growing number of sustainability themes in the different EiT classes demonstrate

an increase in focus on a variety of sustainability themes being taught in different study programs at the university.

Challenges Related to Organizing a University-Wide Initiative

In this section we highlight the strategic and practical challenges of organizing this university-wide educational initiative and the integration of sustainability. Instituting EiT represents considerable strategic, pedagogical, and organizational challenges.

The strategic challenges are, by and large, related to the fact that EiT is a mandatory university-wide course. This implies that discipline-specific programs on the Master's level cannot represent full-time study, as all Master's students have to spend 7.5 ECTS learning how to work across disciplines on sustainability. There are, of course, differing opinions among faculty as to whether this is the best allocation of time and resources.

The pedagogical challenges are related to establishing interdisciplinary problem areas for the assignments that serve to motivate and unite students across disciplinary borders, including establishing an interdisciplinary curriculum for the team process, selecting appropriate course reading material, and preparing the teaching staff (which changes from year to year).

The organizational challenges are related to organizing student teams across faculties and developing appropriate examinations. To accommodate part-time students, virtual classes have been developed where student teams only meet online. This also allows for mixing students across the three NTNU campus cities across Norway. In addition, COVID-19, and the resulting pandemic, has led to EiT becoming fully digital in periods of lock-down in Norway and at NTNU. This has had implications for pedagogy and has required a rapid development of hybrid learning environments. The Experts in Teamwork Academic Section has in the period of 2020–2022 developed an extensive toolbox for learners in the digital environment.

4   MOVING FORWARD

We conclude this chapter by looking ahead to how sustainability can be strengthened further in the EiT course, in connection with other strategic initiatives at the university. We also look at how EiT, as an educational initiative, can become a source of inspiration for other HEIs that wish to

integrate sustainability by making a university-wide course part of their curriculum.

The recent evolutions related to sustainability in research and education at NTNU provide a strong basis for moving sustainability more to the forefront within the EiT course. This is made possible by showing how the course is already preparing students to be able to contribute to a sustainable future, while, at the same time, clarifying how it fits into the larger picture of future study programs; and by giving clear directions on which competencies for SD a study program should focus on, while also providing inspiration on how student-active pedagogical approaches can get operationalized. It is also critical to proceed with the ongoing dialogue on and development of future studies at the Bachelor's, Master's, and PhD levels, while focusing on how sustainability is integrated into different programs of study.

Collaboration with different networks provides opportunities for further development, inspiration, and the dissemination of similar initiatives both nationally and internationally. Shared efforts in the Nordic Experts in Teams network led to the further development of courses within the partner institutions, and the efforts also act as a source of inspiration for other HEIs that want to integrate similar course concepts across the globe.

The Experts in Teamwork Academic Section has also been one of the partners in Engage—the Centre for Engaged Education through Entrepreneurship, since 2017. Engage is one of the Norwegian Centres for Excellence in Education with a vision *to increase the number of students in Norway and around the world with entrepreneurial skills and the mindset to become change agents for the better*. Sustainable development is entrenched in this vision, in the projects of the Centre, and activities targeting students, educators, and researchers. The Centre provides adjacent perspectives and pedagogical approaches from the practice of entrepreneurship education that can be enriching for the further development of the EiT course. In the same way, partnerships offer an opportunity for reaching out to the larger range of HEIs worldwide.

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