

Critical Eco-Reflexive Approaches: A Case Study of “Teaching for Sustainability” Towards SDG 4.7 Transition Via a Whole School Approach Perspective in Higher Education

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Key Message

Considering the art, science, and philosophy of teaching, professional teachers have autonomy in decoding innovative ideas into practices. In teaching, teachers perform a key role in applying didactic modelling. Teachers’ professional knowledge integratively connects the contemporary with future world-centred visions for schooling in the Anthropocene. Regarding self-determination, participation, and solidarity, *Bildung* is an essential part of sustainability didactics. *Bildung* entails a dynamic worldview that values the independence of mind and spirit grounded in ecological and social interdependence.

integrative worldview perspectives, pluralism, and sustainability awareness.

This chapter first provides a general introduction to the Whole School Approach (WSA) in relation to sustainability and introduces the context of the case study and its theoretical underpinnings. The subsequent section contains an in-depth presentation of the case study, followed by a short explanation of how the case was selected, analysed, and reported. This is followed by a presentation of the results and a discussion of the study outcomes. The closing section offers some lessons learned from a critical eco-reflexive analysis of the case study and suggestions to strengthen the WSA from a Higher Education for Sustainable Development (HESD) perspective.

20.1 Introduction

Teachers hold a key role in decoding innovative ideas into practices and accomplishing applied didactic modelling. The case study discussed in this chapter consistently displays the challenges of accumulating fragmented facts without relevance, and it proposes a holistic approach to HESD-based teacher education embedded in

20.1.1 The Whole School Approach to Sustainability

UNESCO describes the Whole School Approach (WSA) as a key thinking tool for Education for Sustainable Development (ESD) “to enable learners to live what they learn and learn what they live” (UNESCO, 2020). In the context of sustainability, the WSA can be traced back to the 1990s, when educational reforms started to engage more in holistic integrated sustainability agendas highlighting how environmental issues

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interconnect with social and political issues (Henderson & Tilbury, 2006). According to Mathie and Wals (2022), the WSA “provides a framework for re-orienting and redesigning education considering emerging global sustainability challenges. It invites a holistic, systemic, co-creative and reflexive effort by all participants included in education to meaningfully involve students in complex sustainability challenges.” By “holistic”, they refer to the effort to explore and address sustainability issues from multiple perspectives in a relational and integrated way. “Systemic” refers to concurrently considering main aspects of the education system (curriculum planning, educational development, visions, leadership, school–community associations, and teaching practices). “Co-creative” refers to including multiple voices and social actors in developing the WSA within a given context. Finally, “reflexive” refers to the continuous learning, monitoring, evaluating, and re-adjusting that are necessary since the world is in “constant flux” (Mathie & Wals, 2022).

While established governmental and non-governmental certification programmes award schools with certificates if they implement ESD into their daily practice, they often depart from an accountability perspective. Several studies (Pauw et al., 2015; Pauw & Van Petegem, 2018) compare schools in certification programmes with schools not participating—in terms of ESD outcomes—and often show negative effects, particularly when estimating the effects on student perception of the occurrence of holism and pluralism in their classrooms. It is difficult to generalise the results regarding the effectiveness of ESD, particularly in the eco-schools in Sweden, which have more potential for effectiveness and show promise in this context. However, Olsson and Gericke (2016) found such schools were underperforming in educating students on sustainability and environmental issues. This finding is remarkable, considering the amount of effort spent on having an ESD school profile and applying a WSA as a thinking tool for educational innovation in general and as a more comprehensive approach that considers the engagement and

commitment of the students from both a short- and a long-termed perspective.

20.1.2 Teaching for Sustainability in a Swedish Context: Introducing the Case Study

Sweden has a tradition of collaborative pedagogies, including features such as theme-based team teaching (Avery & Nordén, 2021). However, in the past decade, the country has turned towards more conventional standards and a curriculum-driven system, which affects the scope left for teacher collaboration and transdisciplinary approaches in ESD (Nordén, 2018). While policy and curricula play important roles, practical considerations related to teachers’ professional competence are informed by how teaching *subject knowledge* is structured today. Thus, this case study focuses on the *unconventional* WSA-inspired course Teaching for Sustainability (TfS) for international student teachers engaged in practice teaching within higher education at Malmö University (MAU). Their initial training in subject teaching focusing on *mode, resources, content, and assessment* has consequences for their ability to teach sustainable development goals (SDGs) across subjects. One strategy of teaching these students in the course has been to work with transdisciplinary teaching in teacher teams (Yueh & Barker, 2011). This, in turn, requires increased attention to teacher collaboration, the role of school leadership, and issues of WSA for educational development.

This chapter discusses professional education and development based on the concept of *Bildung*, which describes the self-formation of independent yet socially reflective, ethically aware, and democratic-minded individuals (Sörilin, 2021). Earlier research in this area has examined the learning, content, and activities required to develop appropriate critical knowledge capabilities (Bowden, 2004; Steiner & Posch, 2006; Nordén, 2018), drawing on experiences of teaching ESD in a variety of non-traditional upper secondary and pre-school context settings (Nordén, 2016; Nordén & Avery,

2021). A (more “humanistic”) critical-reflexive approach to sustainability education that discusses and problematises its content and practices creates a broader cultural milieu where teacher education/training can develop. With a didactic foundation in eco-reflexive approaches, rarely used in teacher training and professional development programmes, the study presented in this chapter seeks to aid educators in their sustainability-oriented educational planning and analysis, but from a more critical perspective. The multifaceted aspects of anchoring holistic, systemic, and sustainable perspectives meaningfully in education are emphasised in the course Teaching for Sustainability (TfS); thus, due to the need for more knowledge and examples of WSA in practice, this course was chosen as the case study. The study considers which unconventional (or non-traditional) changes from the educative concept of a WSA would most effectively support transitions towards sustainability when putting these ambitions into practice.

20.1.3 Re-designing Methodologies for Transformative Teaching Towards Eco-reflexive Bildung

Given the nature of modern societies and the global challenges that we face, sustainability education has to be reconceptualised to open diverse opportunities for students to critically and reflexively question and engage with the world. This reconceptualisation demands developing and adopting curricula and instructional approaches that foster eco-reflexive sustainability thinking and participatory action research as students explore complex systems and phenomena of relevance to them and their communities. This chapter elaborates on this educational perspective by incorporating contemporary ideas on eco-reflexive Bildung processes and sustainability education (Sjöström & Talanquer, 2018). Although not commonly practiced in the sustainability education literature (Sjöström et al., 2017), these processes can be used to conceptualise a humanistic (Nussbaum, 2010) and critical-reflexive approach to sustainability education

development in an “eco-version”. Specifically, the thinking, saying, learning, knowing, doing, and practice of sustainability education should take into consideration moral-philosophical-existential-political alternatives (Kemmis et al., 2014).

Rarely conducted in teacher training and professional development programmes, this case study focuses on achievable co-determining indicators of progress and reflexive methodologies for transformative teaching towards sustainability as an essential component of learning-based change and innovation. It aims to examine how international teacher education students in heterogeneous groups experience their learning process in the context of a student-led *non-traditional inquiry-based* learning assessment. With a critical eco-reflexive approach assisted by participatory action research (Kemmis et al., 2014), the students analyse and describe their interpretation of critical consciousness, critical literacy (content), and critical agency (mode) involved in sustainability education. Accordingly, they also engage in reflecting upon the standards of their upcoming profession. The study findings may indicate whether the current teacher education ought to be revised didactically. The research question is as follows:

From the perspective of Higher Education for Sustainable Development (HESD), what should be included in a revised WSA didactic that is informed by a Bildung-oriented eco-reflexive approach?

20.1.4 Theoretical Underpinnings for Teaching Towards Sustainability at Malmö University

Malmö University (MAU) is in the challenging process of re-designing adult learning in higher education through Challenge Based Learning (CBL). With emphasis on contributing to a global learning society and fulfilling the UN sustainable development goals (SDGs)—particularly the connection between quality education for all (SDG 4); sustainable cities and communities (SDG 11); peace, justice, and strong institutions

(SDG 16); and partnerships to achieve the goals (SDG 17)—MAU is devoted to the dialogues on the role of higher education in the knowledge transformation of society. As a young and socially inclusive university, MAU appeals to people who have traditionally not had access to higher education and cultivates their previous experience and knowledge as valuable learning resources. In line with WSA, “this engagement sets the arena for inclusive education and the co-creation of knowledge, originating from the values and experiences everyone brings to the learning environment” (Christersson et al., 2022). MAU prioritises aligning theories, methods, and practices to provide learning experiences and a common foundation for knowledge formation, independent of disciplines, grounded in a holistic HESD based on CBL (Leijon et al., 2021).

According to Goldberg et al. (2022), well-being and engagement should be used as daily guidelines for teaching—that is, teaching should not be based only on the learning outcomes measures. Thus, in line with experience-based learning, the indicators of the learning process should be well-being and engagement. This requires teachers to focus on the students interests and strengths. Qualitative studies investigating the role of well-being and engagement on academic achievement show the potential of a process-oriented teaching approach (Goldberg et al., 2022).

In an attempt to map CBL in higher education, this case study might contribute to research that explores CBL and student voices, praxis, and effect on learning. CBL aims to generate readiness to handle unknown future challenges holistically on an HESD base (Christersson et al., 2022). Thus, both *critical thinking* and *critical doing* need to be integrated when approaching global and local challenges. A broader approach, including theories and methods not explicitly labelled as CBL, could provide a deeper understanding of a growing field. Comparing other school forms from a WSA lens might also be valuable. Furthermore, based on MAU experiences, Christersson et al. (2022) claim higher education institutions could “contribute to the sustainable development of a global learning

society by adopting the CBL-domains” (p. 11). The social mission of research methods in higher education is pivotal, underpinning the CBL-domain *Diversity and Inclusion*, particularly in emerging innovative and collaborative learning and social innovation (cf. Avery & Nordén, 2021). Also relevant are the fast-changing technology and a labour market demanding active, creative citizens ready to re-skill and re-learn. This requires the CBL-domain of *Collaboration and Co-Creation* that enables students, staff, and societal stakeholders “to tackle complex societal challenges through inter- or transdisciplinary perspectives on learning, where praxis and theory are interwoven” (p. 11). Moreover, through adopting the CBL-domain *Change Agents and Contextual Challenges*, higher education institutions can contribute to societal transformations (Christersson et al., 2022). Working with CBL is challenging as it provokes the roles and the relationships between institutions, students, staff, and stakeholders. Transformative CBL processes require an open-minded and inclusive co-creation of knowledge by bridging research and education in collaboration. They also require institutional and individual courage to allow and support creating innovative didactics for teaching and learning that would shape a sustainable learning society.

20.2 Method

This case study sheds light on how international exchange students ($n = 37$) are undertaking the course Teaching for Sustainability (TfS). The course is annually offered on site at Malmö University. The syllabus for the course was tested, modified, and revised by the course leader (the author of this paper) for approval of revision number 3 (Malmö University, 2022).

20.2.1 TfS Objectives and Assessment by 2022

The aim of the course TfS is to develop the teacher students’ competence and knowledge on

planetary boundaries and in sustainability education. The student should develop deep approaches to learning towards sustainability and knowledge formation on challenges regarding the UN Sustainable Development Goals in global–local contexts, as well as teaching skills in relation to the student’s learning process. The course’s learning outcome assesses capability to describe the Anthropocene, analyse humans’ effect upon their environment, and actively discuss sustainability issues and challenges to sustainable development in their home countries and worldwide. The course involves different assessment forms, including workshops and a home assignment. Further, the students reflect and share their insights on the value of professional transformative teaching and individual learning skills by participating in a joint platform to progress knowledge formation among themselves explicitly.

20.2.2 Study Design and Methodology

The study’s method design is inspired by *effective WSA* to sustainability as characterised by Tilbury and Galvin (2022b), summarised in the following five points (Tilbury & Galvin, 2022a, emphasis added):

- (a) RELEVANT—to school’s mission; national educational priorities; *community identity*; as well as, environmental priorities of the region.
- (b) RESOURCED—with expertise and support in sustainability and learning for sustainability; physical resources and technologies *to make the transition*; and, medium-term finance to execute plans.
- (c) REFLECTIVE—skilled in critical reflection and evaluation at all levels; developed *critical thinking competences in its staff* and students; striving to become *a learning organisation*.
- (d) RESPONSIVE [cf. Participatory action research]—embraced a flexible structure and adapted to local and cultural settings; devel-

oped *learner capabilities that helped recognise complexity* as well as the changing nature of sustainability challenges and rejected a one size fits all approach to sustainability.

- (e) REFORMATIVE—appreciated that the agenda is not simply one of adding on environmental or SDG themes to the curriculum but that of *reframing the entire educational experience*.

This case study analyses and describes how the concept of WSA can be used as a general thinking tool for educational innovation addressing an overarching umbrella of “sustainability” within international teacher training programmes in higher education. With this re-balancing transition (Wals, 2021), the specific HESD course TfS at MAU seeks to re-orient education to be responsive, relevant, responsible, and re-imaginative, considering pressing local and global encounters (cf. Li, 2021).

The method holistically applies a Whole Institution Approach (WIA), which is inspired by constructive alignment (Trigwell & Prosser, 2014), illustrated by Fig. 20.1. The study relies on an interactive process viewing the curriculum as a dynamic, emergent, and collaborative process of learning for both student and teacher, and the beliefs or conceptions of the teacher are also considered a crucial tool for understanding successful curriculum design towards WSA and WIA. As course leader and teacher, I felt that my students were well prepared for the subject when attending the TfS classes because the teaching applied already from the start of the TfS course provided the prerequisite knowledge by adopting constructive alignment (see Trigwell & Prosser, 2014).

The different steps conducted in this case study could be compared with the didactic modelling cycle (Fig. 20.2), with four steps based on a humanistic Bildung-oriented tradition as interpreted by Sjöström (2022). Didactic models involve theoretical tools that teachers can use in planning, implementing, and analysing teaching (namely, didactics). They could differ but share that they support teachers in reflecting on teach-

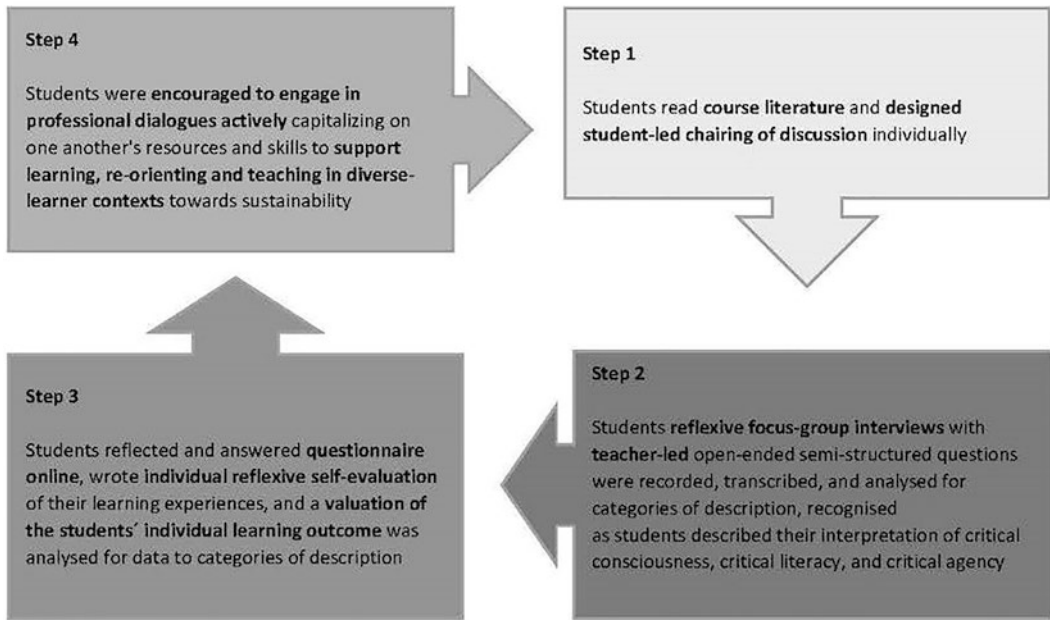
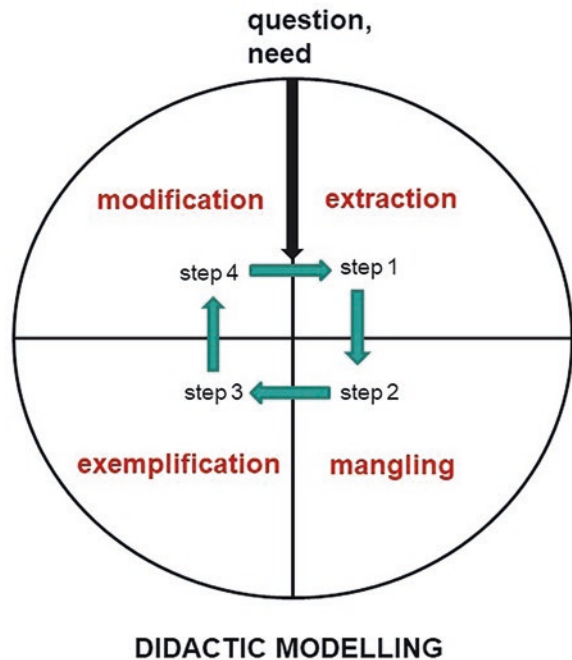


Fig. 20.1 Visualisation of the study’s methodology and procedural steps

Fig. 20.2 Didactic modelling cycle with four steps. (Sjöström, 2022, p. 255)



ing practices, grounded on the didactic questions of why, how, and what to apply in teaching arrangements for specific learning situations. Didactic models are useful in constituting a basis for teachers’ professional judgment, and they can

be seen as bridging the gap between theoretical perspectives and teaching practices (Fig. 20.2). They often have equally theoretical–philosophical as empirical–analytical foundations. Synonyms to didactic models are frameworks,

compasses, instruments, and tools (Sjöström, 2022).

In this study, where I explored inclusive pedagogy, I have devised multiple tools to engage the participating student teachers in reflective teaching and critical dialogue. Didactic modelling can be considered as one of these tools that could be appropriate and helpful towards WIA. The steps of the study were as follows:

Step 1 consisted of an oral literature examination seminar on the course book. Therefore, it initially required the students to individually read the course book *The World We'll Leave Behind: Grasping the Sustainability Challenge* (Scott & Vare, 2018) and prepare three questions each on sustainability challenges to chair in the upcoming student-led group discussions. (See Step 1, extraction, in Fig. 20.2.)

In Step 2, the students participated in reflexive focus-group interviews with semi-structured questions raised by the lecturer. The interview questions covered students' previous experiences of various assessment forms in general during their earlier higher education studies; their ways of studying the course book; and their own approaches to deciding and transforming content knowledge to adequate questions, taking command in the learning discussion, and sharing expectations and reflections on the learning processes. The student teachers were divided into eight separate groups (consisting of three to five participants each) to conduct focus-group discussions for *idea exchange and experience sharing* among themselves as well as for the purpose of collecting empirical research data for current case study.

The focus-group discussions with the international student teachers ($n = 18$ in the year 2022; $n = 19$ in the year 2021) were recorded, transcribed, and analysed. Thus, prominent characteristics were distinguished in the data in line with the qualities indicated by the *effective WSA* points above, and categories of descriptions were recognised. This revealed how the students analysed and described their interpretation of critical consciousness, critical literacy (content), and critical agency (mode). (See Step 2, mangling, in Fig. 20.2.)

In Step 3, the students anonymously and individually ($n = 37$) answered an extended online questionnaire by writing their individual reflexive self-evaluation of the learning outcome. This added further data for analysis in the study. (See Step 3, exemplification, in Fig. 20.2.)

Finally, in Step 4, I encouraged the student teachers to engage in some form of professional dialogue with one another (for example, actively take part in one another's presentations and the final papers for the remaining examination parts of the TfS course) to discuss what they could do to support everyone's learning and what they believe about re-orienting and teaching for sustainability in diverse-learner contexts. (See Step 4, modification, in Fig. 20.2.) In addition, reflections at the conclusion of the case study improved the data collection.

20.2.3 Data Analysis

Audio files were transcribed with Amberscript™ (Version 2022 Global B.V., Amsterdam, The Netherlands), which is a GDPR-compliant and ISO27001 and ISO9001-certified tool that Malmö University has chosen for converting audio to text in a safe and anonymous manner. I reviewed all transcripts to ensure accuracy. Any information related to a specific person was replaced by a non-identifiable descriptor. Transcripts were explored for themes through qualitative analysis. This form of thematic analysis emphasises the use of hierarchical coding but balances a highly structured process of analysing textual data with the flexibility to adjust to the needs of a study (Brooks et al., 2015).

A coding template was developed for both the validation in focus-group discussion (transcripts from the interviews in Step 2) and the written post-validation questionnaire (in Step 3). To define an initial coding template, I used open coding to create codes based on a subset of the transcripts. The created codes were revised and refined based on subsequent transcripts during an iterative reflective process. All quotes were carefully read and analysed and then slightly edited for readability.

The analysis of the empirical material can be described as abductive analysis (Peirce, 1934) and involved identifying descriptions in the material in relation to the research aim. Alternating between theory-loaded empiricism and empirically loaded theory revealed qualitative patterns. Concretely, the analysis followed the interpretation paths of close listening and reading to identify distinctive descriptions, to put critically problematised distinctive categories of descriptions in relation to earlier research and concepts (Marton & Booth, 1997; Trigwell & Prosser, 2014). A cohesive analysis was performed considering the didactical modelling, resulting in a conceptualising focus (Sjöström, 2022). Empirical and theory-based interpretation paths were characteristically intertwined. Quotations were selected for their clear exemplification of the categories of descriptions in the data gathered.

20.3 Results

Drawing on the empirical evidence, the case study provides a better and a more comprehensive understanding of learning in sustainability transitions. Teaching and learning in transition contexts can be perceived as a non-linear, iterative process of meaning-making of experiences in communicative interaction; this process is in a reciprocal relationship with the critical social, (bio-)physical, and institutional context, and by gaining knowledge and insights, it helps generate new forms of WIA. Furthermore, it can be seen as a process where opportunities for collaborative action are experimented with and developed by ideas and put to practice in various networks.

20.3.1 Why Use the WSA Concept?

The conducted steps in the didactic modelling cycle showed the impact of WSA on academic achievement. Analysis of the reflexive focus-group interviews emphasised aspects regarding why we should use WSA. A conscious desire to change the world through a WSA within sustain-

ability studies showed implications for changing the teaching of and with student teachers.

Consequently, these expectations need to be met and contextualized to strengthen the student teachers' ability to extend and develop their teaching of the SDGs across subjects. Nourishing their request for continued training in transdisciplinary teaching and subject didactics may form a novel solid foundation. To further facilitate the way ahead, encouraging whole institution approaches, also student interactions should be considered to power transgressive learning (Wals, 2021). The course component areas, identified as needing some transitional change pedagogically, are as follows—mode, resources, content, student interactions, and assessment:

Challenging the MODE is critically reflecting on the relationships between roles, resources, and content. Influenced by a WSA, TfS focuses not on learning tasks but on better compositions of experiences to facilitate learning. This demands a flexible, holistic, relational, and educative teaching mode. One question, though, is how educators could play a more effective role in student groups and whether—or to what extent—the students and teachers/educators share responsibilities. Is the educator really needed for learning to occur?

Challenging the RESOURCES is using materials, tools, and approaches purposefully to enhance learning. What would happen if each student group could curate their own resources? This case study presents how the students shared concepts but learnt different content.

Challenging the CONTENT is filtering and evaluating the skills, practices, and information with which the students engage.

Challenging STUDENT INTERACTIONS. The students were given opportunities to be the experts, and they took on the expert roles while collaborating with students from other countries. The students developed a support network out of campus when preparing for the forum discussion (Examination 1) in class. Thus, in a way, they took command and “led the teaching”.

Challenging the ASSESSMENT concerns re-balancing the activities and artefacts that describe, support, and reflect learning. A relevant question

is, how does the assessment (namely, the unconventional examination format) help students learn about the standards of their field or future profession? Moreover, how does the educator, efficiently and effectively, make clear to the students what they need to know prior to the assessment?

20.3.2 What Is Useful in WSA and How?

To illuminate what could be of value to include in a WSA to HESD didactics informed by a Bildung-oriented eco-reflexive approach and how, the analysis focused on the third step (exemplification) in the didactic modelling cycle. The textual analysis of the individual reflexive self-evaluation in the questionnaire answers showed what to consider when using the WSA concept and how. Three categories emerged from analysing the students' questionnaire answers: powerful knowings, understanding, and reimagining ethics. They are presented below through quotes (emphasis added).

Quotes Exemplifying POWERFUL KNOWINGS

Thanks to this type of examination i have been able to talk and reflect about sustainable development with my classmates sharing different opinions and reaching common conclusions. I really liked learning about the different aspects that affect SD such as circular economy, gender equality or the influence of educations, and I think that this experience has *enriched my knowledge about this topic*.

I started with very low knowledge but was able to gain many opinions and different insight of other cultures. I had to do a lot of research on my own because the lectures were sometimes too professional and overwhelming for me, but as I digged deeper and gained more knowledge I started to like the topics.

The only thing I would change could be to show the students *how* can they *really show* that they have *acquired the knowledge*.

From an academic prospective, I added new informations to the knowledge I had about climate change, about what is climate change and *how educations is a powerful tool to solve many wrong*

behaviours that caused it. Studying sustainable development from an educational point of view, gave me access to new practical tools that I'm sure I will use in future projects, especially ides for activities and teaching methods that I would like to explore.

I feel more secure to talk about envrionmental issues and the complicated problems of climate change. I always felt like not knowing enough or having wrong information and often said nothing because I would have felt embarassed to talk about possible "fake news": I often hesitate to contribute to specific topics but this literature seminar and discussion really makes me feel more confident.

Many students experienced that they went from a more general view in the whole topic to seeing the whole complexity and interconnection within the different topics. The variety of learning assessments was enriching, and many students felt they could acquire *knowledge* by applying them. Some deepened their knowledge through discussions found useful, while engaging with other students' opinion and connecting these to their own or disagree. Talking to one another helped most of the students "to build sustainable knowledge". Many of the students realized that the examination forms enabled them to show different acquired abilities and understanding.

Quotes Exemplifying UNDERSTANDING

I learnt to consider environmental challenges and solution as part of an educational agenda in which I am both a learner and a teacher. Learning about climate change issues from the prospective of someone who needs to share informations in a easily accessible way, changed how I interact with learning material. Discussing about social implications of the climate crisis in an *engaging way gave me more understanding of interconnected dynamics* that I haven't considered before.

I read the book and was able to connect the course classes with what I was reading *I got a feeling of deep understanding of the subject*. I believe without the learning activities the teaching process would not have been the same...

I found myself looking for more content that could help me better understanding the topic and shape my thoughts from a different point of view. Being responsible for my own performance in a collective environment, as the examination, helped me being responsible about my education.

It is not that my idea of sustainability changed, it is that I didn't have one. This course made me open my eyes. As a future teacher, one of my aims is to teach in sustainable terms. Implementing concepts such as “circular economy”, or “living within the limits”.

I think my idea of sustainability and ESD has expanded beyond belief. I came from an education where sustainability wasn't really talked about nearly as much as it is in Sweden, so I was really grateful to get to learn about these concepts in such a deep way. Doing so in a more heterogeneous context (with people from different countries) was also really rewarding, since I could hear about the initiatives in different places. The examination was also really interesting and I plan to implement something like this in my career as a teacher since it was a really rewarding experience.

I sometimes wondered if I—as an individual—am even able to change the world. *I now know: I surely do!* Even though climate change is a global disaster and we have to globally fight against it, I know, that I can rethink my routines and habitats to be able to influence this world positively. Also as a future teacher I now know, that I will have great influence on my future pupils. It won't be easy, but with the knowledge I gained I now know that I can...!... I will go on to listen to speeches and podcasts and to watch documentaries because I think they need to be heard and seen.

The students thought the learning process was perfect, with an actual book that talks about issues of the subject and from daily life. The book was easy to read and understand. After the creation of the question, some students made lots of their own ideas, connections, and other sub-questions that made them reflect more deeply on the book. Finally, to prepare their own questions was really productive because they learnt from other perspectives, people, and points of view. The activity was not stressful.

Quotes Exemplifying REIMAGINING ETHICS

Both the lessons and the book assigned gave me new insights and knowledge about the topic. The book assigned was compact and filled with a big amount of content and data, without focusing too much on science but *providing a bigger understanding of how different topics interact with each other.* The examination dynamic, consisting in making questions and answering in a comfortable and relaxed environment, resemble how a discus-

sion in a public informal setting works, and I appreciated the freedom of choosing how to present my question and deciding if I wanted some specific tools to help me and my classmates to perform better (ex. a classmate gave us a sheet with informations for understanding better the concept of system thinking, and gave us opportunities to develop our thoughts on that content).

... appreciate the fact that the course tries to use innovative methods to teach us about sustainability. Even though it is a very interesting topic, learning about it can sometimes be boring if the teaching method is not the right one.

In the group activities, you can help another and *everyone has different knowledge which grows to a big one.*

The book did meet my expectations, but sometimes it *feels like a tale.* I think that ending hunger could be done with one person's money, but the world works by interests, economy... In some kind of way I think that the same people that is truly responsible for polluting are the ones making the rules for sustainability.

Very (!) good (learning) experience, something new for me—Best and favourite way of learning (interaction with others, talking, discussing)—Benefits from interaction with others, it is nice to reflect on different opinions—also after the exam—Sustainable and effective way of learning, I'll for sure remember more of it than through a written exam—I was reading with more concentration and a more intense way of attention than I would read normally—Time frame was fine for me, really short breaks (at least 2 min) are important—Nice to get responsibility to co-create the exam through our own questions.

It was great for me to experience learning to be fun after a long time. I was a bit tired of the monotonous way of learning at my home university and it feels really refreshing to work this way. Everything felt well-thought-through and connected—a red thread was clearly visible for me! I can really integrate this new knowledge into my life and into the facts I already knew. It felt like this kind of learning made much more sense to me and that reading the course literature was really important and interesting as a preparation for the exam—it's not so often the case that a course literature is really "taken seriously" and such a big part of the class/lecture/seminar.

The learning situation was encouraging, since the students experienced autonomy and got the opportunity to take responsibility for their learning outcome. The students experienced the freedom to make out thoughts, opinions, and

reflections. They felt deliberated, free to share, and had the opportunity to set a sustainable mentality that they thought could be put in practice every day. So, from a social aspect, many students learned a lot through critical discussions in learning situations with other people. They valued the various forms of learning situations (lecture, seminar, workshop, study visits, group discussion), trying to evolve out of university in the practical learning settings (e.g. museums) to have a broader view on the topic.

Reading the course book helped the students absorb the concept of sustainability, but the assessment was a new learning experience. Many students were anxious, unacquainted with predicting and being accountable for the assessing discussion. After the assessment, students continued to reflect and talk about the questions raised. They said it generated a deep, long-lasting learning opportunity compared to a written examination. They described their learning processes as ongoing, even after the closing seminar.

20.4 Discussion

This section offers an advanced critical analysis and reflection and calls attention to the effectiveness of the Whole School Approach to ESD in the course Teaching for Sustainability.

From a *Bildung* perspective, subjects within HESD (and its ambition towards WSA-responsive education) need to be open to reflectivity and debate (Herranen et al., 2021). To achieve this, Herranen et al. (2021) underscore three kinds of knowledge: (1) *content knowledge*, that is, ontological knowledge; (2) epistemological knowledge, which is basically *understanding*; and (3) ethical knowledge, which allows critically seeing ESD in a social context and considering ethical aspects. These three kinds were recognised in the course and consistent with the assessment of the participating student teachers. They were to a great deal found to be achieved in various examination situations, as stated by the course evaluation of the learning outcome of the TfS.

20.4.1 Double Unlocking for Powerful Knowings

First, the course’s *content knowledge* was new and much appreciated, since many students were unfamiliar with the UN SDGs and how they could be applied in education. From a *Bildung* perspective, discussions about the connection between content and students can be elevated based on Klafki’s concept of “double unlocking” (Sjöström & Eilks, 2020, p. 56), which denotes unlocking both the knowledge and the student. During teaching and learning, students can be offered cases that they can use to verify the subject matter; further, the students can participate in discussions about the content and how to study it. Thus, powerful (HESD) knowledge and capabilities can be applied as specific (HESD) knowings (Bladh, 2020). From an eco-reflexive *Bildung* perspective, such HESD knowings are framed by a socio-eco-critical awareness. They are examples of “powerful knowings” (Carlgrén, 2020).

20.4.2 Intended Deep, Responsive, and Eco-Reflexive Study Strategy

Second, some student teachers experienced the knowledge formation process as troublesome, and they encountered having to find their own *understanding* of what—and how much—was expected of them, since they were not used to the type of examination form used in the course. It became a challenging transition for individual students to step up and take the floor. Some students expressed that they thought communication and feedback should be clearer; since they were not used to taking responsibility for selecting holistic approaches, they felt insecure about having to decide how to prioritise areas for knowledge formation. This gave an opportunity for some critical reflexivity on the shared learning experience on the part of both students and lecturers. These lessons learned influenced how the learning environment was set up next time. Some factors that were experienced as helpful to the students (e.g. concerning the performance) were

knowledge of the procedure, guidance, and supervision (Step 4, modification). The support of peers and of the teacher will be developed further since these were, in particular, seen as beneficial to mentally process the procedure.

Qualitative variation in approaches to teaching is related to variations in students' approaches to learning. When teaching has the intention to develop or change students' conceptions and to question students' understanding rather than present information, the students are more likely to adopt deeper approaches to learning. In particular, when the teachers focus on transmitting the course concepts that might be available in a good book, their students adopt more of a surface approach (Trigwell & Prosser, 2014). On the contrary, this was not the case in this case study, due to the conducted constructive alignment that was employed considering the object of study (the intended learning object), the teaching approach, and the assessment focus. According to Trigwell and Prosser (2014), students' perceptions of the assessment requirements are related to variation in the quality of their approach to learning. When tests are perceived to measure understanding rather than reproduction, students describe a deeper intended study strategy, which was the case for the student teachers in the TFS course.

20.4.3 Didactic Modelling as a Framework for Reformative Transitioning Towards WIA

For many student teachers, *critical pedagogy* is equal to *ethical considerations*, which they may find relevant and can *reimagine*. Nonetheless, the relationship between knowledge, values, and action is complex. Consequently, in addition to providing knowledge of environmental issues, education should draw attention to values, emotions, and social norms. Education should be framed with democratic values. Furthermore, teaching always needs to expose students to well-informed alternative reasoning. According to Alexander (2018), pedagogy worthy of the design

nation 'critical' must not only offer exposure to different viewpoints but also initiate certain ethical perspectives.

Students must be able to transform epistemological knowledge and get skills to question mainstream discourses. As necessary meta-skills, self-efficacy, and creativity strengthened by responsive critical thinking come into question, for example, in challenging learning situations (cf. Herranen et al., 2021). A holistic view is necessary in sustainability education. In practice, it means including philosophical, ethical, and socio-political perspectives into HESD, focusing on problematisation to facilitate understanding of uncertainties.

The WSA-influenced didactic in this case study frames HESD through a wider and more socio-philosophical perspective. The reason is to emphasise critical notions, assess the understanding of knowledge in the course, and evaluate student teachers' possibilities to apply the knowledge in practice. That purpose inevitability demands describing and analysing teachers' and students' views and roles and highlighting eco-reflexivity. In contrast to the fact-based tradition, which focuses on scientific factual knowledge, or the normative tradition, which focuses on changing people's way of living in different directions, the pluralistic teaching tradition stresses the uncertainty of knowledge; it also views environmental issues as moral and political problems (Sund et al., 2020).

Shedding more light on content issues, Herranen et al. (2021) remark that didactical teaching and *Bildung* require normativeness, so the teachers—and in this case, student teachers—are challenged to be aware of the inevitable normativeness present in interacting with any subject matter. Testing the WSA influences in teacher practices empirically demonstrated its potential, usefulness, and limitations. Since teachers are in the position of decoding innovative ideas into practices in their teaching, they perform a key role in the applied phases of didactic modelling. This case study correspondingly highlights the challenges of accumulating isolated facts without relevance (fragmentation) and proposes a holistic approach to HESD-based teacher education

embedded in integrative worldview perspectives, pluralism, and sustainability awareness.

20.5 Conclusions

Along with assessing learning outcomes, teaching should focus on developing learning needs—not only within the course but also in a wider perspective within a learning community and in relation to both research and our daily practices—for individual and collective interactively constructed understanding. The eco-reflexive approach includes an understanding of interconnectedness and holistic thinking. Through responsive decision-making processes, individuals need to be able to navigate in our multifaceted world. Therefore, both teacher and student teachers need to establish a professionally critical reflection capability—since a reconceptualisation of HESD with the eco-societal systems is essential. Herranen et al. (2021) consider meta-skills such as critical thinking, creativity, resiliency, and self-efficacy important when challenging situations occur. In planning for a sustainable society, Herranen et al. (2021) emphasise resiliency will be required to overcome the unavoidable challenges ahead. One way to obtain a holistic view of HESD, instead of fragmented pieces of knowledge (Nordén & Avery, 2021), is to adopt a system-oriented approach—such as WSA—to understand the challenges of achieving sustainable development. It permits us to recognise the system components of WSA also within HESD, the integration of subject knowledge within and between different disciplines.

20.5.1 Lessons Learned and Suggestions for Strengthening WSA from an HESD Perspective

This case study provides a tool to address the didactical WSA questions of *why*, *how*, and *what*. Powerful HESD knowledge in a WSA is placed in the centre, supported by critical knowledge

capability (Nordén, 2016). From an eco-reflexive Bildung perspective, the WSA-influenced HESD is framed by a socio-eco-critical awareness. One of the key lessons from this case study for course and curriculum design is that implications are concerned with the quality of learning associated with the variation in the nature of knowledge that teacher education institutions intend their students to learn. The categories of description of the object of study vary, including a focus on topics rather than the discipline as a whole (i.e. WIA), on knowledge as being unproblematic rather than disputed or questionable, and on specific practical skills rather than analytical, enquiry-based skills (Nordén, 2016). Consequently, the didactic modelling (Fig. 20.2) could be further developed and tested in various WIA contexts, especially empirically with student teachers specialising in teaching students from different age groups and different backgrounds.

When students share their knowledge and experiences of Anthropocene sustainability challenges, they develop critical sustainability literacy. Tentative results in this study indicate that student teachers developed critical eco-reflexive thinking focusing on learning and holistic understanding—seeing a bigger picture while taking responsibility for their own student-led learning. This case study could be considered as (and compared to) a whole school approach since the investigated course could also be seen as involving prospective schools where the students will act in their roles as teachers in their future professional life, thereby influencing and implementing criteria similar to the WSA criteria (Bianchi et al., 2022).

The key findings from the study generate recommendations for WSA policy and practice in higher education, HESD, and teacher education institutions. For instance, educative and critical eco-reflexive pedagogy for inclusive teacher education could be useful. Hopefully, the methodological strengths and limitations of this study could inspire future research. The TfS course aims to enable higher education to deal with the complex socio-ecological and economic questions and uncertainties of our time (Wals, 2021).

Understanding internationalisation as an empowering process that fosters collaboration between universities and society (cf. Mindt et al., 2017) may be a valuable starting point to develop WSA-influenced international sustainability-oriented curricula.

The WSA is not a tool or a prescription for employing a specific agenda like ESD but a means to encourage schools—including higher education institutions—to think about educational innovation generally. A WSA allows multiple themes to be simultaneously addressed within the overarching umbrella of “sustainability” or “sustainable development”, not by reducing them to “learning tasks” but by using them as entry points to a different way of working and living. As such, a WSA represents a transition perspective (Van Mierlo et al., 2020), in that it does not intend to optimise mainstream education. Rather, it seeks to re-orient it by anchoring it in different principles and values that contribute to an education that is more relevant, responsive, resourced, reformative, and re-imaginative in the light of urgent global challenges.

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