

## Article

# CoDesignS Education for Sustainable Development: A Framework for Embedding Education for Sustainable Development in Curriculum Design

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**Abstract:** In the context of the global climate change debate, the integration of Education for Sustainable Development (ESD) in higher education institutions (HEIs) has been identified as one of the top priorities. This paper presents the CoDesignS ESD Framework (hereafter “Framework”) focused on HEIs, though the Framework is applicable to other types of educational institutions. The Framework introduces transformative pedagogies and teaching methods that extend beyond typical ESD competencies, encompassing cognitive, socio-emotional, and behavioral domains for a holistic design and delivery. It was evaluated using a focus group and interviews among sustainability practitioners and academics, learning and curriculum designers, students, and government officials involved in ESD. The evaluation demonstrates key stakeholders’ engagement with the Framework and appreciation of its potential to integrate sustainability into university curricula across different disciplines. The findings suggest that the Framework is easy to use, making sustainability explicit in the curriculum and actively developing the competencies students require to bring about change beyond the classroom. The feedback received has helped the further development of the Framework, including the CoDesignS ESD Toolkit Planner and Dashboard, which provide a more effective way of integrating the learning design and ESD components embedded as part of the CoDesignS ESD pillars.

**Keywords:** ESD; sustainability; competencies; higher education; learning design; curriculum design; sustainable development

## 1. Introduction

Education is the backbone of a sustainable development agenda with its success depending on individuals acquiring relevant knowledge, skills, and attitudes to address global challenges [1,2]. Education should be transformative, allowing individuals to make informed decisions and take individual and collective actions to change our societies and care for the planet [3]. Education for Sustainable Development (ESD) is recognized as an

integral element of Sustainable Development Goal (SDG) 4 on quality education and a key enabler of all other SDGs.

The United Nations (UN) decade of education for sustainable development ran from 2005 to 2014 and was designed to integrate the principles of sustainable development into all aspects of education. The SDGs are a call to action for HEIs to adapt their teaching and learning processes to prepare students for the challenges of the 21st century and beyond. By embedding these goals into their core functions, HEIs can play a pivotal role in achieving a more sustainable future. During this time, ESD became more widespread through processes of raising awareness and capacity building [4]. The General Assembly of the UN on resolution 70/1 of 25 September 2015, entitled “Transforming our world: the 2030 Agenda for Sustainable Development”, reaffirmed education for sustainable development as a vital means of implementation for sustainable development. It encouraged stakeholders, including governments, private sectors, and civil society organizations, to scale up action through the implementation of the Framework entitled “Education for Sustainable Development: towards achieving the Sustainable Development Goals” [3]. It has been recognized that, for ESD to be as effective as possible, higher education institutions (HEIs) should be transformed as a whole and should act as role models for their students. Generally, such an institutional approach encompasses campus operations, community engagement, research, and education. However, this study focuses on curriculum transformation.

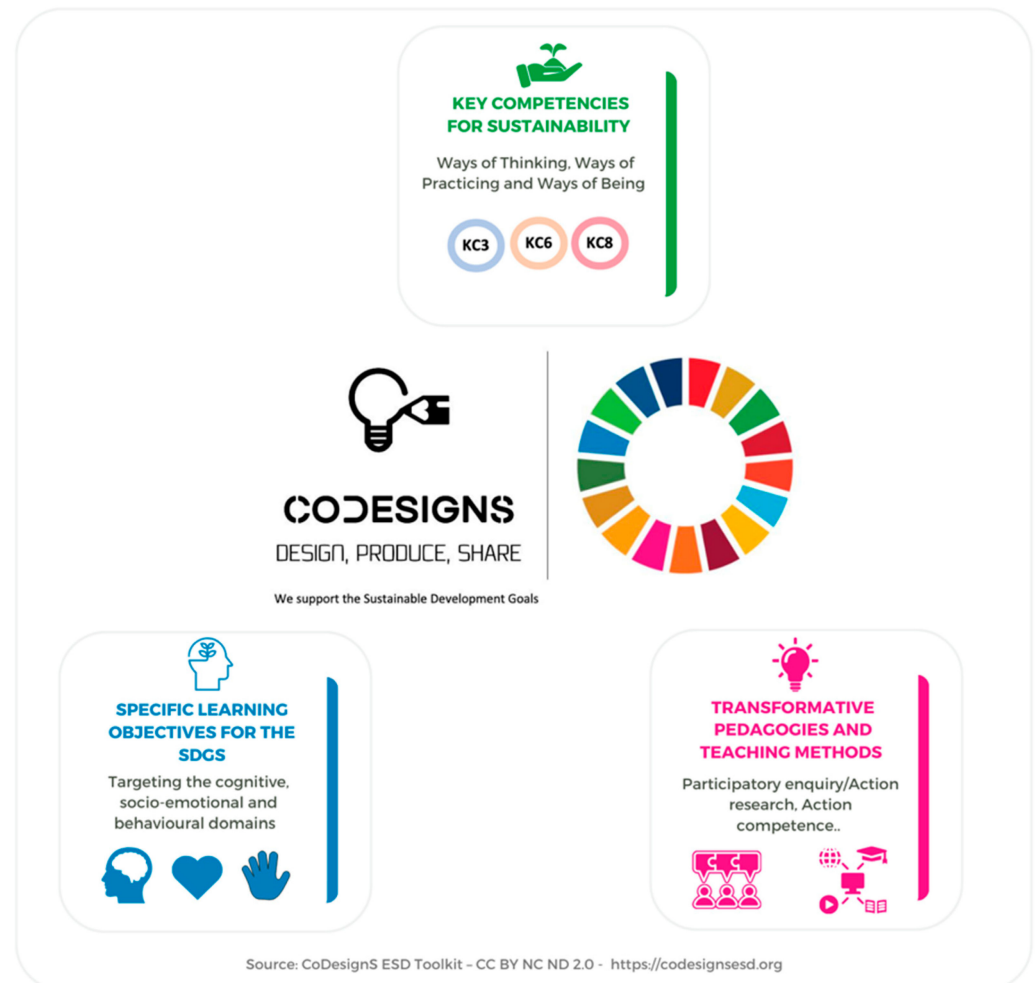
Despite HEIs making gradual progress towards embedding sustainability into their programs [5], the integration of ESD requires moving from knowledge-driven education to competency-based education, necessitating a transformative shift in curriculum design and teaching and learning practices [6]. To bring about this transformative shift, effective and scalable teacher training programs are needed [7–9]. Lozano et al. [10] identified twelve sustainable development competencies and associated them with pedagogical approaches. Similar frameworks were developed by Evans [11] and Wiek et al. [6]. These competency frameworks have been helpful. However, they lack contextualization and operationalization of ESD competencies. Given the limitations of the existing frameworks, Wilhelm et al. [2] introduced a heuristic procedure and planning tool that empowers educators to establish coherent ESD teaching and learning environments and redesign and design curricula. Recent research suggests that using ESD principles can enhance the competencies of professional development of academics at institutions of higher education, especially attitudes and course design skills [12].

While there have been attempts in developing competence models for ESD, little has been accomplished to produce workable frameworks to put them into practice. Therefore, the objective of this research is to present and evaluate the CoDesignS ESD Framework (hereafter ‘Framework’), a comprehensive model designed to operationalize ESD competencies in higher education institutions (HEIs) and beyond. This study aims to bridge the gap between theoretical competence models for ESD and their practical application in educational settings. Central to this investigation are two key research questions: First, “How effective is the Framework in operationalizing ESD competencies within higher education institutions?” Second, “What role do transformative pedagogies, as outlined in the Framework, play in enhancing sustainability education across different educational levels?”

The Framework is developed with a focus on HEIs but is versatile enough to be adapted to other educational contexts. The paper is structured as follows: The next section discusses the Framework in detail. The third section presents the methodology that is used to evaluate the Framework. The results are presented in Section 4, followed by the discussion section. Finally, the paper concludes with a discussion on the limitations and future recommendations. This research aims to provide educators and institutions with a tangible, adaptable tool for integrating ESD into their curricula, thereby contributing to the broader goal of fostering sustainable development through education.

## 2. The Framework

More recently, a CoDesignS ESD Framework in learning and curriculum design was developed [13,14]. This new CoDesignS ESD Framework goes beyond the typical focus on ESD competencies. The framework looks at the design and delivery of those competencies targeting not only the cognitive domain (head) but also the socio-emotional domain (heart) and the behavioral domain (hands) [15,16]. This new CoDesignS ESD Framework introduces transformative pedagogies and teaching methods. See Figure 1 for the CoDesignS ESD pillars [17].



**Figure 1.** CoDesignS ESD pillars.

Pillar 1: Key Competencies for Sustainability that are relevant to all SDGs [1] and have been classified in the recent ESD guidelines published by the QAA and Advance HE [18] as Ways of Thinking, Ways of Practicing, and Ways of Being.

Pillar 2: Specific Learning Objectives for the SDGs. This pillar encourages Transformative Sustainability Learning (TSL) where educators use the three domains of learning: the cognitive, socio-emotional, and behavioral domains (head, heart, and hands) to engage students in a transformative educational experience [15,16].

Pillar 3: Transformative Pedagogies and Teaching Methods that support potential learning approaches such as participatory enquiry, action research where students investigate an important and personal issue to them [19] and collaboration, problem orientation, inter- and transdisciplinarity, and the linking of formal and informal learning methods [1,19,20].

### 2.1. Key Competencies for Sustainability

The key competencies for sustainability have been described in the ESD literature as the knowledge, skills, and values that students need to be able to adapt to complexity, uncertainty, and global sustainability challenges. As mentioned previously, several ESD competency frameworks have been presented in the literature [6,10,21]. Pillar 1 of the CoDesignS ESD Framework focuses on the key competencies for sustainability outlined in the ESD Learning Objectives UNESCO report [1]. Please refer to Table 1 for details.

**Table 1.** Education for Sustainable Development Goals: learning objectives [1].

Key Competencies for Sustainability
Systems thinking competency: The abilities to recognize and understand relationships, to analyze complex systems, to think of how systems are embedded within different domains and different scales, and to deal with uncertainty.
Anticipatory competency: The abilities to understand and evaluate multiple futures—possible, probable, and desirable; to create one’s own 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 abilities to understand and reflect on the norms and values that underlie one’s actions and to negotiate sustainability values, principles, goals, and targets in the context of conflicts of interests and trade-offs, uncertain knowledge, and contradictions.
Strategic competency: The abilities to collectively develop and implement innovative actions that further sustainability at the local level and further afield.
Collaboration competency: The abilities to learn from others; 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 problem solving.
Critical thinking competency: The abilities to question norms, practices, and opinions; to reflect on one’s own values, perceptions, and actions; and to take a position in the sustainability discourse.
Self-awareness competency: The ability to reflect on one’s own role in the local community and (global) society, to continually evaluate and further motivate one’s actions, and to deal with one’s feelings and desires.
Integrated problem-solving competency: The overarching abilities 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 competences.

### 2.2. Specific Learning Objectives for the SDGs

Pillar 2 of the CoDesignS ESD Framework focuses on the specific learning objectives presented in the ESD Learning Objectives UNESCO report [1]. The learning objectives are described in the cognitive, socio-emotional, and behavioral domains focusing on each of the SDGs. “The cognitive domain comprises knowledge and thinking skills necessary to better understand the SDGs and the challenges in achieving them (head). The socio-emotional domain includes social skills that enable learners to collaborate, negotiate and communicate to promote the SDGs as well as self-reflection skills, values, attitudes, and motivations that enable learners to develop themselves (heart). The behavioral domain describes action competencies (hands). Additionally, for each SDG, indicative topics and pedagogical approaches are outlined.” [1,15] (p. 11). Recent research suggests that the use of the CoDesignS ESD Framework and Toolkit Planner significantly increased participants’ willingness, confidence, and ability to integrate ESD into curriculum design effectively [22].

### 2.3. Transformative Pedagogies and Teaching Methods

Pillar 3 of the CoDesignS ESD Framework emphasizes the need to move from first-order learning [23] or low-order cognitive skills [24], where the focus is on information recall, to second-order learning [25] or high-order cognitive skills [24,26,27], where the emphasis is on reflective, collaborative, and experiential learning and teaching practices that lead to the emergence of the core values of sustainability.

Transformative pedagogies are typically student-centered, active learning opportunities that allow learners to engage with learning cognitively, emotionally, and behaviorally. The strategies presented here create opportunities for experiential learning in a way that enables the learner to critically reflect on alternative perspectives, which is a valuable prerequisite for tackling large and complex issues of the type they will encounter in the context of ESD.

As explained above, this pillar focuses on potential learning approaches such as collaboration, problem-solving, inter- and transdisciplinarity, participatory enquiry, and action competence where students are encouraged to envisage alternatives and solutions to unsustainable practices [1,23,27].

Table 2 presents specific teaching strategies advocated to ESD [16,28]. It is important to highlight that these teaching strategies target second-order learning [25]. Individual methods can be combined, for example, Georgallis & Bruijn [29] combined case-based learning and debate to teach sustainability in business education.

**Table 2.** Teaching strategies advocated for ESD [16,28] as adapted by the authors.

Specific Teaching Strategies Advocated to ESD	
Role plays and Simulations	Role plays and simulations can be powerful educational experiences in terms of creating scope for empathy with other points of view and vicariously experiencing situations which in real life could be high risk. Role plays support learning in the cognitive, psychomotor, and affective domains [30].
Group discussions	Small group discussions support higher-order learning and critical thinking in allowing different members of the group to share different perspectives, often in the context of solving an authentic problem [31]. Teachers should seek to enable learners with high social anxiety to be part of a group and contribute in ways that are comfortable to them. In the context of sustainability, small group discussions can lead to action competence [32].
Learning landscapes	Learning landscapes can be physical or virtual places where learning can take place in teacher-centered or student-centered ways, depending on the design of the learning experience. However, outdoor learning in particular can motivate students' curiosity and create a scope for serendipitous discovery [33].
Object-based learning (OBL)	Object-based learning is learning through objects. Traditionally associated with learning through interactions with tangible museum objects, objects can be physical or virtual and stimulate enquiry-based learning [34].
Digital storytelling	Digital storytelling engages the learner through hearing/seeing someone else's story or telling their own. As with other creative pedagogies, storytelling often includes an emotive element that can be enhanced through multimedia representation and the unique voice and perspective of the storyteller [35]. It has been shown to promote students' environmental literacy [36].
Debates	Debates stimulate critical thinking in encouraging students to 'take a side' in an argument, taking time to construct and defend an argument but also being able to see the validity of alternative perspectives [37]. Asking students to defend a perspective they do not agree with can be a valuable learning experience.
Critical incidents	Critical incidents are any events that stimulate learning from reflection, with origins in aviation and anesthesia [38]. They are often used in professional education such as teaching, where a trainee teacher can reflect on an event that typically had an unexpected outcome, triggering what Schön [39] would call reflection-in-action, as well as reflection-on-action. Critical incidents encourage students to reflect on their learning and develop valuable meta-cognitive skills.
Case studies	Case studies stimulate meaningful learning. They are typically professional cases that students might encounter in the workplace, which have been written to encourage students to apply their learning to solving complex, real-world problems through innovative solutions [40].
Reflective accounts	Reflective accounts are typically written in the first person and allow the students to relate their knowledge, skills, and attitudes (collectively, competencies) to their own professional practice. They can be linked to critical incidents or form part of a portfolio the learners develop throughout their studies [41]. Engaging in reflective practice can also improve student assessment performances [42].
Problem-based learning	Problem-based learning differs from problem solving in that it is a specific teaching method that originated in medical education but that has been adopted in other disciplines and been promoted as a transformative pedagogy for sustainable education [43]. Students are typically presented with a case and have to design intended learning outcomes based on the case to drive and direct their learning. In small groups, students are supported by a facilitator at the start of learning about the case and at the end when they present and consolidate their learning.
Fieldwork	Fieldwork is typically supervised visits to sites of interest in a specific discipline, where students can be encouraged to develop practical and professional skills. Here, preparation and helping students to translate their in-classroom or in-lab learning into a 'real-life' environment is an important scaffolding activity. Fieldwork can be designed around specific SDGs [44].

#### 2.4. CoDesignS ESD Toolkit

The CoDesignS ESD Toolkit with its example case studies (referred to as 'cases') and the CoDesignS ESD Toolkit Planner have been developed to support the implementation of the CoDesignS ESD Framework, encouraging a co-creation and co-design approach [45]. The CoDesignS Toolkit takes the form of a set of cards and cases that are freely available to

download from the CoDesignS Education for Sustainable Development website under a Creative Commons License [45].

The CoDesignS ESD Toolkit cases can be applied to different scenarios, encouraging a co-creation and co-design approach among academics and disciplines and helping to contextualize and operationalize ESD competencies and practices. The CoDesignS ESD Toolkit Planner is available under different plans via the Association for Learning Design and Education for Sustainable Development [17].

### 3. Methods and Approach

As stated in the Introduction section, the central research questions of this study are twofold: to evaluate the effectiveness of the Framework for incorporating ESD principles and competencies into educational curricula and the role of transformative pedagogies in enhancing education across different levels. Therefore, this study spans a diverse international scope, involving participants from the United Kingdom (UK), Venezuela, and the United Arab Emirates (UAE), regions that represent a mix of developed and developing economies with distinct cultural and political landscapes.

The inclusion of these countries provides a rich comparative perspective on the challenges and strategies for embedding ESD into educational systems [46]. The UK, with its established higher education infrastructure, offers insights into how ESD is integrated in a developed context, while Venezuela, facing economic and political turmoil, provides a contrasting backdrop where educational initiatives may encounter significant obstacles. The UAE represents a rapidly developing nation that is investing heavily in educational reform and innovation, including the integration of sustainability into its curricula.

Participants from these varied regions comprising five students, eight academics, two learning designers, and one government official were purposefully selected for their experiential knowledge and direct involvement with ESD in educational settings. Their diverse backgrounds are instrumental in exploring how ESD principles are adapted and applied across different educational and cultural contexts, where access to data and the practice of ESD can be influenced by unique regional challenges.

The exploratory strategy of the research, supported by qualitative interviews and focus groups, is designed to elicit an in-depth understanding of the nuances involved in ESD curriculum design. The small sample size is deemed appropriate for this initial investigation, aiming to capture a snapshot of the varied approaches and experiences with ESD across these three distinct countries. In the literature, it is widely accepted that, for explorative research, a small sample size may suffice, especially in the case where access to data extraction is still characterized by cultural constraints and political conditions [46]. Other scholars have argued that small samples can be quite sufficient in providing complete and accurate information, as long as the informants are subject matter experts in their field [47].

The selection of participants for this study was primarily based on the researchers' personal contacts and professional networks. Recommendations from colleagues and peers within the field were also considered to identify potential participants who could provide valuable insights relevant to the research objectives. This approach was adopted due to its practicality and efficiency in accessing knowledgeable and experienced individuals in the area of study. However, it is important to acknowledge that this method of participant recruitment may introduce a degree of selection bias, as it relies on the researchers' existing networks and the subjective judgment of those providing recommendations. Despite this, efforts were made to ensure a diverse range of perspectives by selecting participants from various backgrounds and areas of expertise related to the study's focus. The researchers were confident that the quality of the information provided by these participants was rich and thick, because they were in the field [48]. For example, all the learning designers had more than five years of experience in course development.

A focus group was achieved with five students at one of the universities in the UAE that has embraced diversity and internalization as its core value. This session was facilitated

via web conferencing, accommodating the diverse locations of all participants and ensuring a convenient and accessible platform for open discussion. The focus group was expertly led by the Head of Sustainability at the university, with the valuable addition of a Professor of Innovation, who is an integral member of the research team. Their combined expertise provided a rich context for the discussion, guiding the conversation and encouraging thoughtful participation from the students. The CoDesignS ESD pillars, cards, and cases were presented and explained to the participants before the start of the session. The session lasted approximately 90 min, allowing ample time for each participant to express their views and engage in the conversation fully. The entire discussion was conducted with the full consent of the participants for recording. This not only ensured ethical compliance but also provided a valuable resource for a detailed analysis post-session. The recorded material also served as a crucial data source for our qualitative analysis. The structure of the focus group discussion was carefully designed to be both guided and flexible. We employed a qualitative structured discussion approach, which allowed for open-ended responses while ensuring that all relevant topics were covered comprehensively. The sample questions used to steer the conversation are available in Appendix A. These questions were instrumental in eliciting detailed responses and facilitating a focused yet natural flow of discussion.

The qualitative structured interviews with the rest of the group were carried out to receive feedback from the participants about the CoDesignS ESD Framework. The CoDesignS ESD pillars, cards, and cases were presented and explained to the participants before the interviews. The questions for structured interviews are available in Appendix A. Five researchers involved in the development of the CoDesignS ESD Toolkit conducted the interviews that took place over web conferencing. The interviews were conducted in English, lasted for 60 min, were audio-recorded with participants' consent, and transcribed to facilitate the coding of the statements.

We went through a thorough process of analyzing the focus group and interview data in order to ensure a comprehensive understanding of the participants' perspectives [49]. Following the transcription of the audio recordings by an independent transcriber, we engaged in a detailed thematic analysis using NVivo 10, qualitative data analysis software. The analysis followed Braun and Clarke's established steps of thematic analysis [46], which provided a structured approach to interpreting the data. Basically, we started by becoming familiar with the data, where we immersed ourselves reading and rereading the anonymized transcripts to gain an in-depth understanding of the content [49]. This step was crucial for identifying initial ideas and patterns. The next step involved generating initial codes from the data. These codes were systematically applied across the dataset, identifying features of the data that were relevant to the research questions and the three pillars of the framework. We then grouped the coded data into potential themes, ensuring they formed a coherent pattern. The themes were then reviewed in the context of the entire dataset, checking if they accurately represented the meanings evident in the data. Once the themes were established, we further refined them by identifying the essence of what each theme captured within the data. Finally, we put together the analytic narrative of the data and contextualized the analysis within the existing literature and the broader research questions, providing a clear and compelling argument supported by the data. Throughout the analysis process, we met regularly to compare and refine our coding in order to resolve any discrepancies in interpretation and ensure consensus on the key themes.

The study was conducted according to a research protocol approved by the Institutional Review Board at the American University of Sharjah (Application reference: 22-004). Data collection took place in August and September 2021.

#### 4. Results

This section outlines the results from the study by considering the findings from the interviews (coded as P1–P11) and focus group (coded as S1–S5). The process leading to the categories discussed in this section began with a comprehensive analysis of the data collected from qualitative interviews and focus groups. Each pillar of the framework was

scrutinized to understand its relevance and potential application within the educational sector. The insights gained from the participants were instrumental in shaping the final categories and their respective elements.

#### 4.1. Pillar 1: Key Competencies for Sustainability

Pillar 1 focuses on seven key competencies for sustainability. This pillar encompasses a range of competencies deemed essential for fostering sustainability within education. Systems thinking encourages a holistic view of complex problems, while future thinking promotes the anticipation of long-term consequences. Normative competency involves understanding and applying ethical principles, and strategic competency focuses on developing actionable plans to achieve sustainability goals. Critical competency sharpens analytical skills, collaboration competency enhances teamwork, self-awareness fosters reflective practice, and integrative problem solving emphasizes the synthesis of diverse perspectives and knowledge. Each competency is crucial for preparing students to navigate and address the multifaceted challenges of sustainability in various contexts.

##### 4.1.1. Systems Thinking

All the focus group participants and interviewee P8 discussed that, most of the time, the intersectionality of the SDGs is ignored, and focus is often put on single, isolated issues instead of using a broader, systematic, and multidisciplinary approach. P8 also suggested that the toolkit can be used to develop courses with not just the advancement of SDGs in mind but also the barriers to sustainable development. Three participants, P2, P4, and P7, thought systems thinking is a transferable skill, because students as professionals need to be aware of the system they work in and how they can improve those systems. These skills can be applied to sustainability as well. Systems thinking also allows global concepts and lessons to be applied locally and vice versa. Participants P3, P10, and P11 mentioned using local, regional, and global data to study patterns and the interactivity within systems in class. For example, participant P3 said *“For my part, I’m keen on obtaining data, like sustainability metrics from PepsiCo, to enable my students to analyze and formulate hypotheses about what’s enhancing or hindering sustainability efforts. Imagine if I could access an industry database and incorporate it into my teaching. Additionally, if I could compile data on the UAE’s air quality, weather patterns, and extend this to regional and global scales, it would allow students to discern and understand the trends in air pollution”*.

Participants P1, P5, and P6 mentioned activities such as stakeholder analysis and mapping activities as ways to introduce systems thinking in the classroom. Participant P5 explained *“I conduct an activity focused on stakeholder mapping and analysis. This involves presenting students with an issue related to environmental and societal injustice, and then guiding them to map out who holds the power to influence or address these issues. This exercise helps them realize that there are numerous stakeholders involved. It’s crucial for them to understand the role and the diverse range of stakeholders in these scenarios”*.

##### 4.1.2. Future Thinking

During the focus group session, a few students, S1, S2, and S5, mentioned that future thinking is one of the competencies learned by students out of concern for the future. S2 said *“I might have been exposed to the ones that were born out of concern. . . [Students] usually find themselves. . . being concerned for the future”*. S2 added that this concern also makes them more involved in sustainability and sustainable development because of the connections they can make to their real lives and their futures. He said *“That’s why I have to now study about sustainability”*. Participant P4 gave an example of how future thinking is integrated into fields like engineering by teaching students the rationalization of resources and teaching them to create business models that can be sustained in the future. Another way this competency was included by participant P4 was through a visioning workshop where students would be asked about how they envision the future of an industry and the societal, environmental, and economic aspects of it. Participant P8 gave an example of a back-casting



activity, where students create a vision and then formulate the steps needed to achieve that vision. These are integrated within the context of the course, so the exercises are applicable and relevant to the students.

#### 4.1.3. Normative Competency

Placement activities are an example used by a few of the participants, such as P6, P9, and P11, to introduce this competency to the students, where they see what happens in practice and reflect on it to find gaps that need to be addressed in practice. According to P6, *“Examining and altering the systems we operate within, as well as our ways of being, are integral aspects of our work. Reflection and self-awareness are crucial components. However, it’s evident that these elements are often overlooked within the context of sustainability”*.

P9 argued that *“In the undergraduate program, it’s really about the active, hands-on placement activities. When students go out and observe real-world practices, then return to reflect on their experiences, it’s a transformative process. They contemplate what they need to do and how they must evolve to meet the required competencies, for instance”*.

#### 4.1.4. Strategic Competency

This competency was already embedded in three participants’ (P4, P6, and P7) teaching methods. According to P4, *“With strategic thinking, whether it’s about societal impact or job creation, it’s definitely deeply embedded in this process”*. P6 mentioned putting students in the industry was a helpful way to achieve an experience in the real world so they can find solutions not just within classes or campuses but within a whole community. P7 agreed that *“Problem-solving and collaboration are essential elements of our teaching. And strategic competency, it ties in with our ways of thinking”*.

#### 4.1.5. Critical Competency

Six participants, P1, P2, P3, P4, P6, and P8, said that critical thinking competency was already well-embedded in their teaching and educational content. For example, P1 mentioned that *“In the NHS and healthcare sector, we place a significant emphasis on critical thinking and clinical reasoning. I believe that critical thinking is already a well-embedded concept in our field”*. In fact, all five students in the focus group believed that there was an excessive focus on critical thinking in most of their courses. According to S1, *“I feel like we’ve been so focused on critical thinking that we sometimes overlook other aspects. System thinking, for instance, is crucial, as well as understanding one’s role in the community, which ties into self-awareness”*. P8 suggested that teachers should focus more on other competencies, such as system thinking and self-awareness. This is also tied to the knowledge–action gap in ESD, where more attention is paid to theory instead of hands-on approaches.

P3 provided an example of introducing critical thinking into the classroom, such as a workshop that teaches how innovation is not always sustainable. In her class, she would make students provide two contradictory solutions for climate change so they would critically think about innovative solutions for sustainability.

#### 4.1.6. Collaboration Competency

The interviewees had conflicting views on collaboration competency at the university level. P3, for example, argued that being able to collaborate with people is something most students know how to do by the time they reach the university level. Overall, the participants mentioned a variety of collaborative activities included in their courses, such as group projects, practice placements, and interprofessional learning, that encourage collaborative skills. However, participant P11 argued that, even though group projects are present, the system is still designed to individually evaluate students with individual GPAs and individual achievements, so a collaborative competency is not that prominent. P7 explained that many of her students do not like group work; therefore, she tried to minimize group work in some courses that do not require many collaborations.

Students in the focus group explained that applying group work in the community context helps reduce selfishness and individualism to create a higher impact with collaborative thinking. S3 and S5, for example, added that collaborative work encourages diversity. S2 mentioned that this competency is important, because individual work towards sustainability has limited effects but combined efforts from individuals from different experiences and backgrounds achieve better results. S1 pointed out, though, an issue with defining the boundaries of a community and collaboration. *“Because if we think of community as my university or my town or my city, will I really be compelled to act on things that don’t impact me on a local scale? So maybe that’s just something to consider”*.

Collaboration with the community and external parties locally and practically is also another idea that the students thought would be useful for them. This also makes students feel that their work is more meaningful, motivates them, and brings about behavioral changes. According to S4, *“Applying that into local issues more specifically because the more globalized it’s made; the least interested students are”*.

#### 4.1.7. Self-Awareness

The interviewees thought that self-awareness competency helps students understand their role in society and think about the impact of their actions. Thus, it increases environmental and social responsibility. Participant P4 said *“In construction, everything you do it’s always ‘think about community’, and you think about the impact on community, whether it’s noise pollution, whether it is waste pollution, whatever. So you have a corporate responsibility to a society, and in everything you do, you have to take that into consideration”*. According to participant P6, *“When we consider the systems we operate in and the necessity of adapting these systems, it becomes clear that reflection and self-awareness are crucial. These elements are integral to our work and how we approach change”*.

In general, students in the focus groups agreed that self-awareness, along with a collaborative competency, would foster more responsibility if one can see others’ actions and encourage one to do more. Student S1 commented that responsible citizenship can be developed through this process; however, it depends on the country and its definition of a ‘good citizen’. S2 mentioned that this competency also goes hand in hand with systems thinking, where it is important for one to be aware of where one’s role fits into the bigger picture. S3 suggested that instructors can teach self-awareness through authentic learning and assessment.

#### 4.1.8. Integrative Problem-Solving Competency

The majority of the participants believed this competency was important, as all the key competencies are linked together, and four of the participants (P1, P2, P4, and P8) said they have integrated this into their teaching already.

### 4.2. Pillar 2: Learning Objectives for the SDGs

Pillar 2 focuses on specific learning objectives for the SDGs. The second pillar outlines learning objectives aligned with the SDGs categorized into cognitive (the head), socio-emotional (the heart), and behavioral domains (the hands). The cognitive domain involves knowledge acquisition and intellectual skills; the socio-emotional domain focuses on attitudes, values, and social skills; and the behavioral domain emphasizes the translation of knowledge and attitudes into actions. These objectives are relevant for equipping students with the necessary skills to contribute meaningfully to the SDGs, regardless of their geographical or cultural setting.

#### 4.2.1. Cognitive Domain (the Head)

Three participants (P1, P2, and P8) believed that this domain has more focus compared to the other two domains. And it is a domain where six participants (P1, P2, P3, P4, P8, and P10) already included it as a learning objective in their curricula. Therefore, it was easy for them to embed this domain for ESD. Participant P4 said that this domain is followed

even if ESD is seen as ‘just another tick box’ and not invested in much. According to P8, it is seen as the first step where students gain a theoretical understanding of concepts before they develop the other two domains. The way most instructors first tend to think about embedding sustainability is to have a lecture or session on the topic, targeting the cognitive domain.

#### 4.2.2. Socio-Emotional Domain (the Heart)

Five participants (P1, P3, P4, P6, and P7) believed that this domain is less commonly incorporated than the cognitive domain in ESD. However, according to P7, its importance was recognized, as it develops emotional intelligence, which is an important competency. *“This domain makes students relate to the theory more personally, empathetically, and passionately”*. These five participants also commented that this domain complements the other domains, and with it, a learner would be more likely to take more responsible actions. According to P2, an effective way to connect with students in this domain was using narrative.

While the cognitive domain is used to teach more objectively, this domain can be used to have students emotionally connect to sustainable objectives. Participant P3 also incorporated this by requiring volunteering and community service in the class and encouraged students to reflect on these activities and how they make them feel. *“I’ve been encouraging my students to engage in community service activities, even making it a requirement for some of my classes. It accounts for 5% of their grade. They volunteer for initiatives like the sustainability office, and then they’re asked to reflect on their experiences and how it impacts them emotionally and intellectually”*. P7 mentioned that this domain provokes deep thought, according to the participant. P6 said that topics like professionalism, social responsibility, communication, and ethics were already covered in certain modules, which this domain could easily fit.

P1, P2, P3, and P8 said that collaboration and self-reflection were also objectives already present in their courses, so this domain would be easy to incorporate. One challenge P8 talked about regarding the incorporation of this domain was the collaboration between individuals from different cultures. Culture plays a role in shaping attitudes, values, and receptiveness of people towards different ideas.

#### 4.2.3. Behavioral Domain (the Hands)

All the five students in the focus group and five participants (P1, P3, P6, P7, and P8) believed this domain is essential, because it empowers and motivates students to act beyond just understanding sustainable development. The hand supersedes the head and the heart and is a needed step to achieve ESD.

Participants P3 and P6 explained that the cognitive domain is more the norm but that people are afraid to embed this domain. They also said that this domain also gives students agency and autonomy rather than just theoretical knowledge. Four participants (P1, P3, P7, and P8) revealed that their existing curricula have similar learning objectives, where students are required to learn how to put theory into practice. Although, P1 admitted that this is related to giving students experience rather than behavioral change. Nonetheless, they thought this similarity makes this domain easy to embed in existing curricula.

Participants P9 and P10 felt unsure about how to incorporate this domain when it comes to sustainability. Embedding personal behavioral change could pose an ethical challenge, according to P9, depending on the course and students’ expectations coming into the course. *“Implementing community-focused projects in our curriculum is relatively straightforward, but encouraging students to transform their personal behaviors presents a more complex challenge. It’s a bit of a gray area, as it delves into personal habits and lifestyle choices”*.

### 4.3. Pillar 3: Transformative Pedagogies

Pillar 3 explores transformative pedagogies and teaching methods. The third pillar highlights innovative pedagogies and teaching methods that can lead to transformative learning experiences. Action research empowers students to inquire and address real-world problems, problem-based learning develops critical thinking through complex scenarios,

and role plays and simulations offer experiential learning opportunities. Group work and fieldwork encourage collaboration and practical engagement, personal development planning facilitates goal setting and self-improvement, flipped lectures invert traditional teaching models for active learning, and assessments measure and reinforce learning outcomes. These methods are adaptable to various educational contexts, supporting the development of the competencies and learning objectives outlined in the first two pillars.

#### 4.3.1. Action Research

Participant P8 said that students understand sustainability concepts and have developed critical thinking skills but are unable to practically create solutions due to a lack of guidance. Without transformative pedagogies, the gap between theory and practice increases. Participants P2 and P3 talked about not just delivering information but providing students with the space to test the possibility of change and transformation. Some participants (P6 and P7) have involved students in hands-on practices through active learning in writing research, placement activities, joining local initiatives and projects, and interprofessional learning.

#### 4.3.2. Problem-Based Learning

One participant in the focus group (S1) pointed out that the use of action verbs builds more anticipation about the change one can bring, something absent when only theoretical work is included in a course. Theoretical knowledge is soon forgotten when students move on to the next course without the motive to act based on the theory taught.

Participant P2 added that practical projects are more impactful and are remembered by students, allowing them to apply lessons learned later as well. Participant P1 said *"Within the medical and dental education, integrating problem-based learning is almost cornerstone. Students work together and working in the community because a lot of practical applications is needed"*. Another participant (P3) mentioned the need to allow students to practice not just in the classroom or campus environment but within the whole community. In some fields, this can be achieved through practice placements. This way, students can be involved in underprivileged local communities. Participant S2 added that localization here is important, because the more global it is, the less the students will be interested. When applied to a local context, students feel their learning becomes more active. Participant P8 added that one way to do so is by creating action plans for tackling concerns in third-world countries and access to things according to the SDGs.

Participant P4 said problem-solving activities in the classroom allow the instructor to guide students in the right direction, teaching them how to think about the problem, allowing a great deal of transformative learning. Examples of how participants incorporated transformative teaching include improving student writing, research, and presentation skills.

#### 4.3.3. Role Plays and Simulations

Participant P1 mentioned the use of team-based learning in her courses where students work in teams for the entire semester. She said *"In medical courses it is important for our students to engage in role-playing and use simulations to gain a deeper understanding of the subjects"*. Participant P3 started to experiment with different ways of engaging with her students during COVID-19, and she found simulation software to be extremely useful for her students.

Participant S2 expressed his appreciation for the chance to collaborate with classmates, particularly through the use of simulation software and engaging in case studies that involved role-playing. *"Working with my classmates, especially when we use simulation software and take on different roles in case studies, really enhances my learning experience"*.

#### 4.3.4. Group Work

Group work was incorporated by most participants, which is useful in teaching students how to work together towards a common issue despite the struggles of teamwork. According to participant S3, *“I really enjoy group work because it offers us the chance to collaborate and support each other in our learning journey”*.

#### 4.3.5. Fieldwork

Participant P9 explained an activity that required students to go to a place for an hour and focus on something overlooked that needs to prosper and think about its role in a system. *“I found the activity where students spent an hour observing an overlooked aspect of a place to be incredibly insightful. It not only encouraged them to think critically about its role in a larger system but also fostered a sense of collaboration as they shared their unique findings with each other”*. Participant S4, who is a student, reflected on his most recent educational trip to a bread factory. *“Visiting the chocolate factory was an amazing experience. Seeing the entire process of chocolate making, from the raw ingredients to the final product, and understanding the shipping chain really brought the theory to life. It was fascinating to witness how every step is interconnected and crucial in delivering the delicious chocolate we enjoy”*.

#### 4.3.6. Personal Development Planning (PDP)

Participant P1 talked about using PDP tools such as e-portfolios to instigate self-reflection on students' abilities and their thoughts on ways they can help address sustainability issues. This is a useful tool, as it ties into not just education but into students' careers and professions. Another participant, P4, mentioned how she encouraged professional development among her students by encouraging self-reflection. *“In their final year they're looking at their self-reflecting on their own abilities and how they might look to address those later”*.

#### 4.3.7. Flipped Lectures

Participant P3 tried flipped lectures but did not find it successful, because the lectures happened outside of class and students still had to come to class. The majority of the participants noted the challenges of implementing the flipped classroom approach, highlighting that it might not be well-received by all students. Additionally, they pointed out that it demands considerable effort from them to execute it effectively.

#### 4.3.8. Assessments

Assessing transformative activities and projects is difficult, because the impact of an action is not visible or quantifiable, according to participants P5, P9, and P11. Participant P10 observed that assessing the long-term transformation in students presents a complex challenge, and having proper tools to facilitate this evaluation would be beneficial. She suggested *“Providing support through examples like assessment rubrics could aid in the effective design and implementation of transformative pedagogies”*. Participant P3 emphasized that COVID-19 transformed the way she approached assessments in her courses.

### 4.4. Usefulness of the Toolkit

The toolkit's practicality, design, ease of use, and inclusion of case studies and visual information are also emphasized, linking to professional frameworks such as the QAA and Advance Higher Education. This ensures that the toolkit is not only theoretically sound but also practically relevant and easy to integrate into existing curricula.

#### 4.4.1. Practical Application

All of the five students in the focus groups liked how detailed the toolkit was and how it can be applied to a local context. They liked how the toolkit focused beyond the theoretical aspect of teaching sustainability, allowing them to learn how to apply this knowledge in practice. S1 added that embedding sustainability this way throughout the semester instead of one division of the semester would allow students to also remember

sustainability principles after a course ends. S2 thought that, in general, the toolkit also promotes skills that are not included in education right now. The students in the focus group also liked the toolkit focusing beyond just the theoretical learning of sustainability. They believed that the toolkit could make students more competent, and their competency could increase the more this toolkit is applied in different courses and reinforced through repetition in multiple courses.

The similarity of the toolkit with already used learning objectives, competencies, and teaching styles makes the toolkit easy to embed in many courses, according to all the interviewees. Participant P8 explained how an awareness of sustainability and sustainable skills is increasingly becoming an industry requirement, so equipping students and instructors both with the necessary skills and knowledge is important. Therefore, a toolkit that offers guidance in this area is very useful. Participant P3 said that the toolkit has the potential to open many avenues for discussion around course design and said *"I could imagine a course team sitting around with the cards/steps, going back and forward discussing different elements of the toolkit"*. Another advantage of the CoDesignS Toolkit, according to P7, is the ability to connect practices already in place with a body of scholarship. P7 explained that it is important to do so to make sense of what has already been accomplished and what could be applied in individual course designs. Participant P9 appreciated how the toolkit connects SDGs and transformative pedagogies to guide course design.

#### 4.4.2. Design and Ease of Use

Students in the focus group and two participants (P7 and P8) mentioned liking the language used in the toolkit, especially the action verbs. Overall, five participants (P1, P3, P6, P7, and P8) found that the concept of the toolkit was easy to understand and easy to incorporate. They agreed that the toolkit is well-structured and easy to follow as an instructional tool, as it follows the same structure as the original CoDesignS Toolkit. They also agreed the toolkit was detailed, clear, easy to use, and easily applicable to multiple disciplines.

Participants P7 and P8 said that, even though ESD is a complicated and vast topic, the toolkit has *"condensed it really, really well without losing the depth of it"*. They added that the toolkit does a good job of having a 'skeleton' with enough information and the case studies and examples that illuminate it. Participant P4 added that the toolkit was self-explanatory and did not need lengthy training to understand. The language used in the toolkit, specifically the head–heart–hand learning descriptors, was liked by all the participants, because it was easy to remember and understand. P1 said it *"made it seem much more achievable"*. Participants P3, P7, and P8 mentioned these objectives are very similar to learning objectives already used by them intuitively, but the toolkit allows them to define these objectives explicitly. They also liked the language used for the competencies and thought it helped instructors to map competencies within their current curricula. It made it easy to find what is already being delivered in a similar way and what needs to be further implemented to incorporate ESD.

Participants P1 and P2 also liked the step-by-step and detailed approach used in the toolkit, which makes it look achievable and offers guidance for instructors. One explained that there was a logical progression from the bigger picture (sustainability goals) to learning objectives to teaching activities.

#### 4.4.3. Case Studies

The students in the focus group and seven participants, P1, P2, P3, P4, P6, P7, and P8, found case studies very clear and easy to understand and apply, making them easy to embed. They agreed that they would help them design and develop learning objectives and better target the domains and learning objectives for the SDGs. The case studies were useful mainly because they inspire ideas, show how ESD and the framework are seen in practice, and allow instructors to imagine what can be accomplished in their classes. Case studies prompt instructors to connect with similar stakeholders within their local context.

Case studies were also said to be important because they allowed one to view themselves in comparison to others.

#### 4.4.4. Visual Information

Participant P8 liked the use of visuals and the breakdown analysis of learning in the toolkit and said “You just get so bogged down with stuff when you’re designing, and I think that kind of really strategic approach to thinking about the outcomes isn’t always there”. Three participants (P9, P10, and P11) liked the use of color and the fact that the toolkit was ‘not very wordy’ or ‘boring’, making it quick to understand. For someone being introduced to the toolkit for the first time, all the participants found the video to be very helpful in understanding the concept.

#### 4.4.5. Link to Professional Framework

Participants P2 and P7 said they liked the integration of the QAA framework (QAA and Advance HE, 2021) and think that it is important. Participant P4 mentioned that even though QAA documentation is lengthy and boring, the toolkit does a good job of embedding it concisely. However, participant P10 thought the inclusion of the HEA fellowship standards mapping was distracting.

#### 4.5. Feedback for Further Toolkit Development

Participants’ overall feedback was solicited for further toolkit development, focusing on language use, cultural and local relevance, workshops, assessments, visuals, and the mapping of key competencies. This feedback is vital for ensuring that the toolkit remains responsive to the needs of educators and students across diverse educational landscapes, thereby enhancing its universal applicability and effectiveness.

##### 4.5.1. Use of Language

All of the five students from the focus group emphasized that the language of the toolkit was difficult to understand for people without prior sustainability knowledge. They suggested adding more detailed information and examples for clarity. Meanwhile, participant P10 said the education-related terminology was complicated too, especially for the older generation faculty, and “*a lot of these things would just slide right over their head*”. Hence, the participant added that this could be something for graduate schools or new faculty, where they can be taught how to teach. Another participant, P7, thought this toolkit would be beneficial for someone “teaching the teachers” who could help teachers design courses.

##### 4.5.2. Examples and Case Studies

Six participants (P4, P5, P7, P9, P10, and P11) found that the case studies were too specific and not related to their classes at all, so they were not helpful in guiding and helping the design and delivery of course content. For example, the gender equality one is not that relevant for science courses. Participant P4 explained that it might be more useful for educators to learn how to develop their own case studies, because the case studies in the toolkit will not be relevant in every class. Therefore, it would be better to teach how to develop a case study instead, so that it can be used in instructors’ own ways.

Three participants (P9, P10, and P11) mentioned that having case studies for how the entire toolkit is used would be useful. Two participants (P9 and P10) talked about an example where the toolkit has been integrated into a course where there is a set curriculum by the regulator. Examples could show how the toolkit can be incorporated without creating a new curriculum altogether. P4 added that having examples for a range of things, like how the toolkit can be implemented, would also be helpful, for example, working with the university internally. More case studies could also be included for 100% online courses where the focus is not on working with local organizations. P9 said that it would be helpful to have more examples of transformative pedagogies in courses such as math or accounting.

P1 mentioned having examples in the medical and healthcare profession. P10 talked about how hands-on experience working with a local NGO is good but might be difficult for academics to organize and arrange. Therefore, case studies could include something easier for staff to do without necessarily needing to connect with external organizations. Participants P9 and P10 also thought a case study where the head and the heart are shown separately would be helpful to see specific examples of each domain as they overlap.

#### 4.5.3. Being Culturally, Locally Relevant

The five students in the focus group talked about implementing this toolkit being tricky in different cultural and intercultural environments, because people will have different reactions. However, different perspectives mean a more diverse conversation in class. Having cultural relevance is important, because students come from different systems and cultural beliefs about sustainability and are likely to empathize more if they can take what they learn back home. S2 talked about some students coming from cultures that are not that responsible, so gaining a cultural perspective about sustainability allows them to create a new space where they start evaluating their cultural practices and also become involved in local projects. S3 mentioned that, when students are connected with local organizations and NGOs through the classroom, it is easier to see how the goals can be embedded.

Participant P3 highlighted the need to be student-centered and have a look at where students are and consider student readiness, attitude, and culture. Participant P4 believed that the materials were not complicated, but there is a need for people to engage in conversation to not just understand the information but to soak it in and commit to it. Participant P8 mentioned having a community of practice that can be accessed where case studies would continue to be uploaded and shared.

#### 4.5.4. Workshops

Participants P1, P2, and P6 mentioned the need for workshops or bootcamps at the start, where the toolkit is explained in detail for educators less familiar with how to apply some of the principles. P1 proposed a workshop where each group picks an aspect of the toolkit and applies it or reflects on their own curricula in relation to the toolkit and works on it and presents it for critique. P2 said that some of the concepts in the toolkit were abstract and would be enriched by examples during workshops. This practice would allow educators to understand the concepts better and be assured that they're translating the toolkit in the right way.

#### 4.5.5. Assessments

Participant P2 brought up the issue of measuring the key competencies and thought it would be helpful to include this additional element. Participant P4 stated that it would be useful to have an assessment side of the card that aligns "*the whole thing. . .from learning outcomes all the way through activities, learning types and then reassessments*". These assessments need to be authentic as much as possible where relevant. The case studies could also be linked with assessments. Participant P10 added that the evaluation of the long-term transformation of students is tricky, and tools for this would be helpful. Participant P11 said that support with assessment rubrics would also be valuable, because it is difficult to assess activities like action research or debates. Some actions such as engagement with the local community are also not easily quantifiable or 'visible'.

#### 4.5.6. Visuals

Participant P7 suggested having visual tools where course designers can assess if the activities they are designing are balanced in terms of competencies and domains. A participant said it would be good to see them spread out. Participant P10 thought the video "*a lot of memory to hold at once*" and had to be watched more than once. The video should serve as just an introduction, and the toolkit should educate on what needs to be accomplished.



#### 4.5.7. Linking to Framework

Participant P2 suggested an explicit indication of how the key competencies link up to the Learning Design Framework. Participant P6 said showing which SDGs are targeted and how those connect to other SDGs would make the toolkit fit together better. This could be beneficial for people who do not know about ESD and find it difficult to frame transformative pedagogies for ESD.

#### 4.5.8. Mapping Key Competencies

Participants P1, P2, P6, and P7 suggested having a map that shows the goal, then the key competencies, then the three ways of thinking, and so on, so the topology of the toolkit is explained in one image so that it is easy to understand where to start and how things lead to one another.

#### 4.5.9. Application to Existing Curricula

Participant P7 mentioned that understanding at which point in a module design the toolkit is meant to be applied would be helpful. Participants P9 and P10 explained that it would be useful to have contextual information about how to apply the toolkit and what phase to apply it in for courses that already exist and can embed the toolkit without having to change their whole module.

### 5. Discussion

Participants believed many aspects of the toolkit were not new or exclusive to ESD and that skills such as critical thinking, systems thinking, and problem solving were already embedded in education and some job markets as well [43]. On the one hand, this could be confusing, because some institutions will already have a set of competencies in place and will look at the ESD competencies as an extra hurdle. There was also concern about the additional burden of changing learning objectives, as they have often already gone through paperwork and administrative procedures. However, some would realize that these competencies are similar to the learning outcomes already in place and would look at this toolkit as a way of enhancing those outcomes for sustainability in a balanced way. The toolkit and these objectives can therefore act as a reference point and make it easier to link to possible assessments and projects while keeping existing learning objectives as they are [22]. The presence of some of the ideas in the toolkit in existing courses could also make it more intuitive and easier to incorporate into curricula.

This research provides insights into how participants can use these toolkits to design curricula and assessments and how students' cognitive and affective needs can be met and improved. This pedagogical and educational research aims to generate knowledge on topics significant to students, teachers, administrators, schools, and other educational stakeholders. The findings focus on action research to support educators in pursuing effective teaching and learning practices by transforming the quality of teaching decisions, subsequently enhancing student engagement and learning.

An overarching theme that emerged during the interview and focus group discussions is the knowledge–action gap. Participants frequently mentioned that there is a gap between theory and hands-on approaches [22,28]. In other words, students understand sustainability concepts and have developed critical thinking skills but are unable to practically create solutions due to a lack of guidance and channels [32]. Participants also expressed concern that theory was the focus in courses, as it was easier to implement. This is in the context of an already heavy focus on competencies such as critical thinking and the use of traditional teaching methods such as lectures for teaching sustainability [24,26]. Additionally, the participants highlighted more focus on the cognitive domain (the head) as opposed to the socio-emotional (the heart) and behavioral domains (the hands). This is problematic, as without a motive to act on the information received, theoretical knowledge can be more easily forgotten when students leave the classroom [39,40,42]. Another issue encountered is embedding sustainability concepts into one part of the course instead of integrating them

throughout the course, an approach that is less impactful in bringing about behavioral change. Therefore, it is important to provide students with a space to not only put this theoretical knowledge into practice but also to use transformative pedagogies to bring about behavioral change in contexts beyond the classroom [19,32,33]. These are more likely to be impactful and provide students with lessons learned for work and life.

Transformative pedagogies and teaching methods were viewed as being very important in the delivery and design of ESD, as compared to transmissive pedagogies and traditional curriculums [19,43]. They play a role in improving the future not just locally but on a global level by empowering students to participate in the creation of a more sustainable world. In addition, transformative pedagogies are essential in bringing about behavioral change in students, developing their skills, empowering them, and motivating them to act as leaders—all things needed to achieve greater sustainability. A participant explained that students come from diverse backgrounds with different ways of thinking, behaving, and being. Therefore, transforming their perception of the world, how they react to it, and how they integrate into it is very important, as these are ingredients for survival [20,22].

The lack of a multidisciplinary and systematic approach is also seen as a barrier to implementing sustainability by participants. This was viewed not only as a barrier in teaching but also in the general implementation of the SDGs, with their intersectionality often being ignored [24]. The participants pointed out that the toolkit can be used to develop courses with not just the advancement of SDGs in mind but also wider efforts to integrate sustainability. In a recent study, Turner, Cotton, Morrison, & Kneale [50] discussed the barriers and opportunities of embedding interdisciplinarity across a first-year undergraduate curriculum. Further research with university leaders who have experience with the CoDesignS Toolkit would enable the role of institutional strategy and multidisciplinary to be explored more fully as a means of embedding sustainability across HEIs [22].

To examine the academic development programs in sustainability education, some recent research used a theoretical framework such as sustainable education and academic development (SEAD). In the literature of sustainability education, the SEAD and CoDesignS frameworks appear to have contributed to the development of academic programs and curriculum within the context of learning and teaching practice [51]. These frameworks can be critical in fostering organizational learning and change towards sustainability in institutions of higher education by equipping students and teachers with new skills and attitudes. The latter will eventually improve practice and higher-quality learning and teaching. The growing body of literature shows how to embed sustainability within existing university structures. The potential for success is to empower individuals and groups to make change happen within their sphere of influence [52].

As the toolkit is used more internationally, providing local and community contexts is also essential. Additionally, assistance in implementation from an individual with local expertise and practical field experience would enhance the adoption of the innovative teaching methods [50]. This helps eliminate the problem of working towards sustainability in an isolated way through the encouragement of systems thinking and integrative problem-solving competencies. Localization is also important to encourage active learning, as students are less interested if they cannot see that sustainability issues are relevant to them [50].

These contexts also encourage and motivate students to act instead of focusing on theoretical knowledge. There are, however, challenges that educators must be aware of, as cultural and individual differences may deter the implementation of activities in the classroom [19,28]. For example, group work can be challenging for some students. In addition, instructors need to provide a global context [19] to remind students of their role in a much larger system while focusing on issues closer and more relevant to them.

### *Potential Model Adjustments*

Based on the feedback received from participants, the following potential model adjustments will be considered to enhance the effectiveness and applicability of the Framework and the ESD Toolkit:

- **Clarification and Integration of Competencies:**
  - Clearly differentiate ESD-specific competencies from general educational competencies.
  - Develop guidelines for institutions to integrate ESD competencies with existing ones to avoid redundancy and reduce the perception of an 'extra hurdle'.
  - Provide case studies or examples showing how ESD competencies can complement and enhance existing competencies within various disciplines.
- **Streamlining Administrative Processes:**
  - Offer strategies for incorporating ESD learning objectives without an extensive administrative overhaul.
  - Create adaptable templates for learning objectives that can be easily customized to fit into existing curricula and paperwork structures.
- **Balanced Focus Across Domains:**
  - Ensure a balanced emphasis on the cognitive (the head), socio-emotional (the heart), and behavioral (the hands) domains within the toolkit.
  - Develop resources and activities that encourage the application of theoretical knowledge to real-world sustainability challenges, bridging the knowledge-action gap.
- **Practical Application and Transformative Pedagogies:**
  - Increase the focus on hands-on, practical approaches to sustainability education, moving beyond theory-heavy content.
  - Encourage the use of transformative pedagogies that foster behavioral change and empower students to act on sustainability knowledge.
  - Provide a repository of pedagogical methods and activities that promote active learning and student engagement in sustainability issues.
- **Holistic Integration of Sustainability Concepts:**
  - Advocate for the integration of sustainability concepts throughout the course rather than in isolated modules to reinforce their importance and impact.
  - Offer guidance on how to weave sustainability into the fabric of all course contents, making it a consistent theme rather than an add-on.
- **Cultural and Background Diversity:**
  - Acknowledge and address the diverse backgrounds of students in the design and delivery of ESD.
  - Create resources that are adaptable to various cultural contexts and learning styles, ensuring inclusivity and relevance.
- **Empowerment and Leadership Development:**
  - Incorporate elements into the toolkit that focus on developing leadership skills and empowering students to become sustainability champions.
  - Facilitate opportunities for students to lead sustainability initiatives and projects, both within and beyond the academic setting.
- **Assessment and Evaluation:**
  - Align assessments with ESD competencies and learning objectives to ensure they are effectively measuring the desired outcomes.
  - Develop assessment tools that evaluate not only cognitive understanding but also the application and behavioral changes in students.

By making these adjustments, the ESD Toolkit can become more intuitive for educators to adopt and integrate into their curricula, more engaging for students, and ultimately more effective in achieving the goal of educating for sustainability.

## 6. Limitations and Future Research

The research presented in this study, while insightful, is subject to several limitations that should be acknowledged. Firstly, the relatively small number of participants involved in the study may not fully capture the wide array of experiences and viewpoints that exist within the larger educational community. This limitation restricts the ability to generalize the findings and apply them broadly across different educational settings and contexts. Future research with a more extensive and diverse participant pool would be beneficial to validate and expand upon these initial findings, ensuring their applicability and relevance in a variety of educational environments.

Additionally, some participants encountered challenges in identifying suitable starting points for implementing the Education for Sustainable Development (ESD) practices with their students. This indicates a need for further research to explore more effective ways of integrating ESD principles into various teaching contexts and to provide clearer guidance for educators.

While the study successfully employed a reflective approach, enabling teachers to critically assess their teaching practices in relation to the CoDesignS ESD Toolkit, more extensive research is needed to explore how the ESD framework can be adapted and applied in different cultural and educational settings. This would enhance our understanding of the framework's versatility and applicability across various contexts.

Finally, although the creation of the CoDesignS ESD Toolkit is a significant contribution of this research, its primary focus on toolkit development means that other aspects of ESD implementation may not have been explored as thoroughly. Future research could expand on this by examining the broader implications of ESD in education, including its impact on student learning outcomes and teacher professional development.

## 7. Conclusions

One of the objectives of this study is to enhance our understanding of the use and practical implication of the CoDesignS ESD Toolkit. Based on the findings, this study confirms that the CoDesignS ESD Toolkit can be uniquely placed to embed sustainability into the curriculum by bringing together scholarship-informed teaching and curriculum design practices with ESD in a new way.

The focus is on active learning that motivates and equips students to put their knowledge into practice, a desire expressed by the students who took part in the focus group. These findings echoed results that suggested curricula revision in light of ESD brought about a positive attitude toward meta-cognitive and a goal-oriented approach to curriculum planning [12]. Through the use of transformative pedagogies—integrating relevant competencies and targeting the socio-emotional (heart) and behavior domains (hands), as well as cognitive domain (head)—students will be better able to relate and respond on a personal level to what they are learning [22]. Having the opportunity to collaborate in real-life situations can help students to see how their role fits into the bigger picture [19,20]. Where generic competencies such as collaboration and self-reflection are already part of the curriculum, the toolkit provides useful guidance on how these competencies could be focused on sustainability, as well as on attributes such as employability.

The evaluation revealed ways in which the toolkit could be further developed. These include a wider range of case studies (cases) and more guidance on how assessment and learning activities can be aligned. To help educators to evaluate whether they have the right blend of competencies and domains across the curriculum, the CoDesignS ESD Toolkit Planner and accompanying Dashboard have been developed. There were some questions about the challenge of assessing personal transformations in individuals; involving students as partners and co-creators to shape assessments may be helpful in addressing this.

Although the participants mostly found the toolkit clear and valued the visual presentation, some participants (especially students) felt that the language would need to be explained to those less familiar with these concepts. Additionally, communities of practice could play an important role, providing support and inspiration for academics to use the toolkit, and enabling them to connect with others' work.

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## Appendix A

### INTERVIEW QUESTIONS

#### PILLAR 1: Key competencies for sustainability

The key competencies for sustainability focus on ways of thinking, ways of practicing, and ways of being:

- What competencies are you already embedding in your teaching?
- Do you think the case studies presented in the toolkit would help you design and deliver these competencies for SDGs?
- What else would be helpful to guide you in the design and implementation of these competencies in your teaching?

#### PILLAR 2: Specific Learning objectives for the SDGs

The specific learning objectives for the SDGs focus on combining knowledge and thinking skills (cognitive domain); collaboration, negotiation, communication, and self-reflection skills (socio-emotional skills); and being able to put into practice and apply the skills learned (behavioral domain):

- What do you think about combining the specific learning objectives in your teaching?
- What domains are you already embedding in your teaching?
- Do you think the case studies presented in the toolkit would help you design and deliver learning objectives for the SDGs?
- What else would be helpful to guide you in the design and implementation of these domains in your teaching?

#### PILLAR 3: Transformative pedagogies and teaching methods

The third pillar focuses on the use of transformative pedagogical approaches and teaching methods focused on action-oriented, transformative pedagogy that supports collaboration, problem orientation, and inter- and transdisciplinary learning:

- How important do you think is the use of transformative pedagogies and teaching methods in the design and delivery of ESD?
- Do you use transformative pedagogies and teaching methods in your teaching?
- Do you think the case studies presented in the toolkit would help you design and deliver transformative pedagogical approaches and teaching methods?

- What else would be helpful to guide you in the design and implementation of this pillar in your teaching?

#### GENERAL QUESTIONS

- Is the toolkit well-designed and easy to apply as an instructional tool?
- Is the concept of the toolkit easy to understand and easy to use?
- What additional information or support would you need to incorporate the toolkit into your teaching?
- What do you like most about the toolkit?

#### FOCUS GROUP QUESTIONS—STUDENTS

- How does the toolkit change your perception of education and the skills, values, and knowledge required to ensure sustainable development?
- Which competencies do you think students already have regarding ESD (covered in step 2)?
- Do you think this toolkit could help to develop the skills necessary to foster responsible citizens amongst you and your peers?
- Which skills are instrumental in developing an understanding of sustainable development (Step 3: Head, Heart, and Hands)?
- Is a sense of community needed for students to develop an understanding of transformative learning?
- Is the language used in the ESD Toolkit relevant?
- Do you think exposure to the ESD will make students more competent?
- To what extent is ESD locally relevant and culturally appropriate?

## References

1. UNESCO. Education for Sustainable Development Goals: Learning Objectives. 2017. Available online: <https://unesdoc.unesco.org/ark:/48223/pf0000247444> (accessed on 22 January 2022).
2. Wilhelm, S.; Förster, R.; Zimmermann, A.B. Implementing Competence Orientation: Towards Constructively Aligned Education for Sustainable Development in University-Level Teaching-And-Learning. *Sustainability* **2019**, *11*, 1891. [CrossRef]
3. UNESCO. Education for Sustainable Development. 2021. Available online: <https://www.unesco.org/en/education/sustainable-development> (accessed on 22 January 2022).
4. Laurie, R.; Nonoyama-Tarumi, Y.; Mckeown, R.; Hopkins, C. Contributions of Education for Sustainable Development (ESD) to Quality Education: A Synthesis of Research. *J. Educ. Sustain. Dev.* **2016**, *10*, 226–242. [CrossRef]
5. Wals, A.E.J. Sustainability in higher education in the context of the UN DESD: A review of learning and institutionalisation processes. *J. Clean. Prod.* **2014**, *62*, 8–15. [CrossRef]
6. Wiek, A.; Withycombe, L.; Redman, C.L. Key competencies in sustainability. A reference framework for academic program development. *Sustain. Sci.* **2011**, *6*, 203–218. [CrossRef]
7. UNESCO. *Roadmap for Implementing the Global Action Programme on Education for Sustainable Development*; UNESCO: Paris, France, 2014.
8. UNESCO. *Issues and Trends in Education for Sustainable Development*; UNESCO: Paris, France, 2018.
9. Lozano-García, F.J.; Gándara, G.; Perrni, O.; Manzano, M.; Elia Hernández, D.; Huisingh, D. Capacity building: A course on sustainable development to educate the educators. *Int. J. Sustain. High. Educ.* **2008**, *9*, 257–281. [CrossRef]
10. Lozano, R.; Merrill, M.; Sammalisto, K.; Ceulemans, K.; Lozano, F. Connecting Competences and Pedagogical Approaches for Sustainable Development in Higher Education: A Literature Review and Framework Proposal. *Sustainability* **2017**, *9*, 1889. [CrossRef]
11. Evans, T.L. Competencies and Pedagogies for Sustainability Education: A Roadmap for Sustainability Studies Program Development in Colleges and Universities. *Sustainability* **2019**, *11*, 5526. [CrossRef]
12. Biasutti, M.; Makrakis, V.; Concina, E.; Frate, S. Educating academic staff to reorient curricula in ESD. *Int. J. Sustain. High. Educ.* **2018**, *19*, 179–196. [CrossRef]
13. Toro-Troconis, M.; Alexander, J.; Frutos-Perez, M. Assessing Student Engagement in Online Programmes: Using Learning Design and Learning Analytics. *Int. J. High. Educ.* **2019**, *8*, 171–183. [CrossRef]
14. Lewis, C. A Structured Approach to Online Learning Design in Dental Education. *MedEdPublish* **2020**, *9*, 246. [CrossRef]
15. Sipos, Y.; Battisti, B.; Grimm, K. Achieving transformative sustainability learning: Engaging heads, hands and heart. *Int. J. Sustain. High. Educ.* **2008**, *9*, 68–86. [CrossRef]
16. Cotton, D.; Winter, J. It's not just bits of paper and light bulbs: A review of sustainability pedagogies and their potential for use in higher education. In *Sustainability Education: Perspectives and Practice Across Higher Education*; Earthscan: London, UK, 2010; pp. 39–54.

17. Association for Learning Design and Education for Sustainable Development (ALDESD). 2022. Available online: <https://aldesd.org/codesigns-esd-framework/> (accessed on 20 March 2022).
18. AdvanceHE. The UKPSF and Associate Fellowship. 2022. Available online: <https://www.advance-he.ac.uk/fellowship/associate-fellowship> (accessed on 20 March 2022).
19. Portuguese Castro, M.; Gómez Zermeño, M.G. Challenge Based Learning: Innovative Pedagogy for Sustainability through e-Learning in Higher Education. *Sustainability* **2020**, *12*, 4063. [CrossRef]
20. Portuguese Castro, M.; Gómez Zermeño, M.G. Identifying Entrepreneurial Interest and Skills among University Students. *Sustainability* **2021**, *13*, 6995. [CrossRef]
21. UNECE. 2015. Available online: [https://unece.org/fileadmin/DAM/env/esd/ESD\\_Publications/Competences\\_Publication.pdf](https://unece.org/fileadmin/DAM/env/esd/ESD_Publications/Competences_Publication.pdf) (accessed on 26 May 2021).
22. Toro-Troconis, M.; Inzolia, Y.; Ahmad, N. Exploring Attitudes towards Embedding Education for Sustainable Development in Curriculum Design. *Int. J. High. Educ.* **2023**, *12*, 42–54. [CrossRef]
23. Tilbury, D. Monitoring and evaluation during the UN decade of education for sustainable development. *J. Educ. Sustain. Dev.* **2007**, *1*, 239–254. [CrossRef]
24. Bloom, B. *Taxonomy of Educational Objectives, The Classification of Educational Goals, Handbook I: Cognitive Domain*; Longman Group: Harlow, UK, 1956.
25. Sterling, S. Sustainable Education. Re-visioning Learning and Change. Schumacher Briefing No. 6. In *Green Books*; UIT Cambridge Ltd.: Cambridge, UK, 2021.
26. Toro-Troconis, M.; Lewis, C. 5 Steps in the Design of Blended Learning Programmes. In *Educational Developments*; Staff and Educational Development Association (SEDA): London, UK, 2021; Volume 22, Available online: <https://www.seda.ac.uk/product/educational-developments-issue-22-4/> (accessed on 25 March 2022).
27. Breiting, S.; Mogensen, F. Action Competence and Environmental Education. *Camb. J. Educ.* **1999**, *29*, 349–353. [CrossRef]
28. Backman, M.; Pitt, H.; Marsden, T.; Mehmood, A.; Mathijs, E. Experiential approaches to sustainability education: Towards learning landscapes. *Int. J. Sustain. High. Educ.* **2019**, *20*, 139–156. [CrossRef]
29. Georgallis, P.; Bruijn, K. Sustainability teaching using case-based debates. *J. Int. Educ. Bus.* **2022**, *15*, 147–163. [CrossRef]
30. Rao, D.; Stupans, I. Exploring the potential of role play in higher education: Development of a typology and teacher guidelines. *Innov. Educ. Teach. Int.* **2012**, *49*, 427–436. [CrossRef]
31. Mills, D.; Alexander, P. Small group teaching: A toolkit for learning. *High. Educ.* **2013**, *36*, 4–24.
32. Ottander, K.; Ekborg, M. Students' discussions in sustainable development based on their own ecological footprints. In *Proceedings of the IOSTE International Symposium on Socio-Cultural and Human Values in Science and Technology Education*, Bled, Slovenia, 13–18 June 2010. Available online: <http://urn.kb.se/resolve?urn=urn:nbn:se:mau:diva-11301> (accessed on 16 June 2023).
33. Tasler, N.; Dale, V. Learners, teachers and places: A conceptual framework for creative pedagogies. *J. Perspect. Appl. Acad. Pract.* **2021**, *9*, 2–7. [CrossRef]
34. Hannan, L.; Duhs, R.; Chatterjee, H. Object-based learning: A powerful pedagogy for higher education. In *Museums and Higher Education Working Together*; Routledge: London, UK, 2016; pp. 159–168.
35. Robin, B.R. Digital Storytelling: A powerful technology tool for the 21st century classroom. *Theory Into Pract.* **2008**, *47*, 220–228. [CrossRef]
36. Andriopoulou, A.; Giakoumi, S.; Kouvarda, T.; Tsabaris, C.; Pavlatou, E.; Scoullou, M. Digital storytelling as an educational tool for scientific, environmental and sustainable development literacy on marine litter in informal education environments (Case study: Hellenic Center for Marine Research). *Mediterr. Mar. Sci.* **2022**, *23*, 327–337. [CrossRef]
37. Scannapieco, F.A. Formal debate: An active learning strategy. *J. Dent. Educ.* **1997**, *61*, 955–961. [CrossRef] [PubMed]
38. Lister, P.G.; Crisp, B.R. Critical incident analyses: A practice learning tool for students and practitioners. *Practice* **2007**, *19*, 47–60. [CrossRef]
39. Schön, D.A. *Educating the Reflective Practitioner: Toward a New Design for Teaching and Learning in the Professions*; Jossey-Bass: Hoboken, NJ, USA, 1987.
40. Sprain, L.; Timpson, W.M. Pedagogy for sustainability science: Case-based approaches for interdisciplinary instruction. *Environ. Commun. A J. Nat. Cult.* **2012**, *6*, 532–550. [CrossRef]
41. Ayers, J.; Bryant, J.; Missimer, M. The Use of Reflective Pedagogies in Sustainability Leadership Education—A Case Study. *Sustainability* **2020**, *12*, 6726. [CrossRef]
42. Lew, M.D.N.; Schmidt, H.G. Self-reflection and academic performance: Is there a relationship? *Adv. Health Sci. Educ.* **2011**, *16*, 529. [CrossRef]
43. Thomas, I. Critical Thinking, Transformative Learning, Sustainable Education, and Problem-Based Learning in Universities. *J. Transform. Educ.* **2009**, *7*, 245–264. [CrossRef]
44. Casinader, N.; Kidman, G. Fieldwork, Sustainability, and Environmental Education: The Centrality of Geographical Inquiry. *Aust. J. Environ. Educ.* **2018**, *34*, 1–17. [CrossRef]
45. Toro-Troconis, M. CoDesigns Education for Sustainable Development Framework. 2021. Available online: <https://codesignsesd.org> (accessed on 20 March 2022).

46. Brown, S.; Saxena, D.; Wall, P.J.; Roche, C.; Hussain, F.; Lewis, D. Data Collection in the Global South and Other Resource-Constrained Environments: Practical, Methodological and Ethical Challenges. In *Freedom and Social Inclusion in a Connected World, Proceedings of the ICT4D 2022, Lima, Peru, 25–27 May 2022*; IFIP Advances in Information and Communication Technology; Zheng, Y., Abbott, P., Robles-Flores, J.A., Eds.; Springer: Cham, Switzerland, 2022; Volume 657. [[CrossRef](#)]
47. Romney, A.; Batchelder, W.; Weller, S. Culture as consensus: A theory of culture and informant accuracy. *Am. Anthropol.* **1986**, *88*, 313–338. [[CrossRef](#)]
48. Patton, M. *Qualitative Research and Evaluation Methods*; Sage: Thousand Oaks, CA, USA, 2002.
49. Braun, V.; Clarke, V. Using thematic analysis in psychology. *Qual. Res. Psychol.* **2006**, *3*, 77–101. [[CrossRef](#)]
50. Turner, R.; Cotton, D.; Morrison, D.; Kneale, P. Embedding interdisciplinary learning into the first-year undergraduate curriculum: Drivers and barriers in a cross-institutional enhancement project. *Teach. High. Educ.* **2022**, 1–17. [[CrossRef](#)]
51. Holdsworth, S.; Thomas, I. Framework for introducing education for sustainable development into university curriculum. *J. Educ. Sustain. Dev.* **2015**, *9*, 137–159. [[CrossRef](#)]
52. Cebrián, G. The I3E model for embedding education for sustainability within higher education institutions. *Environ. Educ. Res.* **2018**, *24*, 153–171. [[CrossRef](#)]

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