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Virtual Exchanges as Pedagogies for Transformative Sustainability Learning: A Critical Realist Multiple Case Study

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Dedication

This is for mom and dad.

Acknowledgments

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Abstract

This dissertation investigates how virtual exchanges can foster transformative learning for sustainability. To understand how VEs can foster or hinder transformative sustainability learning and identify the outcomes associated with the transformations, it explores two cases of VE using a multiple-case study methodology. The first case is a co-designed, comparative Collaborative Online International Learning exchange between two higher education institutions, one from the Philippines and another from Finland. The second case is a ready-made, dialogue-based VE designed as part of a parent research project involving 14 partner universities. Underpinned by a critical realist philosophy, this research uses a M/M approach, gathering data through semi-structured interviews with students and instructors, survey questionnaires, documentation, participant observation, and reflection journals to unearth the pedagogical approaches, learning conditions, and perceptions of students and instructors to provide a comprehensive understanding of the context, mechanisms, and outcomes of the virtual exchange. The findings demonstrate the transformative outcomes prompted by each virtual exchange, as well as the domains (cognitive, affective, behavioral, situated) that were activated in varying intensities, depending on the approach employed and the learning objectives. It also presents eight mechanisms underlying pedagogies that aim to transform students or learners toward sustainable behavior and action. This study highlights the need for pedagogical practices that engage the various domains fundamental to transformative learning for sustainability education while considering the enabling mechanisms in terms of structure, culture, and agency within a social order. Doing so would enable HEIs to cultivate a culture of sustainability in their classrooms and adapt transformative, sustainability-oriented practices in various settings. The dissertation argues that initiatives to “green” the structures of universities should go hand-in-hand with pedagogies that “green” the mind through critical, trans-perspectival, and authentic learning strategies. In this way, universities, rather than being ivory towers of knowledge, could transform into bridges that bring together a pluriverse of ideas and actions towards a more sustainable way of living and being.

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List of Abbreviations

CAIMeR	Context, actors, intervention, mechanisms, and results
CAP	Climate Action Project
CEC	Climate and environmental crisis
CMO	Context, mechanisms, and outcomes
COIL	Collaborative Online International Learning
CR	Critical realism
EfS	Education for Sustainability
ESD	Education for Sustainable Development
GCE	Global Citizenship Education
IaH	Internationalization at Home
ICT	Information and communication technology
IPCC	Intergovernmental Panel on Climate Change
KSA	Knowledge, skills, and attitudes
KSC	Key sustainability competencies
LMS	Learning management system
M/M	Mixed methods
NFP	Not-for-profit organization
PBE	Place-based education
QUAL	Qualitative
QUAN	Quantitative
SAC	Structure, agency, culture
SD	Sustainable development
SE	Sustainable education
TA	Thematic analysis
TEL	Technology-enhanced learning
TL	Transformative learning
TSL	Transformative sustainability learning
VE	Virtual exchange
VL	Virtual learning
WIA	Whole-institution approach
WSA	Whole-school approach
ZPD	Zone of proximal development

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1. Introduction

This chapter provides an overview of a mixed-methods (M/M) multiple case study that aims to explore the potential of virtual exchanges (VEs) to foster sustainability-oriented transformative learning (TL). To address this purpose, this chapter presents a background of the study, the research aims and questions, its significance, a summary of the research design and methodology, and an overview of the chapters in this dissertation.

Background

There is no doubt that the current climate and environmental crisis (CEC) threatens all life on Earth; it is a risk to the planet's physical, *living* beings as well as the dynamic *lifeworlds* and systems that comprise the social realm (Habermas, 1981/2015). The crisis has put into question not only the processes and practices that have caused and continue to damage the environment, but also the underlying values, assumptions, and belief systems that have propelled such harmful and unsustainable behavior. Surface-level changes no longer suffice; for these changes to have a significant and lasting impact, what is called for is a deep transformation—a paradigm shift, where there is not just conformity (doing things better) or reform (doing better things), but a transformation that entails *seeing things differently* (Sterling, 2011). Such an existential shift involves the deconstruction of problematic paradigms and their reconstruction into more socio-ecologically sustainable ones (Fazey et al., 2021; Feola et al., 2021; Stein, 2024)

In the sustainability discourse, education is considered not only a goal of sustainability but also a means to achieve it. There are different ways that sustainability has been integrated into a learning context, whether it is a setting (education *in* sustainability), a subject (education *about* sustainability), a goal or mission (education *for* sustainability), or its motto or ethos (education *as* sustainability) or what Sterling (2001) refers to as sustainable education (SE) (Gajparia et al., 2022; Sterling, 2001). Indeed, in a rapidly changing world beset with uncertainty, sustainability, in its simplest sense—the ability to sustain oneself—is all about learning. Therefore, education, whether formal, informal, or nonformal, plays an important role in enabling sustainability transformations. This is especially crucial for higher education institutions (HEIs) that are regarded, historically and culturally speaking, as progenitors of knowledge and innovation. A university campus could be viewed as a microcosm of society,

with its own governance, physical structures, rules and regulations, populations, departments, making them excellent seedbeds for transformation. Being both the source of ideas and the space where they could germinate, HEIs could thus inspire sustainable transformation in other sectors (Sterling, 2004). Notwithstanding their societal role, HEIs also have a stake in addressing the CEC, as climate change poses not only a manifest risk to their physical structures, organizational make-up, and policies but also a conceptual and existential one that could put into question their role in and responsibility to a rapidly declining world (Fazey et al., 2021). HEIs such as universities must therefore respond to CECs at diverse fronts and depths, fostering changes that range from the individual to the social, as well as structural and paradigmatic (Sterling, 2011).

However, before extolling education as a silver bullet, a number of scholars have already pointed out the error in assuming the relationship between education and environmental sustainability as being “exclusively positive” (Komatsu et al., 2022, p. 298), and others have regarded education as complicit in the crisis, by “promoting knowledge of the sort that has fuelled the destruction of ecologies and undermined human prospects” (Orr, 2009, p. 176) or by following a “model that has been destroying the planet since the nineteenth century” (Lange, 2018, p. 15). Therefore, universities, while being a key player in Education for Sustainability (EfS) or Sustainable Development (ESD), must also be critical of their role in educating students about and for sustainability. Indeed, the current responses and efforts of HEIs have been largely criticized for fragmentation of solutions rather than being systemic or whole-of-institution (McCowan, 2023b; Stein, 2024); oversimplification, reducing a complex problem into a technical one (Lehtonen et al., 2018; Svarstad, 2021; Walsh et al., 2021); and largely techno-optimistic and solutions-focused, pushing for more innovation and growth while glossing over the social issues underlying environmental challenges (Kopnina, 2020; Nightingale et al., 2020). There are also critiques on ethnocentrism in HEIs, where privilege is given mainly to Western imaginaries, models, and solutions while devaluing others (Bhambra & Newell, 2022; Sultana, 2022), reflecting cognitive forms of imperialism (Fals-Borda & Mora-Osejo, 2003; Kopnina, 2020), as well as critiques on the lack of diversity in the global environmental discourse, especially given the place-based nature of sustainability knowledge and practices (Horlings, 2016; Merçon et al., 2019).

Without critically addressing these issues, the improvements made by universities towards sustainability will appear as cosmetic, band-aid solutions to an issue that cuts deep (McGeown & Barry, 2023; Sterling, 2021). For a radical change to truly occur, scholars have advocated the need for a deep, structural shift, a transformative kind of education (Cortese, 2003; O'Sullivan, 1999). In light of the aforementioned issues regarding the prevailing business-as-usual responses of HEIs to the CEC, transformative education would entail pedagogical approaches that promote critical reflection and dialogue towards reflective action within learning conditions characterized by openness, relationality, and diversity—among others (O'Sullivan, 1999; A. E. J. Wals, 2010). The current landscape in EfS or ESD shows the growth of such transformative practices, whether on a small scale such as in the classroom or on a larger, whole-of-institution scale (Blake et al., 2013; Sterling et al., 2018).

This dissertation will look at the potential of such transformative practices in online learning spaces. While the exploration of transformation in online learning is not new (Boyer et al., 2016; Hofmann et al., 2022), only a few have looked at it through the lens of sustainability transformation (Gómez-Zermeño, 2020; Hajdukiewicz & Pera, 2020; Hueske et al., 2021). The focus of this research will thus be on online forms of learning that could foster TL for sustainability, in particular, VEs, an umbrella term that refers to the “engagement of groups of learners in online intercultural interactions and collaboration projects with partners from other cultural contexts or geographical locations as an integrated part of their educational programmes” (O'Dowd, 2018, p. 1). While there are different typologies of VEs—challenge-based, project/task-based, or dialogue-based (Helm, 2024)—they are all anchored on interculturality and dialogic interaction. A growing body of research shows that both online forms of learning (Hueske et al., 2021; Stepanyan et al., 2013; Zhang et al., 2020) and intercultural learning (Marouli, 2002; Skrefsrud, 2022) support deeper awareness of sustainability issues and the development of sustainability competencies. VEs have been studied in the context of language teaching and learning (Dooly & Vinagre, 2022; Helm, 2019; O'Dowd, 2021), global citizenship education (O'Dowd, 2018b), and intercultural education (Avgousti, 2018; M. W. Barbosa & Ferreira-Lopes, 2023). However, they have yet to be researched as a transformative form of learning and as an example of a sustainable pedagogical practice.

Research aims and questions

This study aims to explore the potential of VEs in fostering TL for sustainability in higher education using two cases of VEs: a co-designed Collaborative Online International Learning (COIL) exchange between two partner institutions and a standalone dialogue-based exchange among 14 partner universities. A concurrent, embedded M/M approach grounded on critical realism (CR) will aide in exploring the pedagogical approaches and learning conditions in these two VEs that could lead to transformation, and particularly what is transformed in learners. The research questions and their corresponding aims are the following:

RQ1: How does VE foster TL for sustainability?

Answering this research question entails understanding the elements in the learning environment that could contribute to transformation. This study will do so by exploring the pedagogical approaches¹ and learning conditions² within the VEs that foster TL using the transformative sustainability learning (TSL) framework put forward by Sipos et al., (2008). According to them, TSL approaches should engage a person's cognitive (head), behavioral (hands), and affective (heart) domains, and Horlings et al., (2020) adds, should be situated or place-based (feet), impacting their practical, political, and personal spheres (O'Brien, 2018; Sipos et al., 2008).

RQ2: How does VE contribute to transforming sustainability paradigms?

Secondly, it will examine if and how students are transformed by the VE by identifying the paradigms³ that were transformed. The TSL framework will be used to see how these

¹ **Pedagogical approaches** refer to all the instructional strategies, techniques, and approaches used in teaching such as learning activities and assessments.

² Aboytes & Barth describe **learning conditions** "as the set of external and internal factors, such as partner facilitation and openness to alternative perspectives, respectively, that influence the learner's capacity to engage in a learning situation" (2020, p. 996).

³ **Paradigms** are the "commonly agreed upon ways of perceiving the world based on linked assumptions which have been accepted into the mainstream" (Walsh et al., 2021, p.74) and they include "shared forms of understanding, values, and methods (Merçon et al., 2019, p. 2).

outcomes impact the different dimensions, and it will be supplemented by the transformative outcomes conceptualized in the TL literature (Hoggan, 2016; Stuckey et al., 2014).

Significance of the study

The primary aim of this study is to investigate how VE, an online form of learning that brings together multiple epistemologies in a shared virtual setting that crosses boundaries of time and space, can foster TSL by identifying the pedagogical approaches and conditions that prompt a paradigmatic shift in learners. This dissertation seeks to contribute to the growing body of literature on TL for sustainability by expanding the TSL framework. It also aims to make the case for VEs as transformative, inclusive, and emancipatory pedagogical practices that merit greater consideration in the roster of educational offerings in HEIs.

A secondary but nonetheless important aim of this dissertation concerns its integration of CR in two ways: as an extension of TL theory and as the philosophical underlabourer of its methodology. Firstly, this study attempts to bring TL and CR in dialogue, as the author believes that CR can provide the theoretical grounding that has been lacking TL theory. Secondly, it hopes to add to the small yet growing body of methodological applications of CR through the use of CR-oriented thematic analysis proposed by Wiltshire & Ronkainen (2021) and Fryer (2022).

Research methodology

This dissertation follows a M/M holistic multiple case study methodology grounded on critical realism to examine two types of virtual exchange, a comparative, co-designed COIL between two partners (Case 1) and a dialogue-based, standalone exchange between 14 participating universities (Case 2). Both VEs had sustainability as a central theme. The study uses a convergent approach, in that it describes each case by integrating both quantitative and qualitative data on a defined unit of analysis (Creswell & Creswell, 2017; Yin, 2018) and where both quantitative and qualitative data are collected, analyzed separately, and then compared in a single phase to see whether they confirm each other (Creswell & Creswell, 2017; Yin, 2018), thereby enhancing the reliability and comprehensiveness of the findings (Bryman, 1992). In addition, this convergence reflects a concurrent embedded or nested approach, since the quantitative data is embedded within the predominantly qualitative method (Creswell et al., 2003).

In both cases, the methods used were semi-structured interviews with students, semi-structured interviews with instructors, document analysis, participant observation, student survey questionnaires—although the items in the last method differed for both. The second case, however, had more documents to analyze, such as the participants' reflection journals. Semi-structured interviews and survey questionnaires with open-ended questions for students provided insight on the pedagogical approaches and learning conditions that they deemed effective or transformative, as well as the paradigms that they believe were transformed through the VE. These were triangulated by the quantitative data from the survey questionnaires, as well as insights from instructors through the interviews, observations, and analysis of curricular documents. Being a holistic multiple case study, each case was a unit in and of itself, with a context completely different from the other. Thus, data for each case was collected and analyzed independent of the other case. As the philosophical basis of this research, CR guided the research design by helping determine the kind of questioning needed to unearth causal mechanism underlying observable phenomena, as well as the data analysis strategies to better draw out themes in a purposeful way.

Structure of the dissertation

This dissertation is composed of eight chapters, excluding the bibliography and appendix. It is organized as follows:

- [Chapter 2: Review of Related Literature](#) discusses the foundational concepts of the study, beginning with the concept of sustainability and SD, followed by those relevant to sustainability and education. These include education about, for, and as sustainability, whole-institution approaches and sustainability competences, as well as critiques on the implementation of sustainability in HEIs. This is followed by theories on enabling transformation such as TL theory, third space theory, dialogic pedagogy, and TSL. VE is subsequently discussed in terms of its typologies, opportunities, and challenges, and the chapter ends with a discussion of CR, the philosophy underlaboring this study.
- [Chapter 3: Research Design and Methodology](#) presents the research design, a summary of the two featured cases, the data collection and analysis procedures, and

discussions on data quality, methodological limitations, research positioning, and ethical considerations.

- [Chapter 4: Findings in Case 1](#) and [Chapter 5: Findings in Case 2](#) present the findings in each case, beginning with an overview of each, followed by the findings for each research question. The findings are discussed using the four dimensions (head, heart, hands, and feet) of the updated TSL framework. They include references from the literature that informed the abductive reasoning as well as evidence from the data. The chapters end with a summary of the findings.
- [Chapter 6: Cross-case analysis](#) elaborates on the findings by identifying similar themes that would inform the theorizing of mechanisms. The themes are described following the four dimensions of the update TSL framework.
- [Chapter 7: Discussion](#) presents the insights based on the findings, particularly the use of the morphogenetic approach to examine transformative learning experiences. This is followed by a discussion of the theoretical implications of the research on the TSL framework and on critical realist research. Practical implications are also discussed, specifically the integration of transformative pedagogies for sustainability and VEs as trans-perspectival third spaces. The chapter closes with a critique of the research design.
- [Chapter 8: Conclusion](#) provides a synthesis of the dissertation by elaborating its key findings, contributions, practical implications, and limitations. Paths for further research are also delineated.

2. Review of Related Literature

This dissertation aims to investigate the potential of VEs in engendering TL for sustainability using a critical realist lens. It is thus a coalescence of three distinct yet interconnected layers: CR as the onto-epistemological base, TSL—with roots in TL and sustainability research—as the pedagogical approach, and VE as the learning experience under scrutiny. In the subsequent literature review, these three layers are further explicated. It begins by briefly describing the ecological crisis and the resulting clamor for sustainability transformation. It then delves into the essential concepts and practices associated with sustainability in education such as sustainability competencies and whole-institution approaches to sustainability. Given the push for transformative forms of learning in sustainability education, the chapter introduces TL theory and its cognate pedagogical theories and approaches such as critical pedagogy, dialogic pedagogy, third space learning, and global citizenship education. This is followed by an elaboration of TSL, an approach to learning that combines TL and sustainability, but with revisions based on the place-based nature of sustainability research. After which, VEs are expanded, arguing their potential as empowering spaces for sustainability transformation. Finally, given the orientation of this dissertation on CR, the last section describes the key literature on CR that underpin its methodology. It explains the aims of critical realist research, the morphogenetic approach and its connections with TL, and lastly, the methodologies tied to CR.

Conceptualizing sustainability

The 2023 report of the Intergovernmental Panel on Climate Change (IPCC) asserted that because of the unabated emissions of greenhouse gases, “there is a rapidly closing window of opportunity to secure a liveable and sustainable future for all” (IPCC, 2023, p. 88). However, climate change is only one among the nine major environmental issues that, if left unaddressed, would endanger the earth’s stability and resilience (Richardson et al., 2023), and six of these have already surpassed the boundaries of what constitutes a “safe operating space for humanity” (Richardson et al., 2023, p. 2). This exigent threat of environmental collapse—compounded by interwoven social issues—is what motivates the urgent, persistent calls to move towards more sustainable ways of living, being, and even thinking in all areas of society, especially in education. Sustainability has thus become a contemporary battle cry,

penetrating into scientific/policy discourse and the vernacular. However, the definition of sustainability—and by extension, sustainable development—continues to be unclear and ambiguous (Ruggerio, 2021). Although an exhaustive review of the multiple conceptualizations and their orientations is beyond the scope of this dissertation, it is important to discuss some approaches and establish a definition that will serve as the axis of this study.

Table 2.1 shows the representative ways in which sustainability has been conceptualized and classified in the research. The axes put forward by Gadotti (2009) shows the directions to consider in pedagogies that integrate sustainability. He argues that it must be approached in two ways, by: (1) inculcating knowledge, values, and behaviors that hope to preserve the natural environment and the biophysical processes governing life on earth; (2) and protecting the cultural, social, and political aspect of human life. One does not outweigh the other, as ecopedagogy espouses a strong link between human and non-human beings (Gadotti, 2010; Misiaszek, 2020). These dimensions recall the tripartite conceptualization of

Table 2.1

Conceptualizations and classifications of sustainability

Source	Classification	Description
“Axes” of sustainability in ecopedagogy (Gadotti, 2009)	Ecological, environmental, and demographic sustainability	Preservation of the ecosystem and the physical, natural world vis-à-vis human action
	Cultural, social, and political sustainability	Maintenance of identity, diversity, and the quality of life through active citizenship, distributive justice, and democratic processes
Sustainability paradigms (Gibbons, 2020)	Conventional	Economic growth hand-in-hand with ecological protection and social equity
	Contemporary	Anthropocentric worldview aiming for human well-being within environmental limits
	Regenerative	Holistic worldview; relational approaches
Sustainability and SD paradigms (Ruggerio, 2021)	Weak sustainability (Hegemonic paradigms)	Anthropocentric worldview; nature as a resource (ecosystem services); technocratic solutions to environmental problems; unquestioned objective of economic growth
	Strong sustainability (Emerging paradigms)	Ecocentric worldview; relational ontologies and epistemologies; transformative solutions for the common good (buen vivir)

sustainability into environmental, social, and economic pillars or overlapping circles (Boström, 2012). Other dimensions have also been included such as cultural sustainability (Dessein et al., 2015) and the inner dimension of sustainability (Grenni et al., 2020; L. Horlings, 2015).

Rather than dimensions, the classifications of Gibbons (2020) and Ruggerio (2021) similarly put sustainability on a spectrum, from weak to strong, from conventional to regenerative, respectively. A weak form of sustainability conceptualization and operationalization espouse a largely anthropocentric, neoclassical worldview (Cirella & Zerbe, 2014), which reflects the conventional and contemporary paradigms put forward by Ruggerio (2021). However, Gibbons (2020) posits that while the contemporary sustainability paradigm can push for reform, it is not enough for radical change, due to its focus on the symptoms rather than the underlying causes of unsustainable behavior. For instance, the continued promotion in educational institutions of dichotomized, rational thinking that classifies disciplines and gives primacy to reason could prevent interdisciplinary collaborations and render alternative and often marginalized sources of knowledge invisible (Lehtonen et al., 2018; McCowan, 2023b; Walsh et al., 2020). Even interdisciplinary collaborations are established, without a critical understanding of power asymmetries, interdisciplinary research could merely exacerbate existing hegemonic knowledge regimes (Fritz & Binder, 2020; Schmidt & Neuburger, 2017) such as intellectual colonialism (Fals-Borda & Mora-Osejo 2003). Another example is how the concept of ecosystem services, despite the greater regard given to the natural world, bespeaks an anthropocentric view that instrumentalizes the ecosystem—the Earth as a natural capital, as a resource (Adelman, 2018; Kopnina, 2020; Kopnina et al., 2018; Washington, 2020). With this view, technological and efficiency-based solutions could override those that value biodiversity and ecosystem flourishing (Kopnina, 2020; Washington, 2020; Washington et al., 2021). Examples of this in practice include circular economy and green economy (Cirella & Zerbe, 2014; Gibbons, 2020; Ruggerio, 2021) where the focus still remains on growth and development.

Meanwhile, strong sustainability entails adopting an ecocentric and holistic worldview (Barrett et al., 2017; Lange et al., 2021; Walsh et al., 2021) as well as regenerative paradigms and practices (Buckton et al., 2023; Gibbons, 2020) such as *buen vivir*, relationality, and biocultural or social-ecological systems approaches (Görg et al., 2017; Merçon et al., 2019).

It contends for a more integrative approach to sustainability, one that goes beyond accommodation or reform and compels a transformation of frames of reference (Jickling & Sterling, 2017; Sterling, 2011, 2021). Advancing contemporary sustainability, regenerative approaches are not only life-healing but life-*enhancing*, able to “generate, sustain, and evolve increasingly higher orders of vitality and viability for the life of a particular place” (Mang & Reed, 2012, p. 8). This rootedness to a sense of place is what makes regenerative approaches context-dependent, and to better understand the story of each context, participatory and interdisciplinary practices should be leveraged, as they can better unravel the multiple experiences in a community (Du Plessis & Brandon, 2015; Robinson & Cole, 2015). This could include customs and behaviors, local and regional priorities, relationships, power dynamics and asymmetries, paradigms, and worldviews (Gibbons, 2020; Robinson & Cole, 2015). In addition, knowing the “story of a place” (Robinson & Cole, 2015, p. 136) involves unearthing embedded histories, especially those with colonial legacies, as colonialism is posited to have played a significant role in destroying the planet (Bhambra & Newell, 2022; Stein, 2019).

In regenerative or strong sustainability paradigms, the focus is not only on the symptoms but also on the causes that propel unsustainable patterns (Du Plessis & Brandon, 2015; Gibbons, 2020). The iceberg model used in systemic thinking illustrates this idea of underlying causal mechanisms, where observable symptoms or events are only the tip of the iceberg (Maani & Cavana, 2007). To better understand phenomena entails uncovering the multiple layers beneath: the reoccurring patterns or trends; the underlying structures and the relationships between them that influence such patterns; and at the deepest end, the mental models, which are the constellation of assumptions, values, and beliefs that define a system (Maani & Cavana, 2007). To foster transformation from such a depth, strong sustainability approaches entail critical reflection, where action, reflection, and dialogue occur in iterative cycles (Reed, 2007). This critical reflexivity parallels the concept of *praxis* advocated by Freire, which he saw as necessary alongside dialogue for the enfranchisement and democratization of society (Freire, 1978, 2021; Giroux, 2010).

From the myriad of conceptualizations and classifications, it is clear that when using the term “sustainability”, whether in a research study, institutional mission, or even

description, it is imperative to establish a definition that would provide clarity on the underlying paradigms and values. This dissertation adopts this definition of sustainability⁴:

“opposed to everything that suggests unbalance, competition, conflict, greed, individualism, domination, destruction, expropriation and undue unbalanced material acquisition, regarding change and social transformation of society or environment. So in the most generous and widest way, sustainability means a new egalitarian way, a free, fair, inclusive and solidarity way to get people together in order to build their social living world at the same time that they handle, manage or transform the natural sustainable environment where they live and on which they depend to live and be together” (Brandão, 2008, p. 136 as cited in Gadotti, 2009, p. 204).

Such a definition evokes a deep sense of relationality with both the human and natural world, and these relations are nurtured through fair and inclusive means.

Sustainability and education

In the sustainability discourse, education plays a central role in promoting sustainability; not only is it considered a goal but also a means to achieve it. Aside from being Goal 4 (Quality Education: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all) of the 17 Sustainable Development Goals (SDGs), it is seen as a bridging goal (Boeren, 2019) that could help in reaching the targets of the other sixteen, as targeted in Goal 4.7 (ESD and Global Citizenship), where learners must be equipped with the knowledge and skills to promote sustainable development (UNESCO, 2017). The relationship between sustainability and education has been described in diverse ways, from its historical evolution in the Western hemisphere (Wals & Benavot, 2017) to its integration in a learning context. Education *in* sustainability leverages the environment as a learning resource, and usually, learning occurs outside the classroom (Gajparia et al., 2022; Michel, 2020). The last three, education *about*, *for*, and *as*, (See Table 2.2) were conceptualized as

⁴ Due to the neoliberal underpinnings of “sustainable development,” the term “sustainability” will be used for this dissertation, and this also applies to the use of Education for Sustainability (Efs) rather than Education for Sustainable Development (ESD). However, the SDGs will remain as-is.

progressive phases of change in the learning process (Gajparia et al., 2022; O'Neill et al., 2018; Sterling, 2001). These phases are not linear and can co-exist in a learning setting as complementary approaches to change.

Education about, for, and as sustainability

Education *about* sustainability focuses on cognition by instilling “declarative knowledge” (Michel, 2020, p. 24) and raising awareness of sustainability concepts, processes, and issues (Barth & Burandt, 2013; Michel, 2020; Sterling, 2001, 2011). However, knowledge of sustainability issues does not always lead to behavioral change (Heeren et al., 2016), and while certain kinds of knowledge—in particular, the causes of climate change—could increase concern, other kinds of knowledge, such as those on the physical characteristics and consequences of climate change, could even inhibit it (Shi et al., 2016). This is not to say that sustainability knowledge is unimportant; rather, it is insufficient in challenging unsustainable paradigms (Sterling, 2011). Although it does involve “doing things better” (Sterling, 2011, p. 25), this kind of change only maintains or conforms to the status quo of unsustainability (Sterling, 2001). In addition, since education *about* sustainability concentrates on information, the focus and scope of the curriculum content—what counts as relevant sustainability knowledge—will have to be continuously negotiated (Gajparia et al., 2022).

Table 2.2

Education about, for, and as sustainability

	Level of change	Focus of change	What is being learned	Approach
About	1 st	What are we teaching and learning about?	Disciplinary content knowledge	Transmissive
For	2 nd	How are we teaching and learning?	Skills and attitudes	Transactional
As	3 rd	Why are we learning?	Paradigms	Transformative

Note: This table was adapted from Gajparia et al., 2022; O'Neil, 2018; Sterling, 2011

If the focus of education *about* sustainability is knowledge, that of education *for* sustainability is individual agency (Gajparia et al., 2022); and if the former merely conforms to existing paradigms, the latter seeks to reform it (Sterling, 2001) by “doing better things” (Sterling, 2011, p. 25). EfS aims to hone the competencies, values, and behaviors that would

empower individuals to not only live sustainably but also act for sustainability (Gadotti, 2009; Giangrande et al., 2019; Rieckmann, 2018). It is characterized by a holistic, participatory, transdisciplinary, and action-oriented pedagogy to promote autonomy, problem-solving, collaboration, and reflexivity that would enable students to systematically approach complex sustainability issues and critically reflect on the implications to their personal lives (Feriver et al., 2019). EfS is similar to the ESD 1 approach conceptualized by Vare & Scott which entails the “promotion of informed, skilled behaviors and ways of thinking, useful in the short-term where the need is clearly identified and agreed” (Vare & Scott, 2007, p. 191).

Lastly, education *as* sustainability or SE goes beyond conformity and reform and seeks the transformation of unsustainable paradigms (Gajparia et al., 2022; Sterling, 2001) by enabling individuals to “see things differently” (Sterling, 2011, p. 25). While EfS focuses on individual *agency*, SE focuses on the *individual*. By engaging the whole person through creative, reflexive, and relational approaches, learners can look deeply into their mental models and explore the ambiguities, dilemmas, and contradictions that are the seeds of transformation (Gajparia et al., 2022; Sterling, 2001). The focus of SE on the exploration of paradigmatic dilemmas reflects the process of unmaking *before* making in sustainability transformation (Feola et al., 2021). It requires the deconstruction of our current “institutions, forms of knowledge, practices, imaginaries, power structures, and human–non–human relations” (Feola et al., 2021, p. 2) to see which of those need to be *unmade* and transformed. This approach is parallel with Vare & Scott’s ESD 2 where sustainability concepts and practices need to undergo continuous critical scrutiny for possible contradictions, and as such, this dynamic, open, and open-ended process is what gives it its emergent, transformative potential (2007). The criticality in SE also recalls ecopedagogy, which extends Freire’s critical pedagogy and liberation agenda to the natural world (Gadotti, 2010; Misiaszek, 2020; Misiaszek & Torres, 2019) toward “planetary socio-environmental justice” (Misiaszek & Torres, 2019, p. 466). Indeed, in a rapidly changing world beset with uncertainty, sustainability, in its simplest sense—the ability to sustain oneself—is all about learning. To stay afloat amidst the tides of change, every ebb and flow should be seen as an opportunity to learn, unlearn, and sometimes relearn. The aim of SE is for learning to embody sustainability, where “the process of... sustainable living is essentially one of learning, while the context of learning is that of

sustainability” (Sterling, 2001, p. 39). To stop learning is to sink. Therefore, education, whether formal, informal, or nonformal, plays an important role in enabling sustainability transformations.

Promoting sustainability in higher education

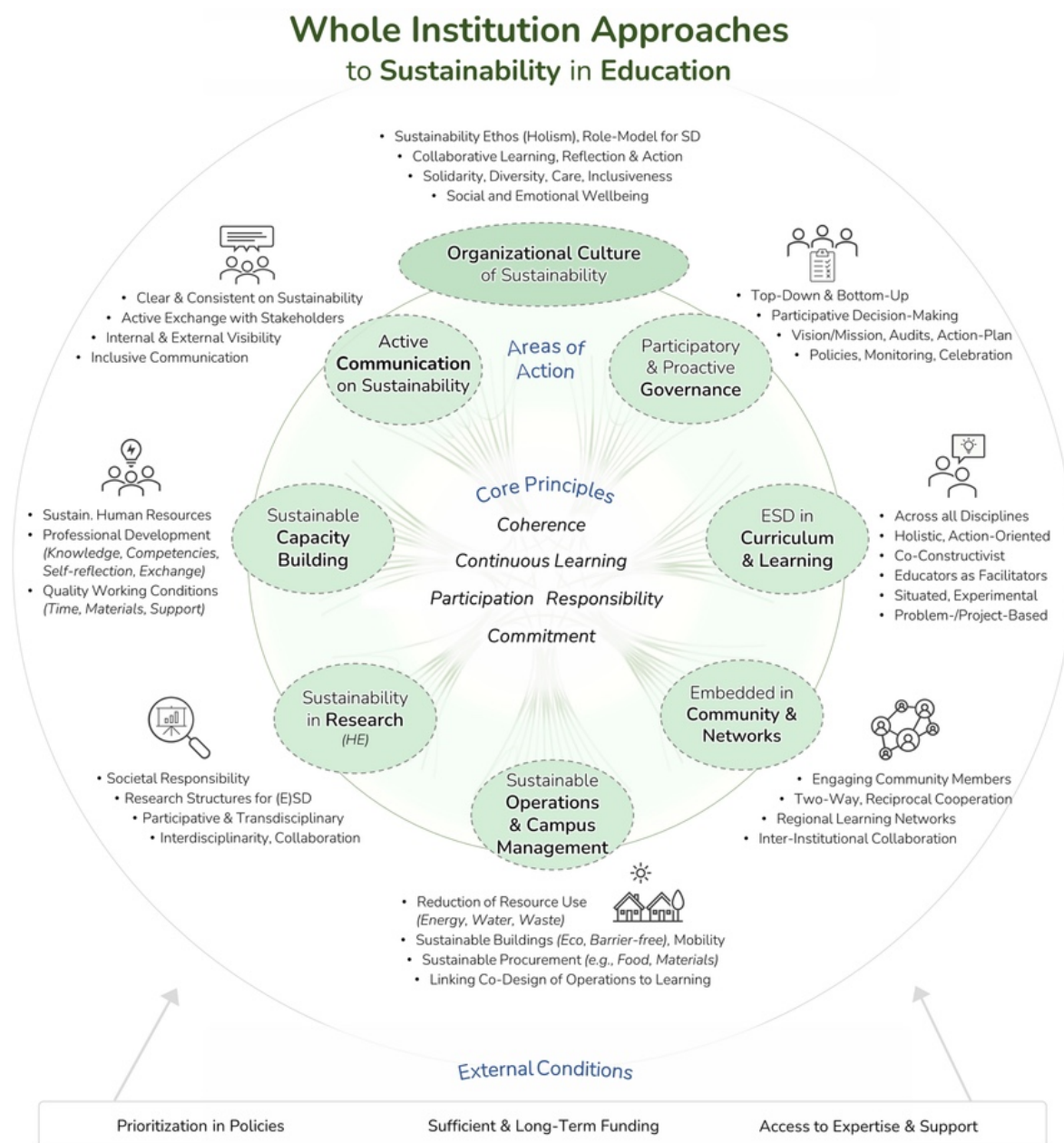
HEIs such as universities are key in pushing for such transformation, as they have historically been considered loci of knowledge generation, diffusion, and application through research and teaching (Fazey et al., 2021; McGeown & Barry, 2023; Schofer et al., 2021). Many of the scientific breakthroughs and innovations as well as sociocultural movements of the past two centuries were cultivated within the halls of universities (Schofer et al., 2021). As pedagogical spaces, they have a profound impact on the ideas, values, and behaviors of those within their scope, which includes the members of the university, the local community, and the regional stakeholders (Fazey et al., 2021; Sterling, 2021). This critical role they play as progenitors of thought and action is what predisposes HEIs to become hubs or *living labs* of scholarship, experimentation, and innovation grounded on sustainability (McGeown & Barry, 2023; Purcell et al., 2019).

Whole–institution approaches

Indeed, since 2014, UNESCO has been advocating for the improvement of learning environments through whole school (WSAs) or whole institution approaches (WIAs), echoing this most recently in the ESD for 2030 roadmap as the second of five priority action areas. Starting in primary and secondary schools as WSA, this was adopted and renamed by HEIs to WIA to reflect the needs of larger university systems (Mallow & van't, 2020; Mathie & Wals, 2022). A university campus is a microcosm of society, with a large population of diverse stakeholders, a system of governance, policies, physical structures and edifices, energy, sewage, and water systems, and perhaps even flora and fauna—it is its own ecosystem (Kohl et al., 2021; Sterling, 2004), and thus has a potential to be a living lab to explore sustainable alternatives in almost all aspects (Purcell et al., 2019). Using a WIA involves the holistic integration and alignment of sustainability into all areas of an institution, namely: (1) Vision, governance, and leadership, (2) Pedagogy and curriculum, (3) Operations and campus management, (4) Community connections and networks, (5) Research (6) Capacity-building, and (7) Communication (Holst, 2023; Mathie & Wals, 2022). Sustainability thus becomes a

uniting vision of all areas in an educational institution. This recognizes the hidden curriculum embedded in socio-physical environments, where learning occurs not only through what is taught in the classroom but also through what learners see and experience in their learning environment, be it a school or a university (Holst, 2023; Mallow & van't, 2020). WIAs acknowledge that the institution *itself* can facilitate sustainability transformation (Holst, 2023; Kohl et al., 2021).

Figure 2.1 Whole Institution Approaches to sustainability in education (Holst, 2023)



Note: From *Towards Coherence on Sustainability in Education: A Systematic Review of Whole Institution Approaches*, by J. Holst, 2023, Sustainability Science.

The systematic review of Holst (2023) produced an illustrative framework (see Figure 2.1) that shows the seven areas of action anchored by the core principles in the center and the key defining concepts in the outer circle. This systemic, WIA to EFS should penetrate facilities (school operations), governance (policy and capacity building), community (partnerships and relationships), and also curriculum (teaching and learning), embodying an ethos of sustainability in its processes (Kohl et al., 2021). This is aptly described by Kohl et al., as “greening the mind” rather than just simply greening the campus (2021). Such an approach requires “interactive, integrative, and critical forms of learning” (Rieckmann, 2018, p. 48) that become the groundwork for paradigmatic change towards proactive social actions—thereby reflecting a transformative, action-oriented pedagogy (Lange, 2018; Rieckmann, 2018). According to a recent review of sustainability research in HEIs, while there has been growth in the field, there needs to be greater balance in terms of thematic areas, as most of the research focuses on campus sustainability or organizational-level environmental management in universities, neglecting themes such as emission reductions, sustainability reporting, and the development of sustainability competencies (Leal Filho, 2015; Stein, 2024).

Sustainability competencies

Aside from WIAs to sustainability, sustainability competencies have been gaining traction in educational practices as they provide educators with a framework of the kind of knowledge, skills, and attitudes that must be inculcated in students (Redman & Wiek, 2021). It was first introduced by Wiek et al., (2011) a little over two decades ago, underwent subsequent changes in 2016 (Wiek et al., 2016), and continues to be developed or rehashed by other scholars (Bianchi et al., 2022; Brundiers et al., 2010; Pacis & VanWynsberghe, 2020; Redman & Wiek, 2021). The most cited and well-known framework in the literature is that developed by Wiek et al. (2011, 2016), with six key sustainability competencies (KSCs): (1) systems thinking competence; (2) futures thinking or anticipatory competence; (3) values thinking or normative competence; (4) strategic thinking or action-oriented competence; (5) collaboration or interpersonal competence; and (6) integrated problem-solving competence. It was recently updated to include two more competencies: (7) intrapersonal and (8) implementation competencies (Redman & Wiek, 2021).

Systems-thinking competence involves analyzing complexity sustainability problems and challenges, interventions, and their impacts across different domains, perspectives, and scales towards the advancement of sustainability transformation (Pacis & VanWynsberghe, 2020; Redman & Wiek, 2021). This entails applying systems concepts such as cause and effect, systems dynamics, feedback loops, inertia, etc. (Wiek et al., 2016). **Futures-thinking** (or anticipatory) competence is the ability to envision future scenarios, anticipate the impact and evolution of interventions (if implemented), and consider alternative pathways when necessary. It enables proactive responses and more informed decision-making when faced with sustainability dilemmas (Redman & Wiek, 2021; Wiek et al., 2016). **Values-thinking** (or normative) competence involves being able to recognize and reflect on one's personal values as well as those in the social and natural world, whether intrinsic and extrinsic. It also entails critically evaluating their alignment with sustainability principles, actions, and interventions. **Strategies-thinking** (or strategic) competence is the capacity to creatively plan, implement, and test effective—even alternative—strategies and interventions to bring about sustainability transformation (Pacis & VanWynsberghe, 2020; Redman & Wiek, 2021; Wiek et al., 2016). This also involves leveraging available resources, coordinating with stakeholders, and managing time and collaboration within the team. **Interpersonal** (or collaboration) competence is the ability to collaborate successfully in a professional team representing diverse disciplines and engage meaningfully and effectively with multiple stakeholders to tackle sustainability issues (Pacis & VanWynsberghe, 2020; Redman & Wiek, 2021). **Implementation** competence involves the capacity to effectively and efficiently put into action sustainability strategies and interventions, with the understanding of iterative processes of implementation as well as the short and long term visioning required in sustainability advancement (Redman & Wiek, 2021; Wiek et al., 2016). **Intra-personal** competence is the practice of self-care and resilience in sustainability transformation. It entails introspection and recognition of one's strengths and weaknesses, as well as potentials and limitations (Redman & Wiek, 2021). Lastly, **integration** competence entails developing actionable problem-solving frameworks to sustainability issues and implementing viable solutions through collaboration and care for one's self and all others involved (Redman & Wiek, 2021).

Table 2.3

Greencomp areas and competence vis-à-vis competencies proposed by Redman & Wiek (2021) and Wiek et al., (2016)

Greencomp area	Greencomp competence	Corresponding competence from Redman & Wiek (2021)
Embodying sustainability values	Valuing sustainability	Values thinking
	Supporting fairness	
	Promoting nature	--
Embracing complexity in sustainability	Systems thinking	Systems thinking
	Critical thinking	--
	Problem framing	Integration
Envisioning sustainable futures	Futures literacy	Futures thinking
	Adaptability	
	Exploratory thinking	Strategic thinking
Acting for sustainability	Political agency	*Implementation
	Collective action	Interpersonal
	Individual initiative	Intrapersonal

Another way sustainability competencies have been grouped is the more recent Greencomp European Sustainability Competence Framework (Bianchi et al., 2022), in which 12 competences were grouped into four representative areas: embodying sustainability values, embracing complexity in sustainability, envisioning sustainable futures, and acting for sustainability. Table 2.3 lists these competences and how they correspond with those proposed by Redman & Wiek, 2021. Two Greencomp competences seem to have no clear corresponding competence in Redman & Wiek's conceptualization, namely promoting nature and critical thinking. For the latter, critical thinking seemed to be integrated into other competences such as problem framing and systems thinking. That of implementation is not fully captured by Greencomp's competence of political agency, as the former appears to have a broader scope while the latter concentrates on implementation in the political sphere (Bianchi et al., 2022; Redman & Wiek, 2021). These KSCs have been used as a guide for program and curriculum design and also as an assessment and accreditation tool to evaluate student attainment of KSCs after an intervention, both in schools and universities (Lozano et al., 2017, 2019; Redman et al., 2021; Wiek & Redman, 2022).

Critiques on the implementation of sustainability in HEIs

The responses and efforts of HEIs have been largely criticized as firstly, fragmented rather than systemic or whole-of-institution (Leal Filho, 2015; Stein, 2024), placing greater focus on initiatives to *green* the campus such as reducing the carbon footprint rather than incorporating it in pedagogy, research, and community engagement. Thus, their responses seem more like scattered initiatives across the university rather than being a shared effort within one (Gardner et al., 2021; McCowan, 2023b; Stein, 2024). This fragmentation is also exhibited in how KSCs, instead of being implemented as an integrated framework, are being used as a checklist that one can simply tick off of (Lozano et al., 2017; Redman et al., 2021). Second, HEIs have been criticized for oversimplification, where a complex problem with social, political, cultural, and economic dimensions is reduced into a technical one, and this is perhaps why most efforts have concentrated on reducing environmental impacts—addressing observable and external symptoms rather than its underlying causes (McGeown & Barry, 2023; Nightingale et al., 2020; Stein, 2024). This oversimplification is often attributed to the dualistic reasoning typical of modernity, where concepts are reduced to dichotomies: human/nature, reason/intuition, social/individual, man/woman (Lehtonen et al., 2018; Nightingale et al., 2020; Walsh et al., 2020). It also relates to the third issue of HEI responses being largely techno-optimistic and solutions-focused—“business-as-usual but *greener*” (Baskin, 2019, p. 165). There is a vehement push for more innovation and growth, as if more technologies, better infrastructure, and stronger disaster risk reduction practices could save the planet. However, it “obscures how societies and environments are co-emergent” (Nightingale et al., 2020, p. 344). Social dynamics underlie environmental behaviors and practices, so focusing mainly on technical fixes addresses merely the tip of the iceberg. These critiques reveal a focus on policies, practices, and structures while largely neglecting the paradigms and the purpose that undergird university culture (Sterling, 2021). Initiatives to *green* universities must not be limited to their external structures but must also include *greening the mind* (Kohl et al., 2021).

In conceptualizing how HEIs could respond, Fazey et al. (2021) use the lens of *emergencies* operating in three levels—manifest, conceptual, and existential—to describe domains of change alongside CEC impacts on HEIs. The first level consists of **manifest**

emergencies, externalized threats that include direct (e.g. natural disasters, changing weather, economic crises due to droughts, etc.), transitional (the cost of restructuring buildings, training staff), and reputational (trust, image regarding climate response) risks. To overcome them, universities must improve existing practices, policies, physical structures, technologies, and financial investments by asking themselves *“Are we doing things right?”* (Fazey et al., 2021, p. 5). This is reflective of Sterling’s (2011) description of first-order change⁵ as “doing things better” (p. 25) to represent sustainability-led organizational change that is merely reactionary or what he terms as *conformative*.

Table 2.4

Emergencies universities face due to the CEC

Emergency	Learning domain	Problem as question	Response/ approach	Domain of change
Manifest	Single loop	Are we doing things right?	Doing things better (Conformative)	Practices (Practical sphere)
Conceptual	Double loop	What are the right things to do?	Doing better things (Reformative)	Policies (Political sphere)
Existential	Triple loop	What is right?	Seeing things differently (Transformative)	Purpose and Paradigm (Personal sphere)

Note: This table was adapted from Fazey et al., (2021), O’Brien (2018), and Sterling (2011, 2021b)

In case solutions to manifest emergencies do not suffice, rather than improving things, there might be a need to completely change them—the same way one would bulldoze and rebuild a house that is beyond renovation. This is the second level of **conceptual emergencies**, and they can be applied to an institution’s conceptual foundations, rules and norms—whether formal or informal—organizational system or structure, leadership and governance, worldview, and assumptions by asking *“What are the right things to do?”* (Fazey et al., 2021, p. 5). Such changes would involve “doing better things” (Sterling, 2011, p. 25)

⁵ The orders of change from first to third are based on Bateson’s (1972/2000) levels of learning. Learning I is characterized by objective, linear learning. Learning II is a more complex learning process, involving the formation of value judgments and meaningful gestalts from what one perceives. Learning III is characterized by epistemic learning, a profound restructuring of the self.

and could include revamping the curriculum to integrate interdisciplinary and participatory collaborations, thereby moving away from siloed departments. It could entail the dismantling of large, transmissive, teacher-centered lectures to foster relational, dialogic, and student-centered pedagogy. The last emergency universities have to grapple with is on an **existential level**, asking questions such as “*What is right?*” (Fazey et al., 2021, p. 5) or “*Who are we?*” that would require “seeing things differently” (Sterling, 2011, p. 25) or at least, envisioning the role and mission of the university differently. This would necessitate an exploration of the university’s values and ethics, mission and vision, as well as their purpose and role in society. Changes at this level require paradigmatic shifts—or transformations.

Enabling sustainability transformation

Theorizing transformation

O’Brien (2018) visualized sustainability transformation processes applicable to any context as three nested spheres of practical, political, and personal domains (Figure 1). At the center of this heuristic is the **practical sphere** which refers to the actions, behaviors, and technical interventions that would lead to a visible and measurable outcome—hence its placement at the center (O’Brien, 2018). Changes in this sphere would respond to the manifest emergencies posed by CEC to HEIs, and examples of interventions would include removing single-use plastic on the campus or renovating buildings towards energy efficiency (Fazey et

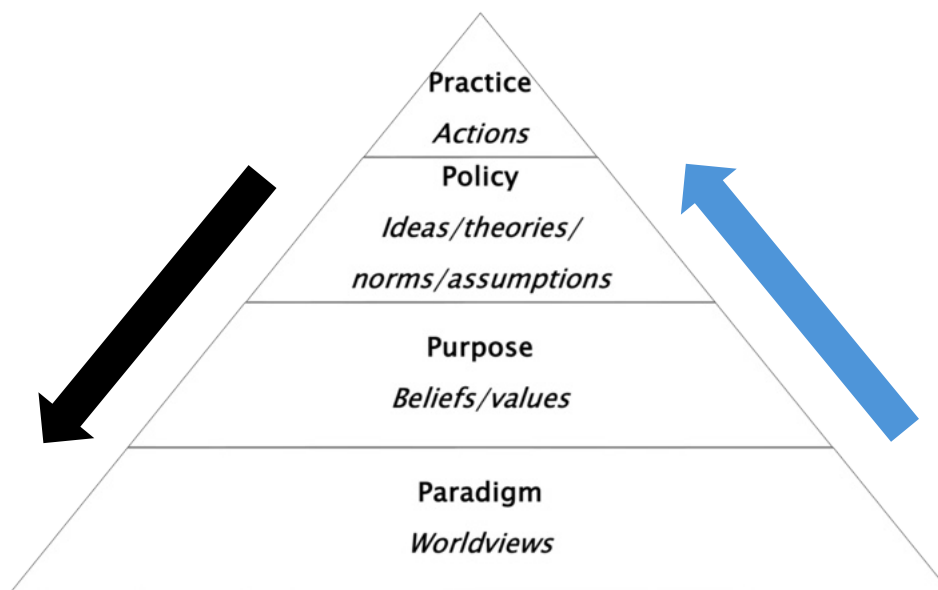
Figure 2.2. Spheres of Transformation (O’Brien, 2018)



al., 2021). The **political sphere** surrounds the practical, and it represents the systems and structures that are usually established via political processes—the vertical and horizontal relationships within an organization or body of people, and the norms, rules, and regulations that organize and govern their interactions (O’Brien, 2018). Changes in the political sphere such as restructuring of departments to promote interdisciplinary knowledge and collaboration or curriculum reform to include more service and experiential learning opportunities would address conceptual emergencies (Fazey et al., 2021). The outermost sphere is that of the **personal**, which represents both individual and collective beliefs, values, and paradigms that go on to influence the systems and structures put in place in the political sphere and the practices and behaviors in the practical sphere (O’Brien, 2018). The use of nested spheres rather than a pyramid demonstrates how the personal is manifested in all spheres of transformative processes and how they are not separate but integrated; a change in one sphere should ripple inwards or outwards to the other spheres (O’Brien, 2018).

Similar to Sterling’s (2001) conceptualization, Stein (2024) proposed a social cartography mapping three approaches to sustainability: **mainstream sustainability** (behind the curve), **critical sustainability** (on the curve), and **beyond sustainability** (ahead of the curve). Stein goes into greater detail by explaining how each approach views the causes of CEC, their sustainability orientations, and the role of university researchers, educators, and administrators amidst the crisis (Stein, 2024). Another way of looking at HEI responses is through the levels of manifestation in organizational and educational culture posited by Sterling (2013), starting with practice at the top of the pyramid, followed by policy, then purpose, and finally, paradigm at the base, which are based on his five levels of knowing: actions; ideas/theories; norms/assumptions; beliefs/values; and paradigms/worldviews (Figure 2.3). He argues that how humans come to know and behave in the world largely depend on the cascading interplay of these levels. Starting from the foundational levels, worldviews influence the levels above in an upward cascade until they manifest in an individual’s everyday actions (as illustrated by the blue arrow on the right of the figure). The impact of worldviews on everyday practices is something that human beings are not always aware of. The opposite effect could also occur; an experience could be so impactful that they cause a change in a person’s worldviews, as represented by the downward arrow to the left

Figure 2.3 Levels of knowing and their manifestation in organizational and educational culture



Note: This was adapted from Sterling (2013, 2021), where levels of knowing (italicized) and levels of manifestation (boldface) had their own pyramids

of the figure. He claims that this cascading effect also applies to organizations and educational institutions. For example, the ideas and norms that a university holds on the causes and risks tied to climate change affect the kind of policies that it will enact (Sterling, 2013). In one of his more recent works, Sterling goes deeper into the concept of paradigm, stating that a university structure's underlying paradigm affects everything above it, and he expounds on its three dimensions in a university context—concern (purpose or ethos), conception (operation), and consequence (impact), representing the perceptual, cognitive, and practical dimensions, respectively (Sterling, 2021). This foundational level is often ignored but plays a significant role in transformation.

Although this is not an comprehensive list of the various models of transformation, what can be gleaned from those mentioned (Fazey et al., 2021; O'Brien, 2018; Sterling, 2013, 2021) is the importance given to the *scope* of transformation, from the individual to the social, as well as its *depth*, from external changes to internalized ones. Without critically addressing underlying thorny paradigms, the improvements made by universities towards sustainability will appear as cosmetic, band-aid solutions to an issue that cuts deep (Bina & Pereira, 2020; McGeown & Barry, 2023; Sterling, 2021)—transitions, yes, but not necessarily a *transformation* (Stirling, 2015).

Transformative learning theory

Such shifts are the focal point of TL theory. Since its conception in 1978, TL has been understood—and confounded—in three different ways across the literature: (1) the transformation of one's frames of reference; (2) the process of learning an individual goes through during a transformative experience; (3) and pedagogical practices or programs designed to provoke transformation (Stevens–Long et al., 2012), with the first receiving the most attention (Anand et al., 2020b). These three have been classified as transformation, transformative learning, and transformative education, respectively. A **transformation** is a deep, lasting, and holistic change in paradigm or worldview, dramatically altering how a person thinks, feels, and behaves (Sterling, 2011; Stevens–Long et al., 2012). **Transformative learning** is the process a learner goes through—their thoughts, feelings, and actions—within a transformative experience, while **transformative education** refers to the educational program or practice that is specifically designed to enable TL experiences (Stevens–Long et al., 2012). However, what has been the subject of greater inquiry is TL—the process itself, exploring *how* transformation is fostered in a learning setting (Taylor & Snyder, 2012).

Table 2.5

Multiple conceptualizations of transformation and its derivations

Term	Conceptualization	Description
Transformation	Change in one's frame of reference	Deep, lasting, and holistic change in paradigm or worldview, dramatically altering how a person thinks, feels, and behaves
Transformative learning	Process an individual goes through during a transformative experience	Process of learning that an individual goes through—their thoughts, feelings, and actions—within a transformative experience
Transformative education	Pedagogical practices or programs designed to provoke transformation	Educational program or practice that is specifically designed to enable transformative learning experiences

Note: This was adapted from Stevens–Long et al., 2012

As such, TL theory offers a comprehensive framework for understanding how individuals—or in the case of an educational setting, *students*—can undergo profound personal and intellectual growth by critically examining and transforming their beliefs and

assumptions. Developed by Mezirow, TL is described as the process by which an individual's frames of reference are fundamentally and irreversibly changed (Anand et al., 2020a; Hoggan & Kloubert, 2020; Mezirow, 1997, 2006). Shaped by one's culture, social structure, and interactions, a frame of reference is an individual's meaning structure, the lens through which the world is experienced, thereby affecting beliefs, decisions, feelings, and actions (Mezirow, 1997, 2006). In simpler terms, it is one's paradigm⁶ (Calleja, 2014). A frame of reference is composed of two dimensions: a habit of mind and a point of view, with the former influencing the latter (Mezirow, 1997, 2000). **Habits of mind** or meaning perspectives are "broad, abstract, orienting, and habitual ways of thinking, feeling, and acting, influenced by assumptions that constitute a set of codes," (Mezirow, 1997, pp. 5–6) whether cultural, social, linguistic, moral–ethical, epistemic, philosophical, educational, economic, religious, psychological, aesthetic (Mezirow, 2000, 2006)—and this author would argue, environmental. They have been succinctly described as "unique compilations of shared social resources" (Hoggan et al., 2017, p. 55). Habits of mind are articulated as **points of view** or meaning schemes, which are "the constellation of belief, memory, value judgment, attitude and feeling that shapes a particular interpretation" (Mezirow, 2006, p. 92). When points of view are articulated, they become prone to feedback from others and are thus more pliant and prone to transformation than habits of mind (Anand et al., 2020b; Mezirow, 2006). Meanwhile, **frames of reference** are the arena of learning; one can either elaborate on existing frames of reference, learn new ones, or transform them (Mezirow, 1997, 2000, 2006), but learning of a transformative kind occurs only when frames of reference—either habits of mind or points of view—are transformed.

Mezirow's conceptualization of TL did not give importance just to the process of transformation but included its outcome; the purpose of transforming one's frames of references is "to make them more inclusive, discriminating, open, emotionally capable of change, and reflective so that they may generate beliefs and opinions that will prove more

⁶ Mezirow was highly influenced by Thomas Kuhn's concept of paradigm, which he substituted with his own term, "frames of reference" (Calleja, 2014).

true or justified to guide action” (Mezirow, 2000, pp. 7–8). After an extensive review of the literature, Hoggan categorized transformative outcomes into six categories with their corresponding subcategories: worldview, self, epistemology, ontology, behavior, and capacity (Hoggan, 2016a; Hoggan, 2016b). Although some of the outcomes such as behavior are not necessarily transformative based on the TL conceptualization, they could be seeds for potential transformation. Therefore, while transformation *is* learning, not all learning is transformation. Transformations could either be epochal, a sudden restructuring of a habit of mind, or cumulative, incremental changes in interconnected points of view that lead to the restructuring of a habit of mind (Anand et al., 2020b; Eschenbacher, 2020; Eschenbacher & Levine, 2022). The process is broken down into ten phases (Mezirow, 2006, p. 94):

- a disorienting dilemma;
- self-examination with feelings of fear, anger, guilt or shame;
- a critical assessment of assumptions;
- recognition that one's discontent and the process of transformation are shared;
- exploration of options for new roles, relationships and action;
- planning a course of action;
- acquiring knowledge and skills for implementing one's plans;
- provisional trying of new roles;
- building competence and self-confidence in new roles and relationships;
- a reintegration into one's life on the basis of conditions dictated by one's new perspective.

These phases are neither strict nor linear and there is no fixed duration for each (Singer–Brodowski, 2023). The starting point to any transformation, whether epochal or cumulative, is a "disorienting dilemma," which is then followed by a process of critical reflection, discourse, and ultimately, a restructuring of beliefs and perspectives through reflective action (Mezirow, 2000, 2006). A disorienting dilemma occurs when individuals are confronted with experiences or information that reveal and challenge their previously unchallenged and subconscious assumptions that shape their values and behaviors (Taylor & Elias, 2012). It is characterized by dissonance, interruption, conflict, contradiction, incoherence, or disorientation (Grund et al., 2024; Singer–Brodowski et al., 2022), demonstrating how TL is

often a difficult endeavor that brings about *edge* emotions such as anger, confusion, uncertainty, and discomfort (Grund et al., 2024; Mälkki, 2019). Indeed, the transformative process is marked by struggle; it is an “epiphanic, or apocalyptic, cognitive event—a shift in the tectonic plates of one’s assumptive clusters” (Brookfield, 2000, p. 139). It requires stepping out of one’s comfort zone and confronting deeply ingrained and oftentimes long-held beliefs, assumptions, and values to see which are rooted in problematic paradigms (Brookfield, 2009; Hoggan et al., 2017). However, Lange clearly expresses “that at the point of greatest instability lies the greatest potential” (Lange, 2012, p. 203).

After experiencing a disorienting dilemma, individuals often undergo a period of critical reflection. Inspired by Paolo Freire’s concept of *conscientização*, critical reflection is considered key to TL, and it “involves rethinking deeply held, and often distorted beliefs, about who we are and our lifeworld” (Feriver et al., 2019, p. 46). Reflecting critically does not always lead to transformation (Eschenbacher, 2020), as reflection can occur at varying depths, and a more nuanced understanding of one’s already existing mental structures is not necessarily transformative (Brookfield, 2000; Sterling, 2011). Reflexivity, however, or the capacity to reflect on one’s existing assumptions, convictions, and value judgments in relation to their structural and cultural environment—and vice versa (Archer, 2007)—has transformative and emancipatory potential (Finnegan, 2019, 2022). It implies standing outside oneself to better understand who we are and *how* we are in reference to *where* we are (Bornemann et al., 2020). As Sterling puts it, “the experience of seeing our worldview rather than seeing *with* our worldview” (2011, p. 23, emphasis in original) is an exercise of individual empowerment through the exercise of reflexive *agency*, that is “knowing and possessing the power and disposition to act in or towards one’s real interests” (Finnegan, 2019, p. 53).

Critical reflection is then followed by discourse, where an individual leverages the power of the collective to better examine or appraise frames of reference under question. Mezirow’s conception of discourse in TLT was greatly influenced by Jürgen Habermas’ theory of communicative action and his ideas on language, lifeworlds, and domains of learning. Discourse involves engaging in constructive dialogue with others who serve as “critical mirrors” (Brookfield, 2000, p. 146) to clarify, justify, or challenge the meaning of an

experience (Mezirow, 2000). For discourse to be fully realized, Mezirow (2000) outlined conditions that participants must have:

1. accurate and complete information;
2. freedom from coercion and distorting self-deception;
3. openness to alternative points of view: empathy and concern about how others think and feel;
4. the ability to weigh evidence and assess arguments objectively;
5. greater awareness of the context of ideas and, more critically, reflectiveness of assumptions, including their own;
6. an equal opportunity to participate in the various roles of discourse;
7. willingness to seek understanding and agreement and to accept a resulting best judgment as a test of validity until new perspectives, evidence, or arguments are encountered and validated through discourse as yielding a better judgment (pp. 13–14)

Thus, through a constructive environment marked by rational discourse (Brookfield, 2000), an individual could harness the collective ideas, opinions, and experiences of the community to critically reflect on their related frames of reference and modify their actions based on their insights (Mezirow, 2000). This recalls Wals' (2010) concept of *gestaltswitching*, which describes the capacity of an individual to shift from different ways of thinking or *gestalts*, whether cultural, spatial, temporal, or disciplinary. In fact, dialogue is regarded as vital in seeking novel and relevant solutions to the problems of the 21st century (Wals & Schwarzin, 2012). Dialogue has been described in the literature in other ways such as “edifying conversations” (Arcilla, 1995, as cited in Singer–Brodowski et al., 2022), whose purpose self-improvement through reasonable conversations; transformative conversations which includes both interpersonal conversations (self-reflection) and rational discourse (Eschenbacher, 2020); deliberative discussions (Monroe et al., 2019); and epistemic discussions or “how do we know what we know” talk (Holthuis et al., 2014). Engaging in such epistemic discussions in classrooms has been shown to improve learning gains (Holthuis et al., 2014), showing promise in their use, even for conceptual knowledge. In addition, dialogues could lead to perspective change, either by broadening one's perspective, learning how to shift between

different perspectives—and thus being more empathetic as a result, and transcending one’s perspective—that is, transformation (Wilhelmson, 2006). In fact, McCowan (2023b) argues that the two fundamental elements to transformative educational spaces are critical questioning and deliberation, which are characteristic of discourse. They are stepping stones to the construction of new possibilities because of how they enable reflection of one’s assumptions, perspective-taking, and the possible restructuring of one’s beliefs, values, and perspectives (McCowan, 2023b). What is common in all the conceptions of dialogue is the exercise of grappling *with* others to have a deeper understanding of oneself *through* others, which is what separates discourse from everyday conversation. Discourse is then followed by either the reorientation or *transformation* of one’s mental structures or the reinforcement of prior assumptions, revealing parallels with the morphogenetic approach where transformation is described as morphogenesis and the reinforcement of the status quo as morphostasis (Archer, 2020). These parallels will be further discussed in the section on [Morphogenesis: Transformation through a critical realist lens](#). In either case, the practice of reflexivity through critical reflection and discourse, whether it results in morphogenesis or morphostasis, nevertheless engages individuals in reflective action (Anand et al., 2020b, 2020a; Mezirow, 2006; Singer–Brodowski, 2023). However, critical reflection, a disorienting dilemma, and discourse describe only one of the three processes of transformation: the cognitive/rational process of transformation; two other processes—that also reflect the perspectives of TL—include extrarational and social critique (Stuckey et al., 2014). Extrarational processes involve arts-based approaches, engaging the emotions, and inculcating spiritual or imaginal processes, while social critique processes include practices that unveil oppressive behavior, critique dominant ideologies, and empower individuals and groups towards social action (Stuckey et al., 2014).

What is evident in the ten-step process is that TL occurs at the intersection of two worlds: the individual and the social (Eschenbacher & Levine, 2022; Finnegan, 2019; Sterling, 2001). Transformation begins as an interior, oftentimes emotional disorientation as an individual grapples with edge emotions during their self-reflection (Mälkki, 2019; Singer–Brodowski, 2023). This internalized process then extends to their social world; to clarify and challenge their paradigms in question, they engage in dialogue, debate, and collaborative

problem-solving with others who hold differing perspectives. Even if the reorientation of frames of reference is an individual endeavor, the process and outcome of transformation has social implications and repercussions (Eschenbacher & Levine, 2022; Finnegan, 2019).

Looking into the outcomes of transformative learnings, [Stuckey et al. \(2014\)](#) posited four: acting differently; having a deeper self-awareness; having more open perspectives; and experiencing a deep shift in worldview. To differentiate a transformation from mere change or transition, Hoggan et al., (2017) suggested depth, breadth, and relative stability as criteria. Depth refers to how much an experience impacts one's habit of mind (or meaning perspective). Breadth refers to how far the changes extend in terms of an individual's contexts—whether it affects their personal, practical, or political spheres. Lastly, relative stability refers to the durability of that change, as transformative change is neither short-lived nor temporary. In describing the outcome of transformation, Stein (2019), highlights the relational definition of TL according to O'Sullivan (2019):

Transformative learning involves experiencing a deep, structural shift in basic premises of thought, feelings, and actions. It is a shift in consciousness that dramatically and permanently alters our way of being in the world. This shift includes our understanding of ourselves and our self-locations and our relationships with other humans and with the natural world. It also involves our understanding of power relations in interlocking structures of class, race, and gender, our body awareness, our visions of alternative approaches to living, and our sense of possibilities for social justice, peace and personal joy (O'Sullivan et al., 2002, p. xvii as cited in Stein, 2019)

Looking back at the definition of sustainability that guides this research, several echoes can be heard—relationality, social and environmental justice, fairness. TL is thus a valuable framework for understanding sustainability transformation in the face of CEC as they both require deep, structural, and long-lasting shifts facilitated by the critical examination of problematic paradigms and the resulting revision of action (Feriver et al., 2019; Gajparia et al., 2022). As Fazey et al., (2021) point out, the CEC is not only a physical threat, but also an existential one, as it challenges our deepest assumptions about who we are and what constitutes our world, what we know, and what we believe in—encompassing ontological, epistemological, and axiological dimensions (Walsh et al., 2021). **Ontologically**, the CEC

compels us to reconsider who we are as humans, individually and collectively, and what our role is in relation to other beings with whom we share this planet (Fazey et al., 2021; McCowan, 2023b; Singer–Brodowski, 2023). It forces us to confront the interconnectedness of all beings on Earth and embrace an ecological worldview, where we see ourselves not as separate entities but as integral parts of a complex web of life (Buckton et al., 2023; Harmin et al., 2017). **Epistemologically**, CECs challenge the foundations of our ways of knowing by questioning the limits of human cognition and the adequacy of our current modes of understanding and sense-making (McCowan, 2023b). It makes us question how development and growth are defined and bring into question whose knowledge counts (Harmin et al., 2017). **Axiologically**, we are called to ask, “*What is valuable?*” and “*What is worthy of preservation?*” It also brings to the fore questions on justice, whether social, intergenerational, or cognitive. In arguing the importance of TL in sustainability research and practice, Bornemann et al. (2020) contend:

far-reaching, cross-sectoral, and cross-level changes of the system itself are required: we need a complete restructuring of economic production and consumption patterns, and a re-orientation of the individual and collective values and mindsets that produce them (p. 1)

However, it is important to note that Mezirow made no mention of a specific worldview to be adopted or content to be taught—the focus was on the skills and habits to be developed to hone learners’ transformative agency to prevent TL from being used as a tool for indoctrination rather than emancipation (Hoggan & Kloubert, 2020). In addition, Mezirow highlighted that not every learning experience has to lead to perspective transformation, as TL is often uncomfortable, terrifying, and even threatening (Hoggan et al., 2017; Singer–Brodowski, 2023).

A critique of TL

Despite the continued integration of TL in sustainability research and education, it has received criticism for its focus on individual transformation, overlooking the impact of broader structural and cultural conditions—power dynamics, institutional barriers, social inequalities—on learning experiences (Illeris, 2014). Additionally, TL has not given as much attention to the emotional and extra-rational aspect of transformation, concentrating mainly

on cognitive processes such as dialogue and reflection, when transformation is as much affective as it is cognitive (Mälkki, 2019). Another criticism of TL concerns the *how* of transformation, especially in educational settings. It is unclear how a disorienting dilemma can be prompted in a learning setting and what the mechanisms that could foster/hinder TL are. These drawbacks could be circumvented by drawing from other theories and pedagogical approaches such as third space theory and dialogic pedagogy, both of which will be explained in the subsequent sections. Another means of addressing the weaknesses of TL, especially in its lack of holism, is through TSL that recognizes the holistic dimension of transformation in educational settings and by anchoring TL on robust social theories such as CR.

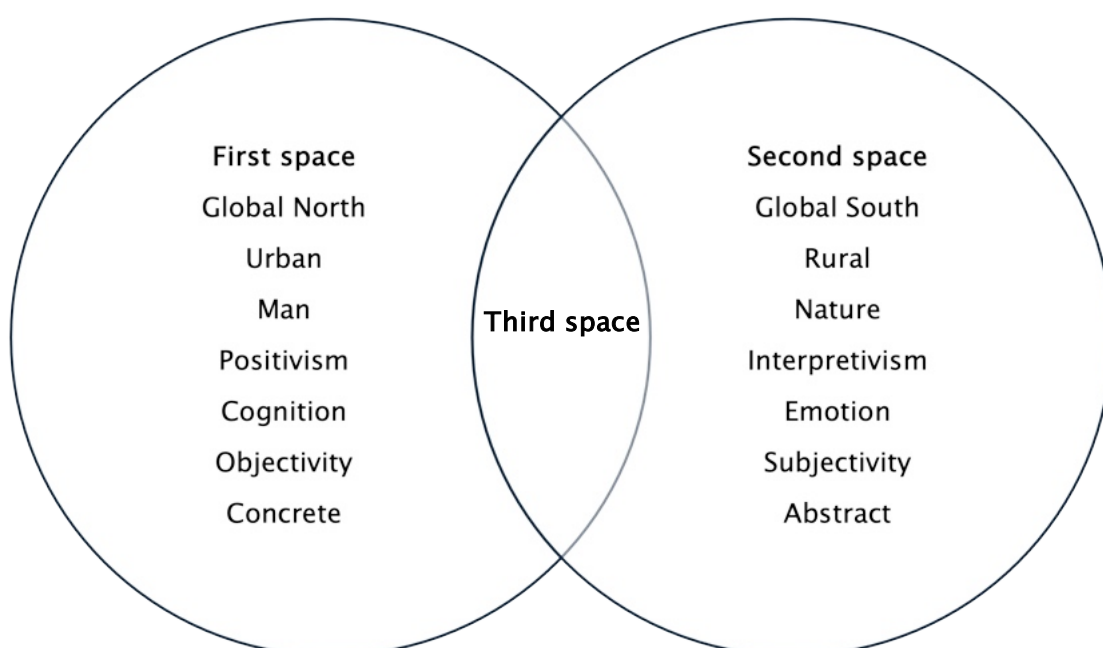
Third space learning

The literature on TL has shown how tension, conflict—the friction between an old, problematic frame of reference and a new one—could be a starting point for transformation. Although grappling with new paradigms could be uncomfortable for learners, it could also be empowering, and the role of educators is to facilitate such empowerment in their learners by creating spaces inside academia where everyone—themselves included—is encouraged to probe difficult issues, engage in critical conversations, and question others and themselves (Singer–Brodowski, 2023). Such spaces are not physical, fixed locations but are constructed practices (Anand et al., 2020b; Singer–Brodowski et al., 2022). Describing them as *transformative* spaces, Pereira et al. (2020) suggest that they should be “designed to generate ideas that challenge the status quo and the dominant systems, and hence change the systems conditions that created the problems in the first place” (p. 174). Transformative spaces are fertile ground for TL, as only at the convergence of different—even conflicting meaning perspectives within a “safe enough” (Pereira et al., 2020, p. 162) space can paradigmatic tensions freely emerge and be subject to the critical reflexivity and discourse that engender radical transformation (Finnegan, 2022; Scoones et al., 2020; Singer–Brodowski, 2023). This entails having their learners look at their epistemological positions and individual experiences, critically reflect on them, and engage in dialogue with others (McCowan, 2023b).

This idea of a transformative space where tensions can be explored reflects the concept of third space (1994), described as a “hybrid location of antagonism, perpetual tension, and pregnant chaos” (Satchidanandan, 2002, p. 52). The term was popularized by

the postcolonial theorist Homi K. Bhabha in his seminal work *The Location of Culture* (2004), where he used the idea of the third space to challenge binary constructions of identity and culture, arguing that cultural identities are fluid and constantly negotiated in dynamic, in-between, *liminal* spaces. Inspired by Henri Lefebvre's *The Production of Space* and Victor Turner's idea of *liminality* or limen, Bhabha's *third* space describes a state of in-betweenness, a "border zone" (Kalua, 2009, p. 23) marked not only by restlessness and disorientation but also by "experience and empowerment" (Bhabha, 2004, p. 6, as cited in Kalua, 2009) in the process of negotiating and constructing one's identity (Meskell-Brocken, 2020). What counts as first or second is often arbitrary; what is important is that both represent binary, dichotomized logic. For example, Gutierrez's study on literacy saw traditional notions of academic literacy occupying one space and sociocritical literacy based on the lived experiences of students occupying another (Gutiérrez, 2008). The first space could represent what is shared and accepted in the public sphere, while the second space represents alternative or marginalized ways of being and knowing—implying something more personal, or at least, less accepted. The third space would be the intersection of both spaces (See Figure 2.4), where the boundaries between dichotomies are blurred and "where oppositional categories can actually work together to generate new knowledges [and] discourses" (Moje et al., 2004, p. 5) from their intersection. It is a hybrid space where individuals experience

Figure 2.4 Exploring dichotomies in third spaces



ambiguity, uncertainty, and the suspension of conventional norms and identities as diverse cultures intersect and from where new forms of identity and meaning emerge (Meskell–Brocken, 2020). However, educators must also be careful not to impose their own beliefs on their learners, thereby brainwashing them. Rather than acting as knowledge authorities, they must be “fellow conversationalists” (Singer–Brodowski et al, 2022, p. 10) who demonstrate the possibility of grappling with disorientation and contradiction while working towards sustainable change.

Dialogic pedagogy

The concept of third space has similarities with that of dialogic spaces, described as “the space of possibilities that opens up when two or more incommensurate perspectives are held together in the creative tension of a dialogue” (Wegerif & Yang, 2011, p. 312), which is how third spaces could also be described. Indeed, it has been contended that a prerequisite of dialogic space is “difference—in what is already known, and what is presented—as well as a willingness to engage with difference as we share, hear, and consider what is presented” (Boyd & Sherry, 2024, p. 116), which recalls the liminal spaces of tension, opposition, and restlessness that could also be the seedbed of empowering experiences. Dialogic spaces are characterized by multiplicity—of voices and perspectives—interacting to co-construct knowledge and understanding and produce new meanings (Bouton et al., 2024; Wegerif, 2024). Such spaces or environments are among the components of dialogic education, which comprises pedagogical approaches in which social interaction and dialogue are central to the learning process (Calcagni & Lago, 2018; Cui & Teo, 2021). A learning setting that adopts dialogic education encourages learners to articulate their perspectives and even critique those of their peers—and this opportunity to express, share, and discuss could sharpen students’ cognitive skills (Lefstein & Snell, 2013). A critical review by Cui and Teo (2021) on dialogic education revealed four important components, the first being the **dialogic environment (or space)**. They highlight the importance of establishing an environment conducive to dialogue, asserting the creation of such an environment as a prerequisite to dialogic education (Cui & Teo, 2021). Bouton et al., assert that three conditions must be met in the creation of a dialogic space: (1) the existence of a gap or tension between participants’ perspectives; (2) openness among participants through humility, egalitarian relationships—even with the teacher, and

mutual respect; and lastly, (3) acceptance in following the unpredictable flow of dialogues (Bouton et al., 2024). Meeting these conditions are challenging to teachers as it requires time, flexibility, and leveraging strategies that would make everyone's voice heard. The second component of dialogic education is the **teaching goal**, which provides direction and purpose to the dialogue to prevent it from turning into an aimless conversation. This teaching goal is not fixed and may change based on the third component, which is **classroom talk**. Classroom talk mutually reinforces both the teaching goal and the dialogic environment. A safe dialogic environment enables classroom talk, and continued classroom talk reinforces the dialogic environment in a symbiotic relationship. The last component is **dialogic moves**, strategies that enable classroom talk. They include elicitation, extension, connection, challenging, and critique. Bringing together all four components requires the creation of a learning context that is collective, reciprocal, and supportive, with learning content that is cumulative—where knowledge is co-constructed and built on each other—and purposeful (Alexander, 2006). This teaching approach harnesses the power of talk to increase learning outcomes (Kim & Wilkinson, 2019). Through a student-centered approach, dialogic learning environments encourage knowledge co-construction—whether student-teacher or student-student. Learning is less about transmitting knowledge and more about increasing understanding through shared meaning-making in a democratic space (Calcagni & Lago, 2018).

Pedagogical approaches for EfS

In a literature review on pedagogical approaches for sustainability, Lozano et al., (2017, 2019) organized those with high relevance and known use into three categories: universal; community and social justice; and environmental education. The first category of **universal** approaches comprises pedagogies that apply to all subjects and disciplines, and this includes case studies, mind and concept maps, interdisciplinary team teaching, lecturing, and project/problem-based learning. The second and third categories refer to approaches that are specific to their respective subject or disciplinary area: community service learning, jigsaw/interlinked teams, and participatory action research fall under the **community and social justice** category, while pedagogical approaches under **environmental education** include eco-justice and community, place-based environmental education, supply chain/life cycle analysis, and traditional ecological knowledge (Lozano et al., 2017, 2019). In another

literature review on sustainability competencies and pedagogies, from 172 references, Evans (2019) found 16 pedagogical approaches that support sustainability learning. They were then grouped according to relevance (according to the number of references citing the approach) and confidence by calculating the percentage of references to each approach that were from sources of high relevance. The pedagogies that recorded high relevance and confidence were the following: (1) project or problem-based learning in a community or organization; (2) integrative learning (inter and trans-disciplinary); (3) project or problem-based learning in class; (4) active learning (in class); and (5) collaborative learning. Those with medium relevance and high confidence were: (6) service learning; (7) research-based learning; (8) critical text/information analysis/interpretation; and (9) reflexive learning. Other approaches that had low relevance and/or confidence were discussion-based learning, writing-intensive learning, case studies, experiential learning, creative work/expression, learning communities, internships/apprenticeships (Evans, 2019).

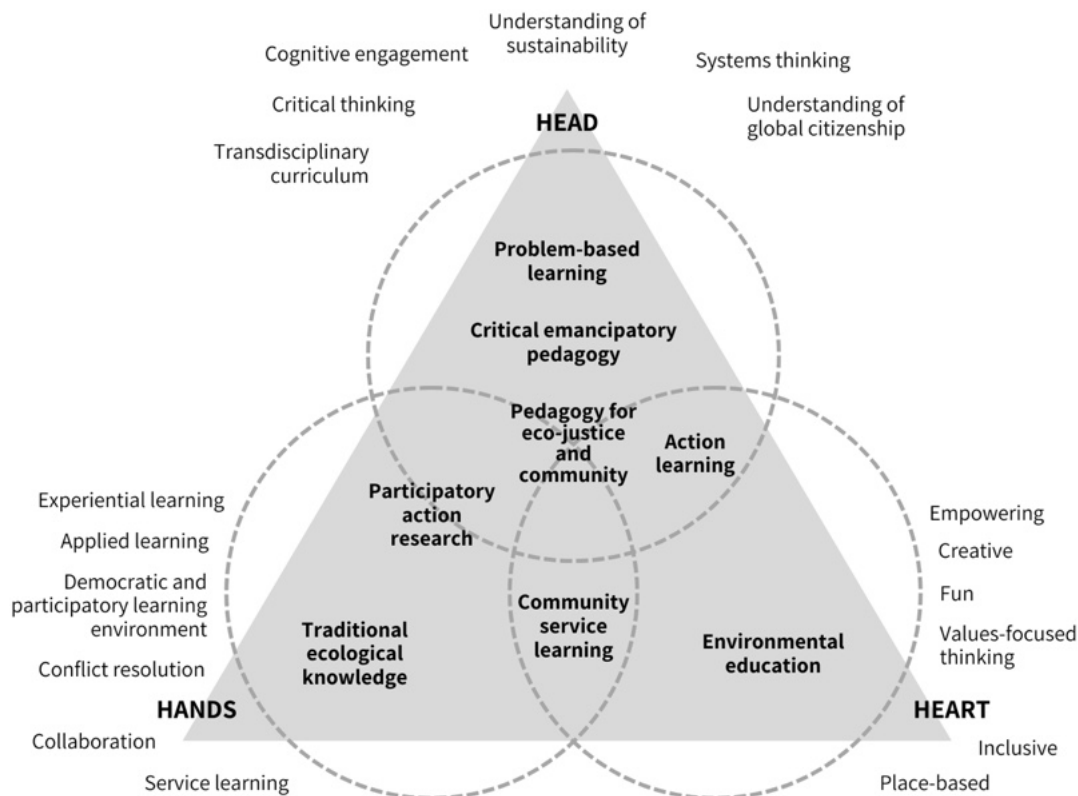
When juxtaposed with the broad literature on TL and transformation, parallels can be found in terms of pedagogical approaches, outcomes, and conditions. These include an action-oriented pedagogy and problem orientation (Feriver et al., 2019) through transformation labs (Scoones et al., 2020); inter- and transdisciplinarity through an ecology of knowledges (Feriver et al., 2019; McCowan, 2023a; Scoones et al., 2020); participatory and collaborative approaches such as discussions (Vare & Scott, 2007), dialogues/discourse or edifying conversations (Mezirow, 2006; Scoones et al., 2020; Singer-Brodowski, 2023) and criticality and reflexivity (Baumber, 2022; Bornemann et al., 2020; Finnegan, 2019, 2022; Howlett et al., 2016; McCowan, 2023b). Others that sustainability learning could adopt from the TL literature are self-directed, autonomous learning (Feriver et al., 2019) and the linking of formal and informal learning environments (Feriver et al., 2019; Singer-Brodowski, 2023). Some of the aforementioned learning conditions and pedagogical approaches have been receiving great attention in recent sustainability transformation literature, specifically those pertaining to transdisciplinary learning (Barth et al., 2023; Baumber, 2022; Klein, 2014), systems thinking (Howlett et al., 2016), and place-based approaches (Grenni et al., 2020; Horlings, 2015, 2016). Overall, pedagogical approaches and learning conditions that aim for TL oriented on sustainability must seek to be critical, relational, and emancipatory (Wals,

2020). One way these have been organized is through the TSL framework put forward by Sipos et al., (2008).

Transformative Sustainability Learning (TSL)

The TSL framework (Sipos et al., 2008) combines TL and SE pedagogies into a framework organized by the three domains of learning as conceptualized by Bloom (1956): (1) **cognitive** that pertains to theoretical understanding of sustainability concepts and issues (head); (2) **affective** that comprises emotions, values, and motivations (heart); and (3) **psychomotor** that involves application of theoretical learning through the development of practical skills and hands-on, manual activities (hands). The framework also builds on Orr's exhortation for a connective education towards EfS, connective in the sense of bringing together the various disciplines as well as being able to "connect disparate parts of the personality: intellect, hands, and heart" (Orr, 1992). It posits that to enhance ecological, social, and economic justice in HEIs, structural transformations in the way we teach are necessary (Burns, 2015; Sipos et al., 2008). Taking on a TSL approach would transgress the transmissive, fragmented, disconnected, and competitive dominant models and foster the kind of learning that will become the groundwork for proactive social actions (Burns, 2015). It would also address the criticism of TL as describing transformation mainly from a psycho-critical perspective that focuses solely on cognitive processes and reflection in transformation while neglecting other dimensions (emotional, cultural, spiritual, biological, etc.) that impact a learning setting (DeSapio, 2017). The classification according to the domains is similar also to that of Van Poeck et al. (2020), who in their exploratory review of learning in sustainability transformation, categorized learning outcomes as either conceptual, practical, or relational—head, hands, and heart, respectively. In their conceptualization of TSL, Sipos et al. (2008) visualize these domains as a Venn diagram, to show the possibility for synergies in the overlaps (see Figure 2.5). They also listed learning objectives (scattered around the figure).

Figure 2.5 The TSL pedagogy adapted from Sipos et al., (2008)



Pedagogical approaches and learning conditions in the **head dimension** (cognitive domain) encompasses “knowledge, thinking, reflection, and expansion of perceptions” (Anderson & Tonner, 2023, p. 166) and the ability to make sense of sustainability knowledge and theories (Horlings et al., 2020). According to Sipos and colleagues (2008), learning objectives under this domain include cognitive engagement, a transdisciplinary curriculum, critical thinking, systems thinking, understanding of global citizenship, and understanding of sustainability. Activities that engage the head could include student research projects, class discussions, multimedia learning materials, case studies, and lectures (Wakefield et al., 2022).

The **heart dimension** pertains to the *affective* domain, that which enables emotions, values, care, and motivations (Anderson & Tonner, 2023; Horlings et al., 2020). It refers to the *why* of one’s actions or behaviors—what would compel students to act or live sustainably. This entails establishing emotional connections and creating meaningful learning experiences that build student empathy and inspire action, and these could include sharing of personal experiences tied to sustainability or visiting initiatives or centers that are already engaged in sustainability-oriented work (Anderson & Tonner, 2023; Wakefield et al., 2022).

A TSL pedagogy seeks to engage students cognitively (head) via a transdisciplinary curriculum that incorporates systems thinking concepts in deepening learners' understanding of sustainability. It needs to be done in a collaborative and participatory learning environment where learners can apply these concepts—for example, by engaging with a community through service learning (hands). Lastly, the educational experience should foster learners' creativity and have them reflect on their values (heart). These learning objectives could be used to assess sustainability programs using a decision matrix, evaluating how much each objective was addressed on a scale from 0 (not addressed) to 4 (exemplary). The goal of this tripartite approach is to effect change in the behavioral domain (Sipos et al., 2008). In addition, they studied established sustainability and transformative pedagogies and mapped them on a ternary diagram (text in boldface positioned within the triangle) based on TSL to demonstrate how these existing examples activate the different dimensions of the TSL framework. Their mapping also shows how these pedagogies are not *fixed* and would depend on their use in practice.

Finally, the dimension of **hands** reflects how knowledge (head), emotions, and values (heart) are translated into behaviors or actions. While the cognitive domain uncovers the *what* of sustainability, the affective domain the *why*, and the situated domain the *where*, the behavioral domain focuses on *how*—the *process* of manifesting or prompting and individual's understanding and convictions into action in a specific place (Horlings et al., 2020). The learning objectives under this domain established by Sipos et al., (2008) were divided into three levels: **personal** (experiential learning, applied learning); **classroom** (democratic and participatory learning environment, conflict resolution), and **community** (collaborative, service learning), which has parallels with O'Brien's three spheres of transformation: personal, practical, and political (2018). Instructional strategies that target the *hands* could include civic engagement tasks, planning and/or implementation of community-based solutions, evaluating individual or group carbon footprints, or creating diagrams to understand sustainability-oriented values or behavior (Anderson & Tonner, 2023; Wakefield et al., 2022).

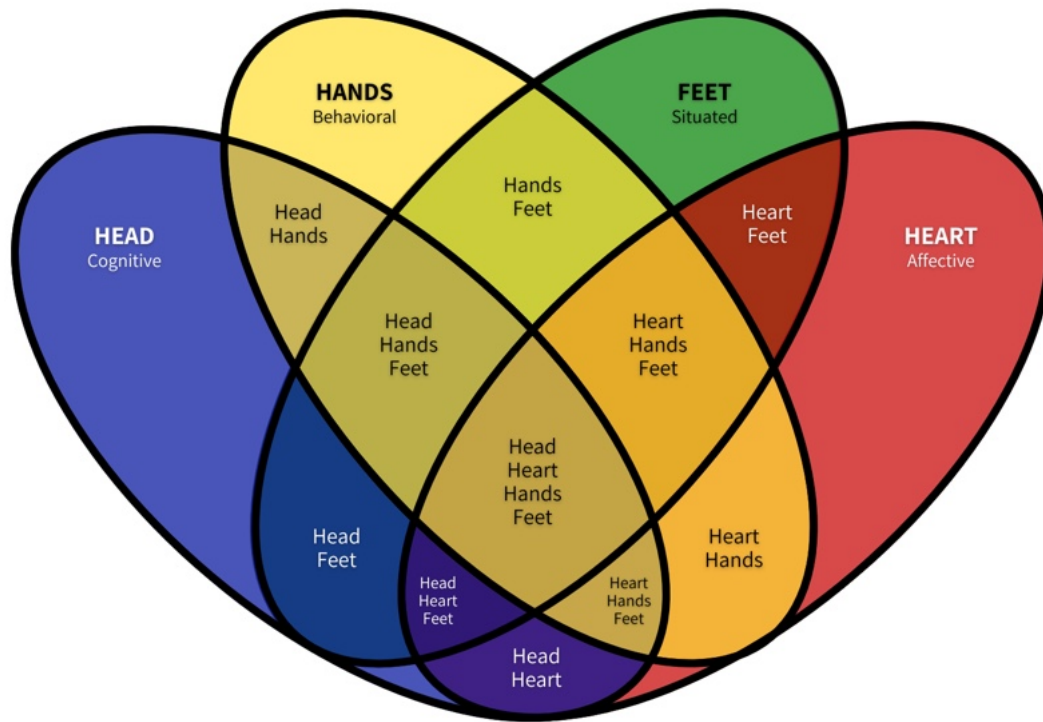
Since the publication of the TSL framework, other scholars have attempted to build on it, expanding the hands dimension to include any form of skill-building or action, thus being reimagined as the behavioral domain rather than psychomotor (Anderson & Tonner, 2023;

Singleton, 2015, 2024; Wakefield et al., 2022). Singleton (2015, 2024) added another element to the TSL framework—the concept of place. In her model, the interaction of the head, hands, and heart is always tied to a place, which she describes as an “authentic context for learners to build meaning and belonging” (Singleton, 2024, p. 5). In the original TSL framework, place-based learning fell under the affective domain, yet given the burgeoning research on place-based approaches to sustainability (Grenni et al., 2020; Horlings, 2015, 2016; Horlings et al., 2020; Singleton, 2024) there is a need to reflect on the importance of place in shaping sustainability actions, emotions, and even knowledge. Place has been defined as:

the unique, multilayered network of living systems within a geographic region that results from the complex interactions, through time, of the natural ecology (climate, mineral and other deposits, soil, vegetation, water and wildlife, etc.) and culture (distinctive customs, expressions of values, economic activities, forms of association, ideas for education, traditions, etc.) (Mang & Reed, 2012, p. 28)

From this definition, place does not refer to a physical, concrete location but also includes intangible elements that emerge from it, such as meanings and values—a sense of place and place values (Grenni et al., 2020). Given its importance, current research has integrated this dimension of place to the TSL framework, particularly those by Singleton (2015, 2024), who expanded the TSL framework to show how education that engages the head, hands, and heart is always situated, and Horlings et al., (2020) whose model captures the different roles of a researcher in place-based sustainability—the embodied researcher, in other words. The latter model also integrates the concept of relationality in the feet dimension, as it pertains to engaging in and being responsible for the “inhabitants” of a place, whether human or non-human (Horlings et al., 2020). With no intention of reinventing the wheel but only demonstrating the synergies of these four dimensions in a classroom setting, the author of this dissertation revised the TSL framework to weave in the situated domain (feet) to represent place-based pedagogies, as shown in Figure 2.6. While feet was part of the affective domain in the original TSL framework (Sipos et al., 2008), it was added to reflect the framework for the embodied researcher conceptualized by Horlings et al. (2020) to describe researchers whose head, hands, heart, and feet are activated in their work. Indeed, the inclusion of **feet** highlights the importance of place-based sustainability or engagement in places—cultivating

Figure 2.6 The revised TSL framework: Head, Heart, Hands, and Feet



a sense of place and grounding them in a context. Thus, the **feet** dimension represents the *where* to which one's knowledge and emotions are directed, specifically the surrounding connections and communities that shape and are shaped by a person. It is not an encompassing dimension as in Singleton's model but is an integrated part of this multi-dimensional framework, and it can either stand alone or have synergies with other dimensions. Examples of pedagogies that connect learners to a place are those that fall under place-based education (PBE), a pedagogical approach that foregrounds the relationship between the learning process and its context, including even the environment beyond the walls of a classroom or a school. It emphasizes the interrelatedness and the importance of place—not just its tangible features, but also the meanings, values, and experiences underlying it—to the learning process (Yemini et al., 2023). Examples of PBE are community-based learning, experiential learning, and service learning. Other strategies include nature walks, field visits to local areas, or desk research on the history of communities or areas.

Aligned with the literature on TL and SE, TSL regards learning as a means to empower learners to question and change problematic frames of reference, which could, in turn, lead to social action (Harmin et al., 2017; Leal Filho et al., 2018; Sipos et al., 2008). These pedagogies should engage students' cognitive (head), behavioral (hands), affective (heart),

and situated (feet) domains (Singleton, 2015, 2024; Sipos et al., 2008) and impact their practical, political, and personal spheres (O'Brien, 2018).

Virtual exchange as transformative praxis

Such a pedagogy that could be potentially transformative toward sustainability is VE, a form of technology-enhanced learning (TEL) that leverages technology to engage “groups of learners in online intercultural interactions and collaboration projects with partners from other cultural contexts or geographical locations” (O'Dowd, 2018, p. 5). Thanks to advancements in Web 2.0 technologies, the number of similar educational programs that use technology to connect learners from different geographies has flourished, albeit using different terminologies such as telecollaboration, Online Intercultural Exchange, e-tandem, teletandem, globally networked learning, and COIL (Helm, 2018; Mudiamu, 2020; O'Dowd, 2018a). According to O'Dowd (2022), through the Virtual Exchange Coalition that brought together different VE practitioners, the term *virtual exchange* was established to encapsulate the myriad “technology-enabled, sustained, people-to-people education programs” (as cited in O'Dowd, 2022, p. 13). He then describes VE as:

an umbrella term which refers to the numerous online learning initiatives and methodologies which engage learners in sustained online collaborative learning and interaction with partners from different cultural backgrounds as part of their study programs and under the guidance of teachers or trained facilitators (O'Dowd, 2021) (2022, p. 11)

VE found its beginnings in the United States through the 1988 iEARN initiative that connected youth from New York and Moscow during a period of conflict and tension between the United States and then-Union of Soviet Socialist Republics (Helm, 2018; Himelfarb & Idriss, 2011; O'Dowd, 2018a). This initial aim of conflict transformation is what also spurred the creation of Soliya's Connect Program, which sought to ease political and religious tensions post-9/11 through intergroup dialogues (Himelfarb & Idriss, 2011). However, VE flourished in use during the late 1990s in the field of foreign language education through the telecollaborative model of VE, which dominated up until 2010 (Jager et al., 2021). Since then, VE has been used in other areas other than foreign language learning, such as teacher education and training (Hildeblando Júnior, 2023), pre-service teacher education (Baroni et

al., 2019; Glimäng, 2024), management and business (Barbosa et al., 2020; Ferreira-Lopes et al., 2022; Srouf et al., 2023), indigenous knowledge systems (Leonard & Mercier, 2014); climate change education (Adefila et al., 2021), to name a few.

As a form of TEL that connects learners from diverse geographic locations, VE has become a space where multiple realities, backgrounds, and experiences—especially those that are normally underrepresented—could interact. Sustainability-themed VEs could thus represent an EfS pedagogy in two ways: by weaving in sustainability-oriented topics into a syllabus, it could enable learning *about* sustainability; and by including multiple ontologies and epistemologies in a single learning space, it could embody a socially sustainable form of learning. In addition, given the environmental cost of international mobility in terms of carbon footprint, it could also be a more environmentally sustainable form of learning (Campbell et al., 2022; McCowan, 2023a; Nevins, 2014; Nevins et al., 2022).

Typologies of VE

VEs encompass a diverse range of formats and approaches, with various curricular aims. Consistent in most, if not all VEs, is a learning approach grounded on experiential forms of learning, collaboration, intercultural learning, and critical inquiry and discussion (Mudiamu, 2020). VEs have been classified in different ways (See Table 2.6): according to their subject orientation (Jager et al., 2021), main curricular aim (Helm, 2024), education support (Helm & Beaven, 2020), and format or mode of delivery, whether fully online, blended, or hybrid.

Helm's (2024) classification of VEs is based on their main curricular aim: dialogue-based, comparative, and challenge-based. **Dialogue-based VEs** prioritize intercultural communication and understanding through structured—and oftentimes facilitated—discussions (Collins et al., 2022; Hildeblando Júnior, 2023). Dialogue is both the vehicle and the endpoint; it is dialogue for the sake of dialogue. Learners are not required to work on a final task or project, as the point of the exchange is for them to engage in meaningful, deliberative discussions anchored by smaller tasks or activities to explore a particular theme or issue from multiple points of view (Helm, 2024). Key to fostering meaningful dialogue-based exchanges is an atmosphere of openness, where learners can safely and bravely express their doubts or speak about complex issues such as sustainability (Glimäng, 2022).

The second category of VE is the **comparative approach**, which involves the

comparison and analysis of an issue, concept, or phenomenon across different geographies or cultural contexts (Helm, 2024). For example, one VE (Cioltan–Drăghiciu & Stanciu, 2020) examined and compared the impact of the First World War 100 years later from the perspective of Hungarian and Romanian students. Another had business students from Spain and the Netherlands discuss each of their country’s contexts using Hofstede’s National Culture Dimensions before analyzing a business case (Ferreira–Lopes et al., 2022). Through comparative VEs that explore parallels and contrasts between cultures, students gain insights into diverse experiences and points of view (Helm, 2024). In this type, while dialogue is still a vehicle, the main aim is comparison, which usually requires a joint presentation at the end.

Table 2.6

Classification of Virtual Exchanges

Criterion	Classification	Description
Main curricular aim	Dialogue-based	Engage in dialogue over an important theme or issue; dialogue as both means and end
	Comparative	Compare the situation in different contexts using a central theme or issue
	Challenge-based	Work on a major task together; usually entails finding a solution to a given problem
Education support	Ready-made facilitator-led dialogue	VE is designed and implemented by an external organization that collaborates with universities; usually comes with facilitators for dialogues
	Co-designed exchanges	VE is designed and implemented by collaborating educators
Mode of delivery	Fully online	All activities, whether asynchronous or synchronous, and student interactions are completely online
	Blended	Part of a bigger exchange where only the first part is online while the second part involves face-to-face interaction; also known as blended intensive program
	Hybrid	VE is only a small part of a longer course; participating students from the same university interact with each other face-to-face; only the VE is the online component

Challenge or project-based VEs represent Helm’s (2024) third category, wherein participants collaborate to tackle a real-world problem or undertake a creative project to encourage interdisciplinary collaboration and problem-solving skills while promoting cultural exchange and mutual learning (Barbosa et al., 2020; Heilmann et al., 2023; Srour et al., 2023). This VE exemplifies project or problem-based learning, as the fulcrum is the final output. For

example, one VE brought together language studies students from Finland and ICT and management tourism students from Poland into international teams to work on a promotional tourism video (Háhn & Radke, 2020).

Another typology of VEs classifies them by their design: Ready-made facilitator-led dialogue or co-designed exchanges (Helm, 2021; Helm & Beaven, 2020; Jager et al., 2021). On one hand, **ready-made facilitator-led dialogue**, which Jager et al. (2021) refers to as a “service-provider approach” (p. 6), involves pre-structured and facilitator-led exchanges created by an organization external to the university. The planning, preparation, and implementation of the VE is thus outsourced to an organization specializing in exchanges, and their programs already follow a predetermined curriculum or set of topics on a certain theme (Jager et al., 2021; O’Dowd, 2021). In addition, they usually come with trained facilitators to guide participants through discussions, ensuring that conversations remain constructive and productive (Helm, 2018). Organizations that create such VEs include Soliya, Conversifi, Talkabroad, Sharing Perspectives Foundation, The Stevens Initiative, and Linguameeting, and most of them are part of the Virtual Exchange Coalition (Helm, 2018; Jager et al., 2021; O’Dowd, 2021). On the other hand, **co-designed exchanges** are educator-driven, co-created university courses that either share a syllabus or incorporate an international aspect through the exchange (Helm & Beaven, 2020; Jager et al., 2021). Examples of such VEs include those designed by educators from at least two different universities or those organized with the support of the State University of New York’s (SUNY) COIL Center. Partner educators are in charge of shaping the content, structure, and goals of the exchange, an approach that is better catered to those seeking a more personalized, subject-specific exchange experience, where they can explore a topic of mutual interest and relevance (Helm & Beaven, 2020). While ready-made exchanges provide structure and guidance, co-designed exchanges promote autonomy and collaboration, allowing participants to shape their exchange experience according to their interests and goals.

The last categorization focuses on how such VEs are delivered. While most of the VEs in the literature are fully online, a new type of VE is emerging that combines VE and physical mobility, referred to by Erasmus+ as a *blended intensive programme* or BIP (European Commission, 2024). As preparation for international mobility, students first engage in a VE to

build rapport and learn foundational concepts. An example is the Aeneas Route BIP, a collaboration between six universities from diverse departments studying the Aeneas Route. Their 24 participating students engaged in a VE in June and was followed by a physical exchange in September (Giannotti, 2022).

Opportunities and challenges in VE

More than being a technology-enhanced pedagogy, VE is an opportunity to “learn from difference” and “be taught by difference” (Stein, 2021) through the presence of multiple epistemologies. In fact, Helm’s definition (2018) foregrounds this, where VE is:

a reflective, experiential approach to education which aims to encourage participants to engage with difference, to assess and interrogate information and perspectives, and to explore and negotiate identities, their own as well as those of others, through online, intercultural interactions with distant peers (p. 6)

Through structured online environments, participants engage in dialogue, exchange ideas, and collaborate on shared projects, fostering critical thinking, empathy, and appreciation for diversity (Helm, 2018; Helm et al., 2023; O’Dowd, 2021; Wimpenny et al., 2022). By bringing to the fore a plurality of insights and experiences, these online interactions central to VEs could broaden perspectives, challenge stereotypes, create opportunities for intercultural awareness and sensitivity, encourage collective action, and enhance cooperation on global problems (Rubin, 2017; Simões & Sangiamchit, 2023). One significant advantage of VEs lies in their capacity to foster intercultural communicative competence (Avgousti, 2018; Hackett et al., 2023; Machwate et al., 2021; Oviedo & Krimphove, 2022), enhancing participants’ awareness and sensitivity towards cultural differences (Leonard & Mercier, 2014; Simões & Sangiamchit, 2023) and fostering respect for religious diversity (Elliott-Gower & Hill, 2015). By providing authentic contexts for linguistic practice and interaction, VEs also help learners improve their language and digital skills (Machwate et al., 2021). Other pedagogical opportunities that can be found in VEs are the possibility for actual engagement with local communities residing abroad (Rubin, 2017); being able to prepare students for global employability and multicultural work settings (Oviedo & Krimphove, 2022); interdisciplinary learning (Rubin, 2017); and *glocal* awareness (Adefila et al., 2021; Glimäng, 2024). It has indeed become one of the tools to foster Global Citizenship Education (GCE) by facilitating

meaningful cross-cultural dialogue (Di Sarno García, 2023). On a larger scale, VEs have been used by universities to supplement their internationalization strategies through Internationalization at Home initiatives (Guimarães et al., 2019; Jager et al., 2021; Oviedo & Krimphove, 2022). Furthermore, VEs are an accessible alternative to traditional international mobility programs, promoting inclusivity and democratizing access, as it is a cost-effective option (Gorman et al., 2020; Háhn & Radke, 2020) that reduces the carbon footprint tied to mobility (Jager et al., 2021; McCowan, 2023b; Nevins et al., 2022).

Despite the number of positive learning outcomes and opportunities, VEs encounter several challenges that impede their effectiveness. Language poses an obstacle, whether it is speaking the agreed-upon language or being able to understand when someone else is talking (Barbosa et al., 2020; Hackett et al., 2023; Oviedo & Krimphove, 2022). Varying levels of language proficiency among participants can hinder communication and comprehension, limiting the exchange of ideas and mutual understanding. Moreover, poor internet connectivity (Hackett et al., 2023; Háhn & Radke, 2020; Oviedo & Krimphove, 2022) and timezone differences (Barbosa et al., 2020; Oviedo & Krimphove, 2022) further exacerbate these challenges, complicating scheduling and coordination efforts. Another issue expressed by VE educators is the difference in scale and depth compared to in-person classes (Oviedo & Krimphove, 2022). There is not enough reflection and discourse in VEs and interactions are marked by conflict avoidance rather than constructive criticality (Helm, 2018). Task-oriented VEs such as comparative and project-based VEs, while valuable for achieving specific learning objectives, may inadvertently prioritize task completion over interpersonal interaction, limiting opportunities for meaningful personal engagement (Moalla et al., 2020).

Finally, there is still resistance to VE over the presumption that it would supplant international mobility. Some of these challenges concern implementation and not the practice itself. For example, face-to-face classes with a heterogeneous mix of students do not automatically lead to improved intercultural communicative competence. Educators must still create the space through careful planning and purposeful design. This underscores the need for pedagogical strategies to maximize the potential of VEs while addressing their inherent limitations. In addition, VEs are not meant to replace international mobility but supplement internationalization initiatives by providing a more accessible option to students. At least in

Erasmus + programmes, they are an even more viable alternative when considering the limited and unequal number of mobility grants provided to member countries, issues of security, and the difficulty some students face in obtaining visas (Helm, 2018).

The advantages and opportunities of leveraging VE as a pedagogical tool redress its limitations, and one potential worth exploring is its use as a third space for TL. In the context of VEs, the liminality of third spaces can manifest as learners switch from different *gestalts* as they navigate cultural and disciplinary boundaries, negotiate their identity, and grapple with the complexities and tensions that come with epistemological stretching (Orsini-Jones, 2023; Wimpenny et al., 2022). Such encounters with otherness disrupt conventional modes of thinking and challenge participants to question their assumptions, biases, and preconceptions, showing that this state of liminality that third spaces open up is also a threshold for transformation (Orsini-Jones, 2023; Wimpenny et al., 2022). VEs could thus be a pedagogical tool to effect sustainability transformation. They could serve as transformative third spaces that explore liminality, provoke reflection, and stimulate discourse among participants (Hildeblando Júnior, 2023). VEs have already been studied through the lens of sustainability (Glimäng, 2022), TL theory (Collins et al., 2022; R. Fritz & Marchewka, 2024) and third space theory (Orsini-Jones, 2023; Wimpenny et al., 2022). However, none has viewed VEs through all three, despite their clear overlaps. This dissertation will be an attempt to unpack VEs as third-space pedagogies that promote TL for sustainability.

Critical Realism: Methodological literature review

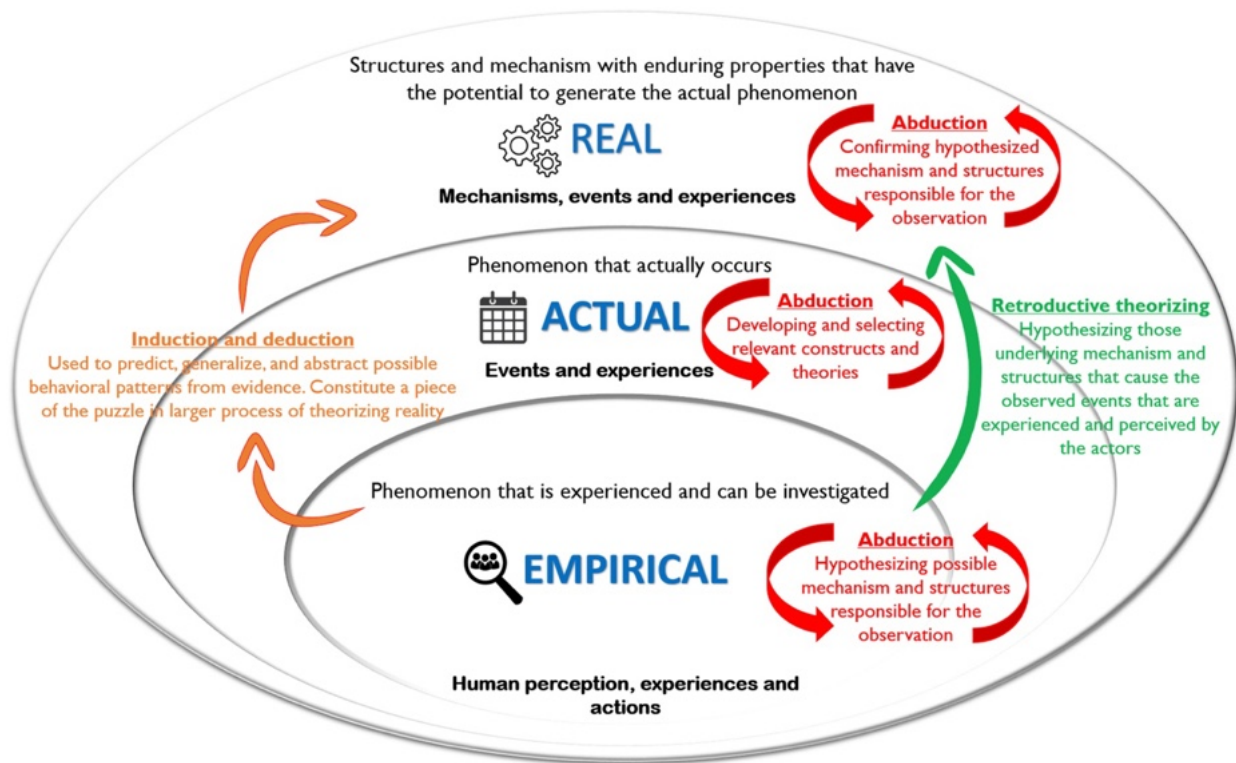
TL theory has been widely used in EfS and sustainability transformation research, and to a lesser but not insignificant degree, in VE research. However, TL is still a theory in progress that needs greater ontological examination (Lange, 2018). In a recent literature review exploring the connections between learning and transformation, Van Poeck et al. (2020) contend that there is a lack of conceptual clarity on the relationship between learning and transformation; while some see them as synonymous, others see the latter as the result of the former. There is thus a need to clarify the conceptual foundations of learning and transformation to better understand how VE could potentially enable TSL. Additionally, given that this study involves actors representing diverse backgrounds and cultures, there is a need for a methodology that could deconstruct the wider context beyond the learning space that

might influence the pedagogical process. Critical realism (Bhaskar, 2008/2013) is a metatheory that could help shed light on both these issues, especially since it concerns causal mechanisms beneath what can be empirically observed, change (or *morphogenesis* in critical realist language), and the interactive relationship between structure, culture, and agency.

CR, advanced by Roy Bhaskar for social scientific research, asserts the existence of a reality independent of the knower, presupposing the *intransitive* nature of reality (Bhaskar, 2008/2013). Reality is what it is, regardless of how humans come to know it. On the other hand, human *understanding* of that reality is transitive, a subjective interpretation dependent on the knower's experience—observations, knowledge, beliefs—which is partial and fallible (De Souza, 2018; Wynn & Williams, 2012). Reality, according to CR, is thus stratified, divided into three domains: the real, the actual, and the empirical (Bhaskar, 2008, 2010). Beginning with the domain of the **empirical**, it consists only of those events that can be observed and experienced by human beings (See Figure 2.7). This is nested in the domain of the **actual**, which comprises events, both observable and unobservable, experienced or unexperienced, that occur due to generative mechanisms within the domain of the real. Lastly, the domain of the **real** reflects total reality and consists of the structures and their mechanisms that occur in the world and exist independent of human perception. These generative structures and mechanisms are what cause the events and experiences in the actual domain, either by enabling or constraining them (Aaltonen & Tempini, 2014; Wiltshire & Ronkainen, 2021). At the same time, action in the actual domain can also affect the structures in the real, either by reproducing or changing them.

A stratified reality resists the conflation of what humans know of the world and how the world *actually* is, making CR less prone to committing what Bhaskar refers to as the “epistemic fallacy,” where questions about existence (or ontology) are reduced to queries about human knowledge (Bhaskar, 2008/2013). This stratification of reality and separation of ontology from epistemology culminates into the central tenets of CR: ontological realism, epistemic relativism, and judgmental rationality. In the context of scientific inquiry, **ontological realism**, a term that encapsulates a reality that is intransitive and independent of human perception, is what allows the world to be an invariable, constant, and thereby

Figure 2.7 Inferencing approaches vis-à-vis the stratification of reality



Note: From *Examining the application of retroductive theorizing in realist-informed studies*, by F. Mukumbang, E. Kabongo & J. Eastwood, 2021, International Journal of Qualitative Methods.

discoverable object of knowledge. It is what makes science possible. While ontological realism forms the bedrock of science, the process of scientific inquiry, especially in the field of social science, is characterized by **epistemic relativism**, which posits that the way humans come to know the world is relative. Knowledge *of* and the process of knowing an object is variable (*transitive*), as it is shaped by social, cultural, and historical forces. Knowledge, being subjective in nature, does not however mean that all knowledge claims are equal, and some could be closer to reality others (Fletcher, 2017). CR stresses that epistemic relativism should be underpinned by **judgmental rationality**, which pertains to the possibility of appraising different and even disputed epistemic positions (Bhaskar, 2009; Danermark et al., 2002). In the context of social scientific inquiry, Albert et al. (2020) describes this triad with ontological realism as the basis of science, epistemic relativism as its means, and judgmental rationality as its end:

Critical realism's claim is that science progresses towards the truth, but on the condition that it properly articulates the relation between the relativity of knowledge

and the rationality of judgment. It is only when one assumes that scientists offer different perspectives on the *same* world that epistemic progress is possible. Ontological realism undergirds judgment rationalism, which tempers epistemic relativism (p. 359)

The aims of CR

Therefore, the aim of CR-grounded inquiry is to explain the emergence of a social phenomenon by theorizing the invisible powers that lie in the domain of the actual and more importantly, the real, which are the underlying “natural and social structures, the causal mechanisms, and the conditions that need to exist that would explain the occurrence of the observed events” (De Souza, 2018, p. 26). CR inquiry begins at the empirical domain but attempts to grasp the causal mechanisms that reside in the domain of the real through the use of conceptual tools and processes such as abduction, retroduction, and retrodiction (as seen in Figure 2.7)—to be further explained in the next section. The task of the critical realist researcher is to, through informed reasoning, arrive at theories that could explain the causal configurations underpinning observable social phenomena (Fletcher, 2017). To put it simply, critical realists attempt to dig deeper into what can be observed in the empirical dimension to unearth the causal mechanisms that dwell in the real dimension—the *whys* and *hows* to the *whats* in the world—using reflexive conceptual tools to guide this exploration (Aaltonen & Tempini, 2014; Tennant et al., 2020). What sets CR apart from realist evaluation is its “orientation towards transforming power dynamics and emancipatory change” (Van Belle et al., 2023, p. 4).

CR thus differs from positivism in the sense that it does not assert causality based on deduction of observable phenomena in a closed system where variables could be manipulated (Lawani, 2020). To critical realists, while empirical data could be evidence of a phenomenon (*a* occurs because *b* causes it), it may not fully explain it because they only represent one domain of reality. Rather than simply asking how *a* occurs through *b*, CR goes further by asking “what needs to exist in *b* for *b* to cause *a*?”, thus extending the inquiry into the real domain (Danermark et al., 2002; Lawani, 2020). CR is neither similar to interpretivist approaches where causation is established through inductive strategies of subjective experiences and contextualized environments. CR could be considered as a middle ground, a

synergy rather than a compromise of positivist and interpretivist approaches due to the abductive logic that CR utilizes (Lawani, 2020). Deduction seeks to test existing knowledge typically through controlled experiments, while induction seeks to generate new knowledge by starting with specific observations. However, due to their adherence to only what can be observed, relying solely on deductive and inductive modes of inference limits the generation of new connections or the development of novel explanatory theories (Weizenegger, 2022).

Looking back at the stratified dimensions of reality, there are phenomena in the actual and real dimensions that elude human perception; as such, there must be a mode of inference that could attempt to grasp what underlies that which can be perceived—and this what abductive logic tries to uncover. Rather than being data-driven, through abductive logic, CR approaches are theory-driven. Recognizing these structures and mechanisms is essential in understanding how they operate, but understanding, according to Bhaskar, should not be the end (Bhaskar, 2009). Beyond seeking explanations to phenomena, Bhaskar regarded *emancipation* as the ultimate goal of CR in such that “the oppressed could, enlisting the services of emancipatory science, fallibly come to understand the fundamental social causes of their suffering and act to transform them” (Hartwig, 2008, p. xiii). It is what puts the *critical* into realist evaluation. Understanding structures and their underlying mechanisms could aide in either strengthening or changing them. Through awareness and reflexivity can one begin to transform oneself. Knowledge of what drives collective and individual behaviors can guide the process of transforming them (Price & Lotz-Sistka, 2015).

Morphogenesis: transformation through a critical realist lens

Bhaskar’s CR lends, not only ontological depth to the research, but also a methodology to deconstruct the structure, culture, and agents of the context under scrutiny. Archer’s morphogenetic approach could serve as the “methodological complement of Critical Realism’s social ontology” (Archer, 2020, p. 140). According to this approach, social structures both constrain and enable individual action, but individuals can also reflexively shape and transform those structures through their actions (Archer, 2020). Its objective is to explain the historical emergence of social change by exploring the interplay between structure, culture, and agency (Togo & Lotz-Sisitka, 2013). In this approach, Archer organizes social reality into three distinct yet connected components—structure, culture, and agency (2020). Their

interaction is characterized by morphogenetic cycles that involve three steps: structural and cultural conditioning within which an agent operates, followed by the social interaction of the human agent, which then results in structural and/or cultural elaboration, thereby starting a new cycle. Such elaboration could mean social change (morphogenesis) or the maintenance of the status quo (morphostasis). Another important aspect of the approach is its focus on understanding the causal mechanisms behind such changes. By deconstructing the structure–culture–agency relationship through a process of induction, abduction, and retroduction, the emergent properties of each component could be identified and analyzed to better understand their role in the change process (Boost et al., 2022). Through the morphogenetic approach, the transformative processes at play within a given social context can be identified and analyzed (M. S. Archer, 2013), as it provides the framework to understand how structural and cultural factors interact with individual agency to produce changes over time (Brunson et al., n.d.; Newman, 2020; Zhang, 2023).

Since the present study explores TL experiences and their possible causes in two online contexts, adopting a CR paradigm allowed for the identification of the causal configurations that prompted such a transformation—how VE as a pedagogical tool could have enabled it, what the transformation involves, and what other mechanisms outside of the VE could have contributed to it—whether or not the context is understood. Such a transformation is reflected in Archer’s morphogenetic approach, considered as the “methodological complement of Critical Realism’s social ontology” (Archer, 2020 p. 140). In this approach, Archer posits that social reality is a result of the interplay of three main dimensions: structure, culture, and human agency. **Structure** refers to the relational conditions—institutional, social, and material—and practices that have an influence on behavior. Structure and culture both depend on human activity (De Souza, 2018) and they either enable or restrict action (Brönnimann, 2022); but while structure delineates the latitude within which agents can act or behave, culture is what gives weight to human activity by attaching meaning to behavior (Wynn & Williams, 2020). **Culture** represents the realm of ideas (De Souza, 2013) and comprises the shared assumptions, values, meanings, beliefs, and norms within a social context (Brönnimann, 2022; Wynn & Williams, 2020). In describing social mechanisms, Blom & Morén (2011) divide them into three categories: *macro*, collective actions

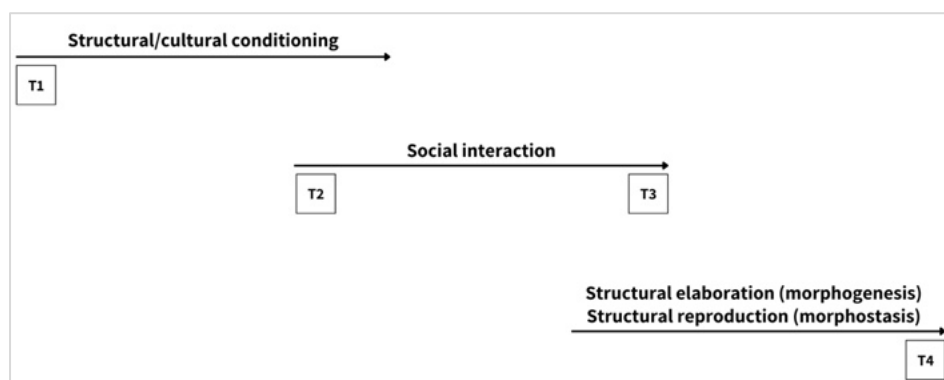
that occur on a societal or systemic level, be it between societies or larger systems within a society (educational system, the religious structures and culture, healthcare system); *mezzo*, collective actions within a group or organization (a university, church, or hospital); and lastly, *micro*, which refers to those social interactions between pairs or small groups. They posit that the driving force behind all these social mechanisms is human intentionality, which can be likened to the last dimension—agency (Blom & Morén, 2011). **Agency** goes into the individual human being and is described as a person's capacity to act that is influenced by social and cultural structures (Archer, 2020). It implies both a person's *sense* of agency or how capable they perceive themselves to be in asserting their own agency as well as the actual *exercise* of their agency (Manyukhina & Wyse, 2019). Awareness of one's agential capacity does not automatically imply its actualization, especially if external structural and cultural conditions might inhibit it. However, as much as agency is shaped—not determined—by structure and culture, so, too, can it shape these external conditions (Fletcher, 2017).

Going back to the core of CR, realist evaluation seeks to provide explanations of causation in a given setting by clarifying the relationship between a context—its structural, cultural, and agentic properties, its mechanisms, and the outcomes, also known as context–mechanism–outcomes or CMO (Pawson & Tilley, 1997). The CMO heuristic was expanded by Blom & Morén (2011) to CAIMeR to include the actors and interventions and replace outcomes with results. A subsequent elaboration by De Souza (2013) deconstructed an action context into four interrelated properties of structure, culture, agency, and relations, and each property could be unpacked to reveal its mechanisms and outcomes. For instance, looking into the mechanisms underlying structure would include an examination of roles or positions, practices, or processes—the material dimension of a context. Meanwhile, looking into those mechanisms underlying culture would entail an examination of the ideas towards all the properties in a given context—what people think or feel about the structure or culture they are in, what their beliefs are concerning their agency or the agency of others or their relations. What these models demonstrate is CR's approach in explaining the context (structure, agency, culture) upon which an intervention or program is embedded to better understand the mechanisms behind what can be observed.

To illustrate the structure–agency–culture (SAC) interplay across the macro, mezzo, and micro categories, in an online university class, **structure** would consist of a teacher or instructor, students, syllabus, established class rules, digital and physical artefacts used to support virtual learning (computer hardware, applications, learning management systems, etc.), as well as larger, institutional structures that influence the classroom (for example, university regulations, internet infrastructure, national policies on online learning, etc.). **Culture** would include the learning atmosphere (whether it's student-centered or teacher-centered), the background of the students (their academic upbringing, field of study, motivations for pursuing online learning), and the community outlook towards online learning. **Agency** would represent how able or empowered individuals within that context perceive themselves to act and how they bring to bear such agency. More specifically, if a student, for example, would like to express a critical yet important opinion during an online discussion, the decision to act on their agency is not only influenced by their own beliefs and disposition toward their agency but is also hewn by both cultural (how accustomed the students are to dialogue, the level of openness to discomfiting or dissonant ideas, the university's position on the war, the dominant belief of the nation) and structural conditions (inclusion of dialogue in the syllabus, university policies regarding freedom of speech, nationwide internet connectivity, etc.). In return, the exercise of their agency also shapes the existing cultural and structural landscape.

The reshaping or the preservation of such landscapes is what Archer's morphogenetic approach seeks to uncover. The inherent properties of SAC cause them to interact in cycles that could either lead to morphogenesis, that is, societal change or morphostasis, which is the maintenance or reinforcement of the status quo (Brönnimann, 2022). The morphogenetic

Figure 2.8 Archer's morphogenetic sequence



sequence (Figure 2.8) consists of three overlapping temporal phases: structural/cultural conditioning (t1–t2), followed by social interaction (t2–t3), and structural/cultural elaboration (t3–t4) (Archer, 1998, 2007, 2020). In Archer's own words, the morphogenetic sequence is described as such:

Every morphogenetic cycle distinguishes three broad analytical phases consisting of (a) a given structure (a complex set of relations between parts), which conditions but does *not* determine (b), social interaction. Here, (b) also arises in part from action orientations unconditioned by social organization but emanating from current agents, and in turn leads to (c), structural elaboration or modification—that is, to a change in the relations between parts where morphogenesis rather than morphostasis ensued. (Archer, 1995, p. 91, emphasis in original)

In this sense, adopting a morphogenetic approach means viewing transformation as oriented in space and time—with a geography and history, rooted in an agent's structural and cultural context, stimulated by their interaction (t2–t3), and effectuated by their reflexive agency and resulting actions (t2–t3). The agent's actions, whether they revise or resume the previous conditioning, affect the context (t4). While the period from t1 to t4 is not fixed, Archer pointed out that they do reflect a prolonged period of time (1995, 2007) that might extend beyond the duration of a dissertation or research grant. Unless they are longitudinal, studies that use the morphogenetic approach may only reflect part of the cycle, and this is, in fact, one of the limitations of the dissertation (to be further discussed in the [Limitations and recommendations for further research](#)).

Nevertheless, such an approach is useful in investigating TSL *in* the classroom without limiting the study *to* the classroom. Paired with the SAC triad, the morphogenetic approach also aids in more consciously viewing participants—in this case, instructors and students taking part in the VE—as agents affected by and having an effect on the world beyond the classroom. Educational programs and interventions, especially those concerning real-world issues such as climate change, do not exist in a bubble. This becomes even more apparent when conducting research involving multiple cultural contexts. Factors outside classroom learning may contribute to or hinder transformative sustainability learning. Taking on a CR stance means that researchers must include factors external to a potentially transformative

classroom learning experience while accepting that what might be captured within the bounds of the research study offers a fractional view; it is not a definitive nor exhaustive explanation but a *dynamic* one that could be subject to further exploration or change.

CR methodologies

Despite the extensive literature on the philosophical and methodological foundations of CR (Fletcher, 2017; Weizenegger, 2022), there is a relative paucity of research on its methodological applications. Danermark and colleagues (2002) proposed five stages in CR explanatory research, while Wynn & Williams laid out five methodological principles when conducting CR-oriented research (2012). Bhaskar and Hartwig (2016) identified the steps in conducting scientific explanatory research through the RRRIREI(C) model, an amalgamation of his previous models, namely RRREI(C)⁷ and DREI(C)⁸ (Bhaskar, 2010). Table 3.1 illustrates these well-known models side-by-side, aligning those steps that are similar across all three. The stages enumerated by Danermark et al., (2002) will be used for this research study due

Table 3.1

Various models in establishing a CR-oriented methodology

Stages in CR Explanatory Research (Danermark et al., 2002; 2019)	Methodological Principles of CR (Wynn & Williams, 2012)	RRRIREIC (Bhaskar, 2016)
1. Description	1. Explication of events	
2. Analytic resolution	2. Explication of structure and content	1. Resolution
3. Abduction/Theoretical redescription	3. Retroduction	2. Abductive redescription
4. Retroduction		3. Retroduction
		4. Inference to the best explanation
5. Retrodiction and contextualisation	4. Empirical corroboration	5. Retrodiction
	5. Triangulation and multimethods	6. Elimination
		7. Identification of antecedents
		8. Correction

⁷ RREI(C), which uses the logic of retrodiction, is an acronym of resolution, abductive re-description, retrodiction, elimination, identification of causal antecedents, and correction (Bhaskar, 2010)

⁸ DREI(C), which uses the logic of retroduction, is short for description, retroduction, elimination, identification of causal antecedents, and correction (Bhaskar, 2010)

to the model's conciseness. What can be gleaned by looking at this table is how they share three concepts fundamental to CR inquiry and research: abduction, retroduction, and retrodiction. Before describing the five stages, these three concepts will first be explained.

It was previously established that when used in research and inquiry, deductive and inductive reasoning used by positivist and interpretivist approaches, respectively, provide an incomplete picture of phenomena because of how their inferences are based solely on what can be observed (Lawani, 2020). This excludes events, experiences, structures, and mechanisms that are invisible but that nevertheless exist, and in fact, understanding what lies beneath could provide deeper insight into the *hows* and *whys* of the observable world. **Abduction** circumvents the limitations of deductive and inductive reasoning by recontextualizing empirical data “within the frame of a new context” (Danermark et al., 2002, p. 91) using existing theoretical concepts that could best explain it (Fletcher, 2017; Wynn & Williams, 2020). Abductive inferences are taken a step further through **retroduction**, an empirical process employed by CR research (Mukumbang, 2021) that hypothesizes the properties of the structures or mechanisms that make a phenomenon possible by asking the question “what properties must exist for X to exist and to be what X is?” (Wiltshire and Ronkainen, 2021, p. 173). CR explanatory critiques are not expected to be exhaustive explanations of the phenomenon, but rather than being considered incomplete or lacking, they are tentative analyses (De Souza, 2018). Thus, CR researchers must maintain openness to further exploration and possible contestation (Aaltonen & Tempini, 2014; De Souza, 2018; Fletcher, 2017). Lastly, **retrodiction** involves a more concrete and less abstract examination of the interaction between the structures and mechanisms that affect the phenomenon under study—how they reinforce, moderate, or counteract each other (Boost et al., 2022; Danermark et al., 2002)—and their effects on events (or non-events) in the actual domain. The hypothesized structures and mechanisms are evaluated in terms of their explanatory power; thus, concrete examples and relevant theories of the mechanisms at play in a specific context must be provided in a retrodictive analysis (Danermark, 2019). Figure 2.7 illustrates the use of these inferencing approaches in exploring the three layers of reality—empirical, actual, and real. As can be seen, while induction and deduction moves in a linear manner (either from

specific to general or vice versa), abduction denotes a back-and-forth in all the layers and retroductive theorizing spans the three (Mukumbang et al., 2021).

To illustrate, if one were investigating intercultural communicative competence in a COIL between two countries and observes that majority of the students from Country A rarely speak up as compared to those from Country B, several inferences could be made by connecting this observation to other datasets such as proficiency level in the language of exchange, gender, educational attainment, course. **Abduction** would make a researcher look beyond the data by using existing concepts or theories as lenses to re-*view* the phenomenon using a fresh set of eyes. For example, using a feminist or postcolonial lens could explain another aspect of this observation—were the students from Country A predominantly women? What about from Country B? Do either of the countries have a colonial history? How might this affect each other's rapport? **Retroduction** broadens the discussion by postulating what must be true of the mechanisms or structures for them to cause the observed phenomenon (Weizenegger, 2022)—it could encompass, on a macro level, the general beliefs each country has on freedom of expression, or even on a micro level, the relationship of each group of students with their teacher or amongst themselves. **Retrodiction** would mean reviewing other contexts where the posited structures and mechanisms are believed to be manifest—for example, another VE where the same phenomenon was observed or a similar phenomenon albeit in an in-person context. It would also entail cross-checking against existing theories

Table 3.2

Stages of CR explanatory research by Danermark et al., (2022; 2019)

Stage	Details
Description	Define the events that comprise the case under study, making sure to differentiate them from empirical experiences
Analytic resolution	Explicate the structural and cultural components and their interaction; search for demi-regularities (Fletcher, 2017)
Abduction/theoretical redescription	Reconceptualize components according to existing theories
Retroduction	Theorize the causal mechanisms producing the events (Aaltonen & Tempini, 2014) via “reflexive trial and error” (Brönnimann, 2022, p. 5)
Retrodiction and contextualization	Investigate relationship between various components and their underlying activating conditions; engage in empirical collaboration to eliminate possible alternatives; evaluate the explanatory power of causal mechanisms

to test how tenable or plausible the hypothesized explanation is. These three form the core of a CR-oriented methodology. In the stages of explanatory research developed by Danermark et al., (2002; 2019), this triad is preceded by description and analytic resolution, and contextualization becomes part of the retrodictive stage. This process was integrated into the research design of the present study to better understand if and how TSL occurred through the two different forms of VE. Table 3.2 details the various stages and the kind of data needed.

As previously mentioned, critical realist studies, despite the breadth of literature on its theoretical foundations, are limited in terms of its practical or methodological applications. Research founded on CR attempts to understand a phenomenon under study through abductive logic, which involves redescribing empirical data using the lens of theory through abduction and hypothesizing structures and causal mechanisms through retroduction. Although the stages of CR-oriented research have already been conceptualized—done so and refined by Bhaskar himself, and built on by other CR researchers—only a few have described what this would look like in the field, particularly for case study research (Fryer, 2022; Wiltshire & Ronkainen, 2021). The contributions of Fryer (2022) as well as Wiltshire and Ronkainen (2021) to CR-oriented thematic analysis were core to the methodology of this study, but their recency betrays the relatively untested approach that this dissertation adopted. Nevertheless, the specificity and rigor prescribed by the combined approaches of Fryer and Wiltshire and Ronkainen for CR-oriented TA could make up for its novelty.

Summary

In conclusion, this chapter provided a review of the literature relevant to the research study, beginning with the concept of sustainability; its application in the field of education, with examples such as the WIA and KSCs; the calls for transformation in HEIs towards sustainability and the theories and or/practices underpinning transformative processes such as TL, third space learning, and dialogic pedagogy; the TSL framework; VE as a technology-enhanced pedagogy that could foster TSL; and finally, the integration of CR as a philosophical and methodological compass.

3. Research Design and Methodology

The previous chapter established the potential of VE for transformative sustainability learning through a survey of the literature on EfS, TL, TSL, and, of course, VE—its history, development, and current uses in higher education. It also expanded on the transformative aspects of VE, such as VE as a third space while, at the same time, highlighting the gap in the research and practice of VE as a TSL pedagogy. This chapter describes how that gap was addressed by expounding on the present study's research design and methods. It begins with the research design, specifically the use of the multiple case study methodology, followed by a description of the research setting, data collection methods and ethical considerations, and the process of data analysis and interpretation.

Research design

Research questions

The core question of the study is: "How does VE foster TL for sustainability in HEIs?" This is further explicated through the following sub-questions:

1. How does VE either foster/hinder TL for sustainability?
2. How does VE contribute to transforming sustainability paradigms?

The first sub-question concerns the *process* of transformation through VE; investigating VE as a transformative sustainability pedagogy entails (1) identifying the pedagogical approaches and learning conditions within the VE that either foster or hinder the transformation of sustainability paradigms and (2) understanding how the transformation occurred through these approaches and conditions. The second sub-question focuses on the *outcome* of the transformation—the sustainability paradigms that were elaborated by the VE and how particularly those paradigms were transformed.

Rationale to the research approach

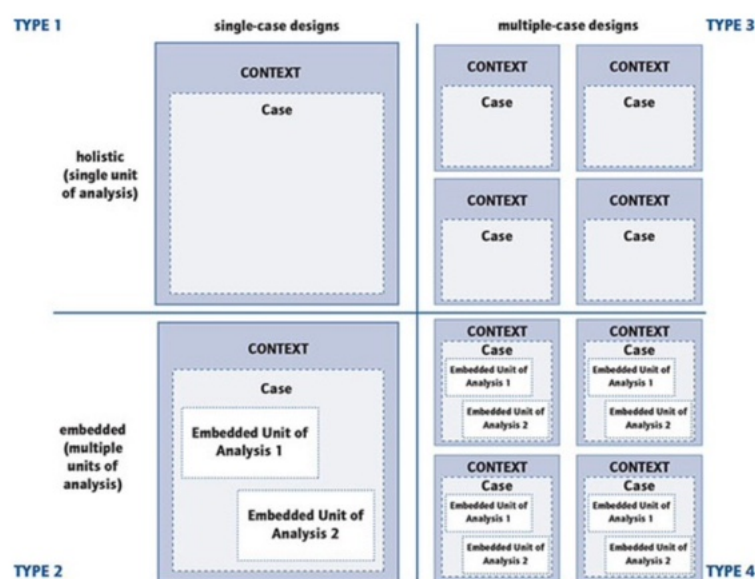
Reflecting a critical realist methodology, this dissertation adopted a convergent (or parallel) mixed-methods (Clark & Ivankova, 2015; Creswell & Creswell, 2017; Guetterman & Fetter, 2018) holistic multiple case study design (Yin, 2018) to examine if and how two types of VEs could foster TL for sustainability. Case studies involve the deep exploration of a social phenomenon, and by doing so, they are suitable in providing more comprehensive, causal explanations (Yin, 2018). As an empirical method, Yin describes the scope of case studies in

two ways: first, case studies aim for depth rather than breadth, as they allow researchers to deepen their analysis of a specific activity, process, or phenomenon within a given timeframe and in its natural context; second, they are used when the boundaries of the phenomenon under study are still unclear and so more contextual information is necessary (Yin, 2018). Data is collected using a variety of methods (Creswell & Creswell, 2017), including documentation, archival records, interviews, direct observation, participant-observation, and physical artefacts that must be used to triangulate information (Yin, 2018). The ability to go deeper with these methods allow rich descriptions that would help in better describing, exploring, or explaining a particular setting (Togo & Lotz-Sisitka, 2013; Yin, 2018). Although case study research has its origins in qualitative research (Harrison et al., 2017), M/M research designs have found applications in case study research due how it reflects the same aim of gaining a comprehensive understanding of a case through a variety of data sources (Creswell & Plano Clark, 2017).

Multiple case study methodology

In addition, this research examines two, therefore multiple, cases through a holistic (see Figure 3.1, Type 3) design where each VE program is viewed globally, as a unit in and of itself (Yin, 2018). Having multiple cases permits a more robust analysis due to cross-case conclusions that can be drawn. Two distinct types of VEs serve as the two cases to be studied: a COIL between two universities that reflects a challenge or project-based VE and an online

Figure 3.1 Case study designs according to Yin, 2018

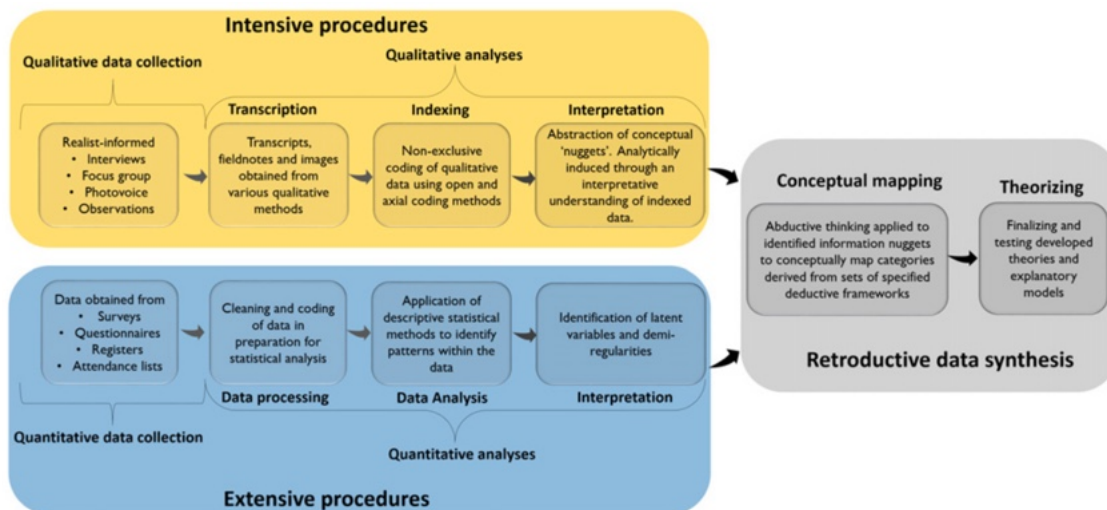


course that is an example of a dialogue-based VE. Although each case falls under the same

umbrella of VE and has similarities with the other in terms of the online setting and the primacy given to multicultural interactions, they differ in various aspects, such as in syllabus design, assessments, pedagogical activities, and teacher presence—to name a few (this will be explained further in the subsequent chapters detailing each case). The general goal and anticipated outcome may be the same, but the processes are widely different. Hence, the notion of *theoretical* replication, where contrasting results are predicted, was applied for this multiple case study rather than a *literal* one that predicts similar ones (Yin, 2018), because of how the two cases that represent contrasting VE strategies reflect viable pathways towards the same outcome of TSL.

Adopting a M/M design means harnessing the strengths of qualitative (QUAL) and quantitative (QUAN) research—narratives could meaningfully expound on numbers, while numbers could provide directness and precision to narratives, thereby providing fuller explanations (Johnson & Christensen, 2020). Furthermore, taking on a convergent design allows for data triangulation and, when properly implemented, would allow the strength of one method to offset the limitations of the other and vice versa (Johnson & Christensen, 2020; Tashakkori et al., 2021). The use of a M/M case study design in this present study is aligned with the aim of critical realist research, as it uses multiple sources of information to better explain a phenomenon, as it allows one to “document generalities *and* the complexity and mechanisms explaining them (Johnson & Christensen, 2020, p. 448, emphasis in original). Nevertheless, the adoption of a research design also necessitates the recognition of its weaknesses. Aside from being expensive and time-consuming (Johnson & Christensen, 2020), it also faces challenges that include inference quality, inference transferability, and multiple validities legitimization (Tashakkori et al., 2021). **Inference quality** refers to the issues of internal validity and credibility in QUAN and QUAL research methods, respectively. This pertains to the quality of the explanations based on the QUAN and QUAL findings. The quality of the inferences is dependent on the quality of the research design and its implementation during the process of gathering data and the rigor employed during data analysis (Tashakkori et al., 2020). **Inference transferability** amalgamates external validity in and research and transferability in QUAL research, and it refers to how much of the conclusions from the

Figure 3.2 Convergent mixed methods research design in CR-informed research



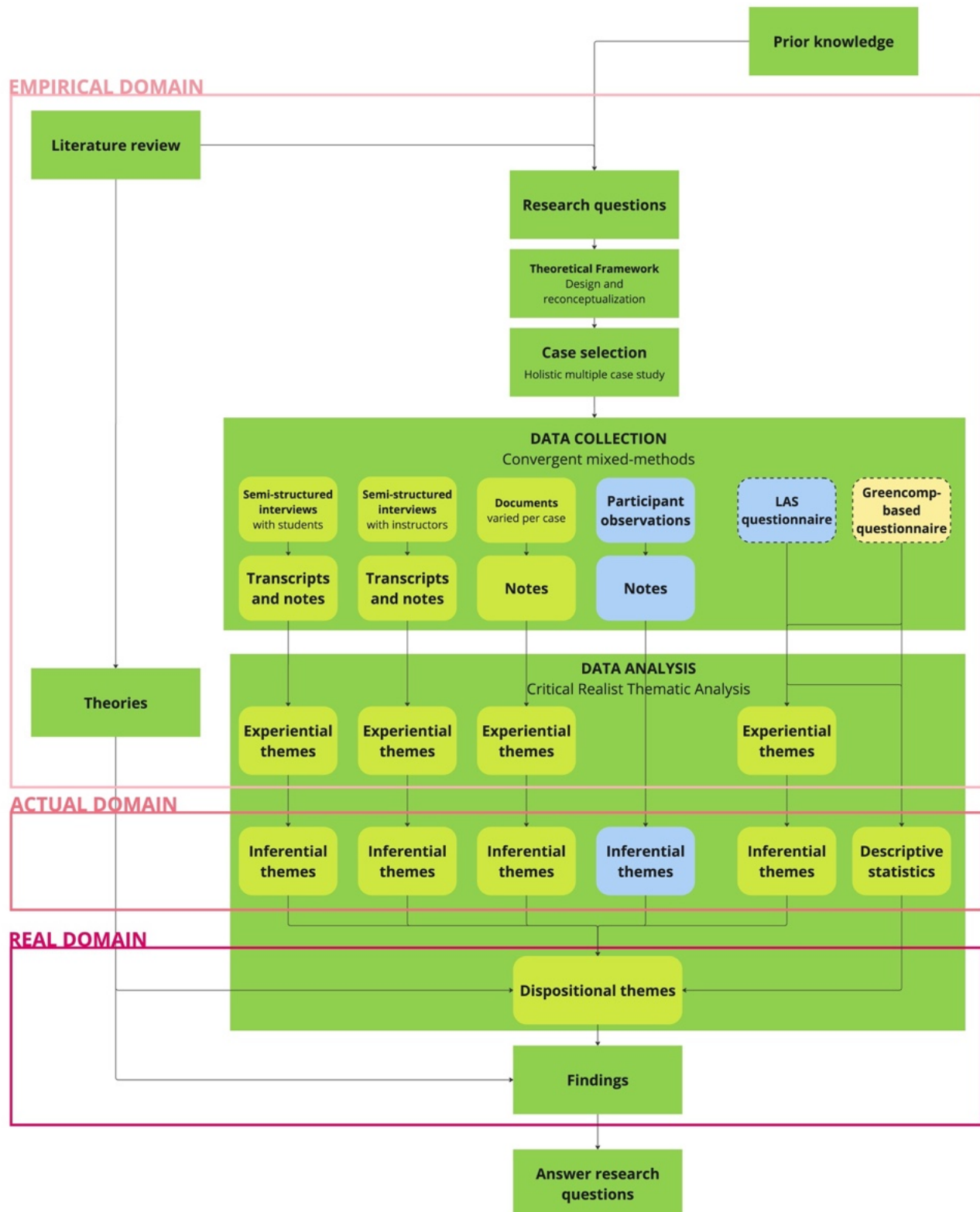
Note: From *Retroductive theorizing: A contribution of critical realism to mixed methods research*, by F. Mukumbang, 2021, Journal of Mixed Methods Research.

research can be applied in other settings or contexts (Tashakkori et al., 2020). Finally, **multiple validities legitimization** pertains to how M/M requires researchers to prove the validity of different research methods in various ways, which could be taxing for a single researcher to accomplish (Johnson & Christensen, 2020).

Convergent mixed-methods research design

Lastly, the study takes on a *convergent*—sometimes referred to as *parallel*—mixed methods design (Creswell & Plano Clark, 2017; Doyle et al., 2016; Tashakkori et al., 2021) because it collects both QUAL and QUAN data. However, the QUAN survey is nested in the dominant QUAL research design (Yin, 2018). In a convergent research design, the QUAL and QUAN datasets are collected and analyzed separately (Creswell & Plano Clark, 2017) and then eventually synthesized using retroductive analysis (Mukumbang et al., 2021). Having a predominantly QUAL research design allowed a deeper exploration of each case through the experiences of the participants. This depth was supplemented by the QUAN data that provided either confirming or disconfirming evidence. In this way, the findings can be more easily triangulated. Significant challenges of a convergent design include merging two different types of data and having to deal with possible contradictions (Creswell & Plano Clark, 2017). Furthermore, taking on a critical realist philosophy entails integrating the inferencing methods into the research design. Figure 3.1 illustrates how a M/M approach could do so (Mukumbang, 2021). Similar to what is recommended for convergent M/M in general, QUAL (intensive

Figure 3.3 Research design



procedures) and QUAN (extensive procedures) data are collected and analyzed separately. After which, the analyses from both datasets will undergo retroductive synthesis, which involves conceptual redescription via abductive thinking and theorizing to generate causal

mechanisms (Mukumbang, 2021). Taking on this process of retroductive theorizing (Mukumbang et al., 2021) requires greater rigor and constant review of the existing literature on emerging concepts, and this is what makes critical realist-informed research more theory-driven than data-driven. While empirical evidence is still used as a basis, understanding that there are three levels of reality—empirical, actual, and real—means that data can only serve as proof. It may be evidence of a phenomenon, but it is not its explanation (Mukumbang et al., 2021). Thus, throughout the process, researchers working with CR must continue having dialogues with the existing literature to posit the *why* and *how* behind observable phenomena. Figure 3.3 shows the overall design of the research and how the process tackles each of the domains (empirical, actual, real) in critical realist research.

Cases

To answer the research questions, two cases were chosen, as they represent two different types of VE: a COIL co-designed by instructors from two universities, one in Finland (Uni F) and another in the Philippines (Uni P), which is referred to as Case 1; and a dialogue-based, ready-made program designed and facilitated by a not-for-profit organization (NFP) based in the Netherlands, which is referred to as Case 2. Both VEs had sustainability as a central theme, albeit interpreted and carried out in different ways, with Case 1 focusing on integral ecology and the Case 2 focusing on climate justice. Other than the common central theme, the VEs were different, not only in typology, but also in terms of the student population (age, number, cultural and academic background, etc.). Table 3.1 provides an overview of each case, highlighting differences in the duration, number of students, participating universities and countries, and syllabus design. The cases will be explicated further in the subsequent chapters ([Chapter 4: Findings in Case 1](#) and [Chapter 5: Findings in Case 2](#)), but it is important to note that due to stark differences in each, as well as limitations in data gathering for each context, the data collection methods and instruments varied. Hence, rather than being a comparative case study, this research investigated each as its own holistic case and later on conducted a cross-case analysis.

Case 1: COIL

Case 1 was a COIL VE between two partner institutions, one university from the Philippines (Uni P) and another network of three universities from Finland (Uni F). The VE

Table 3.1*Overview of the two VE cases*

	Case 1		Case 2
	Uni F	Uni P	
Course name	Socio-Ecological Problem Solving in Southeast Asia and Europe	Integral Ecology for Socio-Ecological Problem Solving	Climate Justice: From Inequality to Inclusion
Type of VE	Comparative COIL		Dialogue-based online course
Syllabus design	Co-designed by instructors		Designed by NFP's course design team
Curricular integration	Integrated into instructors' existing courses; credited as part of the course		Provided to universities as a ready-made course; curricular integration depends on the university but is usually an elective of 3 ECTS ⁹
VE duration	October 27 – November 21, 2023 Weekly 1.5-hour sessions across 5 weeks		March 4 – May 10, 2024 Weekly 2-hour sessions across 10 weeks
No. of instructors or facilitators	1	2	3 instructors, 11 facilitators
No. of students	11	13	390
No. of universities	2		14
No. of countries	2		13

centered on the theme of integral ecology, and the aim was to use the course as a means to compare sustainability issues and solutions from two different contexts. This was the first time for the instructors from both institutions (two from Uni P and one from Uni F) to organize a COIL, and it took them approximately a year to design the syllabus together (co-designed). The VE covered only a module of the course and not the entire course due to time zone and schedule differences. For the VE, a case-based approach was used, where students were tasked to compare an issue across their contexts. The module with the VE component lasted for five weeks, with a total of six 1.5-hour sessions. At the beginning of the VE, there were

⁹ ECTS stands for European Credit Transfer and Accumulation System, the standard means for valuing and comparing academic credits of courses across European universities

approximately 24 students, 13 from Uni P and 11 from Uni F, but at the end of the course, only four Uni F students were actively participating in the VE. All the Uni P students remained.

Case 2: Dialogue-based VE

Case 2 was a dialogue-based VE designed by an independent organization with experience organizing VEs for universities. The VE was part of a larger research project involving institutions from Europe and the Southern Mediterranean. The central theme of the exchange was climate justice, and three members of the team designed the course, two of whom facilitated the VE. A total of 390 students from 14 participating universities were invited to take part. In such dialogue-based exchanges, facilitators are present to guide the dialogues, and so there were a total of 11 facilitators who managed the initial 22 groups. The course lasted for ten weeks, and it took on a blended approach, where every week, participants had to go through learning resources and then attend their two-hour dialogue sessions. In the end, a little over half of those who registered completed the course.

Participant selection

When conducting case studies, it is important to define or *bound* the case (Yin, 2018), and this means selecting settings and participants whose experiences could generate data that could best answer the research questions. Following the sampling strategies best suited for case study research (Schoch, 2020), the present study used purposeful, criterion, and maximum variation sampling techniques. In accordance with purposeful sampling, which entails defining and *bounding* the case to be studied (Yin, 2018), aside from being able to provide the researcher sufficient access to information, the cases were chosen because they had the following characteristics:

- The case is a credited university course that integrates VE in the syllabus
- The VE component of the course lasts for at least five sessions
- The VE must have predominantly synchronous activities, mixed with asynchronous ones
- The syllabus must be centered on sustainability issues

It was based on these characteristics that the two cases were chosen, the ready-made dialogue-based VE entitled “Climate Justice: From Inequality to Inclusion” and the co-designed COIL centered on socio-ecological problem solving, with Uni P calling it “Integral Ecology for

Socio–Ecological Problem Solving” and Uni F entitling it as “Socio–Ecological Problem Solving in Southeast Asia and Europe.” The participants for the dialogue–based VE included 11 facilitators and 390 students from 14 universities representing 13 countries across the globe. These countries included Algeria, Egypt, France, Germany, Italy, Jordan, Lebanon, Morocco, Netherlands, Palestine, Portugal, Spain, and Tunisia; two participating universities came from Palestine. For the COIL, participants comprised two instructors and 13 students from the Uni P and one instructor and eight students from the Uni F. In addition, the following criteria were established to narrow down the number of participants within the case by including those who adhered to the established criteria and excluding those who did not (Yin, 2018):

- Instructors must have played an active role in the course design and implementation
- Students must have completed the course
- For the reflection journals only: Student participants must have filled out at least five of the nine reflection journals (more than half)

For the COIL case, all three instructors took part in the study, while only six students (three from Uni P and three from Uni F) participated. Unfortunately, the number of participating students from Uni F dwindled due to the high attrition; from 11 students who registered to the course, eight partly attended the course and only four completed it. However, majority ($n = 3$) of those who remained were able to participate. For their Uni P counterpart, the number of students remained consistent till the end of the course, but less than a handful ($n = 3$) responded to the call for interviews in spite of their initial agreement to take part in the research study as well as several follow-ups from the researcher and their instructors. While the small number of participants would be a challenge in QUAN research, in QUAL research, particularly in CR-oriented studies, this should not pose as a problem, as the depth rather than the breadth of the data should be able to expound on the research questions (Bogna et al., 2020; Fletcher, 2017; Willis, 2023). To ensure reliability and validity of the data gathered, other sources were used to confirm the findings and create a clearer picture of the context; these include interviews with the course instructors, curricular documents, and also the researcher’s observations.

On the other hand, participants in the dialogue–based VE involved two facilitators, because only they played an active role in both the course design and its implementation,

thereby being equivalent to a course instructor. Nevertheless, data was still obtained from the remaining nine facilitators through the results of an internal survey conducted by the organization, and it became an additional source of data for this research. As for the students, out of the 390 students who took part in the course, 173 fit the criteria of course completion. From the 173 students, 103 responded to the survey questionnaire and five participated in the semi-structured interviews. For the reflection journals, those of 88 students from 14 different groups were included, and the selection was based on the diversity of the groups and the completion of the journals¹⁰. This form of sampling follows maximum variation sampling technique, where participants are chosen based on the diversity of the sample (Patton, 2023).

Data collection

To better understand the TSL potential of VE, in line with a CR methodology that calls for a deeper collection of data, sources of empirical evidence used in this research study comprised observations, curricular documents, one-on-one interviews with instructors, one-on-one interviews with students/student reflective journals, and student questionnaires. Both cases are examples of digital phenomena, as they are only possible through internet-enabled communication. The research methods followed suit; all were conducted or facilitated using digital platforms (Quinton & Reynolds, 2018). As previously stated, the involvement of the researcher in each of the cases began when the courses were ready for implementation; this dictated the researcher's access to the student participants and the data collection methods that were at her disposal and resulted in variations in the methods for each case. However, other data sources remained the same across cases. Table 3.2 shows the breakdown of the data collection instruments or sources of empirical evidence. Those highlighted in gray reflect

¹⁰ The students in the COIL were divided into 22 groups in total—which were subsequently collapsed into 20, and from these groups, 14 groups were chosen based on student diversity. The 88 students were those who completed at least five reflection journals out of the required nine.

Table 3.2

Research questions vis-à-vis data collection instruments per case

Research question	What data should be gathered?	How was the data gathered for each case?		
	Collect information on...	Collect information from...	Collect information through...	
			Case 1: COIL	Case 2: iOOC
RQ1: How does VE foster TL for sustainability?	Pedagogical approaches used in the class that students deemed effective/ineffective (e.g. activities, assessments, techniques, etc.)	Students	Semi-structured interview	
			LAS questionnaire	Greencomp-based questionnaire
				Reflection journals
		Instructors	Semi-structured interview	
		Documentation	Document analysis	
	Learning conditions that fostered/hindered TSL (e.g. class size, groupings, set-up, interface of the LMS, etc.)	Field notes	Direct observation	Indirect observation
		Students	Semi-structured interview	
			LAS questionnaire	Greencomp-based questionnaire
				Reflection journals
		Instructors	Semi-structured interview	
RQ2: How does VE transform sustainability paradigms?	Sustainability paradigms (according to the transformative learning outcomes) transformed by the VE	Students	Semi-structured interview	
			LAS questionnaire	Greencomp-based questionnaire
				Reflection journals
		Instructors	Semi-structured interview	
		Documentation	Document analysis	
	Information on the process of transformation according to the morphogenetic approach	Field notes	Direct observation	Indirect observation
		Students	Semi-structured interview	
			LAS questionnaire	Greencomp-based questionnaire
				Reflection journals
		Instructors	Semi-structured interview	
		Field notes	Direct observation	Indirect observation

the methods that were either not present in the other (reflection journals) or that differed (LAS vs. Greencomp-based questionnaire and direct vs. indirect observation). In line with multiple holistic case study research, data for each case was collected and analyzed independently and completely before moving on to the next case to allow for rich descriptions of each (Tashakkori et al., 2021; Yin, 2018). Only after the analysis of each case was completed was a cross-case analysis conducted.

Semi-structured interviews

Interviews are one of the optimal data collection methods for critical realist case study research, as they allow researchers to probe the possible causes of events or experiences and the reflections of participants on such phenomena (Yin, 2018). They can be rich sources of data as they can help illuminate the “lived world of the subjects” (Brinkmann & Kvale, 2018, p. 10) by explaining events or experiences and also revealing their insights of such phenomena (Yin, 2018). Because the purpose of semi-structured interviews is to “[obtain] descriptions of the life world of the interviewee in order to interpret the meaning of the described phenomena (Kvale & Brinkmann, 2009, p. 3), they are also aligned with the objectives of CR-oriented research, as they aim for deeper exploration of a phenomenon of interest (Fletcher, 2017; Willis, 2023). For this reason, semi-structured interviews were deemed most fitting for this research and, when possible, served as the primary means of data collection. Most QUAL interviews follow a semi-structured format (Brinkmann & Kvale, 2018) using an interview guide that contains the topics or questions to be covered (Patton, 2023). Rather than being a rigid, pre-determined roster of questions, the interview guide serves as a framework of the central themes or lines of inquiry to be investigated, and the researcher conducting the interview can freely modify as deemed necessary, be it by rephrasing the questions or rearranging their order (Patton, 2023). Indeed, the task of a researcher conducting an interview, particularly for case studies, is twofold: they must explore all the themes and questions within the framework while doing so in a way that is conversational and unbiased (Yin, 2018). Although having an interview guide provides researchers with the freedom to investigate specific lines of questioning with greater depth, only the themes relevant to the research—as stipulated in the framework—should be probed (Patton, 2023). In both cases, participants were interviewed at the end of the course and since

they were based in different countries, interviews were conducted via a videoconferencing platform. Even if there was the possibility to conduct them in-person for those based in the Philippines, participants preferred to have them online. Interviews were conducted at a date and time convenient for the participants and lasted between 60 to 90 minutes. During the interviews, the researcher took down notes, making sure to maintain focus on the participants who were also duly informed prior. The interviews were recorded—as indicated in the informed consent form—but only the audio file was kept for transcription purposes. The researcher transcribed the interviews herself, as this helped in reviewing the information and fully immersing in the data.

The semi-structured interview aimed to understand participants' experience with sustainability-themed VEs and probe the possibility of TSL. They were based on the Learning Activities Survey (LAS) developed by King (2009) to explore transformations of adult learners during a learning process, but the questions were modified to suit an interview and to elicit the steps of the morphogenetic approach. This would help in having a clearer picture of each of the participants' *lifeworlds* and its influence on their VE experience—their structural/cultural conditioning, the social interaction during the VE, and how such an interaction might have either changed or reinforced their previously held conditioning, that is, structural/cultural elaboration. These modifications were conducted with the support of another researcher who was more versed in the philosophy of CR and its methodological applications, and the questions were tested in another study (Araneta & Cuyegkeng, 2024), prior to their use in this dissertation. Although the students were *objects* of transformation in this context, the instructors were also interviewed as the *subjects* of transformation, as they were the ones who designed the learning space that could prompt TSL. Interviewing the instructors could also help in better understanding the structural and cultural conditioning within and surrounding the exchange and the decision for specific means of social interaction (class activities, group assessments, class lectures) facilitated by the VE.

The interview began with questions regarding participants' background to help them ease into the conversation and determine the next line of inquiry, which varied from one participant to the next. Since participants differed in terms of academic background and age, the fluidity of semi-structured interviews allowed the researcher to maintain a coherent

conversational flow by rearranging the order of the questions or modifying the language. In no fixed order, the interview guide included three main lines of questioning (1) **VE** (understanding, prior experience, practice at the university, conduciveness of context—university, region, country—to VE and virtual learning (VL) in general); (2) **sustainability** (personal conceptualization, influences, conceptualization and operationalization at the university, conduciveness of context—university, region, country—to sustainability-oriented action); and (3) the **sustainability-themed VE experience** (prior experience with sustainability-themed VEs, general sentiments about the VE course—strengths, weaknesses, noteworthy experiences, possible transformative event during the VE and influences of such transformation, response to and reflection on the transformation, and effect of the transformation to actions). The articulated lines of questioning vis-à-vis the steps in the morphogenetic sequence and the addressed research questions can be found in Table 3.3.

Table 3.3

Interview guide for students

Question	Morphogenetic Step	RQ
1. Background	structural conditioning	
2. What do you understand of virtual learning (VL)?	structural conditioning	2
3. How is VL practiced at your university?	structural conditioning	1
4. How would you define sustainability? How did you come to this definition? What influences or informs the way you define sustainability?	structural conditioning	2
5. Aside from the VE, did you have a VL experience that incorporated sustainability? In what way?	structural conditioning	1
6. Could you describe your VE experience? What were the strengths and weakness of integrating VE into the course? Were there any noteworthy experiences during the VE?	social interaction	1
7. Thinking back over your VE experience, was there a time when you realized that your values, beliefs, or expectations on sustainability had changed? What changed and why do you think it needed to change?	social interaction structural conditioning	2
8. When and how did you first realize this change had happened? How did you respond to this change?	social interaction (micro) structural elaboration	2

9. What or who do you think influenced this change? Was it part of the class activity or something else? Could you describe their/its influence?	social interaction	2
10. How do you manifest this change in your actions?	social interaction structural elaboration	2
11. How conducive a space is the university in supporting your sustainability values and action?	social interaction (macro)	1
12. What challenges do you encounter in acting on your sustainability values?	social interaction	1
13. Would you recommend using VE to learn about sustainability? Why or why not? What is the added value of VEs in learning about sustainability?	social interaction	1

The four questions following the background (Questions 2–5) looked at the participant's structural and cultural conditioning in relation to VE and sustainability, probing their experiences with each and the influence of their environment on these concepts. This was necessary to look into, as they represent diverse institutions, geographies, and practices that shape the way they view and behave towards VE and sustainability. Understanding such differences could better pinpoint the mechanisms that underlie a transformative event. Although Mezirow's process of TL begins with the disorienting dilemma, that disorientation is conditioned by a person's context or experiences; in other words, asking about a participant's structural and cultural conditioning entails asking them how they were predisposed to such a dilemma. The remaining questions (Questions 6–13) generally delve into the social interaction that occurred during the VE. Question 6 examined the effectiveness of VE as a pedagogical tool, the strengths and weaknesses of its integration into the university course, the noteworthy activities or assessments, and significant experiences that occurred. Questions 7 to 9 investigated the occurrence of a transformative experience during the course, the disorienting dilemmas that they might have been faced with (Question 7), the factors that led to it (Question 9), and their reflective process in responding to such a dilemma (Question 8). Following the queue of the LAS, which looks at external influences to a transformative experience, the succeeding questions probed the conduciveness of the environment in accommodating such transformations (Questions 10–13). Lastly, woven into

some questions on social interaction were those of structural elaboration—how participants responded and manifested the transformation prompted by the course (Questions 8 and 10). As expected for semi-structured interviews (Brinkmann & Kvale, 2018), especially those in case study research (Patton, 2023; Yin, 2018), the order and phrasing of the questions varied, and this depended on the role of the participant—whether instructor or student—and their academic background, as some were working or studying in fields more related to sustainability and others were coming from cultural studies.

Survey questionnaires

In survey questionnaires, participants “self-report their attitudes, beliefs, feelings, and expected behaviors toward an “object” of interest” (Tashakkori et al., 2020, p. 226). Most surveys target breadth than depth, as they are relatively limited in terms of exploring participant responses (Gournelos, 2019). The online surveys used in the present study were intended to supplement the qualitative methods, and they were designed to understand the process and outcomes of student transformation that might have occurred in the course. Only the student participants, the *objects* of TSL, took the survey. However, as will be explained in the succeeding paragraph, the survey instruments differed between the two cases.

Learning Activities Survey

Research that investigates transformative experiences have mainly followed an interpretive, QUAL methodology, but there are also a few QUAN instruments that exist (Romano, 2018). For the COIL, the survey for students explored four areas: (1) participant background, (2) prior experience with VEs, (3) prior intercultural experience, and (4) the process of transformation within the VE. The questions in the last part of the questionnaire were based on King’s (2009) Learning Activities Survey (LAS) that was developed to uncover transformations of learners during a learning process, identifying which activities might have contributed to such a transformation (ibid, 2009). Rather than focusing on the outcomes of transformation, the adopted survey looks into the process itself—the aspects of the VE that could have led to the transformative experience. Although several, more current instruments exist to assess TL and the instrument itself has issues in terms of its construct validity (Romano, 2018), the LAS served the purpose and context of the research. It also acted as a supplementary data collection method, nested in the overall QUAL case study research design

(Yin, 2018). It had a total of 26 items, of which two were open-ended, one where participants had to describe a time during the course when they realized that their values, beliefs, opinions or expectations had changed, and another where they had to describe how their being in the class could have contributed to such a change (See Appendix for survey). It was administered via Limesurvey, a platform managed by the researcher's university, and the link was sent via email to those students who confirmed their participation in the study.

Greencomp-based survey

For the dialogue-based VE, on the other hand, the researcher had to work within the confines of a larger research project from which the VE was born. Although the LAS questionnaire was initially presented, it did not meet the objectives of the larger research project on which the dissertation was embedded, as it aimed to explore changes in the KSCs of students using Greencomp, the European sustainability competence framework (Bianchi et al., 2022). The framework consists of 12 competences divided into four competence areas: (1) embodying sustainability values (valuing sustainability, supporting fairness, and promoting nature); (2) embracing complexity in sustainability (systems thinking, critical thinking, and problem framing); (3) envisioning sustainable futures (futures literacy, adaptability, exploratory thinking); and (4) acting for sustainability (political agency, collective action, individual initiative). Aside from describing each competence, the framework details examples of knowledge, skills, and attitudes for each. This became the basis for the development of a new instrument, in collaboration with two researchers from the parent research project. The development of this survey had to reflect the KSCs while meeting the aims of both research endeavors and maintaining coherence and conciseness. The examples of knowledge, skills, and attitudes were converted into first-person statements, a number of which were edited or removed, while others were added to better suit the context of the study, especially its multicultural aspect, and to meet the research objectives of both research projects. The final Greencomp competences scale comprised 29 statements to be answered using a five-point Likert scale (from strongly disagree to strongly agree). Table 3.4 shows the 29 items along with their corresponding Greencomp area and KSC. Unlike in the COIL case, the survey for this case was designed to be administered before and after (pre and post) the VE in order to record any changes in the participants' competences. Rather than focusing on

the *process* of the transformation, this instrument examined the *outcome* of the transformation, that is, the development of KSCs. The survey thus served as a complement to the semi-structured interviews and weekly reflection journals in understanding the kind of transformation that might have taken place through the lens of the Greencomp framework.

Table 3.4

Survey items based on Greencomp KSCs

	Item	Greencomp area	Greencomp KSC
01	I am familiar with the concept of climate justice.	Embodying sustainability values	Valuing sustainability
02	Climate change does not impact everyone the same way.		Supporting fairness
03	The global north/Western countries/Europe has greater responsibility for climate change.	Acting for sustainability	Political agency
04	I can identify relevant social, political and economic stakeholders in my own community and region to address a sustainability problem.		
05	I know how to work with diverse participants to create inclusive visions for a more sustainable future.		Collective action
06	I can assess my own impact on nature.	Embodying sustainability values	Promoting nature
07	I feel the impact of climate change in my daily life.	N/A	N/A
08	I recognize my own emotions, desires, thoughts, behaviors, and personality when engaging in sustainability issues.	Acting for sustainability	Intrapersonal mindset
09	I am willing to engage with others to challenge the status quo.		Collective action
10	I have experienced environmental inequality.	Embodying sustainability values	Supporting fairness
11	I am confident about anticipating and influencing sustainable changes.	Acting for sustainability	Individual initiative
12	I am concerned about the short- and long-term impacts of personal actions on others and the planet.	Embracing complexity in sustainability	Systems thinking
13	The global north/Western countries/Europe should do more for climate justice.	Acting for sustainability	Political agency
14	Collaborating with others to frame current and potential sustainability challenges is important.	Embracing complexity in sustainability	Problem framing
15	Political accountability for unsustainable behaviour is essential.	Acting for sustainability	Political agency
16	A harmonious relationship between nature and humans is important.	Embodying sustainability values	Promoting nature

17	I am willing to discontinue unsustainable practices and try alternative solutions.	Envisioning sustainability futures	Adaptability
18	Thinking about the future of the planet makes me feel anxious.	Acting	Intrapersonal mindset
19	It is important to look at sustainability problems from different stakeholder perspectives to identify fair and inclusive actions.	Embracing complexity in sustainability	Problem framing
20	I trust science even when lacking some knowledge required to fully understand scientific claims.		Critical thinking
21	It is important to consider sustainability challenges and opportunities from different angles.		Exploratory thinking
22	Local circumstances should be considered when dealing with sustainability issues and opportunities.		Adaptability
23	Gender equity is an important issue for me.	Envisioning sustainability futures	Supporting fairness
24	I am committed to respecting the interests of future generations.		Promoting natures
25	Our wellbeing, health and security depend on the wellbeing of nature.		Futures literacy
26	I cannot anticipate how sustainability problems might evolve or occur over time (scenarios).		Supporting fairness
27	Justice for current and future generations is related to protecting nature.		
28	There are more important issues than climate justice for future generations in my context.		
29	Climate justice is not presently an essential issue for my well being.	Acting for sustainability	Intrapersonal mindset

The pre-VE survey was divided into five sections; the first three—similar to that administered in Case 1—explored participants' socio-demographic characteristics, prior experience with VEs, and prior intercultural experience, and they contained a combined total of 15 multiple choice questions. The latter two included the Greencomp sustainability competences scale (see Table 3.4) and three open-ended questions about VE, specifically their expectations towards the course. On the other hand, the post-VE survey included only the Greencomp sustainability competences scale and a different set of open-ended questions on the VE. The items pertaining to the VE experience were six in total and they asked about the impact of the international and online means of collaboration on their learning experience,

the strengths and weakness of the VE, and lastly, the impact of the VE on their conceptualization of sustainability. Both surveys were uploaded and sent to the students through the learning management system (LMS) being used by the course. It was made clear to the participants that the survey was optional and that it would have no impact on their course standing.

Reflection journals

For the dialogue-based VE, aside from the semi-structured online interviews, weekly reflection journals were among the primary data sources for the student participants. Considered as personal documents (Merriam & Tisdell, 2015), these first-person accounts of a phenomenon allow researchers to peek into the thoughts, feelings, and insights of a participant toward an experience. Thus, reflection journals can be a rich source of data in understanding a particular context or situation from the perspective of individual participants. Seeing that these are personal narrations, they are also highly biased or partial, and may not be “representative or necessarily reliable accounts of what actually may have occurred” (Merriam & Tisdell, 2015, p. 166). Notwithstanding their subjectivity, reflection journals, especially when combined with other data sources, could provide a wealth of information on participant perspectives. Based on the data collection methods in M/M research categorized by Tashakkori et al., (2021), documents such as reflection journals or personal diaries fall under *unobtrusive* measures, as they allow the examination of a phenomenon without researcher interference. Since they were not designed for research purposes but to facilitate reflection during the course, the context served as a camouflage for the research endeavor. Despite the “measurement [being] hidden within the context of the social situation” (Tashakkori et al., 2021, p. 214), the fact that students were being assessed for the submission of these journals—they were among the assessments of the course—already adds a layer of surveillance. Nevertheless, they were the most effective way of collecting rich QUAL and QUAN information on the learning experience of the students throughout the course. For a comprehensive understanding of the students’ learning journeys, only those who completed at least a third of the journals ($n = 6$) were considered for QUAL content analysis.

The reflection journals were among the course assessments, and they had to be submitted through the course’s LMS after each weekly dialogue session ($n = 9$). Students were

not graded based on the content but on their completion—fulfilling a minimum word count of 75 words, with each submitted journal adding points to their final grade. In the instructions, students were directed to use the weekly journal as an “opportunity to reflect honestly on valuable insights, strong feelings towards an issue, significant moments in the group process, or key turning points in [their] thinking”. To aide in their reflection, students were also given a number of prompts, such as their expectations, the relationships and emotions in the group, inspiring moments, challenging moments, negative experiences, specific topics from their asynchronous materials, climate justice, etc. Instructions can be found in the Appendix.

Virtual observation and ethnographic notes

The last data collection method used for this research was observation, which involves compiling an often written record of the events, interactions, objects, attitudes, expressions, and behaviors in a social context (Patton, 2023). This source of data is central to QUAL research (Merriam & Tisdell, 2015; Patton, 2023), as it can provide detailed, descriptive information of an learning setting like VE—the people present, the activities they took part in, the rapport between the participants, the level of engagement—in CR terminology, the social interaction that took place. The observer stance of the researcher varied between cases. For the COIL case, the researcher acted as an onlooker (Patton, 2023), an *observer-as-participant*, in which the group being observed was aware of her research. According to Adler & Adler, this stance allows a researcher to “observe and interact closely enough with members to establish an insider’s identity without participating in those activities constituting the core of group membership” (1998, p. 85, as cited in Merriam & Tisdell, 2015). For the dialogue-based VE case, the researcher was a complete observer (Merriam & Tisdell, 2015), observing indirectly by viewing the archived recordings of the dialogue sessions. This unobtrusive form of observation occurs when archival records—in this case, video recordings—initially produced as part of a research project are used as secondary data (Tashakkori et al., 2021). To allow the participants to engage freely in dialogue, instead of observing the sessions live, it was decided that the researcher observe the video recordings. Nevertheless, participants were made aware at the beginning of the course as well as at the start of every session that all the dialogue sessions would be recorded for research purposes. The researcher jotted down her observations on a notebook during the exchange, and they were immediately

transcribed in a narrative format after each observed interaction. Online observations fall under virtual or digital ethnographic methods, and aside from being able to provide a rich narrative of the setting under study, online observations need to incorporate a nuanced understanding of the virtual culture—the affordances and limitations of the platform being used, the usability and ease of access of the LMS, and the digital proficiency and access of students. However, one challenge that arose for Case 2 is the incomplete archive of video recordings. The recordings were not complete nor consistent for all the groups. Furthermore, the recording showed the windows of participants one at a time rather than providing a complete view of all the windows, thereby limiting. Thus, the researcher was not able to observe an entire ten-week interaction. Nonetheless, these recordings were still used to corroborate with the primary data sources.

An observation protocol (Figure 3.2) was implemented for both cases to ensure a more purposeful and consistent observation strategy (Cohen et al., 2007). In line with critical realist ethnographic research, a section on researcher's thoughts and questions was added to give

Figure 3.2

Observation protocol

Lesson No. _____	Date and time: _____
Time started: _____	Time ended: _____
No. of breaks (with duration): _____	
No. of instructors: _____	Guest instructors: Yes No
No. of students (start): _____	No. of students (end): _____
No. of cameras on (start): _____	No. of cameras on (end): _____
Teaching event 1 (repeated per teaching event)	
Start time	_____
Topic	_____
Instructor	_____
General lesson format (instructional strategy used)	_____
Other instructional strategies used	_____
Groupings	_____
Notes (Student-instructor and student-student dynamics; points of convergence/divergence; questions; cameras switched on/off; internet connectivity)	
End time _____	
Thoughts and questions	

space to the researcher's emerging assumptions (Fryer, 2022). As mentioned, CR does not stay at the empirical level (observable phenomena) but seeks to uncover the causal mechanisms (Aaltonen & Tempini, 2014). This process of abduction can also occur as the researcher observes a setting. However, to prevent the researcher's initial theoretical redescriptions from skewing the observations, a separate section was made.

Documentation

In QUAL data collection, documents can provide rich information, whether as a standalone method or as a means to triangulate with other methods (Bowen, 2009; Creswell & Plano Clark, 2017; Tashakkori et al., 2021). As an unobtrusive method, it allows researchers to explore a setting without having their presence affect or skew it, especially for participants—an issue with more intrusive methods such as interviews or observations (Merriam & Tisdell, 2015; Tashakkori et al., 2021). One of the drawbacks of documentation is possible bias in document selection (Armstrong, 2021; Bowen, 2009). To circumvent this issue, the researcher gathered and used the documents made available to her by instructors of both cases, as well as those available publicly. However, as will be discussed in the , there were differences in the amount of documentation each case had. The collected documents were used to answer the first research question on how the VE fosters TSL. Table 3.5 specifies the documents analyzed per case.

Table 3.5

Documents analyzed per case

	Case 1 COIL	Case 2 Dialogue-based VE
Curricular documents	Uni P course syllabus Uni F course syllabus	Climate Justice course syllabus
Course materials on LMS	Uni P course materials on LMS Uni F course materials on LMS	Course materials on LMS
Others	**Uni P undergraduate course information **Information on Uni F network and course requirements	Group process framework (includes daily resources, instructional strategies) Facilitator feedback form (survey with both quantitative and qualitative data) Weekly reflection journals

Note: **The documents were retrieved from the web pages of both universities.

These documents were analyzed to understand the context of the course, specifically its rationale, aims, contents, learning activities, the role of the instructors, learning materials, grouping, location, time, and assessment (Van den Akker, 2003). This would not only provide a clearer picture of the course but also better reveal causal mechanisms underlying observable phenomena. For example, looking through the course information on the universities' web pages showed a different perspective on the motivation for students to take the course—whether it was a “free” elective or a fixed course in their program. Aside from that, the documents served as a means to triangulate the data from the student interviews, aiding the researcher in pinpointing specific experiences (e.g., instructional strategies, lectures, topics) and connecting them to the aims specified in the documents.

Data analysis

Data analysis for case study research is not fixed, and it depends greatly on the context under study and what the researcher sees as effective in attaining their research objectives (Yin, 2018). This flexibility, however, should not compromise rigor, and Yin (2018) underscores the importance of establishing a data analysis protocol prior to data collection. For this study, the analysis protocol used was aligned with the CR stages in the explanation of open systems, where possibly “two or more mechanisms, perhaps of radically different kinds, combine to produce effects” (Bhaskar, 2008, p. 109). The four stages—causal analysis, redescription, retrodiction, and finally, elimination of alternative causes—were subsequently expanded by Bhaskar himself and by other CR researchers (Bygstad et al., 2016; Danermark, 2019; Danermark et al., 2002). Other studies focused on their application in methodologies such as grounded theory (Hoddy, 2019) and case studies (Fryer, 2022; Wynn & Williams, 2020, 2012), while others looked at specific stages of research such as conducting interviews (Mukumbang et al., 2020) or thematic analysis (Wiltshire & Ronkainen, 2021). What is key in data analysis in critical realist-informed research is that it should seek to uncover causal mechanisms underlying a phenomenon and understand the conditions that are necessary for the phenomenon to manifest (Mukumbang, 2021). This being so, data for this study was analyzed through thematic analysis (TA) that combined Fryer's five-step approach to TA (2022) and Wiltshire and Ronkainen's (2021) explication of code and theme generation into experiential, inferential, and dispositional themes (See Table 3.5).

Table 3.5*TA according to Fryer (2022) and Wiltshire and Ronkainen (2021)*

	Step (Fryer, 2022)	Description
1	Formulate a causal research question	Identify a phenomenon of interest from which a causal research question can be developed.
2	Do an initial scan of the data collected	Skim through the data gathered and write down initial thoughts and observations.
3	Develop codes for the data	Generate experiential themes by describing participants' "intentions, hopes, concerns, feelings and beliefs" (Wiltshire & Ronkainen, 2021, p. 165)
		Develop inferential themes using both inductive and abductive thinking, which would ultimately distill the participants' experiences into a concept
		Based on the inferential themes, derive dispositional themes through retroduction—by postulating the properties that must exist to produce the phenomenon being studied
4	Generate and validate themes	Look for causal explanations and assess their validity
5	Develop conclusions and reports	

Note: The table incorporates Wiltshire and Ronkainen's (2021) generation of three types of themes into the third step of Fryer's model of TA

Data analysis began by skimming through the gathered data—interview transcripts and notes, field notes from observations, reflection journals, survey questionnaire results—and writing down the initial thoughts and observations, which were compiled into a single document. This was followed by TA of the data using both NVivo and Microsoft Excel. Since NVivo was being used by the parent study of the dialogue-based VE, the data was first analyzed using that software, but it underwent a second round of analysis using Microsoft Excel, which the researcher felt to be more efficacious in formulating the three types of themes—experiential, inferential, and dispositional. The coding and thematization process followed the steps outlined by Wiltshire & Ronkainen (2021), where the generation of each theme is an attempt to unearth a domain of reality.

Qualitative data analysis

QUAL data analysis involved applying CR-oriented TA on the semi-structured interviews with students/instructors, reflection journals, documents, and the open-ended questions of the survey questionnaires. Such an approach to TA entails generating

experiential, inferential, and dispositional themes to probe the causal mechanisms. In addition, such mechanisms were classified according to the dimensions (head, hands, heart, and feet) of the TSL framework to better understand how they were activated in a learning setting. The subsequent sections will further explain this approach. Aligned with the procedures of multiple case study research, each case was investigated and analyzed separately before comparing across cases (Yin, 2018). This meant that the analysis of one case was completed before moving to the next. However, the final list of all three types of themes were used as a reference in case similarities across cases were noted.

Describing the empirical domain through experiential themes

The initial stage of coding focuses on revealing the *empirical* domain by developing themes based on the participants' experiences, observations, insights, and emotions. For simplicity and coherence, Wiltshire & Ronkainen (2021) recommended using "The participant expresses that..." as a sentence starter for such themes. An example of an experiential theme used in this study is:

The participant expresses that a university professor who was a sustainability advocate has a huge influence in his conceptualization of sustainability¹¹

This process was repeated for each transcript, checking for both recurring and new themes to better evaluate the strength and regularity of each experiential theme. After completing all the transcripts and journals, the experiential themes that initially emerged were organized into a master list. Those themes that emerged in terms of frequency and strength were rephrased to illustrate their resonance, using the structure suggested by Wiltshire & Ronkainen (2021): "Data show that [some/many/most] participants in this study [strongly]...". Using the previous example, the theme was rephrased as:

Data show that the conceptualization of sustainability of many participants in this study was strongly influenced by a university professor who was a sustainability advocate.

¹¹ This theme emerged in response to the interview question (Q4): "How would you define sustainability? How did you come to this definition? What influences or informs the way you define sustainability?"

The revised experiential themes were collated and reviewed with another coder to better ascertain empirical adequacy, descriptive validity, and interpretive validity. The final list of experiential themes underwent clarification and negotiation, where some were renamed, combined, or discarded. To better organize the themes, each of the long phrases were given a shorthand version.

Generating inferential themes to capture the actual domain

Moving from the empirical domain to the actual, the experiential themes were then reformulated as inferential themes, where the described event or experience was distilled into a concept through inductive and abductive thinking. In line with CR principles, TA should also seek to uncover the events in the social world that can only be inferred through empirical studies and real-life experiences (Wiltshire & Ronkainen, 2021). Thinking about each experiential theme inductively involved formulating tentative statements that extend the event/experience as described by participants in the study to a phenomenon that could plausibly occur to a wider population. Wiltshire and Ronkainen (2021) recommend using “It is plausible to claim that...” to when formulating inductive statements. For example, the experiential theme:

Data show that the conceptualization and operationalization of sustainability of many participants in this study was strongly influenced by a university professor/staff who was a sustainability advocate.

was converted to:

(It is plausible to claim that) having sustainability advocates as mentors at the university strongly influence students’ sustainability values and behavior.

The term “mentors” was used to include not only professors, instructors, or staff, but those who take on the role of a mentor, whether within the context of a university or not. Through this reformulation, the collective experience of participants in the study could be applied to more people or to other similar contexts. The inductive statement is further refined via abduction, which entails drawing from existing literature to redescribe the tentative statement into something more general and conceptual. The goal of abduction is “to add value by connecting the specific instance to one that as is more widely known across contexts as well

as reducing ambiguity” (Wiltshire & Ronkainen, 2021, p. 172). Thus, the abducted inferential theme was:

Champions for transformation: Sustainability champions in the university are likely to influence sustainability transformation.

In this case, the concept of sustainability advocates as mentors at the university was conceptually redescribed as *sustainability champions*, a term used in the literature on sustainability transformation to describe agents for sustainability transformation within an organization such as a university or workplace (Lozano, 2006; Ryan & Tilbury, 2013; Wood et al., 2016). These champions are influential in shaping sustainability-oriented values and pushing for action within universities, whether the champion has a teaching role, occupies an administrative position, or acts as an external consultant or mentor. Using this knowledge from the existing literature allowed the researcher to “abstract” the specific experience recorded by participants. Similar to what was done with the experiential themes, after compiling all the inferential themes into a master list, they were reviewed with another coder, and they were also given a shorthand version.

Probing causal mechanisms through dispositional themes

These inferential themes served as the basis for theorizing the dispositional themes, which “delve deeper into the properties and powers that may cause certain events to happen, i.e., these causal properties or powers predispose the occurrence of the event, which may or may not happen, depending on the context” (Araneta & Cuyegkeng, 2024, p. 4). Generating such themes involves exploring the interplay between structure, culture, and agency of the phenomenon under study and unearthing the intrinsic properties of the mechanisms that cause it—whether or not it occurs. According to Wiltshire and Ronkainen, such themes are considered *dispositional* “because they do not always produce actual events in the real-world as their causal power is dependent on the context in which they reside” (2021, p. 173). This requires retroductive thinking, theorizing the properties that must exist for the phenomenon to occur within that context (Danermark et al., 2019). The same dispositional theme could be generated from multiple inferential themes. Using the previous example of champions for transformation, thinking retroductively, one could posit:

The inferred phenomenon of sustainability champions influencing sustainability transformation is dependent on the conduciveness of the environment to radical changes.

This same dispositional theme applied to another inferential theme of intra-university collaborations as critical in shaping sustainability transformation—these collaborations are predicated on the university's openness towards such partnerships. As was done with the previous two themes, an initial list of dispositional themes was collated and discussed thoroughly before being finalized.

Head, hands, heart, feet and the morphogenetic approach

The penultimate step in data analysis was to understand the interplay of head–hands–heart–feet in the learning process. Each dispositional theme was reviewed using the TSL lens to explore how much of each learning domain, whether cognitive, affective, behavioral, or situated, was stimulated to enable transformation. While this step of classifying according to the TSL framework is not necessary for CR-oriented studies, it elucidates these mechanisms at play in a learning setting. Lastly, these mechanisms were mapped onto the morphogenetic sequence to better understand their SAC interplay (Archer, 2020).

Quantitative data analysis: Descriptive statistics

For the QUAN data obtained via the LAS questionnaire for Case 1 and the Greencomp-based survey for Case 2, descriptive statistics were used to summarize and present the frequency, measures of central tendency (mean), and measures of variability (variance and standard deviation) (Tashakkori et al., 2021). For Case 1, only an analysis of the frequency was conducted, while for Case 2, given that it was a pre- and post-test with Likert-scale items targeted to measure changes in students' sustainability competence, all three aforementioned methods of descriptive data analysis were used. The pre- and post-tests for Case 2 were administered before the start and at the end of the program, and using a paired samples t-test, the mean, standard deviation, and p-value for each item was computed using Microsoft Word analytical software. The mean shows the average score of all the responses for each item, and it is useful in measuring the central tendency or what is typical in a dataset. Standard deviation, which is the square root of the variance, measures variability, or how much a number in a dataset deviates from the mean. Variance within the dataset determines how dispersed the data points are—high variance indicates significant diversity in the responses

among the participants, while low variance implies consistency and a general consensus of responses (Adu & Miles, 2023; O’Leary, 2021; Tashakkori et al., 2021). Changes in the scores between time 1 in the pre-test and time 2 in the post-test were also calculated using a paired samples t-test.

Data quality

Integral to the establishment of a research approach and design is also its critique—being able to weight its strengths and weaknesses. According to Tashakkori et al., (2021), any research project must endeavor to fulfill two requirements to ensure data quality: data validity/credibility (whether the event or construct is captured or represented) and data reliability/dependability (whether the event or construct is captured or represented *well*), where the first term of each concept pair applies to the quantitative tradition and the latter to the qualitative. To ensure the quality of research designs in the social sciences, Yin (2018) cites four tests (construct validity, internal validity, external validity, and reliability) with their

Table 3.6

Tactics used to ensure reliability and validity

Test	Tactic used
Construct validity <i>If process measures what is being studied</i>	Multiple sources of evidence were used – interviews (students and instructors), observations, survey questionnaires, reflection journals, and curricular documents
Internal validity <i>If there is a causal relationship</i>	- Inter-rater reliability checks allowed review of thematic analysis - A detailed explanation using the morphogenetic approach was provided to describe the process of fostering/hindering TSL through the VE - Rival explanations were generated during the thematic analysis (retrodiction in CR-oriented TA) to ascertain causal relationship - Data was triangulated by relying on different sources (student perceptions, teacher perceptions, curricular documents, researcher’s perception)
External validity <i>If findings from a case can be generalized</i>	Use of <i>theoretical</i>/replication logic where two different types of VE were compared using the same TSL framework to predict similar outcomes
Reliability <i>If procedures used can be repeated with similar results</i>	- A case study protocol was used for both cases - A database was created to house and organize all the data (divided by case) in case an inspection is needed

corresponding tactics in case study research. Table 3.6 shows the four tests and the corresponding tactics used in this research to ensure data quality.

In addition, having a M/M design allowed the strengths of each approach—quantitative or qualitative—to offset the limitations of the other (Clark & Ivankova, 2015; Doyle et al., 2016; Tashakkori et al., 2021). For the largely QUAL part of the research design, aside from the aforementioned tests to safeguard credibility and dependability, the interview and survey questions were designed based on the relevant literature and were reviewed by seasoned researchers in the field as well as the research supervisor. The QUAL thematic analysis was cross-checked with the same researchers and supervisor to maintain trustworthiness and coherence of the themes.

Methodological limitations

There were a number of methodological limitations in this study. Firstly, it lacks replicability due to the difference in data collection methods. To increase external validity of a case under study (determining whether the findings can be generalized), a similar data collection strategy should have been used. However, due to limitations in both cases and considerations for Case 2 that was part of a bigger research project, adjustments had to be made to the original research design, particularly with the survey questionnaire. While some methods and their items were consistent across cases (semi-structured interviews for both instructors and students, documentation, participant observation), others differed such as the survey questionnaire and the reflection journals. The original items from the LAS questionnaire were replaced with those based on the Greencomp competences to address the needs of the parent research project—as well as the researcher's. Unfortunately, doing so could not guarantee parallel methods, and as Case 2 commenced after the completion of Case 1, changes could no longer be made to the methods of the previous case. To address this disparity, the researcher made sure to begin the analysis with the QUAL methods and use the data from the surveys as confirmation. In addition, in line with a critical realist methodology, each QUAL data source was analyzed separately to generate experiential and inferential themes before consolidating them to formulate dispositional themes, with the source of each theme being tagged. This allowed the researcher to identify where the themes emerged,

whether from the interviews, observations, reflection journals, etc. In line with this issue, the surveys used for both cases are lacking in terms of validity, lacking in both construct and factorial validity (Romano, 2018). In addition, given that only six students responded to the survey in the first case, it cannot be representative of the students' experience. Similar to the first issue, this was addressed by making sure that the QUAN data was used to corroborate the QUAL findings, culling only confirmatory rather than novel insights.

Another methodological limitation is the small number of students who participated in the interviews for both cases. For Case 1, even after retrieving the consent of all the students and following up with the course instructors, in the end, only three students from Uni P and three from Uni F participated in the interviews. For Uni P, after discussing with the course instructors, one probable reason could be that most if not all the students were graduating and in the process of writing their theses. This could have limited their availability, aside from the fact that the schedule for the interviews fell around the holiday break (from November to February)—which was also the finals period and the holiday season for the students. For Uni F, the low participation could also be attributed to the high attrition. In the end, only four students from Uni F were present during the last session, and the fourth mentioned being unsure about completing the course. Therefore, the three students who were interviewed were the only ones who had completed the course at the time of the interview. For Case 2, as the dissertation was part of a parent research study, methods outside of those previously agreed upon with the partner institutions had to be done either on a voluntary basis or through each of the institution's channels. The researcher opted for the first option, seeking volunteers through the social media page of the VE and asking the international office of her university (which was one of the partner institutions) to extend this call to the participants. Only seven students responded to the call, and two eventually backed out.

Lastly, conducting research that includes the morphogenetic approach and shows the morphogenetic sequence requires time (Archer, 2013). Including follow-up interviews for both cases could have enriched the findings for the second research question, especially in understanding the strength of the outcomes and their transformative potential. Hence, with these limitations in mind, there is a need for caution in the interpretation of the findings in each case, the cross-case analysis, and the overall discussion.

Research positioning

My role in this study was that of a researcher. In no way was I part of the design nor implementation of the course in both cases; my involvement in each came when the courses were ready for implementation. For the COIL case, I was a visiting PhD student of one of the partner universities. Although I was being hosted by Uni P, I had no interaction with that university prior to my mobility abroad. I also established a collaboration with both groups of instructors at the same time, and such a collaboration was focused on establishing the methods to be used, specifically on seeking a compromise between which methods could best capture the kind of information needed to answer my research questions, and those that they would be comfortable with. In addition, I have no personal relationship with any of the instructors nor students, and this allowed me to maintain a level of objectivity during the interviews and data analysis. However, my being Filipino and from the Global South could influence the way I treat the data of instructors and students coming from those regions. To prevent this, coding of the data was always done with another person—ensuring intercoder reliability and preventing bias or misrepresentation of the data. As recommended by Fryer (2022) when conducting CR-oriented thematic analysis, I also recorded my insights in a “Thoughts and Questions” document, that could better help me separate my opinion from what the data reflected and what was also abducted from the initial inferences.

Ethical considerations

Once the cases were selected, permission had to be obtained, first from each of the cases’ offices or departments overseeing research procedures and ethics to be able to conduct the research in their respective institutions. This was followed by seeking permission from the instructors and students who participated in the case. The approval procedure varied between cases (Case 1 and Case 2) and also within the COIL case (Uni P and Uni F).

For Case 1 (COIL), the researcher followed the procedures of each university. The researcher first spoke with the instructors of both universities regarding the possibility of conducting research on their COIL class. The instructors were presented with an overview of the research study as well as the research design, and the data collection methods underwent revision according to the needs and time limitations of the instructors. Once they agreed with the research design and data collection procedures, the researcher drafted a research

proposal detailing the research objectives, rationale, and design—which included the methodology, data collection methods, research protocol, participant recruitment forms, informed consent forms, and the list of questions for the interviews and surveys. The proposal was shared with the instructors and submitted to both university’s respective offices overseeing research ethics. As soon as approval was obtained from the respective offices, the researcher commenced with formalizing the research agreement with the instructors and seeking permission from the potential student participants. First, the researcher shared the final versions of the approved research protocol, participant recruitment forms, and informed consent forms with the course instructors. Once signed by the instructors, these were countersigned by the researcher and sent back to them, accompanied with a link to a Doodle page to schedule the online semi-structured interview at their most convenient time. Then, in accordance with the course schedule, the researcher presented her research study to the students during one of the introductory classes of the course, and this was reinforced with a short video for asynchronous viewing for those who might not have been present. It was stressed that participation in the research was not mandatory and that it would have no effect on their academic standing. The would-be student participants were also informed of the protocols concerning data confidentiality and privacy. The instructors took charge of the participant sign-ups, and the email addresses of those students who expressed their interest in taking part in the research were forwarded to the researcher. The researcher then emailed the students with the participant recruitment form and the informed consent forms, opening also a space for any possible queries. The researcher re-emphasized to the students that their participation was not compulsory, nor would it reflect on their grades. Once the informed consent forms were signed by the students and emailed to the researcher, the researcher countersigned the forms and sent them back to the students, accompanied by a link to the online questionnaire hosted on Limesurvey and a Doodle booking page to book the online semi-structured interview.

For Case 2 (Dialogue-based VE), the researcher presented the study to the organization’s Managing Director and Senior Research Officer, and similar to the previous case, the research methods were revised based on time constraints and access to the student participants. For the instructors, the same procedure was followed as in the COIL case—they

were informed of the research study and as soon as they expressed their interest to participate, the researcher sent them the participant recruitment and informed consent forms. Once the instructors signed the informed consent form, the researcher countersigned it, sent them a copy via email and shared a Doodle booking page for the online semi-structured interview. Recruiting student participants was a little more challenging; part of the agreement that the organization had with the partner universities was the possibility to conduct research using methods stipulated prior; hence, conducting interviews—which was not part of the methods included—would mean either asking for additional permission from each of the universities or gathering volunteers only after the course wraps up through a separate platform, such as the organization’s social media channel. Due to this complexity, it was advised that the researcher use data mainly from the already available sources, and at most, revise the existing questionnaire. If other data collection methods were necessary, the researcher would then need to contact the participants separately. Thus, data collected from the students was confined to the existing data sources, which include the student background datasets (obtained from an internal questionnaire filled out during registration), weekly reflection journals, recordings of the VE, and the questionnaires sent out at the end of the course. However, the researcher was able to seek permission from the international office of her university to contact those students from her university who took part in the VE. Through this was the research able to include semi-structured interviews—but only representing students from her university who participated in the exchange.

Summary

This chapter described the CR-oriented research design and procedures that were used to answer the question: “How does VE foster TL for sustainability in HEIs?” To investigate the transformative potential of VEs, a multiple case study design was adopted, exploring two different types of VEs—a COIL between two universities and a ready-made dialogue-based VE. The COIL also represents a comparative, project-based VE with instructors from each university overseeing students’ progress while the other case is dialogue-based, with facilitators present to guide conversations among student participants. The cases and the participants were chosen using purposeful, criterion, and maximum variation sampling techniques to ensure a diversity of perspectives on the learning experience. The main source

of data were the experiences of students, culled through semi-structured interviews, reflection journals, and surveys. These experiences were methodologically triangulated (Fusch et al., 2018) using data from interviews with the instructors of both cases, curricular documents, and the researcher's observations of the exchanges. Inter coding was also practiced during data analysis to achieve investigator triangulation (Fusch et al., 2018). The data was analyzed thematically, following the stages of CR explanatory research and the steps of TA developed by Fryer (2022) and Wiltshire & Ronkainen (2021). Using this combined approach to TA helped ensure not only depth but a closer look into the mechanisms underlying each exchange to better uncover what about each exchange could have potentially contributed to TSL. Overall, this chapter provided a summary of a CR-oriented multiple case study research design to discover the TSL potential of VEs.

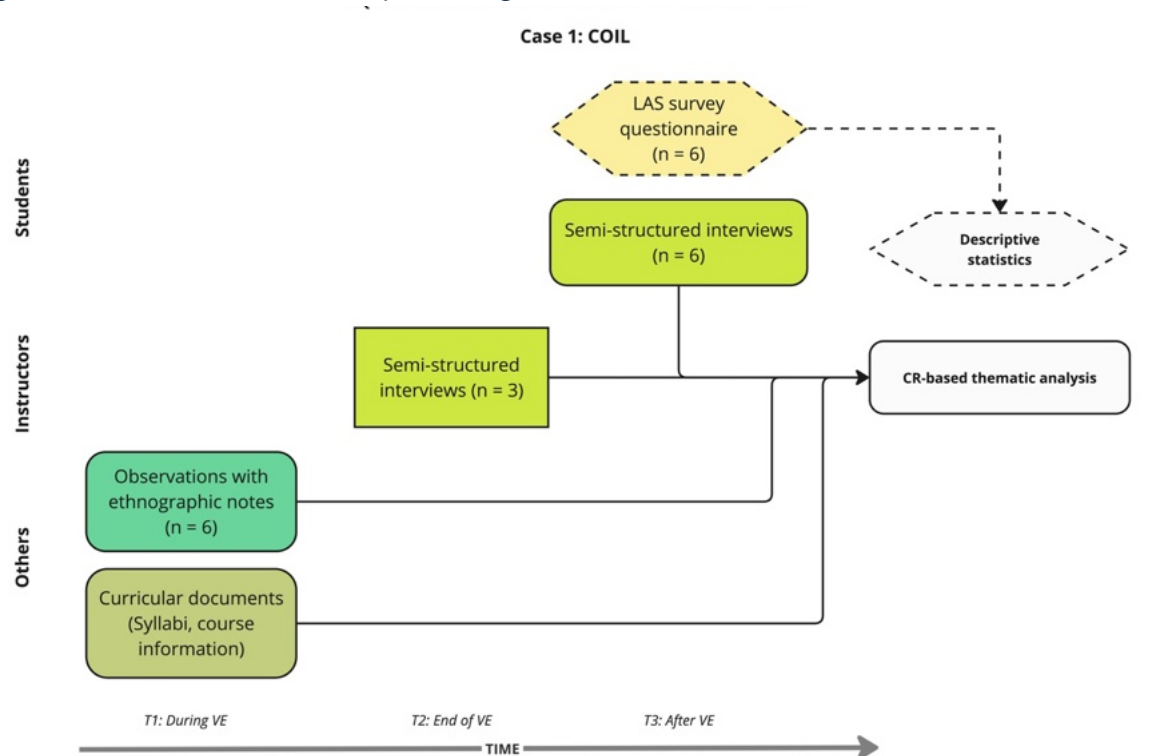
4. Findings in Case 1

The purpose of this multiple case study is to explore the potential of VE as a TSL pedagogy using two types of VE: (1) a COIL between a university in Finland and a university in the Philippines—to be referred to as Uni F and Uni P, respectively and (2) a dialogue-based VE with 14 participating universities from 13 countries across Europe and the Middle East and North Africa. This research aims to understand how VE (in terms of its pedagogical approaches and learning conditions) fosters TSL and identify which sustainability paradigms (an umbrella term used in this research to pertain to knowledge, values, skills, attitudes, and possible behaviors) are transformed through VE. Following a concurrent M/M design, both QUAL and QUAN data were gathered in parallel, with the latter used to supplement the mainly QUAL study. This chapter presents the findings for the first case, while the [subsequent chapter](#) will focus on the second. A cross-case analysis will follow in the [Discussion section](#). The first case of this multiple case study was a comparative six-week COIL between two partners in the Philippines. The partner from the Philippines (Uni P) is a university while the partner from Finland (Uni F) is a network of three universities. A total of three instructors and six students participated in the study. Data was collected through the following methods:

- Semi-structured interviews (with both students and instructors)
- Observation
- Learning Activities Survey or LAS, which had mainly quantitative but some qualitative items (for students)
- Curricular documents (course syllabi from both partners and publicly available information on the university web pages)

Figure 4.1 visualizes the data collection methods and analysis procedures used for the comparative COIL mapped on a timeline (during, end of, and after the VE). Each color hue signifies a different data collection method, and the methods have also been separated according to their source (students, instructors, others on the y-axis). In addition, QUAN methods are represented using a hexagon shape with a dashed outline while QUAL methods have a filled outline. In line with CR-oriented thematic analysis, the QUAL data was analyzed

Figure 4.1 Data collection and analysis strategies – Case 1 (COIL)



per source, first by generating experiential themes (coding only what was stated or perceived), followed by inferential themes (making inferences after a review of the experiential themes that emerged). Only after the generation of inferential themes from all data sources was a comparison made to consolidate the inferential themes into a single list. After which, dispositional themes were generated, revisiting each of the data sources. QUAN data, on the other hand, was analyzed using descriptive statistics. Thus, the findings that will be presented in this chapter will show mainly the dispositional themes—and only if necessary, with occasional references to the inferential and experiential themes on which they were based¹². Because dispositional themes attempt to reveal the underlying mechanisms that cause the inferred phenomena through abductive reasoning, references to supporting literature will be made alongside the explanations and evidence of each theme.

¹² For a complete list of themes, whether experiential, inferential, or dispositional, refer to the Appendix.

This chapter begins with an overview of the learning context, which will be described using Van den Akker's curricular spider's web (2013, p. 59), a schema that illustrates the various threads in curriculum development and implementation:

1. Rationale: Why are they learning?
2. Aims and objectives: Towards which goals are they learning?
3. Content: What are they learning?
4. Learning activities: How are they learning?
5. Teacher role: How is the teacher facilitating their learning?
6. Materials and resources: With what are they learning?
7. Grouping: With whom are they learning?
8. Location: Where are they learning?
9. Time: When are they learning?
10. Assessments: How is their learning assessed?

Not only is the schema useful in helping visualize the learning context in a consistent manner, but it could also aide in answering RQ1 by pinpointing the pedagogical approaches (learning activities and assessments) and learning conditions (teacher role, materials and resources, grouping, location, and time) that either foster or hinder transformation. The description of the learning context is followed by an explanation of each research sub-question, specifying the findings from each of the utilized data sources. These findings are interwoven with quotes from participants to better elucidate the themes culled from the data.

Case overview

The first case is a COIL co-designed by instructors of two universities, one from Finland and another from the Philippines. Although the instructors worked together in developing the exchange, the course within which the VE took place is different per university, set within different schools or departments, with varying general student profiles, study modes, and schedules. The subsequent sections will describe in greater detail the learning context, which is summarized according to Van den Akker's curricular spider's web (2013) in Table 4.1. Details about the learning context were taken mainly from curricular documents provided by the instructors of the course, as well as public information found on each

university's web pages, and most of the information confirmed what emerged from the interviews with the instructors.

Table 4.1

Learning context – Case 1 (COIL)

Rationale	Understand the complexity of socio-ecological problems by learning about the fundamentals of integral ecology and comparing and contrasting real-life cases from two diverse contexts to create meaningful connections between the two
Aims and objectives of the VE	By the end of the VE, students should be able to conceptualize and operationalize integral ecology in crafting innovative, evidence-based action plans to help address complex socio-ecological problems
Content	• Pre-VE: Sustainability leadership and integral ecology • During the VE: Case studies featuring sustainability issues or practices in different contexts
Learning activities	• Pre-VE: Learning activities varied per university • During the VE: Mainly case-based approach with case study lectures, small group breakout room discussions, group presentations, ice-breaker activities
Teacher role	Teachers (instructors) designed the VE and facilitated lectures on the topics; some guest professors were also invited to lecture on certain cases; instructors monitored the group discussions and occasionally jumped in breakout rooms to prompt students
Materials and resources	Slide decks and reading materials provided by instructors; presentation software/application chosen by the students
Grouping	Four mixed groups with three to five students per group; groupings randomly organized by instructors
Location	Zoom web conferencing platform (for the VE); materials and resources for the previous module were uploaded to each university's respective LMS
Time	Six 1.5 hour sessions divided into three parts: lecture, group discussion, group presentation
Assessments	• During the VE: Group case analysis of four cases (Oral presentation of slide decks) • Pre-and Post-VE: Assessments varied per university

Participant background

Background information from the students was collected mainly through semi-structured interviews and the online LAS questionnaire. Through the latter, data regarding participants' age, academic background and status, language proficiency, prior school-based mobility experience—whether physical or virtual, local or international—as well as experience

traveling abroad were gathered. As can be gleaned from the background information of the students in Table 4.2, there are significant differences in age, degree program, and English proficiency of the participants from each university:

- Uni P students – Students from Uni P were younger, pursuing their undergraduate degrees, with a majority in the field of Life Sciences. They were also taking the course together and thus had contact time with each other.
- Uni F students – Two out of the three students from Uni F were above 30, pursuing their Master’s degrees mainly in Education and Social Work. Having come from two different universities, students had no contact time with those from their network. Only one student from Uni F had prior experience with both international school

Table 4.2

Student background information – Case 1 (COIL)

		Uni P (n=3)	Uni F (n=3)
Prior experience with school-organized international mobility		0	1
Prior experience with VE		0	1
Age	20–24	3	1
	30 and above	0	2
Degree	Bachelor’s	3	1
	Master’s	0	2
Program (General category)	Life Sciences	2	
	Education and Social Work	1	2
	Communication		1
English language proficiency	C2	3	
	C1		2
	B2		1

mobility and VEs.

Lastly, it is worth mentioning, especially with a VE held primarily in English, that all students from Uni P declared C2 as their English language proficiency, while in Uni F, two answered C2 and one, B2.

The co-designed syllabus

For Uni F, the course was titled “Socio-Ecological Problem Solving in Southeast Asia and Europe,” offered by the Asian Studies program while for Uni P, the course was entitled “Integral Ecology for Socio-Ecological Problem Solving,” offered by the Environmental Science

program. The course was divided into three main themes: (1) Sustainability or ecological Leadership, (2) Integral ecology, and (3) Socio-ecological crises through an integral ecology lens. Table 4.3 lists down the themes, sub-themes, and content as specified in the courses'

Table 4.3

Themes, sub-themes, and content of both courses – Case 1 (COIL)

	Uni P	Uni F
Theme 1	The Role of Sustainability Leadership	Reflections on Ecological Leadership
1.1	Sustainability and leadership	
1.2	Competencies and behaviors of sustainability leaders	Who is a sustainability leader?
1.3	Is sustainable development enough? The challenge of integral ecology and ecological conversion	The challenge of ecological conversion
1.4	Futures thinking	
	(no description)	• Introduction to future studies • Future studies for sustainable development
Theme 2	Introduction to Integral Ecology	
2.1	Concepts, paradigms, and issues in sustainable development	
	• History of SD • The doughnut economy and the planetary boundaries • The IPAT framework	• The roots of sustainable development • "A big world on a small planet"
2.2	Integral ecology as aligned with sustainability	
	• Ecology in cultural contexts • Ecology of daily life • The principle of the common good • Intergenerational solidarity	• Examining integral ecology • Furthering integral human development in daily life
2.3	A systems approach to integral ecology and sustainability	
	• Introduction to the habit and practices of systems thinking • Iceberg framework • Influence diagrams	
Theme 3	Socio-ecological crises through an integral ecology lens (Virtual Exchange)	
3.1	Philippines/ASEAN case studies	ASEAN case studies
	• The Sachet economy • Social entrepreneurship	
3.2	Finnish/EU Case Studies	European case studies
	• Food and food waste • Mobility	• Circular economy and textiles • Sustainable food systems

Note: Titles that stretch across both universities were worded in the same way in both syllabi.

respective syllabi. Despite the differences in the course title and the department offering the course, the topics were the same according to the syllabi—albeit some changes in the wording and slight differences in terms of content. The VE, which ran from October 27, 2023, to November 21, 2023, was integrated into both courses as part of the final theme “Socio-ecological crises through an integral ecology lens.” It is worth noting that for the VE itself (Theme 3), the case studies as reflected in the observation notes were the following (in order): textile production, consumption, and waste in the Finnish context; food waste and sustainable systems in both contexts; social enterprises in the Philippine context; and sachet economy and plastic pollution in the Philippine context. Even if the cases presented by the lecturers reflected one context, the discussion questions always directed students to compare the practice in their respective areas.

Program offering of each university

Important differences between these two learning contexts must be noted, which includes the degree program that offered the course, study mode, scheduling, target students, number of instructors, and course assessments. On one hand, Uni F’s course was among the advanced courses on the theme of Contemporary Southeast Asia, which is part of a Mini Minor program in Asian Studies that is offered to students of three Finnish universities that form a network on Asian studies. The Mini Minor caters to graduate (Master’s degree) students from all three universities who would like to integrate their major degree with a small minor in Asian Studies. In this sense, students enrolled in the course may come from different universities. Thus, the program generally follows an online, self-study mode, where enrolled students are typically not required to attend any in-person classes—not even synchronous video lectures—and are therefore used to going through their lessons independently. All courses included in this program are hosted in the learning management system (LMS) shared by all universities, Moodle, and the content within each course is organized and uploaded by the instructor. The course adopted mostly this same study mode for the first and second topics (Module 1) but stipulated that there would be mandatory synchronous online sessions for the topic with the VE (Module 2). For Module 1, students could access all the learning material through their own university LMS, and the only application that they were required to use that was outside the roster of their university was the videoconferencing tool used for

the VE, Zoom, which was provided by Uni P. Aside from the assessments required during the VE, students also needed to answer the module assignments that were graded only for completion and submit two learning diaries, one for Module 1 and another for Module 2.

Learning was facilitated by an instructor with a research background in East Asian studies. Even if all learning materials were conceptualized and shared by both universities, the instructor and the students from the Finnish network of universities who participated in the course and the VE approached the exchange from a background more rooted on Asian studies than on sustainability. Indeed, the three students who participated in the study were taking the following degree programs as their majors: Educational, Development and International Education; Multilingual Communication; and Work and Welfare. Two of them were from the same university within the network and another was from a different university. In addition, the only two working students among the participants are from the Finnish group. Even if the three students represent two universities, from now on, the network will be referred to as Uni F. The course started on the first week of October, which is usually when the first semester begins in universities in Finland.

On the other hand, Uni P's course was offered by the Environmental Science program as an interdisciplinary elective available to undergraduate students, as part of the four interdisciplinary electives that all undergraduates of the university are required to complete, regardless of their study program. Being open to all undergraduates, students who enroll in the course could come from a variety of degree programs. Interdisciplinary electives are also normally taken on the last year (out of four) of undergraduate studies; hence, participating students would most likely be in the process of completing their undergraduate thesis. The course followed the "hybrid" set-up being practiced at the university, where some class days are held in-person and others are held online via videoconferencing. The materials of the course, whether provided in-person or online, were uploaded to Canvas, the LMS of Uni P, and the exchanges with Uni F utilized Uni P's videoconferencing platform, Zoom. Aside from the assessments required during the VE, students had to complete two other assessments—both group presentations—prior to the VE and a final individual assessment after the VE. The course was facilitated by two instructors with a background in Earth Sciences and Environmental Management and who were then members of the university's institute of

sustainability. The three undergraduate students who participated in the study were taking the following degree programs: Development Studies; Life Sciences; and Environmental Science. The course started on the first week of August, which is usually when the first semester begins in universities in the Philippines.

Since the first semester in both universities begins in different months—August for Uni P and October for Uni F, the length of time given to the topics prior to the VE varied. Students from Uni F only had roughly a month (from October 2 to October 27) to go through all the topics independently before the VE, with only one class dedicated for a synchronous online session. Meanwhile, students from Uni P had more time, as classes started on August 9. This also means that given the different study modes, students had varying contact time with their respective instructors and classmates.

The shared virtual environment

For the module that included the VE, there were a total of six 1.5-hour classes for the exchange, with an additional session organized by the students outside of class hours. The first class of the VE featured a guest professor from Uni P, who gave a lecture on two topics: integral ecology and culture. In between lectures, students from both universities were divided into four mixed groups to engage in ice-breaking activities and discussions based on provided questions, and these would be their groups for the subsequent sessions. The next four VE classes followed generally the same format (see Table 4.4), where instructors presented their students with a case for around 20 to 30 minutes. For some classes, the case was talked about from both contexts, while for some, the case was talked about only from one. After each case presentation, students were sent into break-out rooms according to their group and were tasked to discuss the case in 45 minutes using the discussion points provided, which ranged from five to seven questions or statements. They also had to submit a group analysis (with a slide deck) to be presented before the end of the class. The last 15 minutes of the class

Table 4.4

General class structure – Case 1 (COIL)

Duration (min)	Class activity	Virtual location
20 – 30	Case presentation by instructor/s or guest lecturers	Plenary session
30 – 45	Group discussion	Breakout rooms
15	Presentation of group discussion	Plenary session

involved the presentations of each group. Although students were encouraged to switch on their webcams, they were not required to do so. During the plenary sessions, instructors or guest speakers had their cameras switched on the whole time, and during lectures, they also shared their presentations on-screen. Meanwhile, a majority of students had their cameras switched off, with either only a letter (representing an initial) or their profile photo displaying on the screen. Students with cameras switched on during the plenary sessions never went beyond four at a time and they were mostly those from Uni F. During the break-out room discussions, more students would switch on their cameras, but this varied from group to group. For example, in one group of four students, all had their cameras switched on, but in another group, all cameras were switched off. It also seemed as if most, if not all the students were following the class from their home environments. Only during two sessions with one group¹³ did the researcher note that students were following from the same classroom in the university. In addition to the video interactions, students could also course their questions or responses via chat or could respond using emojis that were part of the functionalities of the videoconferencing platform.

RQ1: How does VE foster TL for sustainability?

Answering this first sub-question entails uncovering the *process* of transformation facilitated by the VE. This involves identifying the pedagogical approaches and learning conditions within the VE that foster or hinder TL using the lens of the TSL framework. Using CR-oriented TA, thirteen dispositional themes were culled from the data gathered primarily from student interviews and confirmed by student survey questionnaires, interviews with the instructors, analysis of the curricular documents, and researcher observation notes). Dispositional themes provide insight into the mechanisms that caused the paradigm changes associated with the VE to occur. These dispositional themes were then organized into five

¹³ More specifically, the Uni P students of breakout room (BR) 1 were in the same classroom on VE Sessions 4 and 5. Each of them connected via their own laptop.

organizing themes—the first four representing the head, hands, heart, and feet dimensions of TSL, and the last reflecting VL learning conditions.

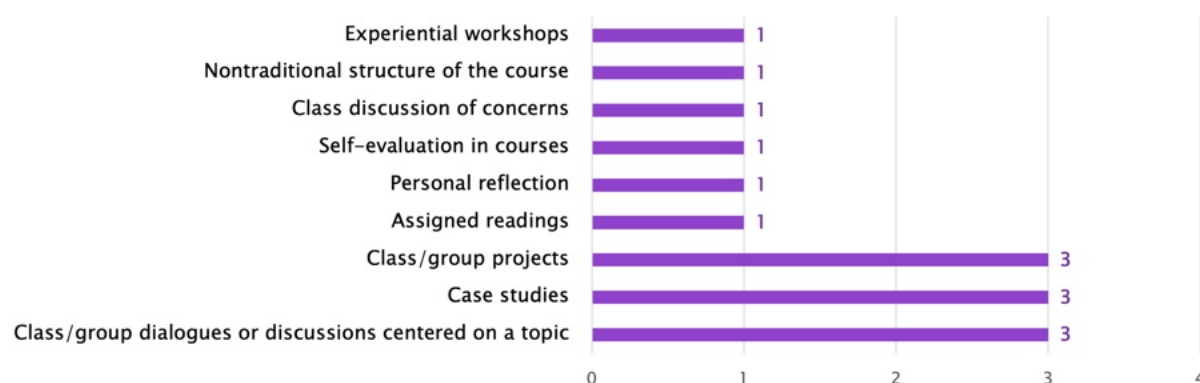
Instructional strategies

Among the variety of instructional strategies used by the class, the most effective in fostering TSL were the following:

- **Case studies** that were presented as lectures from instructors
- **Breakout room discussions** per group that came with discussion prompts
- **Group presentations** in the plenary that came after the discussions

These emerged not only from the student interviews but also from the student survey questionnaires¹⁴. Figure 4.2 shows the class activity or experience that students believed to have caused such a change. This table, however, captures only the instructional strategies that were effective in sparking change, but it does not provide details on the other aspects of the class—the pedagogical approaches and learning conditions that are also important in the teaching and learning process. As previously articulated in [Chapter 3: Research Design and Methodology](#), the use of dispositional themes in accordance with CA-oriented TA helps to uncover how an inferred phenomenon was able to effect such a change. While experiential themes are generated based on phenomena or experiences articulated in the data and

Figure 4.2 Effective instructional strategies – Case 1 (COIL)



¹⁴ Q2 of the VE section of the LAS questionnaire: “Since the time the course began, do you believe you have experienced a time when you realized that your values, beliefs, opinions or expectations had changed?” Four out of six respondents said yes. In response to Q4 of the VE section “Which of the following influenced this change?”, three of them answered that this change was caused by a class activity or experience.

inferential themes seek to make assumptions based on what had been articulated across *all* datasets, dispositional themes go further by theorizing the mechanisms that could have caused the articulated phenomena or experiences—and this is done through the dual process of abduction and retroduction. Ten of the 13 dispositional themes are presented in Figure 4.3, arranged according to the TSL dimensions they each address. The length of the line to the right of the human figure corresponds with the frequency of the dispositional theme in the data relative to the rest of the themes. Both factors that fostered and hindered TSL are specified, with the latter depicted as darker-colored lines below the former. For a tabular view of these themes, refer to the [summary of this section](#), where each theme is listed along with the frequency and references. The figure reveals that the **head** dimension (cognitive domain) was the most positively activated of the four (34%), fostering TSL by exposing students to diverse perspectives and practices; using a critical (systemic) lens; and foregrounding real-life cases. This was followed by **feet** (situated domain), where TSL was fostered (24%) by foregrounding place-based contextualization and by maintaining coherence with university culture. The next dimension is that of the **heart** (affective domain), which showed positive activation (17%) through a pedagogy that provided spaces for social learning and gave voice to first-person, *living* narratives. However, TSL was hindered in this dimension (13%) due to differences or conflicts in schedule and participation as well as interactions that were more transactional discussions than relationship-building conversations. The **hands** dimension was the least engaged (3%), activated through lessons focusing on practical skills.

However, there are differences as to how TSL was fostered *per* university. An analysis of the frequency of the themes from the student interviews per university reveals that the most positively activated domains differed, as demonstrated by Figure 4.4. The least activated dimensions, on the other hand, were the same for both universities, with heart and hands coming in last. For Uni P students, the two dimensions on which the course had the most impact, was that of **feet**, the place-based or situated domain, followed by **head** or the cognitive domain. The opposite was observed for Uni F students, where the most prominent was the **head**, followed by the **feet**.

Figure 4.3 Dispositional themes according to revised TSL framework – Case 1 (COIL)

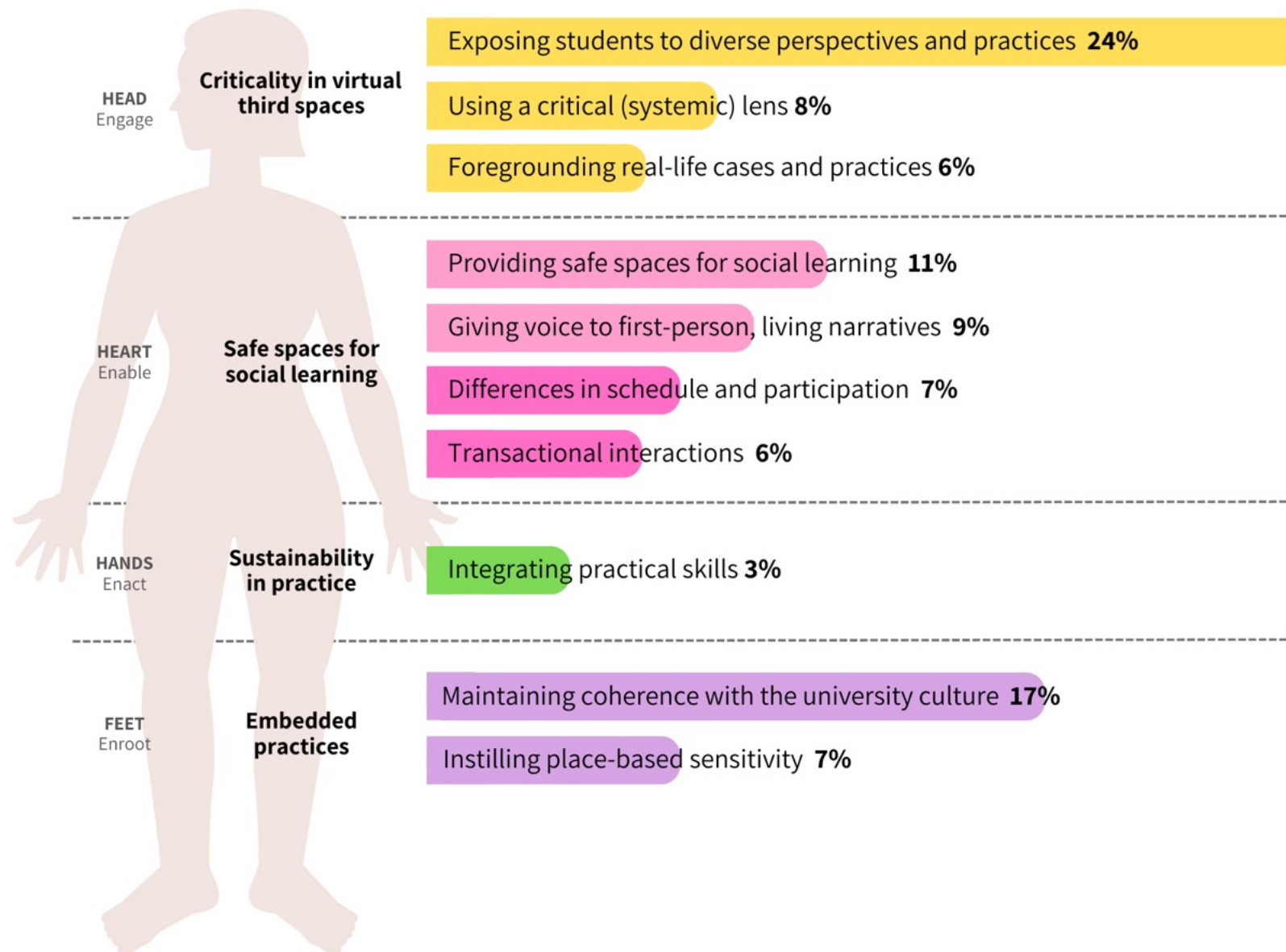
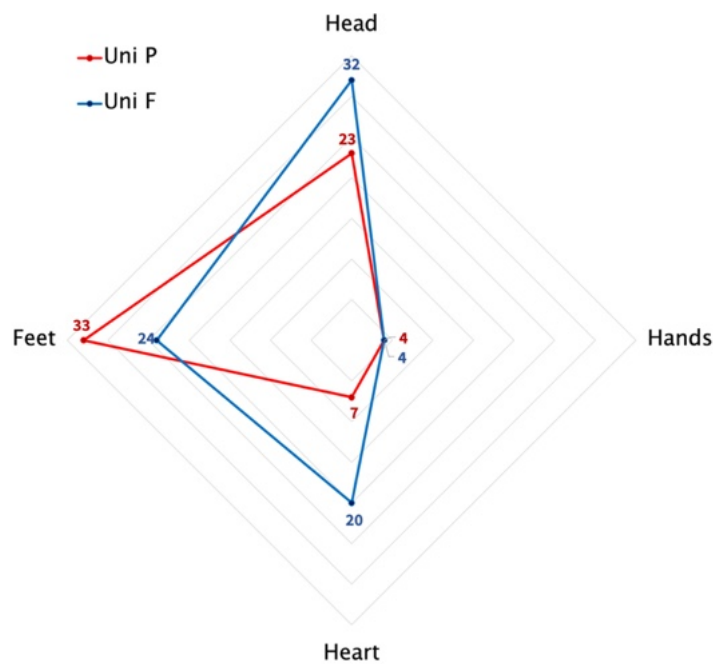


Figure 4.4 How TSL was fostered per university – Case 1 (COIL)



It is also notable how the impact on the affective domain (heart) differed significantly—with the Uni F dataset having nearly thrice the frequency of the Uni P dataset. The dispositional themes as emerging from the data will be further explained according to the four dimensions/domains. Each section will include the following:

- An explanation of the domain
- A description of its comprised dispositional themes
- A comparison of the distribution of the themes per university
- Evidence from the data as direct quotes from participants
- Sources from the existing literature to support the retroducted themes

Head: Criticality in virtual third spaces

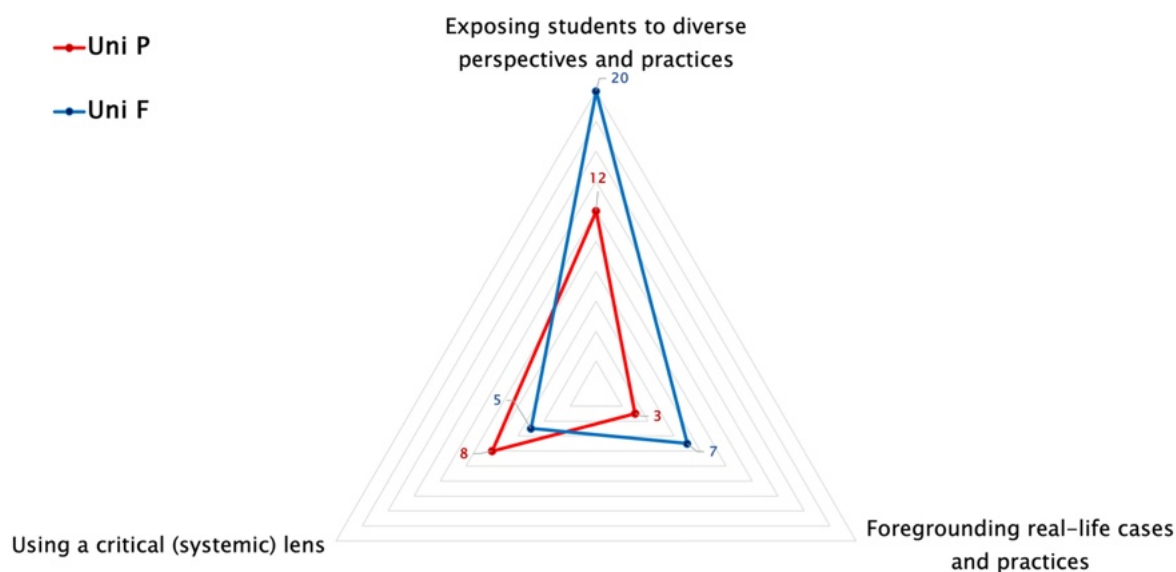
I think the best one was when we had to review the case before and then on the day of the course, we just talked in the small groups... [because] you told your points of view and how you saw this case, and then the others tell their [points] of [view] and how they saw it. And it was [so] interesting because we read the same cases.

– Cara, Uni F student

As described in the above quote, the inclusion of diverse perspectives and real-life applications using a critical lens was key in fostering TSL in the cognitive domain. In this case, out of the four domains, the pedagogical design of the VE tapped into the cognitive domain most by (i) exposing students to diverse perspectives and practices, (ii) using a critical

(systemic) lens, and (iii) foregrounding real-life cases and practices. From all the data gathered, there were no notable hindrances. Figure 4.5 shows the distribution of the

Figure 4.5 Distribution of dispositional themes under the cognitive domain (head) – Case 1 (COIL)



dispositional theme between the two universities—based only on the interviews with students—revealing differences in terms of frequency. For both, **exposure to diverse perspectives and practices** was the most prominent, with at least three participants citing the rarity of being able to interact with people from outside the “*Finnish bubble*” (Bea, Uni F student) or from other cultures or contexts:

Interacting with people from other parts of the world—that really opened our eyes, at least for me and my group. If we didn’t have that virtual exchange... the experience would have been subpar. We don’t really get that much chances to interact with people from other cultures, from other people outside the Philippines that much.

As articulated in this quote by Hiraya, a Uni P student, the exposure to a completely different point of view from a distant part of the world made the difference in her learning experience. According to the student interviews, the instructional strategies responsible for such exposure were the case studies and subsequent group discussions with accompanying guide questions. Indeed, when asked about their motivation for using such strategies, the instructors confirmed that their goal was to have their students try to find similarities and differences among a shared experience towards “*widening their horizons and showing them how the same thing could be done in different ways*” (Ria, Uni P instructor). Mona, a Uni F instructor,

articulated this from the perspective of the *object* of the exposure as well as that of the *subject*—the one sharing the experience:

How to make the best of this online teaching or kind of the profit from this opportunity to establish these contacts and interaction? And also to figure out ways how to somehow convey these aspects of their respective contexts.

The case studies that centered on sustainability-oriented issues in each country followed by group discussions foregrounded **trans-perspectival learning**, which Wals (2017) used to describe learning that “cannot be captured by a single discipline, or by any single perspective” (p. 21). Being trans-perspectival was reflected not only in the cultural diversity, but also in the differences in terms of age and academic background.

They are young, younger than the master students in Finland. So they bring another—the young perspective, a little bit of energy and enthusiasm in the discussion. But they [are] really professional, I have to say.

– Anna, Uni F student

In addition, instructors from Uni P also mentioned exposing their students in other ways prior to the VE by organizing videoconferences with guest speakers. Leveraging the convenience of the online space, Uni P instructors expressed the necessity of exposing their students to sustainability practitioners from diverse fields such as geology, urban water systems, and marine wildlife, coming from distant parts of the Philippine archipelago. For both instructors from Uni P, exposure was critical for their younger undergraduate students who had no work experience. Alexis and Ria, who have had experience teaching both undergraduate and graduate students, articulated that the age and inexperience of the undergraduates necessitated their exposure to diverse sustainability-oriented practices for them to have a taste of the world outside the university environment. Alexis described this practice using the term *scaffolding*, intentionally exposing students to sustainability practices in diverse real-life contexts to “*see how specific issues play out in different places*”. During these webinars with practitioners, students were encouraged to ask questions about their work and, as one participant (Hiraya) mentioned, how practitioners “*feel about the changing world*.” She added that it followed the same question-and-answer format as the VE. This was not the case for students from Uni F; since the modules prior to the VE were all asynchronously delivered, their only exposure to students in this class—whether those from within their university network or outside of it—was through the VE.

This exposure to diverse perspectives and practices also reflects the concept of **gestalt-switching** (Wals, 2010), particularly that of cultural and disciplinary gestalts, as students had to work in interdisciplinary teams, cooperate across cultures, and use their differences to enrich their work. Wals (2010) identifies the capacity for *gestaltswitching* or shifting between different mindsets—be it temporal, spatial, disciplinary, or cultural—as essential in acquiring the knowledge, skills, and attitudes to respond to sustainability issues. Wals also put forward seven non-conventional forms of learning¹⁵ that are associated with EfS, and one of the commonalities among the seven is how learning is viewed as trans-perspectival, “in that it cannot be captured by a single discipline, or by any single perspective” (2017, p. 21). This diversity of perspectives that are in dialogue is important in teaching sustainability knowledge because of how sustainability discourse itself holds a variety of meanings that are usually culturally-situated (Marouli, 2002; Tilbury & Mulà, 2009), and recent research has found how cultural values mediate the achievement of the SDGs (Zheng et al., 2021). Thus, the representation of diverse cultures in sustainability discourse could help in informing action.

In addition, diversity is also of critical significance because of how international policies to address environmental issues are shaped and dominated by Western discourse, despite sustainability being a *global* discourse (Jaskolski & Udoh, 2022; Turner et al., 2024). This Western centrism has pushed existing sustainability paradigms and practices from the Global South to the periphery, or even prescribing paradigms and practices of the Global North to the Global South (Henderson & Zarger, 2017). Indeed, when viewing education from a political ecology perspective, the inclusion of peripheral voices could help in better understanding why these voices were left out in the first place, who spoke for them, and who gets to decide who can speak (Henderson & Zarger, 2017). Aside from diversity being a platform for representation, it is also a means to spur transformation. Trans-perspectival

¹⁵ The seven are: (1) discovery learning; (2) participatory/collaborative learning; (3) problem-based learning; (4) interdisciplinary learning; (5) critical thinking-based learning; (6) systems thinking-based learning; and (7) social (multi-stakeholder) learning (Wals, 2017).

collaborations could equip learners with the skills to tackle sustainability issues using knowledge from diverse disciplines applied across various scales (global, national, local) and contexts (urban, rural). Digital technology can better facilitate these collaborations as it allows for “global collaboration with experiences and engagement for local learning and impact” (Caniglia et al., 2018, p. 365). In addition, a learning environment marked by difference (be it cultural, disciplinary, socioeconomic, etc.) could help in uncovering the contrasting ontologies and epistemologies of those present, and through their overlaps, new ways of thinking and being could be negotiated (Bhabha, 2004; Reljanovic Glimäng, 2024; Zhou & Pilcher, 2019).

The next most pronounced theme under the cognitive domain differed between the two universities: for students from Uni P, the **use of a critical (systemic) lens** showed greater significance, while students from Uni F had more to say on the use of **real-life case studies and practices**. This same result is also reflected in the interviews with the course instructors, where those from Uni P gave more attention to the former while for Uni F, it was the latter that received more consideration. For the theme of a critical, systemic lens being embedded in the teaching strategies, Amihan from Uni P had this to say:

Apart from that, I think the content is also really helpful because they looked at the history of sustainability from the Brundtland Commission, the different definitions from different conferences and asked why, at every level, has anything changed? And why isn't that so?

Being able to question each other and oneself and reflect on the similarities and differences through the discussion seemed to be more impactful for students from Uni P than for those from Uni F. They all mentioned how going beyond the information and asking *why* was helpful in comparing without trivializing or overstating the realities in each context. For example, the students were required to present the case studies using the iceberg framework, which asked them to unearth the mental models underlying unsustainable behavior. In addition, they were introduced to causal loop diagramming to better understand the relationships, links, and influences behind a case. Prior to the exchange, their instructors asked them to compare the SDG profile of Finland and the Philippines, identify the strengths and weaknesses, and probe why. This was affirmed by the interviews with the Uni P instructors, who articulated this dispositional theme more than the Uni F instructor. From the literature, teaching students how to find connections and uncover deeper causes to sustainability dilemmas reflects **critical**

thinking– and **systems thinking–based learning** associated with ESD (Wals, 2017). The ability to see beneath observable events and understand the often invisible patterns, systemic structures, and mental models underlying them are considered key in finding solutions to sustainability issues (Laininen, 2019; Sterling, 2013). The instructors also explained that as important as it was for them to teach their students how to see beneath the surface of environmental issues, of equal importance was scaffolding their understanding to avoid any feelings of inadequacy or self–pity:

We had to make sure that we also scaffolded our kids to feel na hindi kayo kawawa [that you aren't pitiful]; you don't have to feel like the Philippines is such a bad country to live in when you compare socio–ecological issues.

– Ria, Uni P instructor

Although this criticality was more pronounced in Uni P, students from Uni F still reported the integration of critical teaching strategies as being key in helping them question their assumptions as well as actions, as articulated by Bea:

In general, leaving my own bubble that I thought that I'm not in that bubble at all; but then I realised that I have been seeing the problems only from my own point of view.

The last dispositional theme under the cognitive domain is that of **foregrounding real–life cases and practices**, one that emerged more in the interviews with students and the instructor from Uni F. Beyond exposure to diversity, this theme reflects how participants were engaged by real–life applications of sustainability concepts or the presentations of actual situations of unsustainability through the various cases. They were described by participants as *interesting* (Cara), *relatable* (Bea), and *stimulating* (Anna). **Case–based approaches** or case study teaching, where concrete, real–world dilemmas set within a particular context are used as an instructional strategy to generate analyses and solutions (Addo et al., 2022; Hardin et al., 2016), has been utilized in SE because of how it gives students the opportunity to “encounter complexity, manage uncertainty, and generate innovative strategies” (Sprain & Timpson, 2012, p. 2). The cases served as arenas for students to practice their critical and systems thinking skills, work collaboratively, and apply problem–solving skills. The choice of the cases and their order of presentation were also helpful in prompting discussion:

The topics give a daily perspective. It... [sic] interesting because they talk about [sic] fashion industry and food waste, [which] are two daily activities and practices. It's relevant... and then

they move on to social entrepreneurship, which is little bit bigger and multidimensional. So for me, it gives [sic] the way into more serious talking. – Anna, Uni F student

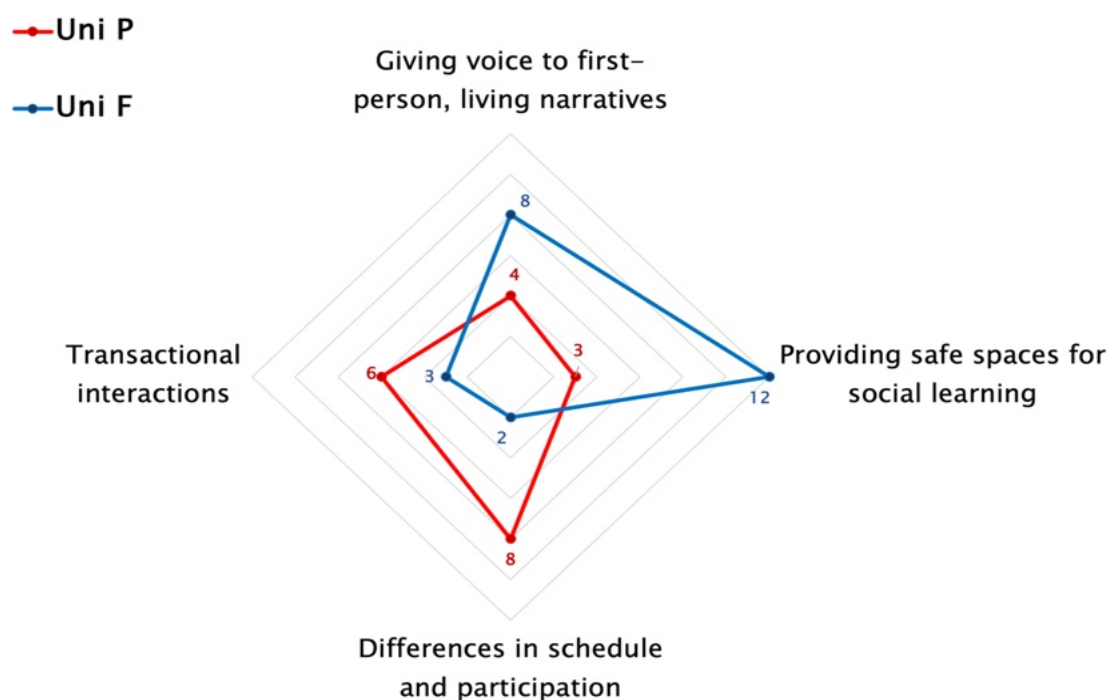
As mentioned previously, the course instructor from Uni F, who had stronger roots in anthropology, mentioned: “It comes [down] to the interpersonal exchange, connecting people from different contexts. Here again, the anthropologist is speaking, kind of enabling this sort of mutual learning” (Mona).

Going back to the first research question that asked how the VE either fostered/hindered TSL, it did so cognitively first and foremost by exposing students to diverse perspectives and practices through the case study presentations and subsequent discussions that were guided by questions. In addition, the integration of teaching strategies that prompted students to ask questions and critically reflect on issues and practices—particularly their real-world applications were effective in activating the *heads* of students. It should also be stressed that these approaches and conditions, while they aim to expand sustainability knowledge and understanding in the cognitive domain, could also be attributed to other domains. For example, the case study approach also builds skills and capacities, indicative of the behavioral domain (hands). However, since the cases in this VE were approached mainly from a theoretical standpoint—with no application whatsoever, it seemed more appropriate to classify them under the cognitive domain. These findings in the head dimension are in line with what the literature on ESD and EfS outline as pedagogical approaches for the development of sustainability competencies, such as the use of case studies, interdisciplinary team teaching, lecturing, and the integration of critical and systems thinking (Wals, 2017). In addition, underscoring and reflecting on power relations in sustainability dilemmas as well as between the diverse partners themselves are also among the learning conditions for sustainability transformation (Rodríguez & Barth, 2020).

Heart: Safe spaces for social learning

Recalling Figure 4.4, looking at the overall frequency of the themes per university and excluding the factors that hindered TSL, the heart is the second least engaged domain for both universities. The place-based or situated domain of feet actually holds more positive weight than the affective, if not for the hindrances in the affective domain that added to the

Figure 4.6 Distribution of dispositional themes under the affective domain (heart) – Case 1 (COIL)



overall frequency¹⁶. Based on data from student interviews, the affective domain of the students was activated through the VE by (iv) providing safe spaces for social learning (11%) and (v) giving voice to first-person, living narratives (9%). However, TSL was hindered due to (vi) differences in schedule and participation (7%) and (vii) transactional interactions (6%). Figure 4.6 shows the distribution of the dispositional theme between the two universities. There are stark differences in their frequency, particularly between those that fostered and hindered TSL affectively. It would seem that for students from Uni F, the affective domain was more positively activated than negatively; however, the opposite seems to be true for students from Uni P. Students from Uni F talked more about how the **provision of safe spaces for social learning** through the case discussions and the group presentations made the course more impactful. In social learning, people with diverse backgrounds, with equally diverse epistemologies, value systems, beliefs, and experiences, whether they are part of an existing learning community or external to it, come together “in order to initiate a creative quest for answers to questions for which no ready-made solutions are available” (Wals, 2017, p. 21).

¹⁶ The inclusion of both catalysts and hindrances to TSL was done to answer the research question, where factors that both fostered and hindered TSL should be taken into account.

Given the diversity of learners in this pedagogical approach, conflicts, contradictions, and differences are expected—which is why the learning environment must be a space where such issues can find resolution, or at least, acceptance. The term **safe spaces** refers to communicative spaces marked by openness and trust (Pereira et al., 2020), but the concept has been developed into safe *enough* spaces (Singer–Brodowski, 2023; Singer–Brodowski et al., 2022) or brave, non–hegemonic spaces (Glimäng, 2022) to highlight the discomfort and disorientation when dealing with uncertainty or with the edge emotions that emerge when “the coherence–producing mechanism of our minds is interrupted” (Mälkki, 2019, p. 64). However, the findings do not show the presence of these edge emotions; rather, they reveal only the first step in establishing these spaces—creating an atmosphere of sharing and mutual respect (Pereira et al., 2020). When students from Uni F were asked more about the favorable aspects of their VE experience¹⁷, Cara mentioned “*talking in small groups*” after the lectures, while Anna, a student from Uni F, had this to say:

Probably the discussion part with [students]. The students, I would have to say, were really great and [sic] boost my learning mood a lot because I'm not really expecting very much at first when entering this course. I thought it was just another university course where I also have to work with others but their energy coming to class is—it's just another course I have to finish. So not really engaging enough for me. But then the [Uni P] students...

However, Uni P students had less to say about this, and perhaps this disparity could be attributed to program and study mode differences—students from Uni F generally followed online asynchronous (or online distance learning) courses. Interviews with the Uni F students and with the instructor revealed that the synchronous VE was not like their usual courses which students would go through independently, at their own time and pace, with little to no interaction with other students—which two of the participants from Uni F said was optimal for them to balance their work and studies. One participant (Cara) said that typically, her only form of interaction would involve email exchanges with her instructors and reading student

¹⁷ Q6 in the semi–structured interview: Could you describe your experience of virtual exchange? What were its strengths and weaknesses?

message boards. Students from Uni P, however, were then finishing their primarily in-person undergraduate degrees, where, according to Uni P instructors, online classes are generally limited in number due to regulations set by the Commission on Higher Education (CHED) of the Philippines. Thus, this disparity in their experience could be attributed to how the interaction in the VE was a novel, unusual practice for students from Uni F; in contrast, students from Uni P were more used to this level of student interaction, whether in person or online. Other possible causes for this disparity will be further elaborated in the [Discussion](#).

According to the students and instructors from Uni P, **differences in schedule and participation** affected their interaction and detracted from the affective impact of the VE. This dispositional theme refers to the difference in the start of the academic calendars of each university that constrained their time for interaction as well as the number of students who participated from each university. Starting with the latter issue, according to the interviews with students and instructors from Uni P, low participation of Uni F students detracted from the effectiveness of the course—indeed, they all mentioned how this low and consistently decreasing attendance affected the quality of the discussion in the breakout rooms. Table 4.5 shows the number of students from each university that were present in the group breakout rooms, with the row highlighted in gray representing students from Uni P. Since there was no class attendance sheet, these numbers were based on the observation notes of the researcher.

Table 4.5.

Number of attending students from the VE based on observation

Date	Partner	Group				
		Group 1	Group 2	Group 3	Group 4	Plenary
Oct 3	Uni P	3	3	3	2	11
	Uni F	2	2	1	2	7
Oct 27	Uni P	3	3	3	3	12
	Uni F	1	2	1	1	5
Nov 3	Uni P	3	2	2	3	10
	Uni F	1	1	1	1	4
Nov 7	Uni P	3	3	2	2	10
	Uni F	1	1	0	1	3
Nov 14	Uni P	3	3	2	3	11
	Uni F	1	0	1	1	3
Nov 21	Uni P	3	2	0	0	5
	Uni F	1	1	0	0	2

As can be gleaned from the table, at the latter part of the exchange, students from Uni P were either twice or almost thrice the number of students from Uni F. This made it challenging for the comparison of their respective contexts.

For instance, on one hand, a participant from Uni F said that this was a problem for her because she *“had no one to confirm if [her] assumptions were correct”* (Cara). A participant from Uni P, on the other hand, stated that the *“experience wasn’t maximized because there were only a few students from their counterpart”*, adding that *“it was underwhelming... the impact of the experience as a whole was, like it watered down because they were just how many people”* (Malaya). All three instructors saw this as a hurdle in achieving the learning outcomes for the VE. Regarding the differences in schedule, classes in the Philippines start at least two months earlier than classes in Finland and according to interviews with the course instructors, this posed as a challenge in designing and teaching the same syllabus. In fact, instructors from Uni P said that the initial design of the syllabus had the theme of sustainability leadership last, which was meant to provide students with a platform for action. However, since it was important to find a common time for the VE, sustainability leadership was placed first and discussed from a theoretical perspective rather than an action-based one, and this was followed by the theme on integral ecology and the VE. One instructor said that if the initial structure were followed, it would have given students the time and opportunity to work on an action-oriented project that would be a culmination of all their lessons, discussions, and reflections. In addition, according to the students, the time provided—the common time was from October 3 and November 21—was not enough to discuss and flesh out the cases.

Indeed, this leads to the next dispositional theme under the affective domain, ***transactional interactions***—or interactions that were more transactional discussions than relationship-building conversations. In fact, this is the reason why the communicative space was described as safe, rather than safe enough or brave—the exchange became more about knowledge or skills acquisitions among a diverse group of students to complete collaborative work (Moalla et al., 2020) rather than an exploration or interrogation of interculturality in sustainability discourse (Glimäng, 2022). All students from Uni P reported this experience,

while only one person from Uni F did. They expressed that more time should have been given not only for the case discussions but also for ice breaker or getting-to-know-you activities:

I think it would have been easier to be motivated about the group and get more out of the break out room groups if we somehow introduced ourselves better in the beginning and had more time to discuss in the rooms.

– Bea, Uni F student

Based on the observation notes, there was only one getting-to-know-you activity during the first meeting of the VE, where students were asked to upload from their camera roll a photo that depicts their culture and share about it in the breakout rooms. In no other session was there a scheduled activity that would break the ice. A student from Uni P mentioned that this lack of time for dialogues made the exchanges in the breakout rooms more functional than conversational: *“It’s more of having more time... I’m not sure how, but help the discussions be more flexible in terms of [...] the kind of prompts they give, so to allow for a more like flexible discussion”* (Hiraya). Amihan from Uni P shared a similar sentiment:

I think it became primarily just about the assessment. When we were talking, sharing ideas, it became like, how do we just answer this question? And then somebody will answer it. But I think if we had a conversation about it outside of the context of the assessment, it might even be more meaningful in that sense. So I don’t know how you’re going to balance like, you know, trying to assess the students but at the same time building relationships, all that stuff.

This lack of time made them focus more on getting tasks done rather than getting to know each other. In fact, in the observation notes for two different VE sessions¹⁸, it was noted that the discussions in the breakout rooms were all about answering the guide questions rather than engaging in dialogue. When the instructors were asked about having observed an instance of transformative learning¹⁹, Ria from Uni P said that she did not *“recall any over light bulb moments that happened”* due to lack of time:

¹⁸ VE Session 2: “Students going through guide questions rather than conversing”; VE Session 3: “Students not questioning each other, Q&A comes from the teachers”

¹⁹ Q9 from semi-structured interview with instructors: Because of the VE experience, did you sense any change in the attitudes of your students during the course? How is it manifested?

If we had more time and we had more interactions with Finland, I think it would have been better. To me, it felt very rushed and very structured. It was done because we didn't have any other choice. So yeah, we'll be meeting soon and see how we can do it better next time.

The transactional aspect of the COIL could be attributed to the lack of time, but, as will be discussed in [Chapter 7 \(Discussion\)](#), students must also be guided into these virtual, intercultural encounters. The kind of VE could also play a part, as project/challenge-based and comparative VEs become more about the completion of a task rather than the exchange between diverse epistemologies (Helm, 2024; Moalla et al., 2020).

Despite this lack of time, students from Uni F nevertheless were positively impacted by how the course **gave voice to first person, “living” narratives**, the last dispositional theme under the affective domain.

It was nice to see and hear from the people in real time [what] was in a lecture I heard or article I read. So it was like speaking to the people who are currently living there... it wasn't just some reporter or some professor; it was the student who is there at [that] same time... it was like very, very cool.

– Cara, Uni F student

As evinced by Cara in the excerpt, the exposure had to come in the form of an *actual* person speaking to them in *real* time, set in their *own* context, for the experience to become “real” to her. As they were discussing the similarities and differences between their countries and sharing personal stories tied to sustainability within their small groups, they were being exposed to *living* narratives. Indeed, another student expressed the same idea:

So it was nice to talk to someone who had first-hand experiences, because these were students also... Maybe we can look them up on the Internet and say, OK, this is the fashion industry, but we wouldn't appreciate it because it's not coming from a person who had experiences, who had stories.

– Amihaan, Uni P student

It was not a story found via random scrolling online or heard from through the news—it was the experience of a real person. Thus, based on what the students shared, it was not so much the stories as it was the storytellers who made the experience being recounted as “more real”. This opportunity to bear witness to *living* narratives and getting to know the “story of a place” (Robinson & Cole, 2015, p. 136) was effective, because, as a participant described, one “*could ask questions in [that] moment and hear straight from the person living there*” (Cara, Uni F).

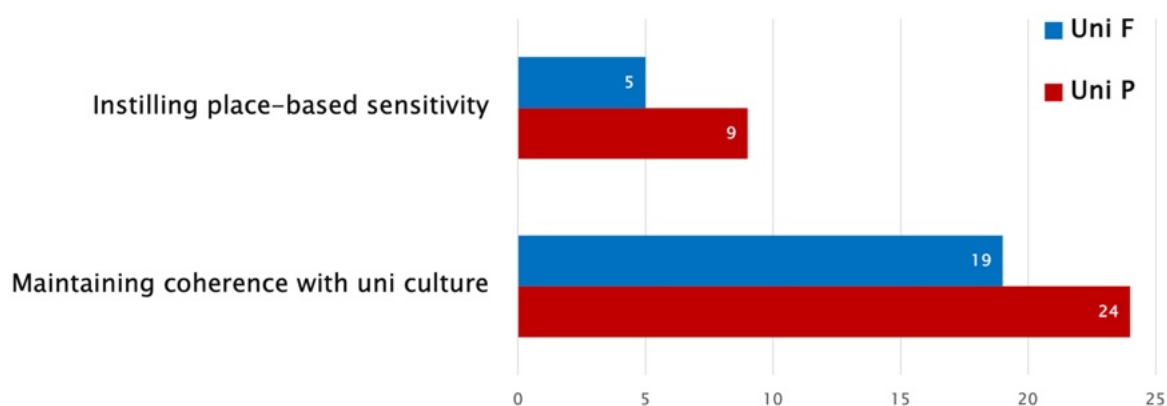
Narratives or narrative approaches have been used in sustainability transformation research as they “can construct and reflect knowledge representative of the place-, time-, and event-dependent dimensions of life” (Frank, 2017, p. 311), which science-based approaches often overlook (Weder et al., 2019). A narrative recounts not only an experience, but the values, assumptions, behaviors, imaginations, and attitudes of the characters, whether human or nonhuman, who are a part of it (Frank, 2016; Weder et al., 2019). Because of how humans “often reason unconsciously, based on emotion, based on neural circuits, and... using the ‘logic’ that stories and metaphors trigger for us”, narratives can, in fact, “influence the scope of action, thinking, and feeling” (Joosse et al., 2024, p. 1911). In this sense, not all sustainability narratives are equal—some stories are told more often than others, revealing power dynamics that fuel their recounting and reproduction (Joosse et al., 2024). However, by bringing to the fore not just narratives, but those from distant realities—for both partners—and by having them recounted, with the help of digital technology, *by* the protagonist *while* in those distant realities made the storytelling more impactful. It added weight to the experience through the materialization of a person living that experience.

Even if TSL in the affective domain was fostered less than the situated domain, answering the research question means considering both positive and negative aspects of the VE that may have impacted TSL—whether the emotions or meaning produced were positive or negative. The safe spaces provided for social learning as well as for the sharing of first-person *living* narratives added to impact of the VE in fostering TSL, particularly among the Uni F students who were not as used to class interactions. This could have been more impactful if not for issues regarding differences in schedule and participation as well as the lack of opportunities for relationship-building that led to more transactional interactions.

Feet: Embedded practices

The activation of this domain is reflected in the following dispositional themes that emerged from the student interviews: *(viii)* instilling a place-based sensitivity and *(ix)* maintaining coherence with the university culture. If only the pedagogical approaches and learning conditions that fostered TSL had been considered, the place-based or situated domain would appear to have more presence in the data (24%) than the affective (20%). Figure 4.7 shows the distribution of the theme according to each university. The theme **maintaining**

Figure 4.7 Distribution of dispositional themes under the situated domain (feet) – Case 1 (COIL)



coherence with university culture reflects the hidden curriculum of sustainability (Winter & Cotton, 2012)—how the participants saw their class as an extension of the sustainability practices within their immediate environment. This may be beyond the instructional strategies employed by the VE itself, but the learning condition of having coherence with the university culture could have added to the TSL potential of the course, as demonstrated in how often the students connected what they learned from or experienced in the class to their surroundings. Although the term “university” was used, it refers to the immediate academic environment the student was exposed to—as they described it—whether it was their department, university, or even local community for those who were online distance learners. For two of the participants from Uni F who study online and live far away from campus, they spoke mainly about the sustainability-oriented practices within their community. For those from Uni P, this coherence with their university culture was evident in how the students were comfortable in critically unpacking cases, as articulated by Amihan:

I think it's more that we all have studied colonial legacies through our course or other university classes. That was always in the back of our mind, so we had appreciation of that, and that made us sort of sensitive, aware. But for people who don't have that in their background, that might be something that I think they'll miss.

This criticality he described that made him and his groupmates from the same university capable of seeing cases from a critical and decolonial perspective seems to be an extension of an existing practice within his own immediate environment—in this case, his department. He also added: *“there's a culture within the [university] that sort of tries to create dialogue. I think that's the most important part, to be able to bring something to the conversation to be able to sort of in a way contribute to discourse.”* Other Uni P students shared a similar

sentiment, giving examples of other university courses that employed the same strategy of using a critical lens to discuss social and environmental issues. Malaya from Uni P even cited their instructors, who were then working at the university's sustainability office, as maintaining that coherence:

We have our sustainability institute, and I'm very impressed by Ma'am Ria and Ma'am Alexis... how good they are at their work and how much they take it seriously. I really learned a lot from them as professors. The sustainability institute is the driving force of the sustainability initiatives in school.

The Uni P instructors also elaborated on this coherence between their class and their school environment, and Alexis described the idea of *"the university as living laboratory"* where, as instructors, they need to walk the talk and embed what they teach in the university environment—and vice versa. For Uni F students, despite their predominantly online form of learning, one mentioned how the campus itself reflects the practices they discussed in the cases. Cara, for example, talked about the food waste scale at their university cafeteria and how she was reminded of this during the case study on food waste. Anna, a student from Uni F, described her school community as being rooted in sustainability:

People not just only talk about sustainability, they do sustainability, and I can see it [in] everyday practice. Most of my Finnish friends are vegan, for example, and we have talked about that, why you choose vegan. So those discussions broaden my knowledge, and also it makes me more conscious about the environment in general, because they care about their nature, about the environment.

The second dispositional theme that emerged from the student interviews is how the course fostered TSL in the situated domain by **instilling place-based sensitivity**. While this relates very closely to the dispositional theme of criticality under the cognitive domain, it specifies the direction of their criticality—putting the structures, practices, and mental models of a place under a microscope. This research adopts the concept of place put forward by Horlings as a constructed and dynamic “assemblage of actors and practices or an entanglement of processes” that is part of a larger web of places that are linked “through social, economic, and political relations” (2016, p. 33). Places, therefore, are not just the physical spaces that can serve as educational resources for sustainability understanding and action, but are the histories tied to them, the meanings and values attributed, the practices

that shape and are shaped by them, as well as the dilemmas and opportunities that emerge from the relations within a place (Grenni et al., 2020; Singleton, 2024). In sustainability research, places are relevant concepts because of how they represent sites of power struggle and negotiation, especially in policy and decision-making, and reflect the values and belief systems of its actors (Horlings, 2016). **Place-based sustainability** research and practice looks into solutions that are tailor fit to the available resources, capabilities, vulnerabilities, and assets of a place, giving importance to local, context-based solutions to a global problem (Horlings et al., 2020). For the COIL, this place-based sensitivity was inculcated through case presentations of practice local to both partners and group discussions, and these were supplemented by the guide questions/discussion prompts provided, as well as some concepts and tools such as the iceberg framework and causal loop diagramming—which will be explained further in the next domain (hands). Amihan's experience encapsulates this theme:

That pre-work was quite essential because it sort of sets up the experience [that] OK, in this SDG we're doing really poorly, but they're doing really great. Why is that? ... I think that happened even before we met the Finnish students, and so I don't think it was sort of judgement or we're putting them in the box. But we got a better appreciation of where they're coming from. And when we came into the exchange, we were ready to verify and test those examples.

– Amihan, Uni P student

The instructions provided by the instructors would prompt students to look at the systemic context surrounding a case: *“Compare experiences and insights, knowledge and contextual issues”* (VE Session 2) or *“You may utilize analytical tools such as iceberg framework or influence diagrams to structure the systemic relations of your findings”* (VE Session 3). Another example of the type of questioning that prompted students to look into the context was in VE Session 6, the last session, where the first discussion prompt was *“What is the root cause of the plastic pollution problem? Is it a technology issue? A collection issue? Is there a more fundamental problem?”* In the interview, Bea from Uni F shared her reflections from this discussion and how wearing a different lens reshaped her initial alarm towards the plastic situation in the Philippines:

I was quite disappointed when I found out for example, the plastic pollution problems in the Philippines... and I [felt] maybe like a bit stupid that why we are worrying about bottle tops here that they need to be attached to the bottom bottles when there is such a problem

somewhere else that everything is ending up in the ocean. But also I like really realise that there are some other bigger problems like poverty for example, but then also that governments are not working the same way like there is a lot of... [corruption].

This excerpt illustrates the importance of suspending initial judgment and contextualizing a phenomenon—seeing the phenomenon in its setting. This reflects a place-based criticality and reflexivity that the instructors also expressed in the interviews, as exemplified by Ria:

When you compare socio-ecological issues, it's the contextualization [that] sustainability, you implement that in different ways and it depends on your context. What might work in Finland might not work in the Philippines—the culture is different. The economic issues are different. The governance and the politics are different. But the goal is the same. The goal to be a sustainable society is the same

It should be noted that both dispositional themes under the situated or place-based domain had greater frequency among Uni P students, who also spoke about their in-class activities outside of the VE. Indeed, despite the interview question referring to activities within the VE module, the students would often refer to other activities within the entire course, such as the in-class discussions they had during the previous modules, the webinars with guest speakers, and pre-work for the VE. Albeit occurring beyond the VE, these statements were still counted to show how differences in the implementation of the same VE could yield different themes.

In general, the VE was able to foster TL for sustainability in the situated domain through instructional strategies such as case presentations, group discussions, and critical questioning that aimed to unearth the context that underlies sustainability knowledge, values, and practices. It also did so by maintaining the same knowledge, values, and practices that students could see in their immediate university environment—the hidden curriculum.

Hands: Sustainability in practice

The behavioral domain was the least activated of the four; in fact, only one dispositional theme emerged from the student interviews, and this was only seen among students from Uni P—the (x) **integration of practical skills**. Some of the learning activities for skill-building cited include causal loop diagramming, concept mapping, and using the iceberg framework. All three students from Uni P mentioned the usefulness of the iceberg framework that was taught to them in deconstructing a case more deeply and realizing how *“mental models are the bottom line of sustainability”* (Malaya). These skills fall under the KSC area of

systems thinking that aims to develop learners' capacity to understand the systems behind (unsustainable) phenomena and analyze their complexity and connectedness across the various domains and scales (Giangrande et al., 2019; Redman & Wiek, 2021). Although this was present in both syllabi, none of the students from Uni F mentioned sustainability-oriented skills or any form of capacity-building. This disparity could be confirmed by the interviews with instructors and the researcher's observation notes. In the interviews with instructors from Uni P (who are environmental sustainability practitioners), they explicitly mentioned honing practical skills since *"the framing of the class was problem-solving"* (Ria). Additionally, one of the most frequently recorded observations regarding the breakout session group dynamics described the Uni P students as primarily facilitating the discussions that involved deconstructing a case through the iceberg framework. Aside from developing the skills that would theoretically view environmental issues, the instructors from Uni P also wanted students from both universities to try to address them, and this was confirmed by the observation notes that recorded certain prompts meant to elicit solutions among students. For example, in the second session on the textile industry, students were required to come up with one suggestion on how to further develop sustainable textile industry solutions. In the fifth session on social enterprises, one of the questions was: 'How can social enterprises become vehicles for leadership in sustainability?' However, both instructors recounted how scheduling differences with Uni F prevented them from including an action project that students would have to implement.

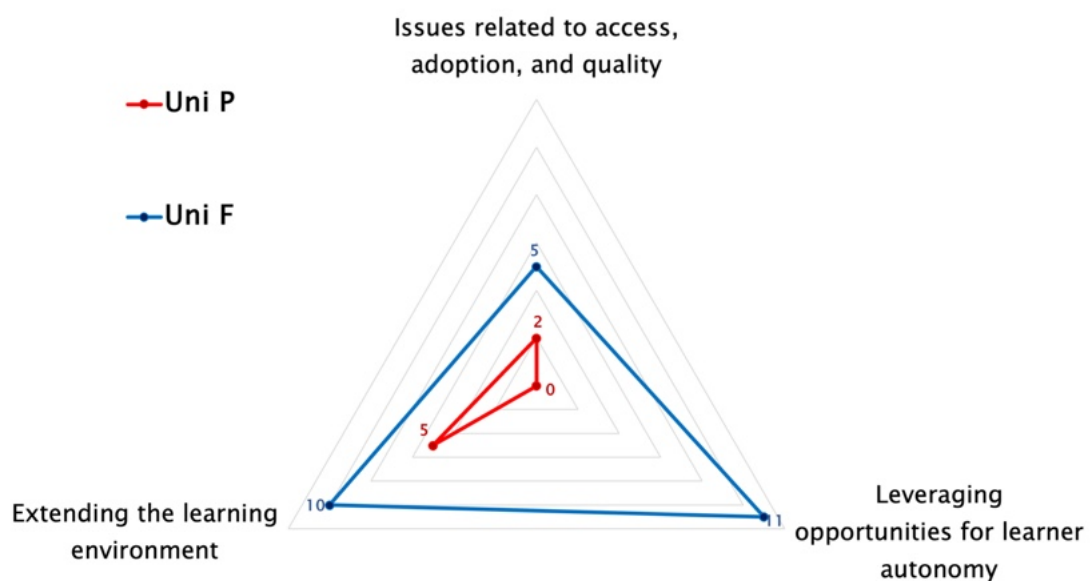
In summary, the *hands* dimension, aside from being the least activated of the four, emerged only in the data from students and instructors from Uni P. An initial explanation—to be discussed further in [Chapter 7 \(Discussion\)](#)—could be the difference of the instructor and student backgrounds of each university, where the instructors from Uni P were actually experts in environmental education and had the knowledge background to teach the skills tied with the KSCs. Two of the three students interviewed from Uni P were taking up degrees related to the natural sciences, and based on the general student population, enrolled students were a mix of those with environmental science and development studies backgrounds. Meanwhile, the instructor from Uni F was more versed in anthropology and the students were approaching the course from backgrounds more grounded in cultural studies.

Another possible reason behind the lack of activation in the hands dimension for Uni F is the difference in study mode, where on one hand, Uni P had more opportunities for in-person contact time because of the hybrid learning environment that alternated in-person and online synchronous interaction. On the other hand, save for the module with the VE that required a blend of asynchronous and synchronous learning, Uni F students were took the course autonomously, going through their learning materials asynchronously. The absence of a mainstay subject matter expert on sustainability and also of opportunities to learn and practice skills tied to sustainability within their learning experience could explain why the development of practical capacities was limited to one partner.

Virtual learning: Expanding learning opportunities and learner autonomy

Beyond the pedagogical approaches and learning conditions that one could describe as being within the control of the instructors in their planning and facilitation, several opportunities and challenges tied to VL that either fostered or hindered TSL were reported by the students in the interviews. Such VL conditions were not included within the TSL framework because they represented both advantages and disadvantages emerging from the mode of learning. Three dispositional themes under VL conditions were observed in the data: *(xi)* issues related to access, adoption, and quality; *(xii)* leveraging opportunities for learner autonomy; and *(xiii)* extending the learning environment. Figure 4.8 shows the distribution of the three dispositional themes that fall under VL conditions. From the figure, a stark difference

Figure 4.8 Distribution of dispositional themes under virtual learning conditions



in the frequency of the theme between students from Uni P and Uni F can already be observed—the possible causes and implications of which will be discussed in the next chapter. The most frequent of the dispositional themes was the possibility found in VL to **extend the learning environment**, which refers to how VL allows students access to classroom learning outside the physical confines of their classroom:

It's such a rich experience because you can attend things and be in places... maybe when you can, whenever you can. Because you just sit at home and still attend things, but you don't have to fly or go there. [It] really enriches our lives. – Cara, Uni F student

Bea, another student from Uni F, mentioned that living in a city far from her university campus causes her to attend in-person classes only 20% of the time, thereby limiting her interaction with her classmates. The two working students from Uni F, Cara and Bea, expressed how virtual learning affords them the possibility to balance their jobs with their education. They also added that through the VE, they were able to expand their classroom experience to include other students, where, normally, they would learn mostly autonomously. For Uni P students, on the other hand, this extension did not apply to their co-learners but their instructors—the learning environment was extended to include other instructors in the form of practitioners who were knee-deep in the field of sustainability. Through opportunities in VL, they were able to *“talk [to] different people from different sectors who would otherwise not be available”* (Amihan).

Students from Uni F also discussed how, despite the synchronous VE being woven into the final module, they were still able to maintain their autonomy as learners through the blended format, which allowed them to go through the previous module at their own pace and time. This is what the dispositional theme of **leveraging opportunities for learner autonomy** represents. In reality, if viewed only from the experience of Uni F students, the frequency of this theme outweighs that of extending the learning environment—albeit slightly.

I don't remember the name of the method [where] you studying [sic] the topic first by yourself before the lessons. And when you can do it online and look through the case study, I think that is very helpful, at least for me when you can dive into the topic before the meetings.

– Bea, Uni F student

According to Anna, another Uni F student, virtual learning gives her *“the flexibility to choose”* and provides her with *“a safe distance when my energy is low.”* Cara also explained how the course format complements her preferred way of learning: reviewing the slides from class according to her schedule and choosing how much time to spend on each slide. Such opportunities for learner autonomy were not seen at all among students from Uni P, and neither was this mentioned by any of the instructors.

The last dispositional theme under VL conditions is **issues of access, adoption, and quality**, which refers to poor internet connectivity and study environments non-conducive to learning. Internet connectivity was recorded as an issue by one student from Uni F and all of the students from Uni P, who mentioned that they had to keep their video cameras switched off most of the time due to their unstable internet connection. The student from Uni F said that on more than one occasion was the thread of conversation lost due to both her and some of her groupmates' intermittent connections. Indeed, a student from Uni F mentioned an issue concerning the interaction that she did not know was rooted in poor internet connectivity:

So I don't know if somebody found it too intimidating to be in that small group to maybe have a camera on and say something. I found it a bit weird and hard to talk to them without seeing their faces.

– Bea, Uni F student

That same student mentioned that in her group, an added challenge was the *“background”* of some of her group members. When they would turn their microphones on to speak—still without a video—the audio was not always clear due to background interference—other people speaking or noise in the surroundings. Indeed, the researcher observed this on three separate occasions for two groups, each with a different student from Uni P. When they would switch on their microphones to chime in on the discussion, there would be interference in the background. As written in the observation notes:

A student from Uni P, whose camera has been off the whole time, “unmuted” herself to talk; I can't understand what she's saying—she seems to be in public, in a very noisy area. I hear tricycles behind her and also a jeepney barker. It doesn't seem like she's in school or even at home.

On the two other occasions, other people were speaking, making it difficult to understand what the person was saying. When the instructors were asked about the regulations for online learning in their respective universities, they said that according to university policy, they

could only encourage, not enforce, having students switch on their video cameras. In fact, this is one noteworthy observation made in the observation notes—there were more participants with cameras off than on; in the breakout rooms, two out of the four groups had audio-only discussions, that is, with no video cameras on. In the plenary sessions that occurred both before and after the breakout room sessions, students' video cameras were generally switched off. Only in the first and second meetings did the researcher record two video cameras switched on throughout the plenary session. This eventually tapered off until all video cameras were off by default; only during their respective presentations did students switch on their video cameras. Table 4.6 shows the number of students with cameras switched on against the total number based on the researcher's observations. The figure demonstrates how there were more students with cameras off than on, week in and week out. Numbers in red indicate meetings where more than half of the students had their cameras switched off.

Table 4.6

Number of students with video cameras switched on vis-à-vis attendance

Date		Group 1	Group 2	Group 3	Group 4
Oct 3	No. of students	5	5	4	4
	Camera on	2	2	4	2
Oct 27	No. of students	4	5	4	4
	Camera on	1	5	1	2
Nov 3	No. of students	4	4	3	3
	Camera on	3	4	3	1
Nov 7	No. of students	4	3	3	3
	Camera on	4	2	0	0
Nov 14	No. of students	4	3	3	4
	Camera on	4	3	0	0
Nov 21	No. of students	4	3	0	0
	Camera on	2	0	0	0

When looking at the three conditions tied to VL—how it extends the learning environment, leverages opportunities for learner autonomy, and carries issues tied to access, adoption, and quality—they all had an impact on the TSL potential of the course, be it positive or negative. The frequency of the former two (10 and 11, respectively) that exceeded some of those in the TSL domains demonstrate their importance to the students, particularly those from Uni F who followed the course autonomously. These themes, although not pedagogical

approaches, were learning conditions endemic to the VL environment that were beyond the control and influence of the instructors of the course.

Summary

A total of 13 dispositional themes were culled from the data, organized into five global themes composed of the four domains of the TSL framework (head, hands, heart, and feet) and VL conditions. These are listed, vis-à-vis their frequency, in Table 4.7. They represent the pedagogical approaches or learning conditions that either fostered or hindered TSL among the students—according to student interviews and confirmed by the student survey questionnaires, interviews with the instructors, analysis of the curricular documents, and researcher observation notes. In addition, although a variety of instructional strategies were used, those that were deemed as effective by the students were case studies (presented as lectures from instructors), the breakout room discussions per group that came with discussion prompts, and the subsequent group presentations. These strategies, combined with the pedagogical approaches and learning conditions, impacted the TSL potential of the VE. Of all the dimensions, the cognitive dimension was the most positively activated of the four (34%), followed by the situated dimension (24%); then affective (17%) which showed both positive and negative engagement, and the least impacted was the behavioral dimension (3%). The categorization of the dispositional themes is not strict—one instructional strategy may tap into more than one domain, albeit in different ways. For example, from the breakout room discussions, at least five themes emerged, including:

- (1) **Using a critical (systemic) lens**, (2) **Instilling place-based sensitivity**, and (3) **Integrating practical skills** – The cognitive, behavioral, and situated domains were activated by the breakout room discussions through the critical prompts that were given by the instructors (What problems relating to food systems do you recognize? Identify the layers of the iceberg model, systemic relations, gender, social
- (4) **Exposing students to diverse perspectives and practices** – The breakout rooms were organized to have at least one student per university, and the students were a mix of those taking their Master's and Bachelor's degrees.
- (5) **Giving voice to first-person, living narratives** – Students were encouraged to ask about each other's contexts during the 30 minutes provided

Looking back at the first research question that asked how the VE either fostered or hindered TSL, the findings show that TSL was fostered more than it was hindered, and the previous sections explained how by detailing the pedagogical approaches and learning conditions that contributed to or detracted from TSL. However, as explained in Chapter 2, TSL is not regarded in the literature as an outcome in the same way that TL is but is described more as a means to the end that is TL. The second research question reframes TSL from the perspective of outcomes.

Table 4.7

List of dispositional themes from student sources with frequency – Case 1 (COIL)

Organizing theme	Dispositional theme The VE fostered/hindered TSL by...	Uni P	Uni F	Ref
Head (Cognitive domain)	Exposing students to diverse perspectives and practices	12	22	6
	Using a critical (systemic) lens	8	5	5
	Foregrounding real-life cases and practices	3	7	5
Heart (Affective domain)	Providing safe spaces for social learning	3	12	5
	Giving voice to first-person, living narratives	4	8	4
	Differences in schedule and participation	8	2	5
	Transactional interactions	6	3	3
Feet (Situated domain)	Maintaining coherence with the university culture	19	5	5
	Instilling place-based sensitivity	5	4	4
Hands (Behavioral domain)	Integrating practical skills	4	0	3
Virtual learning	Extending the learning environment	5	10	4
	Leveraging opportunities for learner autonomy	0	11	3
	(Hindered due to) issues with access, adoption, and quality	2	5	5

RQ2: How does VE contribute to transforming sustainability paradigms?

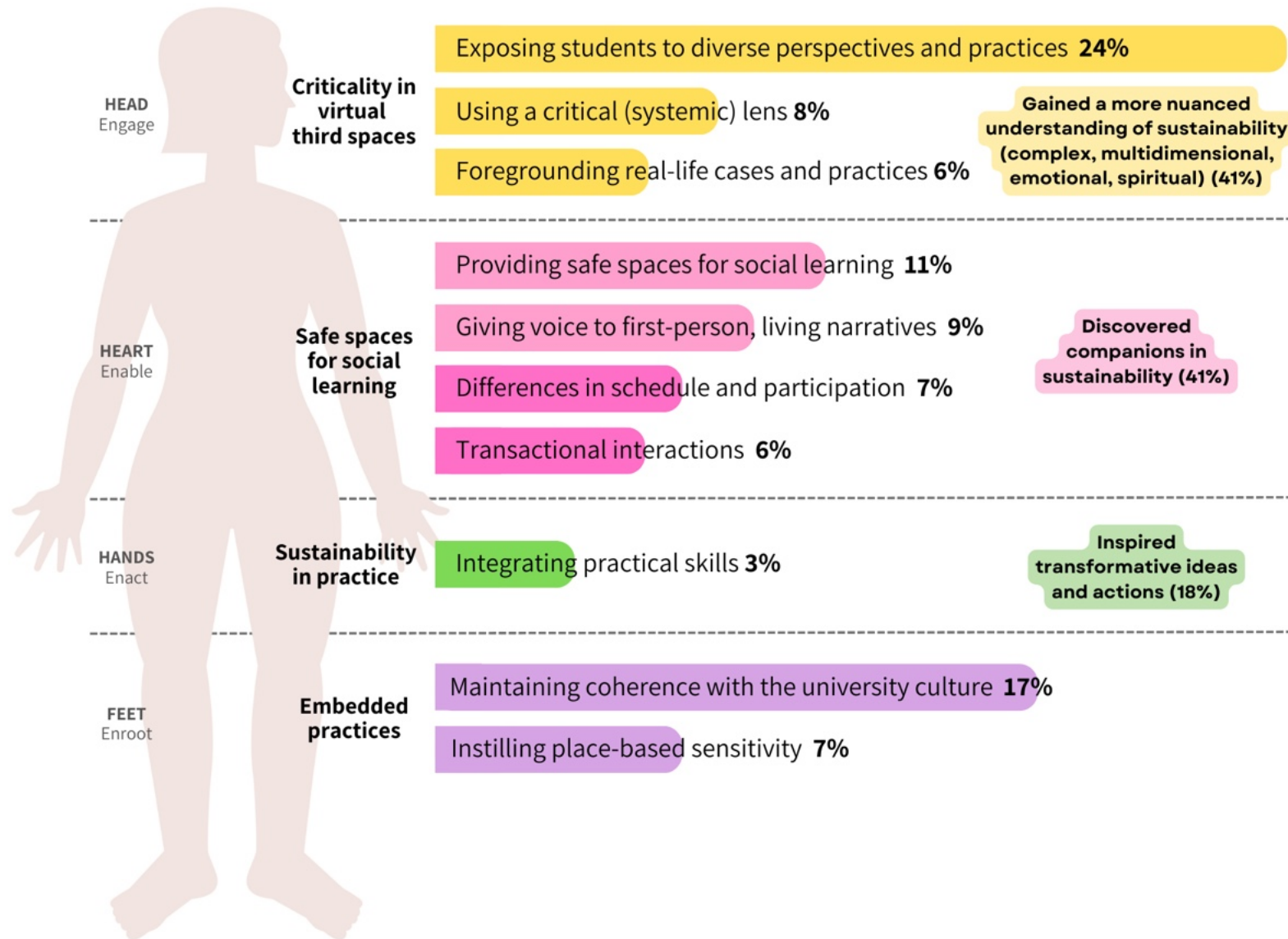
Answering the second research question entails understanding the outcome of the transformation—the sustainability paradigms (which would include values, beliefs, and assumptions) that were changed by the VE and particularly how much those paradigms were transformed. One of the questions in both the interviews²⁰ and survey questionnaires asked students about the possibility of a transformation, without explicitly using the word “transformation” or any of its derivatives, and the responses were used as the primary basis to answer the second research question. Similar to what was done to illustrate the findings for the first research question, Figure 4.9 maps the three themes that emerged from the student interviews according to the TSL framework, together with the pedagogical approaches and learning conditions that could have led to these reported outcomes. The percentage of the theme’s frequency²¹ relative to the rest is indicated. Through the VE, students gained a more nuanced understanding of sustainability—seeing the concept as complex and multidimensional (head); discovered companions in sustainability (heart); and were inspired toward transformative ideas and actions (hands). As can be gleaned from the visualization, outcomes related to the cognitive and affective domains are equal (41% each), outweighing that in the behavioral domain (18%), and no outcomes in the situated domain emerged from the data.

There is, however, a disparity in the frequency among students from Uni P and students from Uni F. Figure 4.10 shows the distribution of the transformative outcomes of the VE per university. Transformative outcomes recorded among students from Uni P lean towards the cognitive domain while those among students from Uni F lean towards the affective domain. The second most impacted domain for students from Uni P was the affective domain

²⁰ Q5 of the interviews for students: Thinking back over your VE experience, was there a time when you realized that your values, beliefs, or expectations on sustainability had changed? Why do you think it had to change?

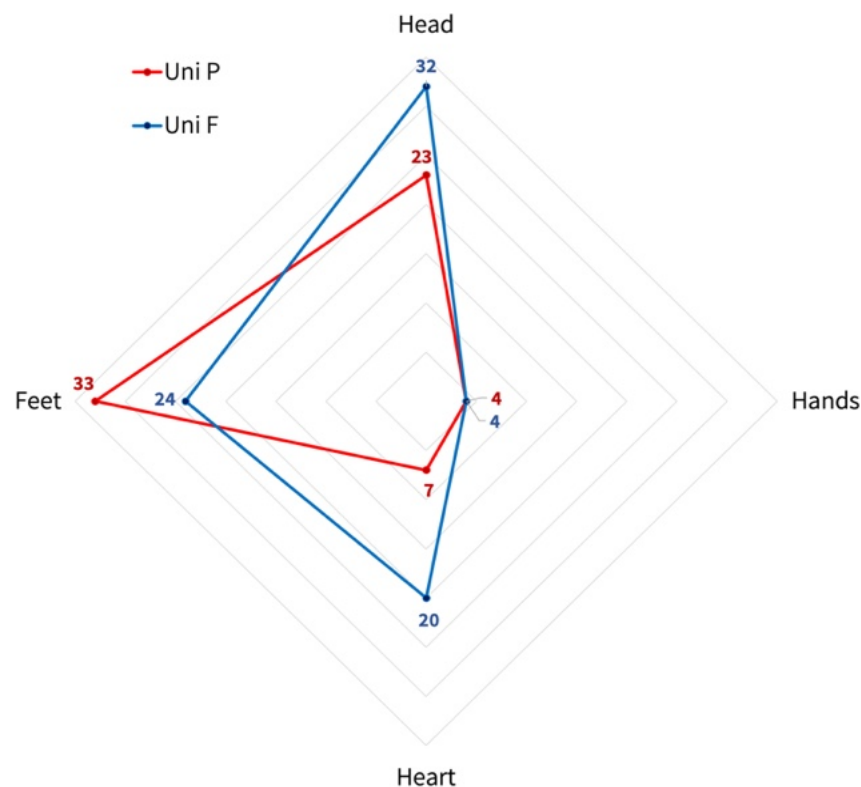
²¹ Even if the question of change was explicitly asked of the students, the thematic analysis applied not only to the answers for this question—as expressed by the students themselves—but to other instances where such a change was implied or described.

Figure 4.9 Transformative outcomes of the VE based on the TSL framework – Case 1 (COIL)



followed by the behavioral domain. However, for students from Uni F, the behavioral domain was not impacted at all. The possible causes and implications of such differences will be discussed further in the subsequent chapter, but the following sections will look into the

Figure 4.10 Transformative outcomes per university



transformative outcomes according to each domain of the TSL framework.

Head: A more nuanced understanding

I think the change was like our definition or concept of sustainability was challenged not so much that we discovered answers, but we had more questions. But in grappling with those questions, [we] got a better appreciation of what sustainability could be and it's more than just resource use. It's more than just looking at resources as economic units, but it's also looking at our values, it's looking at behaviours. It's looking at the way we think, the way we feel.

– Amihan, Uni P student

Based on the student interviews, the most significant outcome of the VE was a **more nuanced understanding of sustainability** (41%), which recalls the complex and systems thinking among the cognitive learning objectives of the TSL framework (Sipos et al., 2008). It should be stressed, however, that when looked at per university, for students from Uni F, the cognitive domain was only the second-most activated in terms of transformative outcomes.

In fact, while all three students from Uni P spoke about this outcome, only two of the students from Uni F did. This theme pertains to the expanded conceptualization of sustainability after the VE; post-VE, students described their renewed understanding of VE as either complex or multidimensional, as evinced by Amihan in the above quote. In his sharing, he talked about the role of emotions in sustainability, and later on he added that he started seeing sustainability as less *“utilitarian”* and more axiological: *“asserting the kind of life that I want to live”*. When he spoke about cycling more often as a lifestyle change influenced by the course, he described it as a change not only in his behavior but also in his values:

This is not just getting from point A to point B, but this is also like about the way I experience my travel—the way I can sort of connect and disconnect, because in the car you're not very connected with your surroundings. So when you realize all these other benefits that are not just economic benefits, but they're social, they're emotional, they're spiritual benefits then that sort of enabled me to, hey, this is an even more appealing option.

Amihan was not the only one who mentioned the spiritual aspect of sustainability—Hiraya from Uni P also described this *“spiritual aspect of nature and culture”* in sustainability *“that is not really evident in the SDG model”* and how the course helped her *“see the spiritual side... the Catholic aspect of integral ecology”* despite having been introduced to the concept in other classes. Anna from Uni F used the word “religion” in describing how the course reinforced what she had already believed about sustainability:

Sustainability for me right now is not like doing major things in order to stop climate change... it's more about how you consciously think about the environment and think about the development and the things happening around you in general—about humans, about the environment, about religion. And religion is taking a big part of that.

These responses reflect a multidimensional view of sustainability, one that has emotional and spiritual undercurrents—a view that has received considerable focus in research on sustainability transitions (Ives et al., 2020; Wamsler, 2019; Woiwode et al., 2021). The multidimensionality of sustainability also reveals its complexity, an understanding of sustainability that emerged as one of the outcomes of the VE. For example, Bea from Uni F, as previously quoted, talked about how the course helped her see environmental issues from a social lens, thereby easing her initial disappointment towards plastic pollution in the Philippines. She articulated having realized *“other bigger problems like poverty”* as well as

corruption. Malaya from Uni P talked about gaining a *“more comprehensive understanding”* through the course, especially after learning how to use the iceberg framework *“to properly dissect these issues.... looking at stuff [on] a deeper level. Also maybe how behavior is, how mental models are important when it comes to sustainability. It's like the bottom line.”* This widened view of sustainability was expressed in the responses to one of the questions²² in the student survey questionnaires, where one respondent wrote: *“The class helped me gain a more comprehensive understanding of concepts or issues that I was familiar with.”* Another respondent wrote: *“Some assumptions that govern my behavior were corrected by the new information I learned in class. The different context with Finland also helped me understand better the nuances in our own Philippine context, helping me achieve a new perspective in things.”* From these two responses, it seems that the exchange provided them the opportunity to *re-view* what they had already known or experienced from a different lens. By looking outside, into the Finnish context, they were more able to look in at their own contexts but in a more nuanced way. When the outcomes of the VE are viewed through the categories of learning outcomes in the TL literature as conceptualized by Hoggan (2016), students experienced changes in the cognitive domain in terms of their worldview (more complex or comprehensive) and capacities (a greater sense of spirituality).

Heart: Solidarity and empathy

Sustainability has been used as a buzz word... so I have [sic] really skeptic [sic] mindset whenever it comes to sustainability. So coming to the class, and I see they're young, that they are young people who are interested in the same subject, and who are really enthusiastic talking about that and have a passion, I feel like I can feel more hopeful. If there is anything changed, [it is] probably my skeptic [sic] approach to the subject. – Anna, Uni F student

In the affective domain, students were able to **discover companions in sustainability** (41%), and this was strongest for students from Uni F, where it emerged more than half the number of times than in the cognitive domain. For students from Uni P, this domain came

²² Q08: Thinking back to when you first realized that your views or perspectives had changed, what did your being in the class have to do with your experience of change?

only second to the cognitive domain. This theme pertains to how the VE, by connecting students from two completely different parts of the world and having them share and collaborate in groups, made students feel less alone, nurturing in them empathy, hopefulness, and solidarity. In the above excerpt, Anna described that the youthfulness and passion of the Uni P students was what made her less skeptical—indeed, she had previously talked about how their energy made a huge difference in the group discussions. Other students talked about how having discovered companions in sustainability gave them more hope:

When you attend the class like we had with the Philippines, so you see that also in the other half of the world, people are trying to do good and to preserve the planet. And it gives me... I don't say strength, but hope, the better tomorrow, as we say. – Cara, Uni F student

Amihan used the term *solidarity*, even stating how the word encapsulates the VE experience:

I think to sum [the class] up in one word, it's solidarity—it's really just the solidarity, and I think that's important in sustainability. Because sustainability without solidarity is, it's purely technical, technocratic, but the solidarity adds in the humanness to it, that we're all humans facing this. – Amihan, Uni P student

The importance of solidarity was articulated by one of the instructors from Uni P, who expressed that the biggest advantage of the VE was giving her students the opportunity to *“exchange ideas on how we can do better, not necessarily to copy, but to be inspired and maybe to meet other people with the same mindset and with the same goals (Ria).”* Aside from sharing practices and solutions, the advantage of the exchange was being able to help her students find a support system:

I always remind my students finding that support system or finding people who are working towards the same thing is already a step to success, because then you can support each other, learn from each other, and inspire each other how to do better and to find new solutions that really work. So I think that's the biggest advantage of a virtual exchange.

From the student survey questionnaire alone, no change in the affective domain was expressed by the students. In fact, the change recorded in the responses from both groups in the QUAN data collection method was limited to the cognitive domain.

Using the categories of TL learning outcomes (Hoggan, 2016), the transformation that students experience in the affective domain fall under the categories of self (self-in-relation) and ontology (attributes: hopefulness). Having discovered companions in sustainability—even

if they live on the other side of the world—stretched the support system of students and could have an implication on how they view themselves in relation to the world. Knowing that there are others who are as committed despite the diversity of their contexts also cultivated in them a sense of hope.

Hands: Inspired ideas and actions

I am actually considering going into the food industry now because of this—I've been considering agriculture. Before, I was not that much interested in agriculture... because obviously, farmers are not really treated well here in Philippines, but they are in other parts of the world—which is another thing I was shocked about... So, I've been looking into it. I'm more interested in food systems now because of [the course]. – Hiraya, Uni P student

Under the behavioral domain, the VE inspired sustainability ideas and actions among the students—but only those from Uni P. This theme applies to how the course inspired students to either think of solutions to sustainability issues or even take concrete action towards sustainability, and it accounts for 17% of the recorded outcomes. This is less than half of what was recorded for both the cognitive and affective domain, of which both universities are represented. All three Uni P students spoke about how the course pushed them to see how they could transplant solutions being practiced in Finland to the Philippines, in a way that would suit the local context. Malaya from Uni P expressed how the course made her look into the enabling factors of a context when looking at solutions to sustainability issues: *“they have, say, two things. They have better situations and they do things better—but what allows that? That's something that we can see as opportunities for our own country.”*

Hiraya and Amihan, however, took it a step further and actually made concrete, sustainability-oriented steps after the VE. In an earlier excerpt, Amihan talked about cycling more often to school after having a more nuanced understanding of sustainability as a result of the VE. Hiraya considered looking into a field that she had not thought about before—agriculture and food systems—after hearing about the practices being done in Finland. If the other data sources are reviewed, there were no changes in behavior expressed by the students in the student survey questionnaires. The instructors only spoke about limited changes in the behavioral and affective domain—with much skepticism and caution. Alexis mentioned how the duration of the course was not enough time to inspire change of a transformative kind. The domain of behavior parallels Hoggan's behavior category of TL outcomes. More

specifically, the students who reported this outcome changed their actions to be consistent with a new perspective and made changes to their professional path.

Case 1 Summary

In summary, the VE, which was a COIL between a university in the Philippines and another one in Finland was able to foster TL for sustainability using pedagogical approaches and establishing learning conditions that activated students' cognitive, affective, behavioral, and situated domains of the TSL framework. Based on the data gathered—primarily from interviews with students and confirmed by the student survey questionnaire, interviews with instructors, and observation notes, students expressed a change that entailed an expansion of their sustainability horizons—whether it meant adding more dimensions and complexity to their conceptualization of sustainability; extending their nexus of care through a larger support system or awareness of the world; or widening their imaginaries for action. When viewed through the four outcomes of TL (Stuckey et al., 2014), these changes reflect two of the outcomes: having a deeper self-awareness in terms of their relationality and having more open perspectives. It goes without saying that these actions are based on student self-reports, taken from interviews and survey questionnaires conducted three months after the VE. Answering the second research question—investigating the transformative outcomes of the VE would require a longitudinal study, which is beyond the scope of this dissertation. However, what can be said from the findings is that the seeds of transformation seem to have been planted. This will be further discussed in [Chapter 7: Discussion](#).

5. Findings in Case 2

This chapter presents the findings from the second case of this multiple case study, a ten-week dialogue-based, ready-made VE that was developed as part of a European project, in which 390 students from 13 universities across 14 countries in Europe and the Southern Mediterranean participated. The aim of this study was twofold: (1) understand the transformative potential of the course—**how** it transforms students—by identifying the pedagogical approaches and learning conditions that reflect TSL and (2) identify its transformative outcomes—**what** the course transforms in students—by identifying the changes that occurred. To achieve such aims, this research undertook a concurrent M/M design, where a quantitative method was embedded within a broader qualitative study, but with data collected and analyzed in parallel. The following four methods were used:

- Semi-structured interviews (with both students and instructors)
- Student reflection journals
- Qualitative surveys (for students)
- Curricular documents (course syllabus, lesson plan, facilitator feedback form)
- Quantitative pre- and post-VE survey (for students)

Figure 5.1 Data collection and analysis strategies– Case 2 (VE)

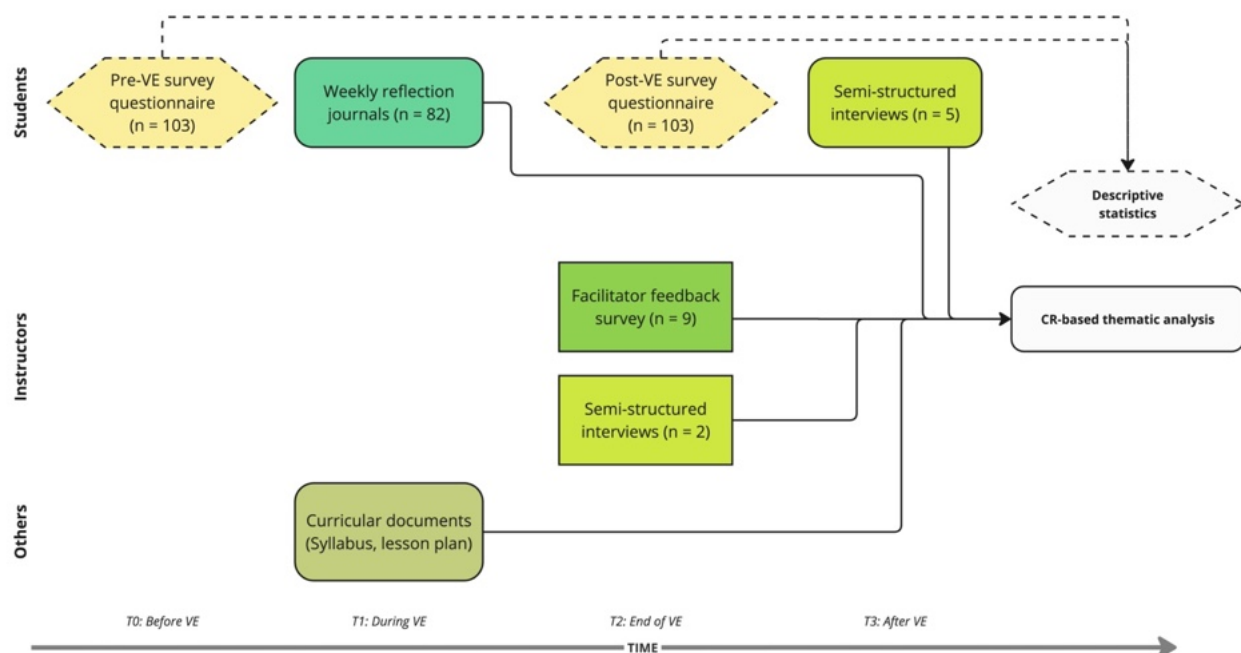


Figure 5.1 provides an overview of the sources, data collection instruments, and data analysis methods used for the dialogue-based VE case mapped on a timeline. Each color represents a different data collection method; quantitative methods are represented using hexagons with a dashed outline while qualitative methods have a filled outline. QUAL data was analyzed using CR-based thematic analysis to generate themes (experiential, inferential, and dispositional) while QUAN data was analyzed using descriptive statistics to identify the mean, standard deviation, and variance. The generation of experiential and inferential themes were done for each data source, and only when it was time to perform a retrodution of the underlying mechanisms—thereby generating dispositional themes—did the researcher combine all the findings within a case. The findings will show the dispositional themes that emerged, with as-needed references to the inferential and experiential themes on which they were based. Being dispositional, the themes proffer explanations of the mechanisms rather than generalizations of the data gathered in the study (Wiltshire & Ronkainen, 2021). The presentation of the dispositional themes will be supported by the literature that was used to conceptually redescribe (via abduction) the inferred data—which is core to CR-oriented analysis. In line with a holistic multiple case study research design, data collection and analysis for this case was completed independent of the first case. Only after the completion of each case was a cross-case analysis was conducted. This chapter will begin with an overview of the learning context (participants, syllabus, and virtual environment), followed by a section to answer each of the research questions. A summary of the findings will wrap up the chapter.

Case overview

The second case of this research study is the VE course “Climate Justice: From Inequality to Inclusion” developed mainly by a NFP with extensive experience designing and implementing dialogue-based VEs for partner universities. The NFP has developed around 25 VEs on topics that deal mainly with environmental and social issues, including climate movements, sustainable food systems, countering hate speech, European refugees, as well as technology and society. The VE on climate justice, an English-language exchange which was launched in the spring of 2024, was designed as part of an EU-funded international project spearheaded by a consortium of six institutions, of which the NFP and the university of the researcher are members (regarded as full partners), in collaboration with 13 associate partner

institutions from Europe and the Southern Mediterranean. The NFP was in charge of designing the VE, training the facilitators, and implementing the various iterations of the VE based on participant and facilitator feedback. At the time of the research study, their team consisted of five members representing three nationalities and who were located in at least four different countries. The course syllabus was developed mainly by three members of the team, two of whom acted as facilitators during the program. Table 5.1 summarizes the learning context of the second case using Van den Akker's Curricular Spider's Web (2013). Information on the learning context was taken mainly from curricular documents (syllabus, post-course report, lesson plan) provided by the NFP. The subsequent sections will describe the VE syllabus, the course participants, and the virtual space of the VE.

Table 5.1

Learning context of Case 1: Dialogue-based VE

Rationale	Connect learners from diverse backgrounds to learn about and engage in facilitated dialogues for them to understand the complexity and intersections of climate justice while equipping them with the tools to engage in climate action
Aims and objectives of the VE	The course "aims to enhance intercultural dialogue between students from Europe and the Southern Mediterranean area on the topic of climate change" (Sharing Perspectives Foundation, 2024, p. 2)
Content	Weekly learning materials and online dialogue sessions centered on eight topics (spread across ten weeks)
Learning activities	Mainly dialogic learning: Independent study of weekly learning materials, online dialogue sessions in groups, various icebreaker activities, climate action project planning and presentation
Teacher role	Three lead instructors developed the VE, two of whom were among the facilitators of the course; weekly dialogue sessions were conducted by trained facilitators
Materials and resources	Audiovisual materials uploaded to the LMS
Grouping	• 22 group with five to eight members each • Groups mixed to be as diverse as possible • Out of 390 registered students, 173 completed the VE
Location	Zoom web conferencing platform
Time	Weekly two-hour sessions for ten weeks
Assessments	• Weekly assignments • Weekly online dialogue sessions • Weekly reflection journal (post-dialogue session) • Group project – also called Climate Action Project (CAP)

Participant background

The VE involved learners²³ from 14 partner institutions located in 13 countries, which included Algeria, Egypt, France, Germany, Italy, Jordan, Lebanon, Morocco, Netherlands, Palestine, Portugal, Spain, and Tunisia—with two participating universities coming from Palestine. Although the language of instruction was English, none of the countries have English as an official language, but learners were required to fulfill a minimum (self-reported) language requirement to enter the course. There was a total of 11 facilitators, two of whom were also course designers. A total of 390 learners enrolled, of which 173 (approximately 44%) completed the course. Based on the sampling strategy outlined in [Section 3.4 \(Participant Selection\)](#), only those who completed the course were considered for the sample. Learners were divided into 22 groups, which was decided based on the availability reported by the students during the course registration. Each group led by a trained facilitator, and for some, a co-facilitator. Figure 5.2 shows the age, gender, and educational levels of the participants against the total number of learners who completed the course. Participants include those who either completed the pre- and post-VE survey, accomplished at least six reflection journals, or participated in the interviews. The course was open to learners from all degrees and degree programs, with a small number no longer enrolled in a formal academic program. For the sake of coherence, all those who participated in the course, whether they were students or not, will be referred to as learners. Majority of those who enrolled were aged 18–21 (n=174), female (n=253), and BA students (n=232). There were 37 nationalities represented in the course, residing in 24 countries. Figure 5.3 shows the different nationalities and countries of residence of the learners. The largest group in the VE composed of Lebanese students (n=69), followed by Palestinians (n=60), Moroccans (n=58), Egyptians (n=34), and then Algerians (n=28). The rest of the nationalities had less than 20 student representatives. Most of the students were residing in Lebanon (n=83), followed by Morocco (n=59), then Palestine (n=51), Algeria (n=30), and France (n=23). A comparison of these two variables

²³ As will be explained later on, the term “learners” will be used for Case 2 rather than “students” to better convey how the VE included participants who were not enrolled in an HEI.

reveals that the learners consisted not only of those residing within their countries of origin but also of visiting international students residing in a host nation.

Figure 5.2 Profile of participants vis-a-vis total number of students

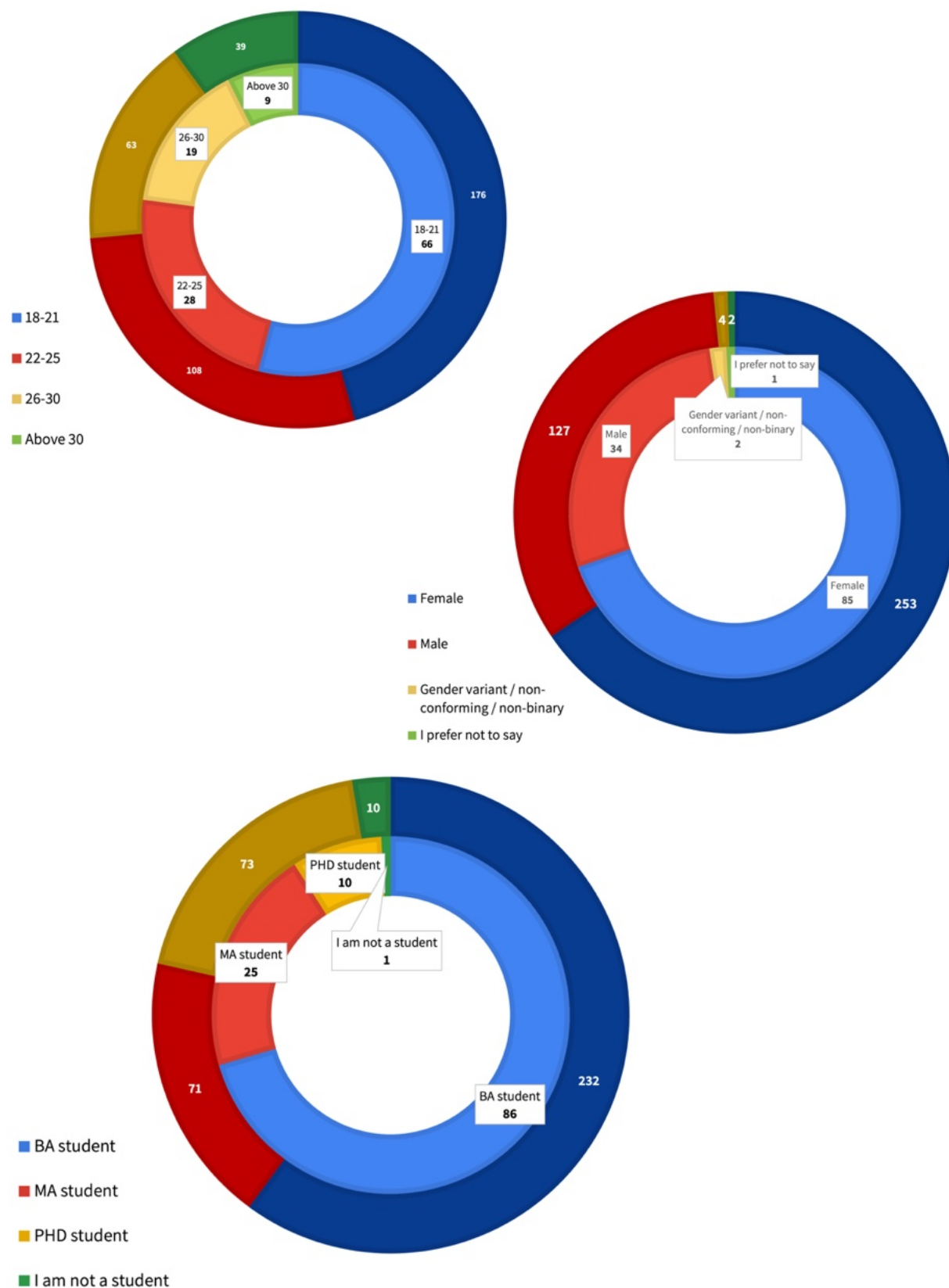
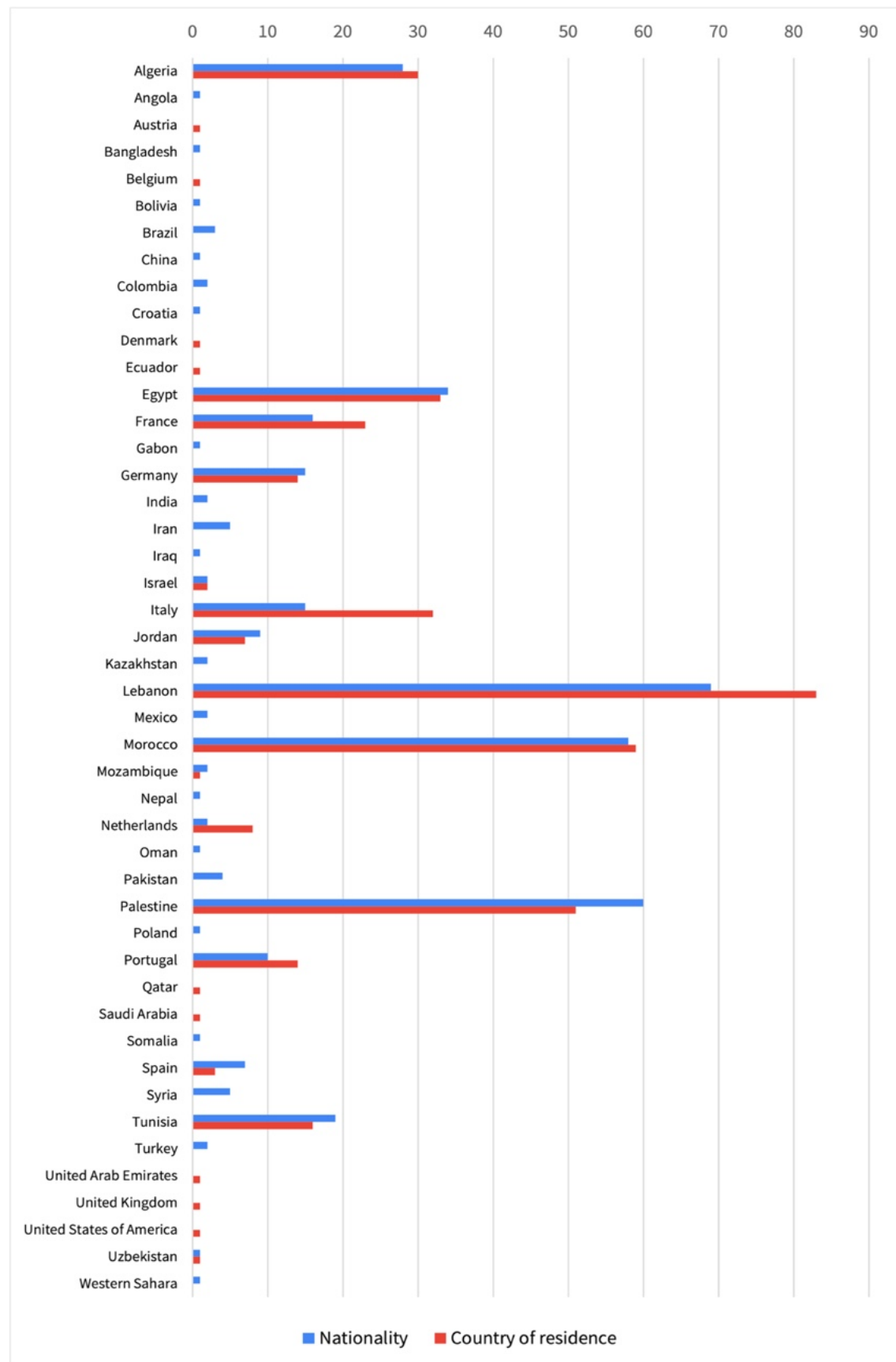


Figure 5.3 Students' nationalities and countries of residence



The syllabus

The course “Climate Justice: From Inequality to Inclusion” is a dialogue-based English-language exchange developed by the NFP as part of an EU-funded international project organized by six main institutions. According to the syllabus, the VE aims to provide an *“interactive and international online learning experience focused on... finding fair and inclusive approaches to tackle the climate crisis”* within ten weeks, with each week centering on a different theme. Table 5.2 shows the main topics of the course according to the syllabus. Week in and week out, learners were expected to allot nine hours of their time to effectively engage with the course, spending no longer than three hours per week for the independent study of the course materials—and this included answering the assignment and writing their reflection journals, two hours for their dialogue session, and then four hours working on their group climate action project (CAP).

Table 5.2

Main topics of the VE per week

	Topic	Brief description
1	Introduction to the Climate Crisis and the Concept of Climate Justice	Introduction to course content and concept of climate justice
2	Climate Change and Inequality (Part I)	Environmental racism; Impact of climate change according to social identity
3	Climate Change and Inequality (Part II)	Intersectionality in climate change
4	Power and Climate Action	Inclusive action and responses to climate change; stakeholders involved
5	Climate Justice Through a Personal Lens	Personal climate stories from around the world
6	Global Politics and Climate Policy	The politics of climate change
7	Critical Lens on Climate Initiatives	A critical review of popular climate solutions
8	Climate Communication and Advocacy	Climate stories in the media
9	Climate Crisis Strategies: Mitigation, Adaptation and Resilience	How nations, cities, and people are responding to the climate crisis
10	Your Climate Actions	Reflection on the journey throughout the course and the next steps ahead

The total course workload was equal to 3 ECTS or 90 hours of work, but where the credits would be applied depended entirely on the regulations of each participating institution or university. Learners were assessed through a point system based on their attendance and

assignment submission/completion. The most points went to the CAP (45 points), followed by the online group sessions (35 points), and lastly, the weekly assignments and reflection journals that were worth ten points each. The course designers developed a grading system that did not focus on the quality of their discussions or their work but on its quantity—assigning points based on their punctuality/tardiness or on the word count of their assignments/journals.

Learning resources and weekly submissions were hosted in a single LMS. Resources were a mix of videos, articles, and web pages publicly available online, with only a handful produced by the organization. Each resource posted was accompanied by at least two guide questions or discussion points. Through the LMS, learners could independently access the resources (made available per week), submit their assignments and reflection journals, and join the online dialogue sessions. The only reason for students to work outside of the platform would have been during the planning of their CAP, where they were encouraged to meet outside of the dialogue sessions to continue with their work. Only during the first meeting were all the registered learners together in a single video call—the rest of the time, they were in video calls with their assigned groups. The language of communication and instruction (through the weekly resources) was English.

The shared virtual environment: dialogue sessions

The core of the exchange were the dialogue sessions. The weekly learning resources were shared with learners not only to provide them with information on the theme for the week but also to prepare them for these sessions, and learners were encouraged to write the reflection journals only after having attended the online dialogue sessions. As previously mentioned, despite the large number of learners who took part in the course at the same time, they were only exposed to twelve others at most. All their interactions occurred with their groupmates and the facilitator assigned to their dialogue group. These facilitators were trained specifically to facilitate VEs; while none of them were subject matter experts on the topic of climate justice, according to both course instructors, they received additional training prior to the course on the fundamentals of climate justice and the current occupation of Palestine—as they did have a large number of learners coming from that area.

The weekly resources and the dialogue sessions represent a blended form of learning, where learners independently go through the learning material first in their personal learning environment and only after do they engage with others on the same material in a shared learning space. The sessions were designed to provide learners with a space to discuss their questions, insights, opinions, feelings, etc. from the resources, and these sessions were not just centered on dialogue, but they also mixed in activities—referred to here as active learning strategies. Prior to the exchange, to help in facilitating sessions, facilitators were provided with a course plan, which was referred to as Group Process Framework (GPF). It contained the rationale of the course and its structure, and guidelines on how to develop and enrich group interactions. It also included a bank of icebreakers and engagement activities to integrate in dialogue sessions. While these icebreakers and engagement activities could vary week in and week out, the mainstay in every session were the free-flowing discussions. A typical flow of a two-hour session would be as follows:

- **Check in and introductions** (15–20 minutes) – sessions would always begin with either an introductory or icebreaker activity; some of those mentioned positively by the participants in their reflection journals were the following:
 - Two truths and a lie
 - Introduce a partner to the group
 - Share a childhood dream
 - Country guessing game
- **Free-flowing discussion** (30–45 minutes) – this took the lion's share of the time in every session, and to better guide discussions, facilitators were provided with questions they could pose based on the week's resources; for example, based on the video "Intersectionality 101," the following questions were suggested:
 - What is intersectionality? What are examples of intersectionality?
 - What are some of your identities? Which of your identities come with social privilege or advantages? Which of your identities come with disadvantage?
- **Engagement activity** (30–60 minutes) – aside from those used for introductions and wrap-up sessions, activities were divided according to diverse themes or objectives (identity, conflict resolution, relationship-building and team-building, winding down,

climate-related) that facilitators were free to choose from based on the topic of the week; some of the engagement activities that were mentioned positively by participants included:

- The privilege walk – Participants take either steps backward or forward based on statements on their background
- Moon landing – Team-building activity where participants rank items necessary for their survival on the moon
- Climate change responsibility roleplay – Participants role play as stakeholders in the climate crisis: politicians, policymakers, corporations, and climate activists
- **Wrap-up** (10–20 minutes) – sessions ended with content and process reflection activities, one of which was widely mentioned in the journals—meta discussion activity where participants dialogued about their dialogue process

Facilitators were free to choose which introductory, engagement, or wrap-up activity to use; hence, while the weekly learning materials were the same for all students, the weekly activities during the dialogue sessions varied from group to group. During the dialogue sessions, learners were encouraged to switch on their video cameras, but based on the researcher's observation notes, not everyone had their cameras switched on. During the fourth week of the exchange, for example, based on the recordings of six groups, two groups had all learners visible through their video cameras while the remaining four had one student each with the camera switched off. Although the recordings showed the attendees one at a time (rather than a grid view with all attendees visible in a single screen)—making it difficult to determine how much of the time cameras were switched on or off—there were those only whose names would appear while talking, signifying that their video cameras were switched off during the interaction. Aside from the video interaction, there was also a chat dialogue box where both learners and facilitators could exchange messages. Plus, the video conferencing platform allowed users to share their screens as well as emojis.

RQ1: How does VE foster TL for sustainability?

Similar to the previous case, answering this first sub-question entails illuminating which pedagogical approaches and learning conditions within the VE could have led to or

detracted from transformation. Data gathered primarily from the student interviews (n=5), open-ended questions from the post-VE survey questionnaire (n=114), and the reflection journals (n=84) were analyzed through CR-oriented TA. Experiential and inferential themes were first generated for each data source and then the inferential themes per source were consolidated into a single list. From there, 15 dispositional themes emerged, cross-checking across the different student sources to validate the retroducted statements. The generated dispositional themes were triangulated with results from the Greencomp section of the survey questionnaire, interviews with the instructors, facilitator feedback survey, and the analysis of the curricular documents (syllabus and lesson plan). These dispositional themes were then organized into five categories—the first four representing the head, hands, heart, and feet dimensions of TSL, and the last reflecting VE/VL learning conditions.

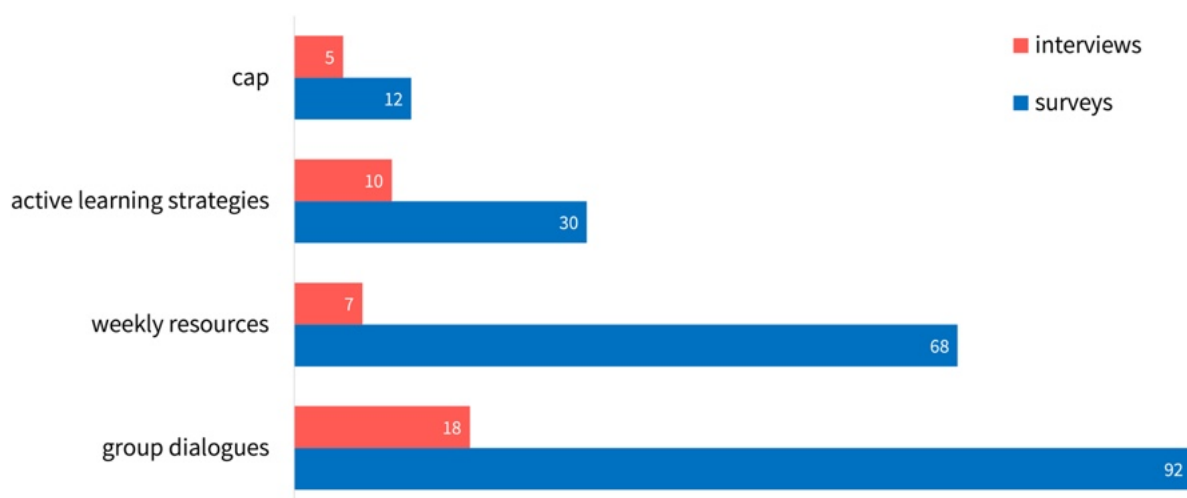
Instructional strategies

Among the variety of instructional strategies used by the class, the most effective in fostering TSL according to the participants²⁴ were the group discussions; followed by the weekly reading materials and video resources; and then the active learning strategies used during the dialogue sessions—such as debates, roleplays, games, and icebreakers; and lastly, the CAP. Students reported not only instructional strategies, but also pedagogical approaches and learning conditions that made an impact. Figure 5.4 shows the instructional strategies participants deemed as most effective based on their frequency in the student interviews and surveys.

²⁴ These emerged in response to the following questions from the student interviews: (Q4) Could you describe your experience of virtual exchange? Which activities were effective/ineffective? (Q5) Thinking back over your virtual exchange experience, was there a time when you realized that your values, beliefs, or expectations on climate justice had changed? Why do you think it had to change? (Q6) What or who do you think influenced this change? Was it part of the virtual exchange activity or something else? Could you describe their/its influence?

They also emerged in response to the following open-ended questions of the survey: (Q1) Has your understanding of sustainability and climate justice changed? If yes, how? (Q2) What do you think contributed to this change? Was it a particular person, activity, moment in the dialogue session, concept, and/or resource? Please describe in detail. (Q5) What did you like most about the VE?

Figure 5.4 Class activity that caused a change in students' conceptualization of climate justice



The label “group dialogues” refers not only to the free-flowing discussions, but to the entire two-hour dialogue session where learners interacted with others, whether discussing a particular topic or engaging in an activity. All the introductory, engagement, and wrap-up activities that were used were grouped together under active learning strategies, but some respondents specified role plays ($n=5$), debates ($n=8$), games ($n=5$), and icebreakers ($n=2$). It should be reiterated that each group had its own set of active learning strategies, as these were based on facilitator choice, but according to the reflection journals, some strategies—those mentioned prior—were most used and mentioned across the groups. The efficacy of the dialogue sessions reflects the aim stipulated in the course syllabus as well as that articulated by both instructors—fostering dialogue among a diverse group of students. More than the instructional strategies, students expressed several aspects of the course that contributed to its transformative potential, which will be revealed through the dispositional themes.

After all the responses were thematically analyzed using the CR approach of generating experiential, inferential, and then dispositional themes, 15 dispositional themes emerged, 13 of which were organized according to the head-hands-heart-feet dimensions of the revised TSL framework, while the remaining two were grouped under the organizing theme of VL. Figure 5.5 presents the themes arranged according to their corresponding dimensions, with each dimension taking a color—yellow for cognitive (head), pink for affective (heart), green for behavioral (hands), and violet for situated (feet). The length of the lines for each theme represents their frequency in the data. Both factors that fostered and hindered TSL are

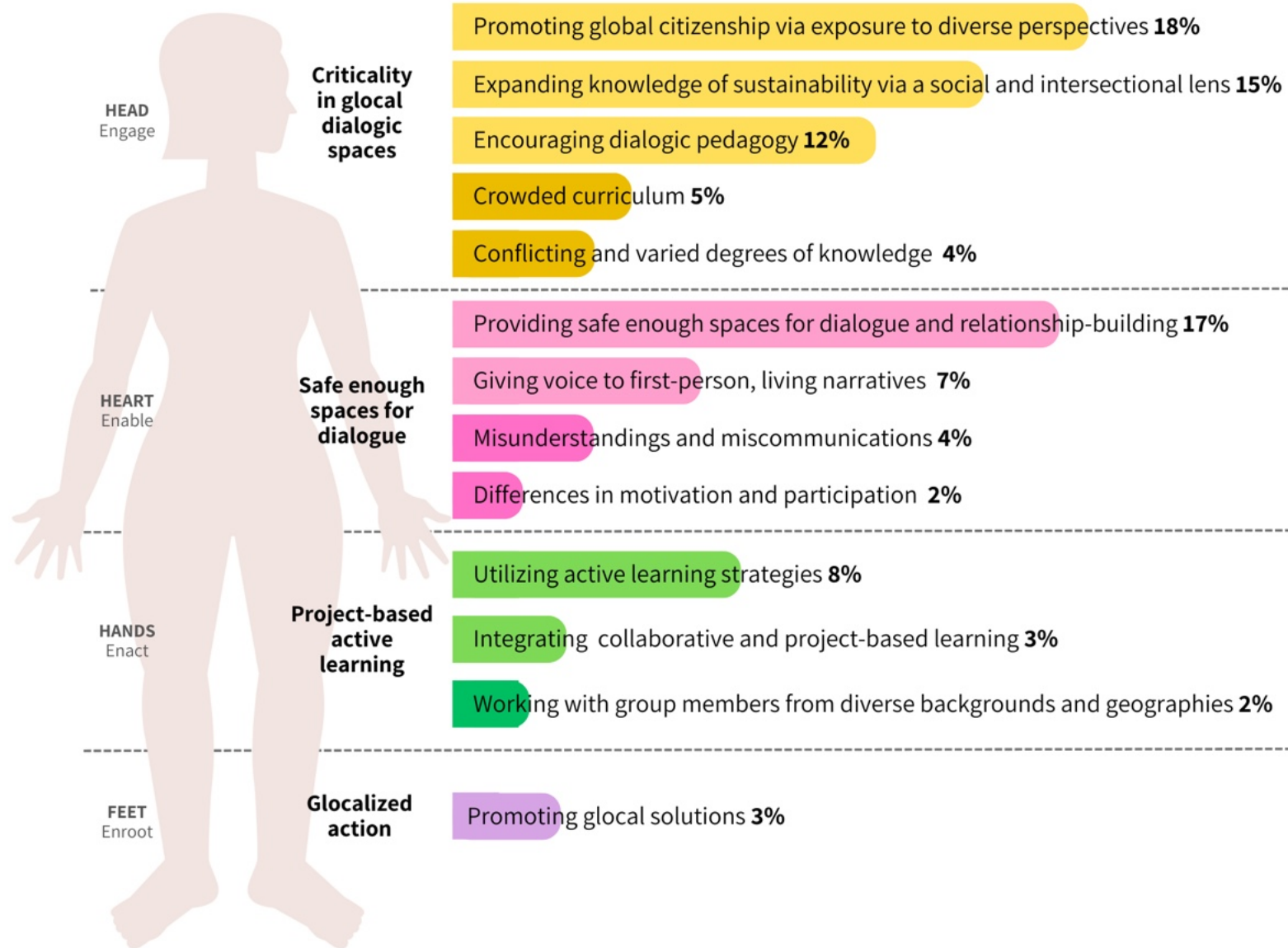
specified. The dispositional themes under VL have been left out, as they will be presented separately.

The most positively activated dimension was the head (45%), engaging students cognitively by promoting global citizenship through critical engagement with diverse perspectives and experiences, encouraging dialogic education, and expanding knowledge of sustainability through a social and intersectional lens. This was followed by the heart (24%), where students' affective domain was enabled by giving voice to first person, living narratives and providing safe enough spaces for dialogue and relationship-building. The next were their hands (11%), where students were given the opportunity to enact sustainability-oriented behavior through active learning, group-based strategies and integration of collaborative, project-based learning to promote climate solutions. The least activated dimension was the feet (3%)—students were enrooted to their situated domains through the CAP that localized action while promoting global collaboration.

In terms of hindering TSL, the biggest hindrance was in the head or cognitive domain (8%), where students reported issues of a crowded curriculum and their peers having conflicting and varied degrees of knowledge; this was followed by hindrances in the heart or affective domain (5%) due to differences in motivation and participation and misunderstandings and miscommunications. Lastly, students reported challenges while working with group members from diverse backgrounds (2%) under the behavioral domain.

The dispositional themes will be elaborated according to the four TSL dimensions—head, heart, hands, and feet. Each section will include a description of the dispositional themes under the domain, direct quotes from participants, findings from each of the data sources to supplement the abducted themes, and the literature used to inform the dispositional theme. After going through all the dispositional themes under the TSL framework, those under VL will also be explained. As in the first case study, these themes were excluded from the TSL framework because of how they reflect learning conditions outside the control of the instructors and which are endemic to the VL environment itself. The section will end with a summary of the findings for RQ1.

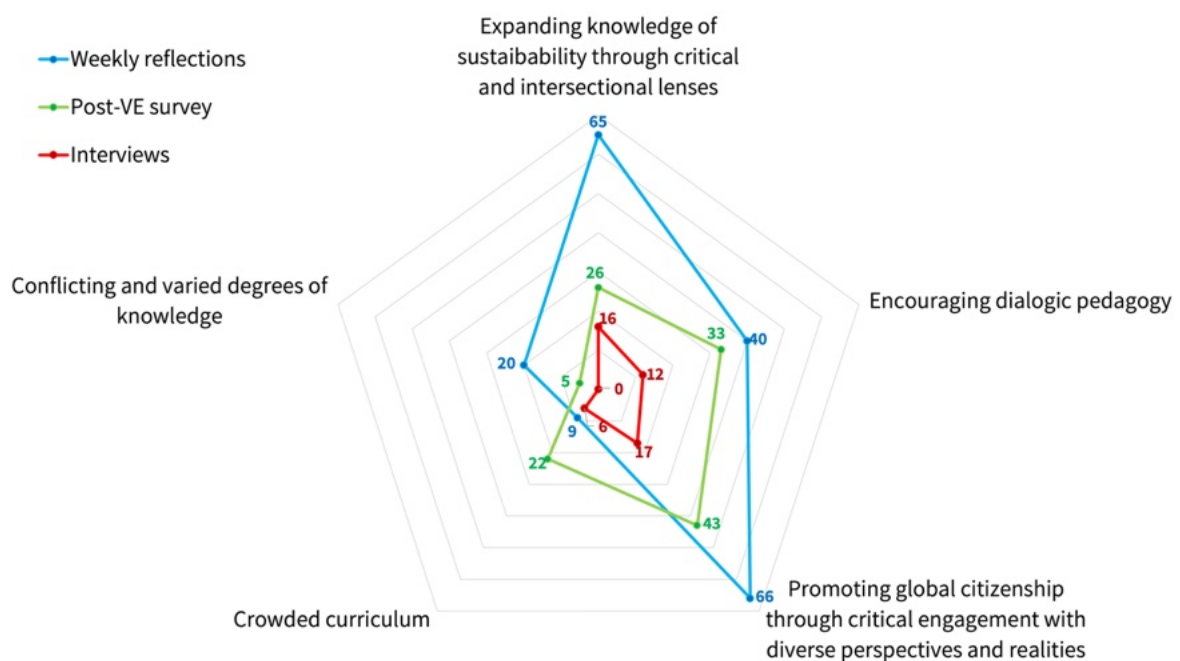
Figure 5.5 Dispositional themes according to head, hands, heart, and feet approach – Case 2



Head: Engaging critically with sustainability in glocal dialogic spaces

Pedagogical approaches and learning conditions in the head—or cognitive domain—deal with knowledge, sense-making, criticality, and reflection of sustainability knowledge and theories (Anderson & Tonner, 2023; Horlings et al., 2020). In this domain, the VE fostered TSL in the cognitive domain by having students engage critically with sustainability in glocal dialogic spaces (45%)—in particular, by promoting global citizenship through engagement with diverse perspectives and experiences (18%), encouraging dialogic education through the exchange of knowledge and opinions among peers (15%), and expanding their knowledge of climate justice and structural inequalities (12%). These three dispositional themes emerged across all three primary data sources with parallel frequency. Figure 5.6 compares the presence of all the themes under the cognitive domain, whether they fostered or hindered TSL. It should be noted that these data sources were gathered at different time periods, thereby showing the strength of this theme during (reflection journals), immediately after (post-VE survey), and six months after (interviews) the VE.

Figure 5.6 Frequency of the dispositional themes under the cognitive domain across all data sources



The most frequent dispositional theme under the cognitive domain that emerged from the data was the **promotion of global citizenship through exposure to diverse perspectives and experiences**, which was done mainly through the group dialogues and supplemented by the weekly resources. Understanding of global citizenship is one of the six learning objectives

under the head dimension of the TSL framework (Sipos et al., 2008). Global citizenship, as described by Anderson (1998) and expounded on by Andreotti (2010) privileges “reciprocal and transformative encounters with strangers” (Anderson, 1998, p. 269) “beyond geographical, ideological, linguistic, or other representational boundaries” (Andreotti, 2010, p. 239). In such encounters, meaning-making is not a normative project with a definitive end—such as a universal definition of a concept—but a negotiated and continuous endeavor. Global citizenship education (GCE) aims to equip students with the skills and tools to acknowledge and address critical global issues—particularly those caused and perpetuated by systemic inequality and power asymmetries—“towards a future that could be ‘otherwise’” (Andreotti, 2010, p. 239). Various approaches and frameworks to GCE have been conceptualized, which were mapped by Pashby et al. (2020) into three main types within a spectrum: liberal, neoliberal, and critical. Exposing students to a variety of perspectives on climate justice, not only those of their group members coming from diverse backgrounds, but also those narratives featured in their lessons—many of which came from the oft-underrepresented Global South—opened the door to the critical examination of inequalities underlying climate issues. The course seems to espouse a more critical form of GCE, as it encouraged students to “reflect critically on the legacies and processes of their cultures, to imagine different futures, and to take responsibility for decisions and action” (Andreotti, 2006, p. 29). This dispositional theme surfaced most frequently across all primary data sources, showing its strength across different periods of data collection. In the post-VE survey, the words of a student from France (C.684) encapsulates this experience of exposure:

Meeting individuals with diverse lifestyles and experiences profoundly shifted my perspective. Engaging in conversations with people whose lives are vastly different from mine, and who navigate the challenges of climate change in unique ways, has reshaped my understanding of this issue. Interacting with such individuals has broadened my horizons and provided me with new insights into the complexities of climate change and its impact on diverse communities.

In a number of reflection journals (n=7), participants talked about how the diversity of perspectives and experiences helped those in privileged positions such as their own to see and confront their privilege (C.684; C.941), such as what a student from Germany expressed:

By listening to new perspectives and being open for new input I feel that I can expand my personal little bubble and ultimately gain a better understanding for the complex world we all live in (G.774).

Indeed, many of the questions posed with the weekly resources invited critical consideration of issues tied to injustice and unequal power dynamics, such as the following observed in the LMS of the course:

- For the article: [For real climate justice, it's time for a food revolution](#) – Look out for how countries in the Global South bear the brunt of climate change consequences, potentially resulting in food shortages and population displacement
- For the article: [10 Climate injustices—and how to fight them](#) – Look out for how climate change impacts people differently not only on the basis of race and gender, but also on the basis of literacy, physical ability, age, and more; what factors increase a person's vulnerability to the effects of climate change?

Such questions were reinforced by the free-flowing discussions in the weekly dialogue sessions, where facilitators were provided with a list of questions, many of which would prompt participants to think of underlying inequalities or power imbalances. Aside from the weekly resources and discussions, the makeup of their groups also allowed the entry of diverse perspectives and realities—even those that seemed so far-removed. Some respondents articulated how being exposed to a reality that contrasted with theirs helped them realize the privilege of being concerned about the climate, as evoked by this entry:

Us Germans being concerned about climate change because we live in a society that allows us to be concerned about the environment versus people in Palestine having so many other problems which does not leave much room for [sic] climate crisis. (I.515)

Others expressed the impact of *“having points of view coming from new horizons”* (B.663)—be it geographies, cultural backgrounds, religions, or academic disciplines—in the change they experienced because of the course²⁵. They mentioned how the diversity or, as one

²⁵ Q3 in the post-VE survey was: What do you think contributed to this change? Was it a particular person, activity, moment in the dialogue session, concept, and/or resource? Please describe in detail.

Palestinian learner put, the *“plurality of opinions and cultures”* (S.830), made them reflect more, and through the interaction with peers, their *“perspective was widened and a sense of shared responsibility was established”* (K.865). This idea of shared responsibility and connectedness is similar to what was articulated by three of the students interviewed. Carmen mentioned that—*“the realization that everything is connected, historical events, colonization, climate change”*—was the most impactful aspect of the course. This reveals a criticality undergirding the exposure. Rather than tokenizing multiculturalism, it was leveraged as a vehicle to confront global issues and unearth their often hidden causes. This promotion of global citizenship through the inclusion of diverse realities also made the dialogues *“enriching”* and *“engaging”*, as Ayaan said in the interview:

I had the opportunity to interact with different cultures, different backgrounds, people from different courses... when I cross-contaminated with those backgrounds, it was widening my perspective on the climate.

– Ayaan, Management Engineering student

The cross-contamination, not only of cultures, but academic backgrounds, age groups, locations, reflects the trans-perspectival learning conceptualized by Wals (2017). This idea not only of exposure but sustained exchange through dialogues ties to the second dispositional theme under the cognitive domain, **encouraging dialogic education** through the exchange of knowledge and opinions, where participants were encouraged to share their understanding of the concept of the week. Recalling the section on [dialogic education in Chapter 2](#), dialogic education “is an approach to teaching and learning aimed at engaging students in classroom dialogues permeated with equality, collectivity, reciprocity and accountability” (Cui & Teo, 2021, p. 1). Learning is less about transmitting knowledge and more about engaging with others in shared meaning-making and increasing understanding in a democratic space (Calcagni & Lago, 2018). A learning setting that adopts dialogic education encourages learners to articulate their perspectives and even critique those of their peers—and this opportunity to express, share, and discuss could sharpen students’ cognitive skills (Lefstein & Snell, 2013).

Indeed, one participant expressed how knowing that there would be an opportunity to discuss in the dialogue sessions caused them to read the weekly resources *“more thoughtfully,”* (B.459), and others articulated the same insight on using the exchanges to

connect what they had learned from the weekly resources. Through the discussions where learners shared their opinions or personal experiences on the climate justice concept, respondents described how having dialogues with others on a topic added to their learning, while one other mentioned that this is where they *“learned the most”* (C.941). A Palestinian learner described the experience as different from what he is used to: *“we learned through indoctrination and here through conversation and expressing different opinions”* (H.869). Even the facilitators commented²⁶ on how this diversity of learners’ academic backgrounds, paired with the exchange of knowledge, improved the experience:

What I liked most (besides the compelling and highly relevant and timely topic) is having PhD students who added depth and perspective to the dialogue.

The above quote also demonstrates the role of the facilitators—even if they led these dialogue sessions, they were there more as guides, as it was the learners who took centerstage. Facilitators were not expected to be subject matter experts in this exchange, and their role was to bring out students’ views and sentiments on the topic of the week, rather than provide them with knowledge. In fact, based on the reflection journals, in two groups, students took turns in pairs to act as facilitators for the week, and this involved coming up with their own questions based on the weekly resources and fostering engagement with peers. It could thus be said that knowledge on climate justice came from two main sources: the weekly learning resources and the peer dialogues. For four of the students interviewed (who, again, were all from the same university), this atmosphere of knowledge co-construction in the VE was also seen as a learning experience that made up for the lack of interaction in their university classes:

Online, it was more excited [sic] for me to join (. ...) because my [university] class, we were like a hundred or something, so we are a lot of students so it’s kind of hard to pay attention (. ...) and it’s just like that, the professor is speaking and that’s it—you are not participating, or you’re not doing anything else.

– Isla, Business Management student

²⁶ This was a response from the facilitator feedback survey developed by the course team and shared with the researcher. The question was “What did you like most about the experience? What did you like least about the experience?”

Ayaan, a Management Engineering student, even said *“when I’m in class, sometimes I feel everyone is converted to maybe an introvert, basically. When the professor tries to ask a question, most of the students, if not usually, the interaction is not there.”* The group discussions that were opportunities to share insights were a positive motivation for the participants, especially since they went hand-in-hand with the weekly learning resources.

Looking back to the literature on dialogic education, the exchange that occurred in this course recalls the concept of **exploratory talk** (Barnes, 2008; Mercer, 2008) where “partners engage critically but constructively with each other’s ideas” (Mercer & Littleton, 2007, p. 51). In particular, Mercer (2008) describes it as a shared and “coordinated form of co-reasoning” (p. 95) where knowledge, insights, and opinions are shared, evaluated, and challenged, and alternative perspectives are also considered. In fact, the diversity of opinions and experiences made the dialogues more susceptible to disagreement and misunderstanding due to the contrasting beliefs, as will be expounded more in the latter part of this section, but rather than being a disputational form of talk, one marked by dispute and argument, or even cumulative, where there is only assent (Mercer, 2008), students were free to explore both confirmatory and conflicting viewpoints. After the first dialogue session, an Italian respondent described how debate that occurred between two of her groupmates inspired her because it *“was the representation of a respectful dialogue”* (D.844). This experience of critical and negotiated knowledge co-construction was confirmed by one of the learners interviewed, Ayaan, who mentioned *“What made the group interesting was that we had completely different opinions on everything and we were open to say whatever we thought actually.”* These weekly videoconferences where the discussions occurred reflect the concept of a dialogic space for creativity²⁷ that is multi-voiced, multi-perspectival, and open-minded, and promotes togetherness, thinking together, and multi-level dialogues (Pifarré, 2019). Findings from the participant experiences and the course plan demonstrate the use of authentic questioning and follow-up questions for elaboration, the stimulation of alternative viewpoints through

²⁷ Creativity here is defined in the context of dialogues as “the emergence of new perspectives out of the tension of holding multiple perspectives together” (Wegerif et al., 2010, p. 614).

roleplays and debates, and the space provided for challenging and critique—all of which are examples of dialogic moves²⁸.

In this same vein, through dialogue sessions and the learning resources that worked hand-in-hand, learners were cognitively engaged by how the course focused on **expanding students' understanding of sustainability through a critical and intersectional lens**—and this is aligned with the learning objectives of critical thinking and systems thinking in the cognitive domain of the TSL framework (Sipos et al., 2008). In the post-VE survey, one respondent from Iran described it to have changed his understanding of sustainability:

One significant factor is materials of week three; the concept of intersectionality.

Understanding that vulnerable and marginalized communities, including low-income populations, people of color, indigenous communities, and those living in coastal areas or regions prone to extreme weather events, more often bear the brunt of climate change effects, contributed to my understanding about first injustice [sic], and then injustice in climate change [sic]. (F.915)

Beyond diversity and dialogue, it was the *lens* the course used—that of uncovering structural inequalities—that learners found to be engaging. One topic highlighted in the post-VE survey responses (n=9) and interviews (n=2) was the intersectionality of climate change—how it intersects with issues of gender inequality, colonialism, racism, poverty, and even war. In the interviews with the instructors, they talked about how important it was for them to hone among the participants *“the ability to be more intersectional and critical”* (Bella, course instructor). A review of Table 5.2 (Main topics of the VE per week) reveals how interwoven this intersectionality is in the curriculum—not only is it the main topic of Week 3, but other related concepts were scattered in the different weeks such as environmental racism (Week 2), the unequal impact of climate change on women (Week 2), and the imbalance of power in climate action (Week 4)—to name a few.

²⁸ According to the framework of dialogic education by Cui and Te (2020), dialogic moves, which is one of the four components of the framework, comprise elicitation, extension, connection, challenging, and critique.

Despite the VE's positive cognitive engagement, there were also aspects that hindered its TSL potential, namely the crowded curriculum (5%) and the varying levels and sources of knowledge (4%). The dispositional theme of **crowded curriculum** refers to content overload, which is when the load of instructional material does not correspond with the capacity of students (OECD, 2020). Even if the participants found the weekly learning resources to be effective, the resources combined with the assignments, weekly dialogue sessions, reflection journals, and the CAP, made the VE as a whole fatiguing to some. When asked about the challenges they encountered during the VE²⁹, *"committing to the weekly materials, assignments, and sessions"* (C.670) was the second biggest issue (n=22). As described by one participant from France in the post-VE survey:

The biggest challenge for me was the amount of work this required. With ADHD and dyslexia, going through all the materials and providing a response every week was a challenge, especially as it came on top of an intense semester at university. For the CLiVEx project, we found a way to leverage each team member's strengths so the additional impact was limited – but it was still very intense in the context of everything else I had to do for other classes.
(G.710)

It became especially challenging to some participants who said that they had to balance the VE and their other academic requirements with their work. It should be said, however, that there were others who said the entire course was well-balanced (n=9).

The last learning condition that could have hindered TSL concerns the **conflicting and varied degrees of knowledge** which refers to an issue that is connected to the diversity of learners. For example, one reflection journal entry (C.941) read:

Staying neutral on the issues discussed is challenging since I already have an extensive background on the topics debated and have worked and studied on them for several years now. Therefore, I am sorry if my rigid position in the discussion has offended other people. Having this variety means managing varying degrees of knowledge—some were climate activists or PhD students on sustainability more versed on climate change while others had

²⁹ Q6 in the post-VE survey questionnaire: "What challenges did you encounter during the VE?"

heard about climate justice for the first time through the course. It also involves reconciling or at least, bringing together, multiple epistemologies in a single space. Another journal entry of a Palestinian learner wrote: *"Sometimes I find it hard to connect with my group and relate to them, because when talking about climate justice, they focus on the "climate" part whereas I am more focused on the "justice" part"* (E.807). This theme is one of the challenges that comes with having diverse perspectives and experiences, and while this was quite pronounced in the weekly reflection journals, it hardly appeared in the post-VE surveys and not at all in the interviews. Although this will be further discussed in the next chapter, this might imply that the theme, despite its prevalence during the VE, did not create a lasting impact.

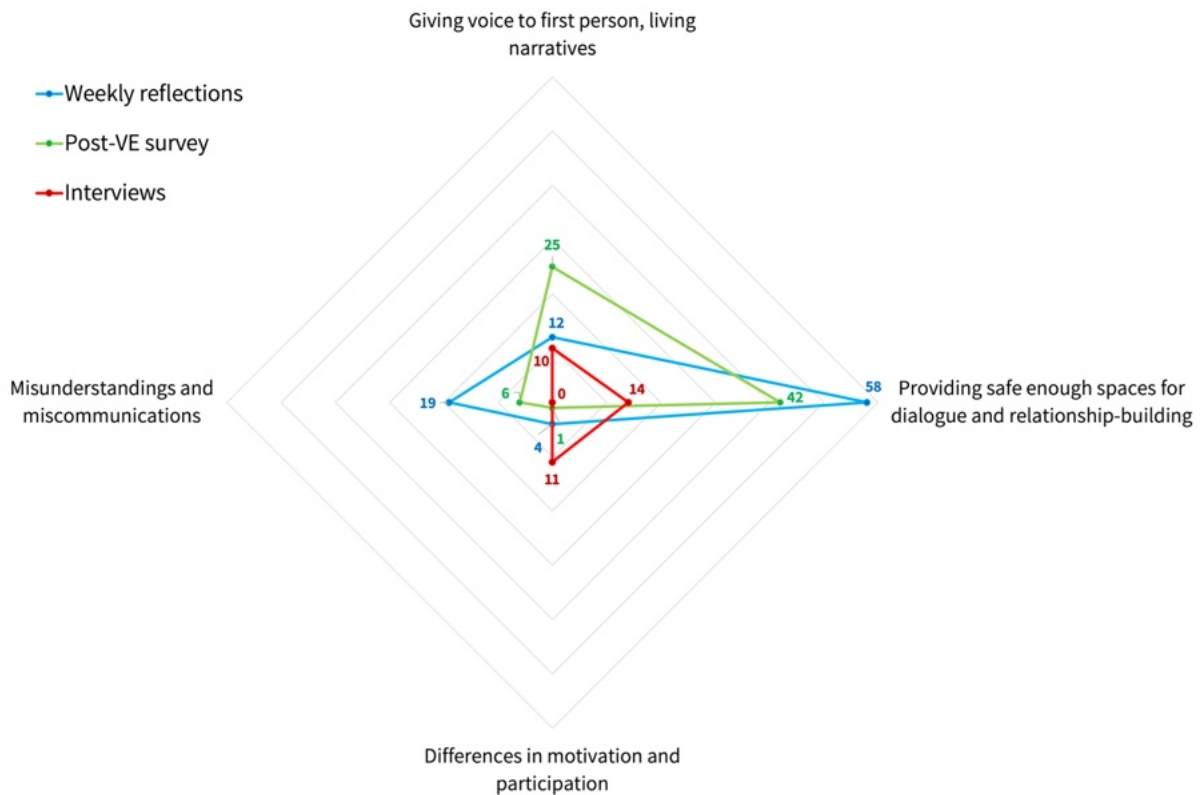
In summary, the **head** dimension was engaged through the VE by providing learners with the dialogic spaces to engage critically with sustainability and providing them with the skills to be global citizens. More specifically, this was accomplished by promoting global citizenship through critical engagement with diverse perspectives and realities, encouraging exchange of knowledge and opinions which is representative of a dialogic form of education, and expanding their knowledge of sustainability through a critical and intersectional lens. There were some hindrances to TSL due to a crowded curriculum and the difficulty of managing conflicting and varied degrees of sustainability knowledge; however, this was a smaller percentage compared to the pedagogical approaches and learning conditions that engaged learners cognitively.

Heart: Enabling through safe-enough spaces for dialogue between living narratives

Enabling the hearts of learners entails tapping into their affective domain, comprising their emotions, values, relations, and motivations—their *whys*. It involves tapping into learners' relational form of knowing—providing value to the relationships formed, whether with human or non-human beings (Singleton, 2024). Next to the cognitive domain, the affective domain was positively activated to foster transformative learning for sustainability because, by creating safe-enough spaces, participants could engage in dialogue and share about their personal, living narratives (21%). More specifically, the dispositional themes under the heart dimension were: providing safe-enough spaces for dialogue and relationship-building (17%) and giving voice to first person, living narratives (7%). However, hindrances were found in this domain due to misunderstandings and miscommunications (4%) and

differences in motivation and participation (2%). Figure 5.7 shows a comparison of the themes under the affective domain across all the data sources, whether they fostered or hindered TSL.

Figure 5.7 Frequency of the dispositional themes under the affective domain across all data sources



The most dominant dispositional theme in the affective domain, as exhibited in the weekly reflections and post-VE surveys, was how the VE **provided a safe-enough space for dialogue and relationship-building**, which is the second most emergent dispositional theme in the data—next to the most prevalent dispositional theme “promoting global citizenship by exposing students to diverse perspectives and experiences”, and equal to the theme of “expanding understanding of sustainability through a critical and intersectional lens”. As can be seen in the above figure, it does not fluctuate over time, and its frequency remains consistently strong across all data sources gathered at different time periods. This theme reflects the concept of **safe enough spaces** (Singer-Brodowski et al., 2022) or non-hegemonic VEs as brave spaces (Glimäng, 2022) in sustainability transformation literature, as well as that of dialogic spaces (Bouton et al., 2024; Boyd, 2023; Boyd & Sherry, 2024; Wegerif, 2013).

As previously mentioned in the explanation of the weekly dialogue sessions, the free-flowing discussions on the topic of the week were interspersed with interactive activities that had diverse aims, whether it was to have participants introduce themselves, break the ice,

resolve conflicts, share their identities, or enhance teamwork—and this is where the relationship-building was also nurtured. These activities were key in easing in learners who were practically strangers into a dialogue on so complex a topic as climate justice. In their reflection journals, participants expressed that the initial hesitation in expressing their thoughts was assuaged by the atmosphere of openness and mutual respect that was slowly established, as encapsulated by the reflection of an Italian student (H.897):

It's not always easy to confront each other, especially when dealing with sensitive topics such as climate injustice but putting yourself on the line and overcoming your limits definitely helps to get through the sessions together.

In fact, in the facilitator feedback form³⁰, one of the facilitators said “I liked how students at certain point in the course started to be more comfortable in disagreeing with each other. This made the conversations more authentic and deep.” The interactions, as described in the reflection journals, were sincere, encouraging, relaxing, and honest. It cast such a strong impression on one participant, that in one reflection journal, they claimed that despite the fact that the session “did not meet [their] expectations in terms of content, [they] found value in the connections formed” (P.342). Others mentioned how this dynamic—knowing that the difference in opinion would not be subject to judgment—encouraged them to share even more, as represented by this journal entry from a Lebanese learner: *“The people in the group negotiate with respect, even when we do not agree on the same thing, and this in return motivates others to engage more often”* (C.921).

Indeed, the care in creating this safe-enough space evokes the kind of environment necessary for **dialogic education** (Boyd, 2023). In the interviews, half of the participants (n=3) said that the relationship-building that occurred within the VE was extended even outside of it; they still communicate with each other and one even met up with some of her groupmates in person. Ayaan mentioned that aside from the screen acting as a shell to help him overcome his introversion, the kindness of the facilitator and the respect he found among his

³⁰ The question was: “Are there any moments in the dialogue sessions that stand out for you as particularly important in contributing to participants’ learning? Please describe.”

groupmates—despite their frequent differences—was what helped him come out of his shell and freely express his opinions. He added that his groupmates were not afraid to question him and make him see the impact of his unsustainable daily practices. More than the learning activities and instructional strategies, the role of the facilitator, as described by Ayaan and many other participants in the reflection journals (n=25), the post-VE surveys (13), and interviews (n=7), was considered key in creating this safe enough space:

I owe a very big thank you to our facilitator as well as she aided and eased the conversations for us at the start before we took them into our hands when we started feeling comfortable enough.

Many others described their facilitators as *kind, supportive, funny, helpful, and understanding* and expressed their indispensability in “*making [them] feel like they belong*” especially during “*the initial awkward moments*”. The facilitators were also viewed as essential in pushing conversations forward and directing debates, especially with their critical and thought-provoking questions—which also ties in with one of the dispositional themes that reflect how the TSL was hindered—**misunderstandings and miscommunications**. These misunderstandings and miscommunications emerged strongly in the reflection journals (n=19), but, save for two instances of misunderstanding that were clearly described, most of the entries pertained to them more generally—simply as having occurred either due to conflicting opinions or difficulty communicating in English. However, they diminished in frequency in the post-VE survey (n=6) despite the fact that in the latter, a question was dedicated to the challenges learners faced. This could be due to the safe-enough space created, where learners generally felt safe enough to share and wrestle with their disagreement or discomfort in the process of unlearning or relearning (Pereira et al., 2019). In fact, in the post-VE survey, two participants talked about conflict within their group as the challenge they faced—it is not certain whether this is the same group—yet how this was resolved with the guidance of their facilitator. Overall, these findings show that the VE was a safe-enough space for sharing, discussion, and even conflict resolution, and that, in a large part, this was due to the guidance of the facilitators per group.

Another pedagogical approach that fostered TSL in the affective domain was how the VE **gave voice to first-person, living experiences**. Similar to first case, this dispositional

theme reflects how learners were exposed to people living in their “actual” setting, thus giving credence and importance to students’ locus of enunciation—which is one of the characteristics of non-hegemonic forms of VE (Hauck & Helm, 2020). This is encapsulated in one reflection journal entry of a learner from Germany: *“I highly appreciate getting input of climate consequences [sic] in other counties. It is something else to just read it or someone telling you”* (I.719). According to the participants, *“being face to face with someone who explains their struggles to you”* (I.697) and hearing the personal stories of “real” people *“reinforced their commitment to advocating for climate justice”* (P.657) and made the dialogues *“more relevant”* (E.727) and even *emotional* (U.757). This was conveyed by Catalina, a Political Science student, during the interview:

The fact that sustainability for me means changing my daily habits while for others, instead, climate change is more urgent, it is important for their lives. For example, the question of climate migrants that I had never thought of, being spoken in first person.

Having the exchange between two regions—Europe and the Southern Mediterranean—also highlighted the Global North and Global South divide and the differences in their ways of life. Hearing from real people in real time, living in situations far less privileged than theirs was particularly striking for those learners residing in Global North countries³¹, as articulated by one student from France in the post-VE survey:

I learned a lot of new information about climate injustice and got a clearer idea of how the people of the global south are living. I also think that listening to some of my fellow group members that are living in Third World countries or countries that are colonized by the global north like Palestine, talking about the conditions they're living in and the injustice they've been suffering from, contributed in changing my perspectives and understanding of climate change, because I put myself in their shoe, and felt very sad and guilty, for being able to have a safe life and not them, even though we're all human beings and deserve to have the same rights. (T.679)

³¹ The inferential theme “Global North–Global South divide among students sparked reflection on privilege” emerged in the reflection journals (n= 6), post-VE survey (n=6), and student interviews (n=2).

This quote encapsulates the impact of sharing *living* narratives of inequality and witnessing the location of a person's locus of enunciation. It also highlighted one of the inferential themes that emerged from the data—the occupation in Palestine. Being the largest group to have completed the VE, there was at least one Palestinian student present in each group. This experience, whether it was hearing from them or simply having them around, cast a strong impression on the learners, as emerging from all the data sources³². In one journal entry, a participant wrote:

However, it was sad that both our participants from Palestine were not able to join the session. They are always the ones having the most technical issues and hardest to understand. It is representative for the global society as Palestinian voices are also less heard globally.

This quote reflects how the narratives enriched their learning by connecting an abstract concept to a living experience.

The last dispositional theme under the affective domain—one that hindered rather than fostered TSL—is that concerning **differences in motivation and participation**, which made up only a small percentage of the themes overall (2%), but which was often mentioned during the interviews with the students (n=11), as seen in Figure 5.7. According to four of the five students interviewed, and present to a lesser degree in the reflection journals, not all learners were as eager to participate in the conversation, as articulated by Isla:

We were only five people, and not all the people wanted to talk. It was either me or the [nationality omitted] girl or the guy from [country name omitted]. The other two were not into participating. It became annoying sometimes because it was mostly just the three of us (. ...) they never wanted to switch on their camera, like the guy from [country omitted] only switched on his camera when the facilitator insisted—a lot. – Isla, Business Management student

One reason behind the lack of participation could have been the language barrier, which emerged in the reflection journals (n=16) and in the post-VE surveys as the second biggest challenge (n=17) participants faced. Despite the course being conducted in English, none of

³² The inferential theme “students were compelled by interactions with Palestinian peers” was present in the reflection journals (n=8), post-VE surveys (n=8), and student interviews (n=5); their group was the most cited of all the groups present in the VE.

the participating regions had English as an official language, and this made interaction challenging for some: *“Having discussions about complex topics in English. I think my English is quite okay, nevertheless I often had to force myself to take part in the discussion and express my opinion in English”* (Z.1057). In addition, according to the facilitators, learners had varying levels of English proficiency, and although the facilitators were helpful in translating and able to make learners feel comfortable with speaking, one indicated³³ that *“none–language seemed to be the factor determining the conversation [sic]. Those with better English were more active and confident. Some gave is a real effort [sic] despite the limitations of vocabulary [sic].”* However, in the same feedback form, majority of the facilitators said that the multiple levels of English language proficiency did not impact the group dynamics—despite participants reporting that this was their own challenge. This issue is widely reported in the COIL literature, where differences in language proficiency has been shown to affect interaction and collaboration among students.

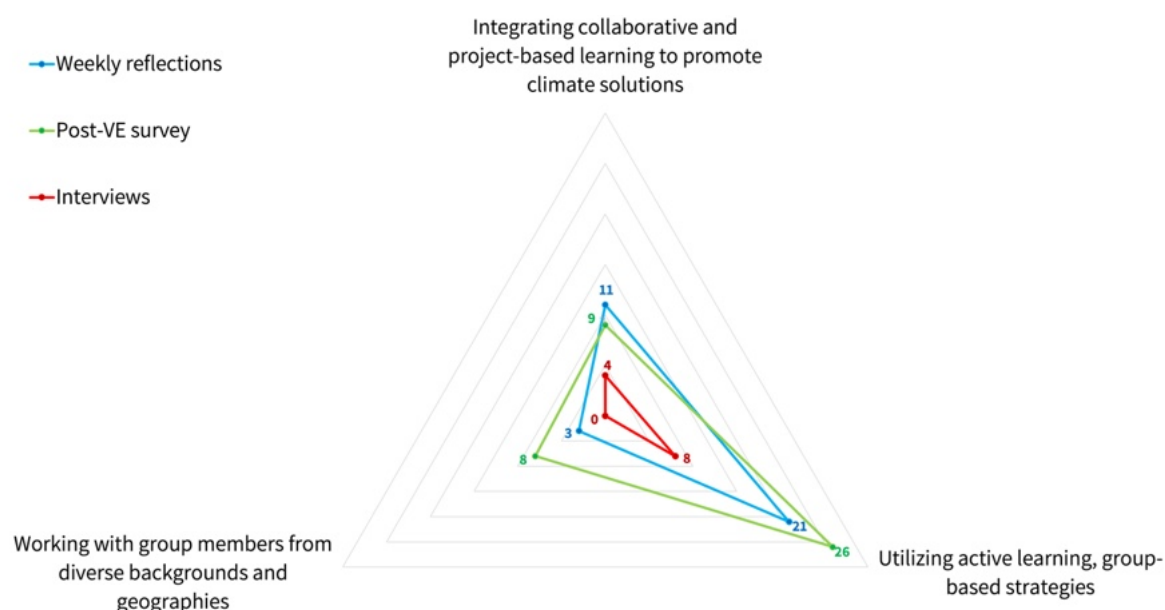
Overall, the VE fostered TSL in the participants’ affective domain more than it hindered, due to safe–enough, dialogic space that was created, which allowed critical dialogue and sharing of first–person, living narratives. However, this came with its share of challenges, such as misunderstandings and miscommunications as well as differences in motivation and participation that could have hindered the TSL potential of the course.

Hands: Enacting through project–based active learning

The *hands* dimension or behavioral domain refers to how knowledge and emotion or values are acted upon—the *how* of sustainability. Experiential, applied, and service learning, as well as opportunities for collaboration, are among the learning objectives in this dimension (Sipos et al., 2008). Participants’ hands were positively activated through project–based active learning approach of the course; in particular, this was done through the utilization of active learning, group–based strategies (8%) and the integration of collaborative, project–based

³³ The question in the facilitator final feedback form was: “Were there any patterns you noticed in terms of participants? For example, master student vs. undergrad, specific universities, etc.”

Figure 5.8 Frequency of the dispositional themes under the behavioral domain across all data sources



learning to promote climate solutions (3%). However, one challenge arose that could have hindered TSL, and that was working with group members from diverse backgrounds (2%). Figure 5.8 shows a comparison of the dispositional themes under the behavioral domain across all the data sources, whether or not they fostered TSL.

Based on the figure, the most striking of the pedagogical approaches under the behavioral domain was **utilizing active learning strategies**. Active learning “engages students in the process of learning through activities and/or discussion in class, as opposed to passively listening to an expert. It emphasizes higher-order thinking and often involves group work” (Freeman et al., 2014, p. 8413–8414). This dispositional theme does not include discussion but refers to all the other activities that aimed to engage the learners in interactive and reflective ways. The strength of this theme was consistent during the VE, immediately after, and even six months after with the student interviews. Looking back at Figure 5.4, these strategies were pointed out by the participants as even more effective than the CAP, and the students who were interviewed remarked on them more than the weekly resources. Active learning has shown to improve student performance and increase inclusivity in classrooms (Brame, 2016). While this dispositional theme could fall under the heart dimension as it fosters a creative and fun learning environment (Sipos et al., 2008), some of the active learning strategies used were actually directed towards climate justice, providing more nuance to their

climate-related actions. In their reflection journals, participants named several activities that greatly changed their understanding of and behavior towards sustainability and climate justice, as encapsulated by these representative quotes:

- **Share a childhood dream** – According to a participant (C.941) from Germany: “...in the Global North we have much ‘crazier’ dreams, because for us travelling and getting to know the world is a dream that is easily realised. For our colleagues from the Global South, however, this is not the case. So you can already see the injustice between these two worlds starting with our childhood dreams.”
- **The privilege walk** – According to a Tunisian participant (K.675), this activity “prompted deep reflection on several points, such as whether I would have the freedom to relocate if my country faced destruction, if I could rebuild my home if it were lost, and if I could readily transition to a fully sustainable lifestyle. These questions underscored the importance of considering privilege and access in discussions about climate change resilience and adaptation.”
- **Climate change responsibility roleplay** – One learner from Germany (G.774) said: “I think exercises like this help to widen our horizons and open our eyes to different perspectives and that is great.”

Another active learning activity that was particularly powerful involved participants thinking like climate polluters, as recounted by one Tunisian participant (O.225) in the post-VE survey:

She divided us into two groups and asked each team to think about arguments to defend two opposite viewpoints about capitalism. I was part of a team defending a viewpoint that I didn't really agree with. Due to my natural aversion to losing a debate, I worked hard with my team to think about the positive aspects of the topic. This experience has changed me a lot. the fact that at the moment I stepped out from the "the box" of my perspective and I put myself in the shoes of an opposite viewpoint made me realize that by focusing only on our own perspectives we can miss a lot of facts and truths.

While there were dull or boring moments reported in the reflection journals (n=4), these were few and far between. The icebreakers and other group activities were helpful in relationship-building, as explained in the previous section ([heart dimension](#)). Another pedagogical approach that appears to have fostered TSL in the behavioral domain was the opportunity for learners to **collaborate with others in a project aimed to promote climate**

solutions through their CAP, a collaborative project to be implemented locally. Within their groups, learners were divided into smaller groups to come up with a solution to a local climate issue—and try to implement that solution. According to the CAP Assignment Guide, students could choose from among the following tracks:

- **Social action** – affect people's behavior to be more sustainable
- **Political action** – influence people in power to take more sustainable decisions
- **Environmental action** – improve the environment directly by taking green and sustainable action

The assignment guide included examples of projects for each track and potential pieces of evidence for participants to show proof of accomplishment in their final presentations. According to the course syllabus, the deliverables under this requirement composed of the following: the climate action project plan, a progress report, a presentation to be shown during the final week, and a blog post. In some dialogue sessions, a few minutes were set aside for learners to work on their CAPs, but they were expected to find time outside of the dialogue sessions to work on them—no more than 40 hours outside of class time as indicated in the syllabus. According to the course instructors, while some of the CAPs were just social media campaigns, others tried to engage with actual, local communities—with some experiencing successes and others encountering challenges.

For example, in the interview, Itzia recounted how she and her group contacted their university to try and organize a world café centered on climate justice. Unfortunately, they were told that this would be too difficult to execute, causing them to change their project. Despite this hurdle, it still provided the participants with real-life challenges in implementing sustainability solutions. In another interview with Salim, he narrated how his group was able to push for differentiated trash bins at the university of one of their group members—despite them coming from different areas. According to one of the facilitators³⁴, one group was able to buy and sell reusable cups and the members expressed wanting to continue working on

³⁴ This was in response to the question: Are there any CAP teams in your group that submitted extremely high quality content and implemented successful projects that will continue or have continued impact after the course?

this project. Aside from implementing the CAP, participants were given the space for feedback-giving from their peers as well as reflection on their project—the process of brainstorming, development, and execution.

The integration of the CAP that addresses a specific need, augmented by opportunities for feedback-giving and reflection demonstrates the practice of both project-based learning and experiential learning. Project-based learning is a form of instruction where students collaborate to achieve a concrete solution or artifact that addresses a real problem (Kokotsaki et al., 2016). Experiential learning, or learning by doing, occurs when learners go through a cycle of abstract conceptualization, active experimentation, concrete experience, and reflective observation (Kolb, 1984; Morris, 2020). Despite being virtually “located,” some of the CAPs were local to at least one of the learners, making it representative of a concrete experience that is “highly contextualized, primary... that involves hands-on learner experience in uncontrived real-world situations” (Morris, 2020, p. 1070). After observing the context critically, learners, through the CAP, had to develop a solution in the form of a working hypothesis (their CAP project proposal) that underwent active experimentation (through the actual implementation of the CAP), which then became a new concrete experience that was subject to feedback and reflection after the presentation of the project—thus opening a new cycle. However, it should be noted that the design, development, and implementation of the CAP occurred within the span of six weeks—considered too short a period of time according to both learners and facilitators.

One disadvantage strikingly emerged from this CAP, which was **working with group members from diverse backgrounds and geographies** (2%). This dispositional theme refers to issues dealing with geographical differences that made collaboration challenging—particularly deciding on where to enact their CAPs and when to meet, as well as cultural differences, as articulated in one of the responses to the post-VE survey:

Another significant challenge arose from managing group dynamics within interdisciplinary teams. While collaborating with peers from different academic disciplines and cultural backgrounds was enriching, it also presented challenges in terms of balancing diverse viewpoints and approaches to problem-solving. (T.845)

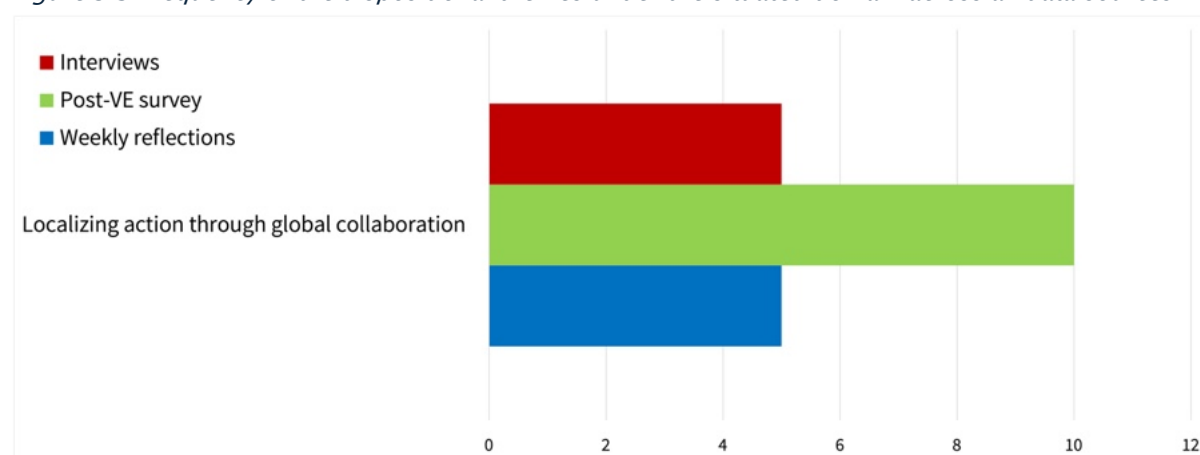
Only one participant specified the cultural differences in terms of communication style. The bigger issue was the geographical differences that participants said made working on a shared CAP difficult, from finding a common time for planning, to implementing the project in the same place despite most of them residing in different areas. Stephanie, one of the instructors of the course said that in the end, many of the CAPs became social media campaigns—and perhaps, this challenged, coupled with the condensed timeline for the CAP, could explain why there were less cases of on-the-ground implementation. Despite this relatively minor issue, overall, the VE was still able to foster TL for sustainability in the behavioral domain—albeit mildly—by prompting learners to act through active learning strategies and collaborative, project-based learning to promote climate solutions.

Feet: Localizing action while promoting global collaboration

Finally, the situated domain or the feet, refers to the *where* of sustainability-oriented action—echoing the idea of place-based sustainability. Although this is similar to the dispositional theme of collaborating with others to promote climate solutions under the previous (hands) domain, the focus of this theme is not so much on the collaboration and action through the CAP, but its implementation in a particular area (3%). Figure 5.9 shows the distribution of the theme in the reflection journals, post-VE surveys, and interviews.

Some of the inferential themes from which this dispositional theme emerged were “Most learners preferred working on a context familiar to them” or “the CAP was an opportunity for learners to familiarize themselves with their community”. For example, in the interview, Itzia mentioned that she only learned about her university’s sustainability office through the CAP. While there were some CAP projects that were done online such as social

Figure 5.9 Frequency of the dispositional themes under the situated domain across all data sources



campaigns and videos, there were also some that involved the locality of at least one of the participants, encouraging them to get in touch with members of their community. Based on feedback from facilitators, one group contacted a local bank, while another got in touch with their university. This also includes engaging with their immediate community outside of the CAP, which emerged during interviews with the students and in the responses to the post-VE survey³⁵, in which only those whose reported actions went beyond their family and friends were coded. One participant from Palestine (C.670) shared how her community continues to plant trees in their shared garden. Two of the students interviewed gave more concrete examples—through the VE, Carmen was able to come up with the theme of her master’s thesis, which merges linguistic translation with conceptualization and operationalization of climate justice and climate change in policy documents from the IPCC and her home country. Catalina shared that she has been looking for master’s degree courses related to political ecology and environmental politics after realizing the systemic and social nature of climate-related issues. In this sense, through the global collaboration espoused by the VE using the dialogues and the CAPs, some learners were inspired to apply these lessons and skills to their local contexts. In addition, by intentionally weaving in resources (Week 5: Climate Stories) coming from countries of their participants—as recounted by Stephanie and Bella, both of the instructors—the course was able to integrate the “local” aspect of a global problem.

Nevertheless, it is important to note that despite having no hindrance, this was the least-activated dimension (3%). Although place-based practices are not limited to those situated in a tangible, physical space and could thus include virtual environment, the VE aimed to represent various places rather than purposefully “[embed] the human in place” (Pisters et al., 2019, p. 4), and this could explain why it was not activated as much despite the CAP.

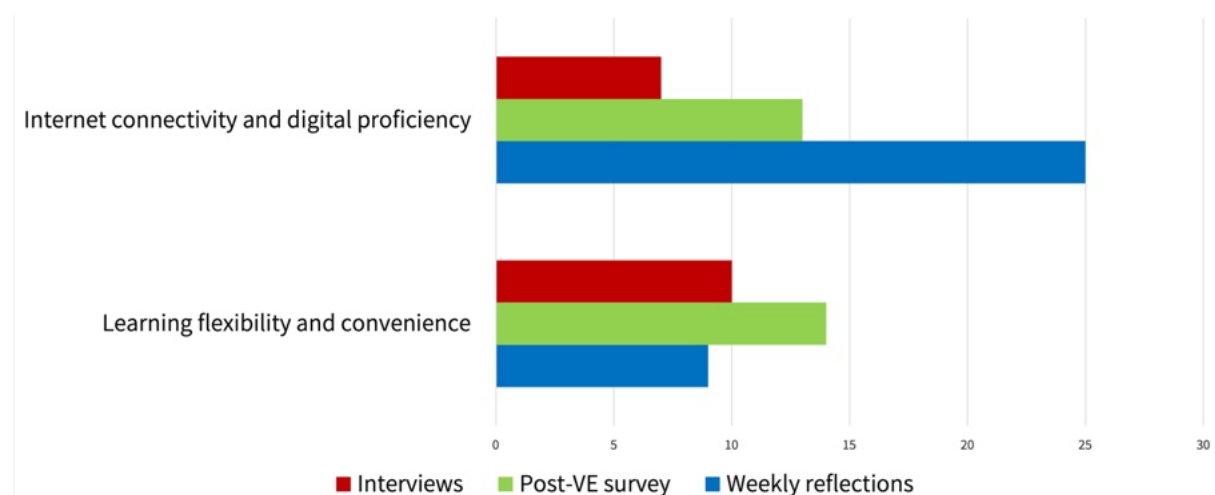
³⁵ Q7 from post-VE survey: How have you shared and/or applied what you’ve learned in the VE to your community? (How do you foresee yourself sharing and/or applying what you’ve learned in the VE to your community?)

Virtual learning conditions: Digital opportunities and divides

Being a form of online learning, the course came with opportunities and challenges endemic to the virtual space, which, in this case, concerned **learning flexibility and convenience** for the former and **internet connectivity and digital proficiency** for the latter. Figure 5.10 shows a comparison of the two themes under the situated domain across all the data sources. In all the data sources, participants expressed how the class being virtual allowed them to follow the class from anywhere in the world. This option of going through the learning resources at their own pace and time as well as following the class in their own space was seen as a strong point especially in the student interviews, where all of the participants expressed this advantage. Indeed, the interviewed participants live far away from their main campus and thus found the VE as a convenient yet effective way to learn. A number of responses in the post-VE survey shared the same sentiment, citing how the flexibility of the virtual format allowed them to balance their schedule with the demands of the course. Although this is an extreme example, as a response to what they liked most about the VE, one participant expressed how the virtual format was a way to sustain learning despite their challenging context:

I am having troubles in my university city because of the economic crisis that is affecting our societies, related to searching a home, spending money on public transports [sic] ... I really hate this situation so, I actually liked the fact that I had the opportunity to meet new people online, if only more programmes are organized in this way!

Figure 5.10 Frequency of the themes under virtual learning across all data sources



However, the underside to the flexibility of VL is the fact that **digital divides** still exist, as a number of participants expressed poor internet connectivity that affected their access as well as participation in the course. This is reflected in the reflection journal entries (n=25) where connection problems—difficulty connecting or poor/intermittent connection—were reported. To a lesser extent, some participants also articulated their lack of digital proficiency in managing the platform or in using the digital tools for their CAPs. These virtual conditions that allow for learning flexibility and convenience—while still regarding the existing digital divides in terms of connectivity and proficiency—may not be transformative in themselves but do expand the possibility for learning experiences like the VE that could be transformative. Without the virtual space, this would not have been possible.

Summary

Overall, 15 dispositional themes emerged from the data, which were organized according to five global themes: four themes representing the four dimensions of the TSL framework (head, hands, heart, and feet) and one centered on VL conditions. These were the pedagogical approaches or learning conditions that, according to students, either fostered or hindered TSL. This was based primarily on student interviews, the open-ended questions of the post-VE survey, the weekly reflection journals, and confirmed by other sources such as the interviews with instructors, facilitator responses from the feedback survey conducted by the VE team, as well as curricular documents such as the course syllabus and course plan. Answering the first research question, the course fostered TSL through instructional strategies such as the blended design of weekly resources and group discussions, supplemented by active learning strategies and the CAP, as well as pedagogical approaches and learning conditions that mainly activated the cognitive and affective domains—and to a smaller degree the behavioral and situated domains. The head dimension was activated through criticality in global dialogic spaces while the heart dimension was activated through the creation of safe-enough spaces for dialogue. The other two domains, behavioral and situated, were tapped into through project-based, active learning strategies and localized action via global collaboration, respectively. Table 5.3 presents a list of all the dispositional themes that emerged in Case 2, organized according to their dimensions, with their frequency in each of the QUAL data sources.

Table 5.3

List of dispositional themes for the dialogue-based VE, with frequency

Organizing theme	Dispositional theme The VE fostered/hindered TSL by...	Reflection journals	Post-VE surveys	Interviews
Head (Cognitive domain)	Promoting global citizenship through engagement with diverse perspectives and experiences	66	43	17
	Encouraging dialogic education through the exchange of knowledge and opinions among peers	40	33	12
	Expanding their knowledge of climate justice and structural inequalities	65	26	16
Heart (Affective domain)	Providing safe-enough spaces for dialogue and relationship-building	58	42	14
	Giving voice to first-person, living narratives	12	25	10
	Misunderstandings and miscommunications	19	6	0
	Differences in motivation and participation	4	1	11
Feet (Situated domain)	Engaging in a real project	60	2	5
Hands (Behavioral domain)	Utilization of active learning, group-based strategies	21	26	8
	Integration of collaborative, project-based learning	11	9	4
	Working with group members from diverse backgrounds	3	8	0
Virtual learning	Maximizing learning flexibility and convenience	9	14	10
	(Hindered due to) issues with internet connectivity and digital proficiency	25	13	7

RQ2: How does VE contribute to transforming sustainability paradigms?

As was done for the [Case 1](#), answering the second research question involves identifying the sustainability values, beliefs, and assumptions that were changed by the VE and mapping them using the revised TSL framework. Two questions in both the interviews and post-VE surveys asked participants about changes that occurred because of the VE. In

addition, the quantitative Greencomp section of the survey questionnaire asked participants to rate 30 sustainability-related statements from strongly disagree to strongly agree. Only one question (How does climate justice and sustainability rank among your priorities/key concerns today?) used a ten-point scale. Table 5.4 shows the items per data source to answer the second research questions.

Table 5.4

Data sources and items to answer RQ2 – Case Study 2

Data source	Student interviews	Post-VE survey questionnaire	
		Open-ended questions	Greencomp statements
Items	(Q5) Thinking back over your virtual exchange experience, was there a time when you realized that your values, beliefs, or expectations on climate justice had changed? Why do you think it had to change?	(Q1) Has your understanding of sustainability and climate justice changed? If yes, how?	30 statements adapted from the Greencomp competences, which were arranged according to the TSL framework • Head – 12 • Heart – 10 • Hands – 5 • Feet – 2
		(Q3) Besides the themes of climate justice and sustainability, what else do you feel you learned through CliveX?	

Experiential and inferential themes were generated for each of the QUAL data sources separately before combining them to consolidate a final list of inferential themes. These were then confirmed with the results of the descriptive statistics used to analyze the QUAN data from the questionnaire. It must be stressed that since the second research question has an exploratory rather than explanatory purpose (what rather than how), the findings presented do not include the causal mechanisms. In fact, the mechanisms behind the sustainability outcomes were already elaborated in response to the first research question. The results of the Greencomp section of the survey will be presented first before moving on to the outcomes mapped according to the TSL framework.

Greencomp survey results

As detailed in [Chapter 3: Research Design and Methodology](#), a section of the pre- and post-survey questionnaire was based on the Greencomp key sustainability competences. Together with two other researchers behind the parent study of the VE, the knowledge, skills,

Table 5.5*Pre and post-test results of the Greencomp section*

Item	Mean PRE	Mean POST	Mean Difference	P(T<=t) two-tail	Greencomp area	Greencomp competence	TSL
I am familiar with the concept of climate justice.	3,49	4,54	1,05	5,86058E-15	Embodying sustainability values	Valuing sustainability	Head
Climate change does not impact everyone the same way.	3,58	4,38	0,8	4,72907E-11	Embodying sustainability values	Supporting fairness	Head
I know how to work with diverse participants to create inclusive visions for a more sustainable future.	3,81	4,31	0,5	1,41763E-07	Acting for sus	Collective action	Hands
I can identify relevant social, political and economic stakeholders in my own community and region to address a sustainability problem.	3,46	4,02	0,56	3,74222E-07	Acting for sus	Political agency	Feet
The global north/Western countries/Europe has greater responsibility for climate change.	3,83	4,44	0,61	4,35997E-07	Acting for sus	Political agency	Head
The global north/Western countries/Europe should do more for climate justice.	4,14	4,54	0,4	8,74346E-06	Acting for sus	Political agency	Head
I can assess my own impact on nature.	3,57	3,97	0,4	8,74346E-06	Embodying sustainability values	Promoting nature	Heart
I feel the impact of climate change in my daily life.	3,57	4,02	0,45	1,81414E-05	Embodying sustainability values		Heart
I recognize my own emotions, desires, thoughts, behaviors, and personality when engaging in sustainability issues.	4	4,39	0,39	4,15072E-05	Acting for sus	Intrapersonal mindset	Heart
I am concerned about the short- and long- term impacts of personal actions on others and the planet.	4,21	4,51	0,3	8,47077E-05	Embracing complexity in sus	Systems thinking	Heart

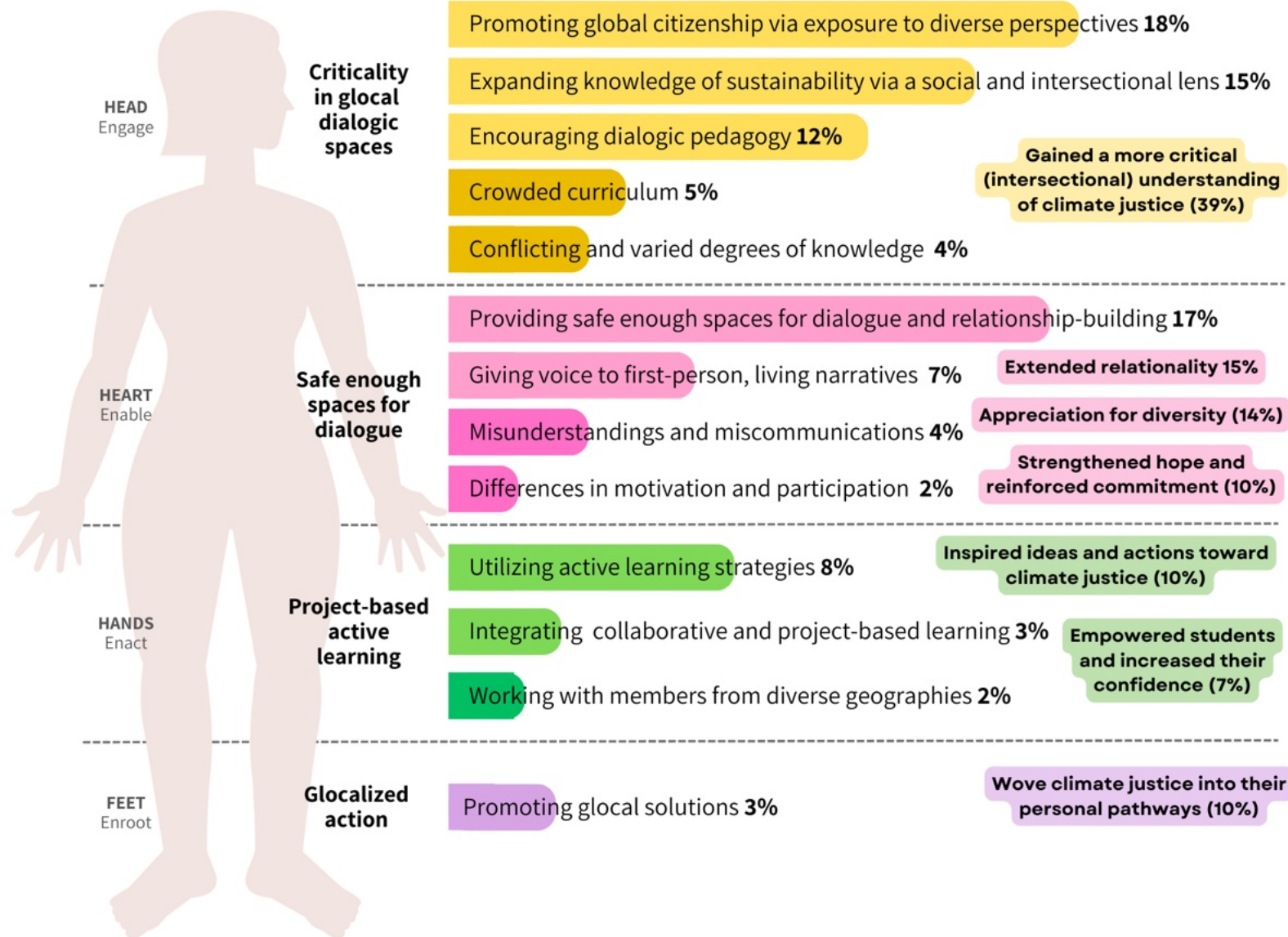
Collaborating with others to frame current and potential sustainability challenges is important.	4,39	4,7	0,31	0,001895498	Embracing complexity in sus	Problem framing	Hands
I am willing to engage with others to challenge the status quo.	4,13	4,45	0,32	0,002327975	Acting for sus	Collective action	Hands
I am willing to discontinue unsustainable practices and try alternative solutions.	4,13	4,45	0,32	0,002327975	Envisioning sustainability futures	Adaptability	Hands
Local circumstances should be considered when dealing with sustainability issues and opportunities.	4,15	4,41	0,26	0,002805378	Envisioning sustainability futures	Adaptability	Feet
I am confident about anticipating and influencing sustainable changes.	3,9	4,17	0,27	0,003324065	Acting for sustainability	Individual initiative	Heart
It is important to look at sustainability problems from different stakeholder perspectives to identify fair and inclusive actions.	4,31	4,53	0,22	0,00538273	Embracing complexity in sus	Problem framing	Head
I have experienced environmental inequality.	3,14	3,53	0,39	0,006368682	Embodying sustainability values	Supporting fairness	Heart
I am committed to respecting the interests of future generations.	4,32	4,53	0,21	0,008520603	Embodying sustainability values	Supporting fairness	Heart
A harmonious relationship between nature and humans is important.	4,54	4,78	0,24	0,010696611	Embodying sustainability values	Promoting nature	Head
Political accountability for unsustainable behaviour is essential.	4,21	4,48	0,27	0,020297229	Acting for sustainability	Political agency	Head
Thinking about the future of the planet makes me feel anxious.	4,05	4,29	0,24	0,066993333	Acting for sustainability	Intrapersonal mindset	Heart

It is important to consider sustainability challenges and opportunities from different angles.	4,37	4,53	0,16	0,09180307	Envisioning sustainability futures	Exploratory thinking	Head
I trust science even when lacking some knowledge required to fully understand scientific claims.	3,79	3,96	0,17	0,116508123	Embracing complexity in sus	Critical thinking	Head
Our wellbeing, health and security depend on the wellbeing of nature.	4,44	4,52	0,08	0,334482601	Embodying sustainability values	Promoting nature	Head
Gender equity is an important issue for me.	4,15	4,2	0,05	0,666834591	Embodying sustainability values	Supporting fairness	Head
I cannot anticipate how sustainability problems might evolve or occur over time (scenarios).	2,81	2,86	0,05	0,700870802	Envisioning sustainability futures	Futures literacy	Hands
Climate justice is not presently an essential issue for my well being.	2,1	2,14	0,04	0,747386591	Acting for sustainability	Intrapersonal mindset	Heart
Justice for current and future generations is related to protecting nature.	4,37	4,4	0,03	0,822892591	Embodying sustainability values	Supporting fairness	Head
There are more important issues than climate justice for future generations in my context.	2,56	2,56	0	1,000000000	Embodying sustainability values	Supporting fairness	Heart

and attitudes listed for each competence were adapted to suit the aims of the VE, resulting in 29 statements that reflect the learning objective of a Greencomp competence. Through an online survey questionnaire embedded in the LMS, students were encouraged to respond to the pre- and post-questionnaires, where a total of 100 students answered both. The results were analyzed using descriptive statistics, in particular via paired samples t-test in Excel. These were then mapped by the researcher according to the four dimensions of the revised TSL framework. In total, 12 statements targeted the cognitive domain (head), 10 for the affective (heart), five for the behavioral (hands), and two for the situated (feet). Table 5.5 shows the results of the pre- and post-tests for each of the 29 statements, showing their respective means, the mean difference, the p-value, and the corresponding Greencomp area, competence, and TSL dimension. The statements have been arranged according to the significance of the p-value and those statements whose p values marked in red are those that recorded a change significant enough to reject the null hypothesis (of having no change occur). Despite the unequal distribution of the competences—and thus representation of each TSL dimension—the findings show that the outcomes of the VE improved knowledge, skills, and attitudes in each dimension. Explanations of these statements will be integrated into the succeeding section, where the outcomes were arranged according to the TSL framework. Similar to what was done to demonstrate the findings in RQ1, Figure 5.11 maps the seven inferential themes that emerged from the three data sources according to the TSL framework. The size of the circles corresponds with the frequency of the dispositional theme relative to the rest. Through the VE, students gained a more critical and intersectional view of climate justice (39%)—the strongest outcome belonging in the cognitive domain. Sustainability paradigms were as equally transformed in the affective domain (39%), by extending relationality (39%). The domain that saw the second to the least outcomes was the behavioral domain; through the VE, students felt more empowered and confident (7%) and inspired in them ideas and actions to address climate injustice (10%).

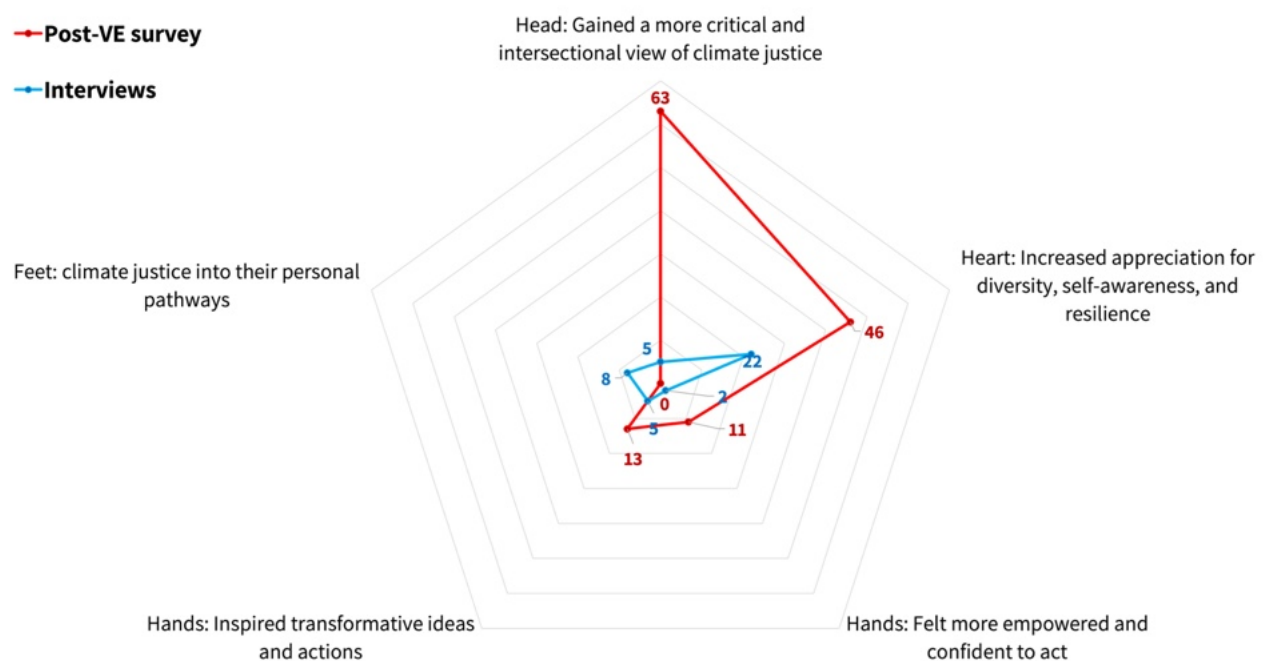
Lastly, participants reported the least changes in the situated domain, but it saw a change nonetheless through the weaving in of climate justice into some of the participants' personal pathways (5%). The strength of the outcomes corresponds with the pedagogical

Figure 5.11 Transformative outcomes of the VE based on the TSL framework – Case 2 (VE)



approaches and learning conditions observed per domain. It should be recalled that unlike the first research question that sought to uncover the causal mechanisms underlying the observed events—thereby necessitating the generation of dispositional themes—answering this question only means looking at the outcomes or the sustainability paradigms (knowledge, skills, attitudes, behaviors, values) that were transformed through the pedagogical approaches and learning conditions observed in the class. While the first question asked *how*, this research question asks *what*. The themes found in the figure are thus the inferential themes that were generated prior to their conversion into dispositional themes. In the subsequent sections, these seven themes will be explored according to the head-heart-hands-feet dimensions, weaving in the findings from both the qualitative (post-VE survey questionnaire and semi-structured interviews) and quantitative (Greencomp questionnaire) data sources. Figure 5.12 shows the frequency of the themes across the two qualitative data sources.

Figure 5.12 Frequency of themes across qualitative data sources – Case 2 (VE)



Head: Gained a more critical (intersectional) view of climate change

Before taking this course, my awareness of climate change stemmed largely from my biology degree. However, delving into the course material revealed to me the diverse ways in which climate change affects people worldwide. While I possessed scientific knowledge on the

subject, I lacked a deeper understanding of its human dimension. Climate change transcends mere scientific inquiry; it is a complex societal issue intricately intertwined with human experiences. **Thus, it became clear to me during the course that considering the lived experiences of individuals is crucial in addressing this multifaceted challenge.**

The response of a learner from France (C.684) encapsulates the change that occurred in the cognitive domain through the VE. Looking back to the literature on dialogic pedagogy, Wilhelmson (2006) posits three modes of perspective change that occur through dialogue: broadening within a perspective, shifting between perspectives, and the transcending of perspectives. Based on the findings, it could be claimed that the last mode of perspective change occurred, where participants' perspectives on climate justice were transformed to include layers of racism, discrimination, colonialism, as well as war and occupation. They were also able to see their understanding of climate justice *as* a perspective (Wilhelmson, 2006) rather than one applicable to all because of the contrasting realities that were represented—particularly the Global North and Global South divide, where the concept of privilege was discussed. For many participants, the VE was the first time they learned about climate change³⁶ and climate justice³⁷, even if they were already cognizant of environmental issues. This course not only introduced them to these concepts but also integrated underlying social concepts—whether they are causes or consequences of the crisis. For those with prior knowledge of climate change or climate justice, the course was able to add nuance to their exclusively environmental understanding through the social layers that were added. In fact, the responses evoked a greater sensitivity to the context underlying sustainability issues, and the need to look into this context when seeking solutions, as articulated by a participant from Germany (U.757):

I would say that my understanding of climate justice has changed a little bit. I am now more aware of the variety – meaning that the experience of climate change will not only differ according to geographic localisation and economic power of the country but [for example]

³⁶ From the experiential codes: Not aware of/vague idea of climate change = 6; no interest in climate change = 5

³⁷ From the experiential codes: Not aware of/vague idea of climate justice = 16

also on socioeconomic inequality, gender inequality, racism, discrimination of indigenous and many more. And so does climate action. I am more aware that the solutions and possibilities might be very different according to our overall situation.

The participant also added that the course increased their confidence as climate action being “*the right thing to do*”. All of the students who were interviewed (n=5) expressed the same idea of a more nuanced view of climate change. While only Carmen said that she had not known about climate justice before the course, all of them recounted that they initially understood climate change and/or climate justice solely from an environmental lens. Through the VE, they were able to explore the social aspects of the crisis. The following concepts were explicitly mentioned by respondents in the post-VE surveys in response to what had changed

Table 5.6

Changes under the cognitive domain, where $p = 0.05$

Question	Mean PRE	Mean POST	Mean Diff	P(T<=t) two-tail
I am familiar with the concept of climate justice.	3,49	4,54	1,05	5,86058E-15
Climate change does not impact everyone the same way.	3,58	4,38	0,8	4,72907E-11
The global north/Western countries/Europe has greater responsibility for climate change.	3,83	4,44	0,61	4,35997E-07
The global north/Western countries/Europe should do more for climate justice.	4,14	4,54	0,4	8,74346E-06
It is important to look at sustainability problems from different stakeholder perspectives to identify fair and inclusive actions.	4,31	4,53	0,22	0,00538273
A harmonious relationship between nature and humans is important.	4,54	4,78	0,24	0,010696611
Political accountability for unsustainable behaviour is essential.	4,21	4,48	0,27	0,020297229
It is important to consider sustainability challenges and opportunities from different angles.	4,37	4,53	0,16	0,09180307
I trust science even when lacking some knowledge required to fully understand scientific claims.	3,79	3,96	0,17	0,116508123
Our wellbeing, health and security depend on the wellbeing of nature.	4,44	4,52	0,08	0,334482601
Gender equity is an important issue for me.	4,15	4,2	0,05	0,666834591
Justice for current and future generations is related to protecting nature.	4,37	4,4	0,03	0,822892591

in their understanding of sustainability and climate justice, and all were coded under the umbrella term of critical/intersectional lens of this theme: gender (n=3); racism (n=2); colonialism (n=3); capitalism (n=3); inequality (n=5); social justice (n=7). This transformed view of climate justice focusing on structural inequalities can be confirmed by the findings of the QUAN survey (Table 5.6), where those statements that showed some of the most significant changes in this domain (highlighted in red) reflect notions of inequality, such as:

- Climate change does not impact everyone the same way
- The global north/Western countries/Europe has greater responsibility for climate change
- The global north/Western countries/Europe should do more for climate justice

In addition, these statements received among the lowest mean scores in the pre-test but also the highest for the post-test. In general, respondents became more familiar with the concept of climate justice, and of the 29 statements, “I am familiar with the concept of climate justice” recorded the most significant change. It should be noted that aside from the statement “I trust science even when lacking some knowledge required to fully understand scientific claims”, the statements that recorded no significant change had already ranked high in the pre-test.

In summary, participants’ sustainability knowledge and understanding (cognitive domain) were transformed by the integration of a more critical and intersectional view of sustainability and climate justice. From the findings, climate change moved from being a purely environmental issue for students to a social one. When the findings from the VE in the cognitive domain are viewed according to [Hoggan's \(2016\)](#) TL outcomes, participants experienced changes in the cognitive domain in terms of their worldview (new awareness/new understandings; ways of interpreting experience) and epistemology (more open).

Heart: Expanded relationality and self-awareness

It changed my general view of life in terms of feelings... this experience helped me to connect with my feelings and share them with others. – Carmen

If outcomes in the cognitive domain concern knowledge and understanding that are crucial to sustainability transformation, those in the affective domain deal with emotions and values that inspire could action. Carmen’s experience demonstrates how the VE became a

space for learners to explore their emotions. The affective domain saw a change equal to that in the cognitive domain, but with interviewed students speaking more profusely (n=22) about this—more than any other outcome. In fact, a review of Figure 5.12 shows that the frequency of the outcome in the affective domain surpassed all the others (head=5, feet=8, hands=7). This could also be due to how the questions were phrased, where, unlike in the post-VE survey where a question on sustainability and climate justice knowledge was explicitly asked, no particular attention was given to this in the interviews. Instead, the question was phrased to include any change, whether in knowledge, values, behaviors, or attitudes.

As a result of the pedagogical approaches and learning conditions used and created by the VE, learners were able to extend their relationality³⁸ by stretching their nexus of care, allowing empathy with distant realities and nurturing their sense of hope. All fall under the umbrella theme of expanded relationality and self-awareness because they deal with kinship and conviviality (Kan & Lejano, 2023; Lange, 2024). As one respondent put it, she was surprised by *“how fast strangers from all over the world can get frinends [sic] you looking forward to see every week”* (Z.1057). From the findings, this relationality seemed to have been enriched by the diversity of the groups. In response to the question “Besides the themes of climate justice and sustainability, what else do you feel you learned through CliveX” in the post-VE survey, a number of participants mentioned how it deepened their appreciation for diversity (n=19). For example, an Italian learner wrote that through the VE, she *“learned to listen carefully to other's experiences and opinions and to embrace different cultures from [hers], to LOVE differences”* (J.847). Some added that the diversity in the group interactions made them care more about what was going on outside of their context (n=7). For instance, one participant responded: *“Through engaging with participants from different regions, I've come to appreciate the nuanced challenges faced by diverse communities, especially in less*

³⁸ This dissertation adopts the definition of relationality put forward by Lejano (2019; 2023) as cited by Pormon & Lejano (2023), where relationality is an “analytical framework wherein the primary focus is on the relationships between an individual (or group) and other individuals (or groups) in a socio-ecosystem, and the system is understood not so much as a collection of objects but a web of relationships. These relationships, moreover, are heterogeneous, connecting human and nonhuman, animate as well as inanimate, things” (p. 2).

developed countries” (Z.1059). Another outcome of this diversity is this sense of solidarity that emerged. A learner from Lebanon wrote:

Futher [*sic*] things I have learned is to love unconditionally, especially that all of my peers are from different regions and cultures, despite all these differences, the atmosphere of the meeting was full of life, joy, and brotherhood... (R.959)

Another participant said: *“The fellow participants also shared a sense of helplessness... however, it is uplifting to have a sense of solidarity from other classmates”* (B.891). These outcomes show the power of dialogue and diverse narratives in deepening a sense of relationality—particularly that between humans—which, in turn, nurtures hope and resilience (Lejano, 2019). Extending relationality means widening the breadth of participants’ empathy to include those living in realities that might have otherwise been so far-removed from theirs. However, this theme did not emerge as strongly in the Greencomp survey questionnaires, perhaps because only two out of the ten statements under the affective domain focused on connection or relationships with others, namely “I am concerned about the short- and long-term impacts of personal actions on others and the planet” and “I am committed to respecting the interests of future generations.” Needless to say, these two statements still recorded a significant increase, as demonstrated by Table 5.7. The results of the Greencomp survey questionnaire reveal that the statements pertaining to the heart dimension that recorded the most significant increase (highlighted in red) were the following:

- I can assess my own impact on nature
- I feel the impact of climate change in my daily life
- I recognize my own emotions, desires, thoughts, behaviors, and personality when engaging in sustainability issues

This reveals self-awareness, which, in the sustainability literature, has been correlated with intrapersonal competence, either as a synonym or as a related competence (Brundiens et al., 2021; Jaakkola et al., 2022; Giangrande et al., 2019; Redman & Wiek, 2021). The study of Jaakkola et al., (2022) explored the literature on self-awareness in relation to TL and (intra-

personal) sustainability competence, and one of the five common themes³⁹ they found in the analyzed articles was “awareness of one’s emotions, desires, thoughts, values, assumptions, and behaviors” (p. 8), which is reflected in the three above statements. One other statement, “I have experienced environmental inequality,” showed a significant increase, that is, more respondents were able to perceive an experience of environmental inequality after completing the course. Greater self-awareness and relationality are within the realm of the affective domain because they compel desire to act through a sense of responsibility. Indeed, their

Table 5.7

Changes under the affective domain, where $p = 0.05$

Question	Mean PRE	Mean POST	Mean Diff	P(T<=t) two-tail
I can assess my own impact on nature.	3,57	3,97	0,4	8,74346E-06
I feel the impact of climate change in my daily life.	3,57	4,02	0,45	1,81414E-05
I recognize my own emotions, desires, thoughts, behaviors, and personality when engaging in sustainability issues.	4	4,39	0,39	4,15072E-05
I am concerned about the short- and long- term impacts of personal actions on others and the planet.	4,21	4,51	0,3	8,47077E-05
I am confident about anticipating and influencing sustainable changes.	3,9	4,17	0,27	0,003324065
I have experienced environmental inequality.	3,14	3,53	0,39	0,006368682
I am committed to respecting the interests of future generations.	4,32	4,53	0,21	0,008520603
Thinking about the future of the planet makes me feel anxious.	4,05	4,29	0,24	0,066993333
Climate justice is not presently an essential issue for my well being.	2,1	2,14	0,04	0,747386591
There are more important issues than climate justice for future generations in my context.	2,56	2,56	0	1,000000000

³⁹ The five themes were: (1) awareness of one’s emotions, desires, thoughts, values, assumptions, and behaviors; (2) emotional resilience; (3) awareness of one’s positionality; (4) awareness of one’s relation to others and compassion; and (5) reflection supporting motivation and willingness to act.

presence can spur TL. Although this emerged only slightly in the student interviews (n=2), two participants said that awareness of their unsustainable behaviors (such as leaving the lights switched on, not segregating waste, using single-use plastics) which was brought to light during the dialogue sessions helped them change their behavior. Although changes in sustainability-related behaviors will be discussed in the subsequent chapter, it could already be said that this extension of relations and heightened self-awareness could have spurred action in some of the participants, as articulated by Salim, a Management Engineering student, who realized that *“my small actions for the environment can make a lot of different changes, but what is needed is strict implementation and management.”*

A review of the categories of TL learning outcomes (Hoggan, 2016) show how the transformation experienced by the students reflect changes in their self (self-in-relation to others/world, empowerment/responsibility, and self-knowledge) and ontology (attributes: hopefulness). Being able to find hope through solidarity and to be nourished into resilience by a deep relationality could indeed be transformative.

Hands: Empowerment and inspiration for action

In terms of their behavior, outcomes among participants emerged in two ways: first, it inspired them towards sustainability actions and ideas and second, they felt more empowered and confident to engage with others coming out of the course. A number of participants said that they began making lifestyle changes through the VE:

Ever since this course started, I immediately started changing some unsustainable habits, like keeping my laptop turned on even though I'm not using it, buying clothes that I'm not going to wear for a long time. I even stopped considering the idea of buying a car in the future and became more than okay with public transportation. (G.679)

Attributing the dialogue sessions and—as Ayaan described it, “confrontations”—that occurred during the VE, where their unsustainable daily habits were discussed, some participants became *“more aware about these practices and very willing to change them”* (C.921). In conjunction with the dialogue sessions, the CAP also inspired more sustainability-oriented action among participants through the process of working together despite the challenges of online collaboration. Ayaan described how *“the [project] was forcing [them] to take action instead of keeping it as thoughts... even if it was little.”* In the post-VE survey, a participant

from Egypt wrote: *"I think (I learned) what a team work is. We were 4 girls from different countries, ages, mindsets and experiences and we made it work"* (L.758). Although these are not changes in their behavior per se, the course honed in them their capacity to collaborate with others on sustainability-oriented initiatives, which is an outcome under the behavioral domain. In fact, the VE was a place for participants to practice communicating in English and working in multicultural groups; at the end of the course, a number of participants (n=9) cited improvement in their English speaking skills and communicative competence, as articulated by one learner from Algeria:

First, I learned about other people's culture and situations. Second, it's not "learned" as it is "practiced" but I had the chance to develop my speaking skills. And third, it gave me more courage than ever and motivation to search for other programs and [subscribe] instead of letting my anxiety get me (A.852).

In addition, a Palestinian learner expressed how the course helped increase his **online** communicative competence:

I did advance my creativity skills, like keeping up with the discussion by sharing something and asking new questions that everyone enjoys listening to and answer. Therefore, my communication skills have advanced, as reading through someone's mind/facial expressions/body language online is much different than in person (V.987).

Table 5.8

Changes under the behavioral domain, where $p = 0.05$

Question	Mean PRE	Mean POST	Mean Diff	P(T<=t) two-tail
I know how to work with diverse participants to create inclusive visions for a more sustainable future.	3,81	4,31	0,5	1,41763E-07
Collaborating with others to frame current and potential sustainability challenges is important.	4,39	4,7	0,31	0,001895498
I am willing to engage with others to challenge the status quo.	4,13	4,45	0,32	0,002327975
I am willing to discontinue unsustainable practices and try alternative solutions.	4,13	4,45	0,32	0,002327975
I cannot anticipate how sustainability problems might evolve or occur over time (scenarios).	2,81	2,86	0,05	0,700870802

Evidence of these themes were also reflected in the quantitative findings (Table 5.8). The statements that recorded the most significant shifts (highlighted in red) were connected with collaboration for sustainable solutions. The only other statement referred to making lifestyle changes.

One noteworthy finding from a comparison of the data sources is how outcomes in the hands and feet dimensions differ per data source. In the interviews, the total frequency of both themes in the hands dimension ($n=7$) is still less than that in the feet dimension ($n=8$). However, place-based outcomes did not exhibit this same strength in the post-VE questionnaire. Only one participant from Palestine mentioned how the CAP tree-planting project was still being continued by her community even after the VE (C.670). A possible explanation could be how, despite the possibility to engage with others on a sustainability-oriented initiative through the CAP, according to the instructors, a significant number of the projects were online, social media awareness campaigns. This is not to say that online campaigns cannot be tied to a place, but the social media pages created by the students did not seem to be anchored on local initiatives or issues⁴⁰. Additionally, most of the groups were students from diverse regions or geographic areas, making the case for place-based approaches more challenging. Salim, who was based in Italy, mentioned that his CAP groupmates were all from different areas, and their project, despite having achieved results, was set in the university of one of his groupmates based in Egypt—a country in a continent he had never set foot in before. Although the CAP endowed in him—and in the other participants—the skills and confidence to engage in sustainability-oriented action, it did not enroot them to a particular location, context, or local initiative.

Looking back to Hoggan's TL outcomes (2016), changes under the hands dimension fall under the category of behavior, where participants were compelled to change their actions to establish coherence with a newly-acquired point of view.

⁴⁰ While the researcher had no access to their CAPs, this was inferred from interviews with instructors and the facilitator feedback form

Feet: Local sustainability action

Lastly, as previously mentioned, place-based outcomes emerged in the student interviews, where all five interviewees spoke about concrete lifestyle changes and three of them talked about making a more concerted effort to weave sustainability into their career path. Carmen, who studies linguistic translation, was inspired by the VE to use climate justice as translated and described in international policy documents as the core of her Master's thesis. She also recommended the VE to a friend, who had just registered to be part of the Fall edition. Catalina, a political science student, began looking into courses on environmental politics and political ecology. Inspired by the facilitator of his group, Salim signed up to become a facilitator and at the time of the interview, had just passed the first level of training. These actions from the students interviewed—months after course end—show the impact of the VE and how this was woven into their personal pathways. Based on the results from the quantitative survey (Table 5.9), both items under feet recorded a significant difference (highlighted in red). Although these items reflect skills and capacities in advocating for and enacting change (making it applicable in the hands dimension), because they are tied to engagement in a particular place—be it stakeholders in a community or local circumstances connected with sustainability issues—these outcomes were placed under the situated domain. However, actual community engagement because of the VE was not reported at all during the interviews and only once in the example of tree-planting in Palestine in the post-VE survey. The actions of the participants was still largely personal (career, dissertation, training), but they were still nonetheless embedded in their own context.

Table 5.9

Significant changes under the situated domain, where $p = 0.05$

Question	Mean PRE	Mean POST	Mean Diff	P(T<=t) two-tail
I can identify relevant social, political and economic stakeholders in my own community and region to address a sustainability problem.	3,46	4,02	0,56	3,74222E-07
Local circumstances should be considered when dealing with sustainability issues and opportunities.	4,15	4,41	0,26	0,002805378

Case 2 Summary

In summary, the VE, which was a dialogue-based VE between students from 14 universities across 13 countries was able to foster transformative learning for sustainability using pedagogical approaches and establishing learning conditions that activated students' heads, hands, hearts, and feet. An analysis of the data gathered shows that there were transformative seeds, yet the type of disorientation as described by Mezirow that is key to transformative learning, was not observed. Although there were reported moments of conflict and discomfort, there was not enough evidence in the data to prove that these resulted in a complete paradigm shift. What could be claimed, however, is that through the safe-enough spaces created by the facilitated dialogues, participants were able to probe into difficult, divisive topics from different perspectives—a first for some of them. This only demonstrates the potential of dialogic forms of pedagogy in engendering change. As in the first case, it goes without saying that the data collected are student self-reports, confirmed by instructor perceptions—a risk in data gathering methods such as interviews, surveys, and reflection journals. In addition, answering the second research with more concrete results would require a longitudinal study with more participants, and not just the handful who responded.

6. Cross–case analysis

This chapter presents a cross–case synthesis of the findings from the two VEs, with the aim of identifying and understanding their as a transformative pedagogy for sustainability. The chapter begins with an overview of the two cases and an explication of some differences in the data collection methods (which will be explained in greater detail in the [Critique of the research design](#)). This is followed by a comparison of the findings structured according to the two main research questions, where the thematic findings from the individual cases are compared and then synthesized into broader themes.

Overview

This multiple case study explored the potential of VE as a TSL pedagogy through two types of VE, a co–designed comparative COIL between a university in Finland and in the Philippines (Case 1), and a ready–made dialogue–based VE between 14 partner universities (Case 2). Specifically, the objective of this research was to understand the transformative potential of VE for sustainability by identifying the pedagogical approaches and learning conditions that foster/hinder TSL and understanding which sustainability knowledge, values, skills, attitudes, and behaviors (encapsulated as paradigms) are transformed through the VE. The research undertook a concurrent M/M design, where qualitative methods were mainly used but supplemented by quantitative data that were gathered simultaneously. In addition, the multiple case study followed a holistic design, where each case was its own complete unit. As previously articulated in [Chapter 3: Research Design and Methodology](#), one of the issues that would most likely impact the potency of this cross–case analysis is the difference in available data collection methods per case. Nevertheless, the aim of this research was not to compare each VE but to understand their transformative potential in general. The fact that the two cases represent two types of VEs, one being comparative and the other being dialogue–based, could further prove this point. Furthermore, as part of retrodictive analysis in CR–oriented research, a cross–case analysis would be fitting, as it mirrors the empirical collaboration necessary in investigating the relationship between the phenomena and their underlying activating conditions. Thus, viewing the mechanisms in both cases would aide in providing vertical explanations of the recorded phenomena.

RQ1: How does VE foster TL for sustainability?

To answer this research question, the dispositional themes in each case were organized according to the revised TSL framework to understand how the VE activated the different domains necessary for TSL. Table 6.1 presents a comparison of the different themes that emerged according to the four TSL dimensions, with the last focusing on the opportunities/hindrances in VL.

Head: Criticality and diversity to enrich learning

Both cases differed in their general pedagogical approach—while Case 1 employed a case-based approach for the VE, where the syllabus was designed according to an actual case based on a sustainability problem that learners had to analyze, Case 2 practiced dialogic learning, where the syllabus was designed based on themes that would become the central point of dialogue among learners. Although both deconstructed the complexity of environmental issues, the first case did so in terms of depth, by identifying the connections (nodes) within a system where that environmental issue manifests itself, as well as its underlying patterns and mental models, while the second case did so in terms of breadth, by exploring its intersections with social issues that either cause or are exacerbated by it.

For example, the sachet economy in the Philippines, which is very much tied to plastic pollution, was one of the real-life situations featured as a case study in Case 1. The discussion prompts probed into the underlying issues of problem, for instance:

- What is the root cause of the plastic pollution problem? Is it a technology issue? Is it a collection issue? Is there a more fundamental problem?
- Who are the players within this system?
- Does the problem lie with the consumer, the waste manager, the manufacturer, or the government?

This kind of questioning applied not only to one case, but to all cases, where root causes, stakeholders, possible solutions, critiques of those solutions, etc., were discussed. Malaya, a student from Uni P talked about how this approach helped her gain a more comprehensive understanding of a sustainability problem:

Table 6.1

Cross-case analysis of dispositional themes, with new dispositional theme

TSL Dimension	Dispositional themes		New theme
	Case 1 (COIL)	Case 2 (Dialogue-based VE)	
Head	Criticality in virtual third spaces	Criticality in glocal dialogic spaces	Criticality and diversity to enrich learning
	Exposing students to diverse perspectives and practices (24%)	Promoting global citizenship via exposure to diverse perspectives (18%)	Leveraging diversity for trans-perspectival learning
	Using a critical (systemic) lens (8%)	Using a critical (intersectional) lens (15%)	Using a critical lens to explore complex issues
	Foregrounding real-life cases and practices (6%)	Encouraging dialogic pedagogy (12%)	Using student-centered teaching approaches
		<i>Crowded curriculum (5%)</i>	
		<i>Conflicting and varied degrees of knowledge (4%)</i>	
Heart	Safe spaces for social learning	Safe-enough spaces for dialogue	Safe spaces for learner interaction
	Providing safe spaces for social learning (11%)	Providing safe-enough spaces for dialogue and relationship-building (17%)	Creating safe-enough spaces for dialogue
	Giving voice to first-person, living narratives (9%)	Giving voice to first-person, living narratives (7%)	Giving voice to first-person, living narratives
	<i>Differences in schedule and participation (7%)</i>	<i>Differences in motivation and participation (2%)</i>	<i>Partners with varying objectives and commitments</i>
	<i>Transactional interactions (6%)</i>	<i>Misunderstandings and miscommunications (4%)</i>	
Hands	Sustainability in practice	Project-based active learning	Developing sustainability competence
	Integrating practical skills (3%)	Utilizing active learning strategies (8%)	Integrating practical skills through active learning
		Integrating collaborative and project-based learning (3%)	
		Working with group members from diverse backgrounds and geographies (2%)	
Feet	Embedded practices	Glocalized action	Embedding in a place
	Maintaining coherence with university culture (17%)	Promoting glocal solutions (3%)	Instilling place-based sensitivity
	Instilling a place-based sensitivity (7%)		
Virtual learning	Leveraging opportunities for learner autonomy	Learning flexibility and convenience	Leveraging virtual learning for increased access to education
	Extending the learning environment		
	Issues related to access, adoption, and quality	Issues with connectivity and digital proficiency	Existing digital divides affecting learning

For example, how to properly dissect these issues. Like the one our profs taught, the iceberg framework... looking at stuff into [sic] a deeper level. So yeah, also maybe how behaviour is, how mental models are important when it comes to sustainability. So it's like the bottom line. Meanwhile, in the fourth week of Case 2, where the main theme was power and climate action, varying topics were introduced, such as the stakeholders of climate change, the history of big oil companies and carbon footprint measurement, the history (and failure) of climate agreements, the impact of corporations on climate action, youth activists in the Middle East, and other examples of global climate action. These topics all touched upon the theme of power but without going too deeply. In fact, this was brought up by a few participants, both as a strength and weakness of the course. On one hand, some noted how the different topics helped them see climate justice from angles they had never considered before, such as gender discrimination and racism. On the other hand, others said that it could have been better to lessen the number of topics so they could go more deeply into them, as expressed by Carmen during the interview:

Some topics were really good, but it felt like we were jumping. Maybe it's better to have more time to discuss, especially since there were some sessions where it was just me and two others talking but not much came out because the topic didn't interest us and the others were just quiet.

For Case 1, one of the critiques regarding the depth was the fact that there was an imbalance in the number of students (one had more than the other) and that there was not enough time to probe as much as they would have wanted. Nonetheless, the approach taken by each of the VEs to explore sustainability seemed to have been determined by the expertise of the instructors and the diversity of learner context. Case 1, with the instructors who were subject matter experts and with two contexts being represented could easily go deeply into a case, while Case 2 could take a wider due to the multiplicity of perspectives present.

Still on the topic of diversity, it was wielded to provide contrasting perspectives and experiences that would enhance the exploration of the concept of sustainability, as represented by the theme **leveraging diversity for trans-perspectival learning**. Despite the cases having two starkly different set-ups, the first being an exchange between only two partners and the second bringing in 14 partner universities, they both had a rich variety of students in terms of age, academic level, discipline, space/place, and culture. Participants

from both VEs pointed out this learning condition as being the most effective in engaging them cognitively, as it allowed them to see how themes tied to sustainability (such as integral ecology and climate justice) are conceptualized and operationalized in diverse contexts.

I like the discussions in the class, where everyone respects the point of view of the other, even when they don't agree. The topics that we read pre-session and discuss during the session are very interesting. What I like about this course the most is the fact that there is no "right" and "wrong", and that we get to reflect on what we read through expressing our own thoughts about it. Me personally, some classmates were able to convince me about certain stances in climate justice issues in many occasions through the discussions. These discussions, along with the ice-breaking activities strengthen the bond between us. (C.921)

However, simply knowing did not suffice—the VE also explored how and why they differed in these contexts through **a critical lens to explore complex issues using student-centered teaching approach**. As explained prior, the direction of this complexity and the approach used differed for each case. Case 1 sought to understand environmental issues through a more systemic lens using a case-based approach while Case 2 used a more intersectional one which was enriched by the dialogue sessions. This critical approach to understanding environmental issues by their deconstruction into the "institutions, forms of knowledge, practices, imaginaries, power structures, and human-non-human relations" (Feola et al., 2021, p. 2) that perpetuate them is key in sustainability transformation. This criticality that begins with environmental dilemmas but extends into the social realm reflects the deepening levels of knowing that Sterling (2010) posits are necessary for TL and the regenerative sustainability paradigm that looks into causes and not just symptoms. It also recalls Vare & Scott's (2007) ESD 2 approach where sustainability concepts and issues undergo continuous critical scrutiny to explore possible contradictions. In addition, both VEs were able to bring about this criticality in a way that was different in its strategy—either through cases or dialogues—but similar in its approach, where learners take centerstage. Indeed, the instructors for both cases were there to provide the necessary background knowledge, materials, and skills for the learners to work together. The larger part of class time was dedicated to learners engaging with each other. Regardless of the differing approaches and foci, the VEs, through their diversity and criticality, were able to imbibe the idea that

sustainability, despite being an urgent global issue, needs to be viewed contextually and systemically.

Heart: Safe spaces for learner interaction

This global theme reflects how VEs are safe spaces conducive to interaction and exchange among learners and how they also give voice to first-person, living narratives—the latter being something somewhat endemic to VE. For the former, this theme illustrates how interaction among learners—whether conversations or dialogues—is the focal point of VE, thereby taking on a more student-centered approach to learning. VEs are therefore safe spaces where learners can interact, whether anchored by a case to be analyzed or a topic to be discussed. The role of instructors is to facilitate learner interaction by equipping them with the necessary knowledge and skills and by providing a space conducive for exchange. Such a space has been described in the field of TL as either safe or safe-enough (Pereira et al., 2020; Singer-Brodowski et al., 2022).

A space described as safe allows learners to share within an atmosphere of respect, openness, and trust—however, there is hesitation to stir the pot when confronted with dissonant ideas or opinions. Glimäng (2022) connected this conceptualization of a safe space with Hauck and Helm's (2020) hegemonic classification of VEs, which is characterized by harmony and compromise in favor of knowledge acquisition and task completion. The COIL could be described in this way, as participants described how the learning environment allowed them to share knowledge and collaborate with their colleagues. Using the case as a fulcrum, they were able to talk about the case, which is usually a sustainability problem, from their diverse contexts and probe into the underlying reasons. For instance, during one class that centered on sustainable food systems and food waste, students were encouraged to discuss this issue in their breakout rooms, identify similarities and differences, and use the iceberg model to better understand it. Students were comfortable enough to talk to each other, share, and ask “What about in Finland? What about in the Philippines”, as noted by Amihan and Bea, from Uni P and Uni F, respectively. However, rather than talk about food waste using a wider, global lens—why there are excessive amounts of food waste in one country while another experiences hunger on an alarming scale—students were focused on comparing between local or national contexts, rather than interrogating the global divides

that could be a cause of this disparity. In addition, based on the data gathered, there was no recorded conflict or disagreement—which normally would be regarded positively—however, using the lens of transformative learning, especially when dealing with complex issues such as sustainability and climate change, transformation is contingent upon the disruption of a problematic frame of reference that is then compelled to transform (Grund et al., 2024; Lange, 2012; Mälkki, 2019). This is why safe spaces, while they can enrich interactions, are not enough to prompt transformative learning (Glimäng, 2022; Pereira et al., 2020; Singer–Brodowski et al., 2022).

On the other end of the spectrum are safe-enough (Pereira et al., 2020; Singer–Brodowski et al., 2022), brave, non-hegemonic spaces (Glimäng, 2022; Hauck & Helm, 2020), where criticality is considered central to learning and where learners are encouraged to challenge each other, engage with potentially divisive topics, and scrutinize their own paradigms. They are considered safe because in such spaces, learners are still free to interact, share, and discuss in an atmosphere of respect and openness, but the *safe-enough* means that in these spaces, there is also no hesitation to deal with “unpleasant” learning situations such as questioning, critique, or disagreement (Glimäng, 2022; Singer–Brodowski et al., 2022), as well as with the feelings of discomfort or disorientation—edge emotions—that emerge as a result of the disruption of long-held, deep-seated values, attitudes, and worldviews (Mälkki, 2019). In safe-enough spaces, instructors guide the students through these uncomfortable learning situations and emotions as they are the seeds of TL (Singer–Brodowski et al., 2022). Citing Hauck and Helm (2020), Glimäng identifies five characteristics⁴¹ of non-hegemonic, brave spaces in VE practice, the fifth being “aiming to challenge and transform participants through VE interaction” (2022, p. 65). In Case 2, where some participants reported having to deal with disagreements in their group—not in terms of teamwork or collaboration but paradigm differences—typifies this safe-enough space:

⁴¹ According to Glimäng, non-hegemonic, brave forms of VE involve “(1) listening and learning as reciprocal processes, (2) creating possibilities for un/relearning, (3) making participants’ locus of enunciation matter, (4) disrupting monolithic worldviews to ‘relocalize the global’, and (5) aiming to challenge and transform participants through VE interaction” (2022, p. 65).

This week's meeting felt more engaging, with everyone actively participating and even sparking some debates. It was great to see diverse opinions being shared on climate change. While I tend to be more pessimistic about our prospects, hearing different viewpoints was enlightening, even if I didn't always agree. We also discussed the women's roles in society, and I confess I was a bit taken aback by some conservative perspectives on this issue. (G.732)

However, this was only observed in some groups, based on an analysis of the reflection journals by group. In addition, because the topics changed weekly, there was not enough space and time to talk more deeply about contentious issues. Indeed, from the reflection journals, divergences that occurred in the dialogues were not followed up or echoed the following week.

As will be discussed more deeply in [Chapter 7 \(Discussion\)](#), the creation of safe-enough spaces for meaningful, transformative dialogue requires preparation and time to build an atmosphere of trust and support (Singer-Brodowski et al., 2022). Time is also necessary not to just poke at the surface but to penetrate and nurture seeds of transformation. Aside from that, it also demands careful consideration of the necessity of such a space, as they can bring about feelings of discomfort and disorientation. While the researcher agrees with the characterization of spaces as safe and safe-enough spaces occurring within a spectrum, a VE being described as “safe” does not necessarily equate to it being hegemonic. However, only safe-enough spaces have the potential for TL.

Still within the heart dimension, another theme that emerged from both cases that touched upon students' emotions and convictions towards sustainability—the *why* of their knowledge and behaviors—is how VE **gives voice to first-person, living narratives**. This concept of *living* narratives manifested itself in two ways—firstly, learners were able to meet peers from cultures or locations they had never been to or considered prior. Meeting *actual* people extended the reach of their awareness and made the place “more real” to them, as expressed by Malaya, a student from Uni P:

Learning directly from their personal experiences, like from our counterpart. If it's something that we did, for example, studying it remotely on our own, it's just gonna be the general concepts or situations, but learning from them directly, it's more personal and we see how it works like in their daily lives.

Secondly, most learners were able to speak about their locus of enunciation from its location, *in situ*. This was especially poignant in Case 2, where learners were exposed to the realities of the lives of their peers, particularly those living under occupation in Palestine:

It was sad that both our participants from Palestine were not able to join the session. They are always the ones having the most technical issues and hardest to understand. It is representative for the global society as Palestinian voices are also less heard globally. (I.515)

This second aspect is made possible through digital technology; people are able to see and hear each other despite being in different locations. In VEs, learners can hear about each other's contexts *while* in their context. The fifth week on personal climate stories had learners not only listen to the climate narratives of those featured but also share their own—how climate change affects them personally, as well as their community. In fact, according to Stephanie, one of the instructors of the second case, prior to the CAP, as a final project in previous VEs, they originally asked learners to engage with someone from their locality and record this interaction for their peers to see and react to—demonstrating the importance of bringing in the learner's immediate community to the conversation.

Despite these learning conditions and pedagogical approaches in VEs that enable TSL, the **varying objectives and commitments among partners** also hinder it. This affected student participation and engagement, as evidenced by the high attrition rate in both VEs. The reasons per case seem to vary. For the COIL (Case 1), the number of students from Uni F who dropped out could be attributed to the novel format—according to the Uni F instructor, students are used to following their courses asynchronously; in fact, they had to specify the synchronous sessions in the course information on both the website and syllabus. In the dialogue-based VE (Case 2), basing on age ranges, course completion surpassed course dropout only for those students between the ages of 18 and 21. There were more student dropouts than completers for those aged 22–25 and 26–30. Seventy-two percent of the PhD students who enrolled dropped out, which was only 45% for BA and MA students. According to the course organizers, the course was not designed with PhD students in mind, and so this could explain why only a few stayed on. Plus, a huge concentration (75%) of those who did not complete the course came mostly from three universities, which could reflect a problem of implementation within the partner institutions. Another issue under this theme that shows

how VEs could hinder TSL concerns the varying objectives of students that manifested in both cases. For the COIL, students who did not complete the course might have been expecting a typical asynchronous course; hence, their objective was not the COIL but its content. For the dialogue-based VE, some participants, whether they completed or not, enrolled not so much to learn about climate justice but to practice their English language skills. Although this theme falls under the affective domain, as it pertains to student commitment and motivation—or lack thereof, this could also be applicable to the cognitive domain, as the material and approach should match the needs and profiles of learners. What could be gleaned is the importance of providing clear information and managing learner expectations even at the start of the course.

Hands: Developing sustainability competence

From the two cases, VEs could foster TL for sustainability in the behavioral domain by developing KSCs through active learning strategies. Although Case 2 activated the hands dimension more strongly than Case 1, the integration of practical skills to better view or respond to sustainability issues was present in both. When viewed using the Greencomp framework, the dialogue-based VE (Case 2) focused on the Greencomp competence area of acting for sustainability through the development interpersonal and implementation competences such as collective action and individual initiative. It used a wide range of active learning strategies selected and conducted by the facilitator, as well as project-based, collaborative learning through the CAP. The COIL (Case 1) centered more on the Greencomp competence area of embracing complexity in each of the cases by developing primarily critical thinking, systems thinking, and problem framing competences among the participants. Although there was less opportunity for group dynamics, the case-based approach was still able to engage students actively. With this, VEs, despite lacking the hands-on, concrete experience that comes with in-person classes, are still able to inculcate in students competences that are considered necessary in ESD/EsF. This theme reflects the importance of honing skills in learners to behave towards sustainability. Skills development could be an important mechanism to TL in SE as it translates knowledge and values into realistic actions that can be measured and evaluated. They also provide visible projections of an individual's beliefs toward sustainability.

Feet: Embedding in a place

Lastly, VEs foster TL for sustainability in the situated or place-based domain by having students speak about their local contexts, thereby **instilling a place-based sensitivity**. This was present in the case-based approach adopted by Case 1, where participants focused on issues in the Finnish and Filipino setting; while in Case 2, this manifested in the learning resources that delved into issues affecting the countries of the partner universities and the CAP. Although only a few projects in the second case were successful in engaging with at least one of the student's local communities, this sensitivity to their immediate environment was nonetheless honed through the VE. For the COIL, this manifested in how the students connected what they learned to their university environment, with participants from Uni P talking about how the course on integral ecology was an extension of what they had already been seeing at their university, thereby demonstrating the effectiveness of whole-institution approaches to sustainability transformation.

It should be noted, however, that this connection with their university environment did not emerge in the COIL, perhaps because the researcher had the possibility to engage only with participants from one university. Nevertheless, when these same participants were asked about how conducive a space their university is for sustainability, they were unable to respond with certainty. Four out of the five students interviewed said that they were not cognizant of their university's sustainability efforts, with one even saying that she had not heard of the university's sustainability office up until she reached out to them for their CAP. Despite the limitation of a virtual setting, VEs could still enroot students to a place by prompting students to begin thinking about their locality—a common factor between both VE cases.

Virtual learning conditions

Lastly, conditions that are autochthonous to VL (or digital technologies) could either increase or decrease the potential of VEs for TSL. Although these are outside of the pedagogical approaches and learning conditions that are within the control of course instructors, these conditions should be considered as they affect the learning experience. An advantage in VL that emerged from both cases is how it increases access to education, and this pertains to how digital technologies allow online distance learning and how they bring in more voices—whether experts or peers—to “enter” the classroom. For the COIL, students from

Uni F talked about being able to manage their work or follow courses despite living far from campus, thanks to courses facilitated by digital technologies. This same advantage was expressed by the interviewed students from the dialogue-based VE, who spoke about the convenience of being able to take the course online. Another aspect under access to education is how digital technology provides access to educational resources—whether they are videos, articles, or resource persons. The dialogue-based VE is a good example of this, where the weekly learning materials were a mix of online resources such as articles and videos. Nonetheless, one of the issues with digital technologies that could detract from the effectiveness of VEs is the existing digital divide, where learners have varying access and proficiency. This was evident in both cases, where a number of students could not keep their video cameras switched on for long periods of time. The positive aspects of VL conditions may not be transformative in themselves, but they do facilitate these possibilities in an online space. As will be expounded in [Chapter 7: Discussion](#), having a structure to facilitate learning could be among the mechanisms that could trigger TL for SE.

Summary

From a cross-case analysis, VEs can foster TSL in all the dimensions but in varying degrees and means. Firstly, learners are cognitively engaged through the presence of diverse peers, be it in age, culture, academic background, or discipline, that promotes trans-perspectival learning; through the use of a critical lens that allows them to explore complex issues, whether by looking into its systems or intersections; and through student-centered teaching approaches where learners take the reins. Second, VE enables learner affect and motivation towards sustainability through safe-enough spaces for dialogue and the inclusion of first-person, living narratives. Third, TSL is activated in the behavioral domain through the development of KSCs and the integration of practical skills through active learning strategies. And lastly, VE fosters TSL in the situated domain by embedding learners in a place and instilling in them a place-based sensitivity. One learning condition found in both cases that might have hampered the impact of the VE is the varying objectives and commitments among partners. Since VEs are facilitated by digital technologies, conditions exclusive to the virtual space are also considered, such as the increased access to education that such technologies provide, but also the existing digital divides that affect this access.

RQ2: How does VE contribute to transforming students' sustainability paradigms?

While the first research question looked into the pedagogical approaches and learning conditions of virtual exchanges that could foster TL for sustainability—hence the elements in a learning environment that could enable the process of transformation—the second research question explores what was transformed—which worldviews, values, attitudes, or behaviors were transformed through VE. For the second research question, the inferential themes that represent the VE outcomes were organized according to the revised TSL framework, as shown in Table 6.2.

Head: Gained a more nuanced understanding of sustainability

For both cases, learners gained a more nuanced understanding of sustainability in different ways. Students from Case 1 talked about how the case-based, systems-thinking approach helped them see the complexity and multidimensionality—environmental, social, and economic—of sustainability issues. Another nuance that emerged that could be attributed to the coherence of the course with the university culture is the emotional and spiritual dimension of sustainability, noted by two students from Uni P. Although this did not emerge in Uni F and was not significant enough a theme for Case 2, this spiritual or religious dimension of climate justice was mentioned by some of the Muslim students who participated in Case 2. While there were only two instances where it was mentioned as an outcome, it did emerge in the reflection journals, especially since the VE occurred during Ramadan and included a resource connecting the Islamic faith and the fight for environmental justice. Ayaan, for example, highlighted this aspect:

Sometimes it happens that you know something but you [aren't] really aware of [it], how the Muslims are, maybe, have the basic knowledge to preserve the natural resources. There was a wisdom they were saying—we know it but we didn't remember it or implement it that much—that even at the end of the life, if you have a tree to plant, you have to plant it.

The course was able to connect his faith with climate justice and help him “relearn things” he already knew but just did not put into action. For Case 1, students from Uni P talked about this spirituality in the way the course was coherent with the university's push to practice

Table 6.2

Cross-case analysis of inferential themes, with new themes

TSL Dimension	Inferential themes		New theme
	Case 1 (COIL)	Case 2 (Dialogue-based VE)	
Head	Gained a more nuanced understanding of sustainability (complex, multidimensional, emotional, spiritual) (41%)	Gained a more critical (intersectional) understanding of climate justice (39%)	Gained a more nuanced understanding of sustainability
Heart	Discovered companions in sustainability (41%)	Extended relationality (15%)	Increased hope through extended (human) relationality
		Appreciation for diversity (14%)	
		Strengthened hope and reinforced commitment (10%)	
Hands	Inspired transformative ideas and actions (18%)	Inspired ideas and actions towards climate justice (10%)	Inspired ideas and actions for sustainability
		Empowered students and increased their confidence (7%)	
Feet	---	Wove climate justice into their personal pathways (5%)	Wove sustainability into their personal pathways

integral ecology aligned with the Laudato Si encyclical of the Catholic Church. The larger part of learners in Case 2 talked about nuance in terms of intersectionality—how this concept emerged not just in the content of the course but also through the intersecting identities of a diverse group of learners. Indeed, learner background, the pedagogical approach used (whether case-based or dialogic) and the course content in each of the cases seemed to complement each other and unearth the complexity of sustainability in different ways.

Heart: Increased hope through extended (human) relationality

Outcomes in the affective domain were as strong as that in the cognitive for both cases and what was common was how the VE extended their web of relationships by having them engage with learners from vastly different cultures and locations. This, in turn, increased their sense of hope. The interaction that occurred in both the COIL and the dialogue-based VE wove threads of connection among the students, and while some respondents described them as transactional, others, especially in Case 2, described them even as “friendships”—with students contacting each other even after the course end. Whether or not friendships were formed, the course was able to expand the reach of student awareness and concern, including people from places that they had never considered prior. According to Lange (2019), deepening this relationality is one of the projects of transformative sustainability education, and she quotes Spretnak (2011) to describe this relational nature of reality:

... all entities in the natural world, including us, are thoroughly relational beings of great complexity, who are both composed of and nested within contextual networks of dynamic and reciprocal relationships. We are made entirely of relationships, as is the whole of the natural world. (p.4)

Notwithstanding this relationality being centered on human relationships in the VE, overlaps in narratives and experiences were still created, thereby fostering empathy between seemingly distant realities. For example, Amiham from Uni P (Case 1) talked about how interacting with students from the Global North made him empathize with rather than trivialize their problems:

But then, hearing them talk about that, it sort of gives you the perspective that these issues, you know, the first world problems, there's always that joke. No, these are problems that they actually take seriously and that they care about and you get to empathise with that.

In Case 2, the response⁴² of one learner (G.679) demonstrated empathy with the experiences of her less privileged groupmates:

I also think that listening to some of my fellow group members that are living in Third World countries or countries that are colonized by the global north like Palestine, talking about the conditions they're living in and the injustice they've been suffering from, contributed in changing my perspectives and understanding of climate change, because I put myself in their shoe, and felt very sad and guilty, for being able to have a safe life and not them, even though we're all human beings and deserve to have the same rights.

This deeper sense of relationality could have emerged in a more pronounced manner in Case 2 due to the relationship-building activities that were woven into the curriculum. Students in Case 1 only had one activity for them to get to know each other better outside of their task; learners in Case 2, however, had at least one for every week. As will be discussed further in the succeeding chapter, these activities are important in preventing an interculturality that is either instrumentalized or tokenized. Having more of these activities woven into the syllabus—especially for learners whose only other opportunity for interaction with each other is online—would help in strengthening their relationships with others and keeping it from becoming transactional interactions. This sense of relationality and solidarity with a bigger world made students feel more hopeful, like they are “not alone in making a difference.” Meeting others from the other side of the world who were as engaged in sustainability solutions made them feel more optimistic about the future.

Hands: Inspired ideas and actions for sustainability

In the hands dimension, both VEs were able to inspire ideas and actions for sustainability, which participants reported as translating into their daily habits, behaviors, or endeavors. There was mention of changes as simple as biking more to school, considering public transportation rather than using private vehicles, or being more mindful of consumption and waste. Others talked about how the VE provided direction in terms of their

⁴² Q2 of Post-VE survey: What do you think contributed to this change? Was it a particular person, activity, moment in the dialogue session, concept, and/or resource? Please describe in detail.

career or advocacy pathways, which will be discussed further in the next domain. Perhaps one theme that emerged in Case 2 that didn't in Case 1 was that of empowerment and confidence. For those who joined the VE to improve their English language skills, they found the VE to be a safe-enough space to push themselves to speak or to engage with others, and they said that through the VE, they were able to build their confidence when engaging with others (n=14). This communicative competence—particularly intercultural communicative competence—is one of the skills that VEs are known to hone in students (Avgousti, 2018; Hackett et al., 2023; Machwate et al., 2021; Oviedo & Krimphove, 2022). Three participants, one from Case 1 and two from Case 2 talked about how the virtual aspect of the course made them feel less shy when engaging with others. The screen mediated their interaction, serving as a protective barrier, where they might have otherwise found it difficult to express themselves. These three participants who are self-described introverts said that they did not feel as uncomfortable about sharing during the VE. Aside from the learning environment being empowering for students, its virtual feature could also lend to its effectiveness.

Feet: Wove sustainability into their personal pathways

This theme under the situated domain of weaving sustainability into participants' personal pathways represents changes made in their careers or advocacies. This exhibited the smallest outcome, and emerged strongly only in Case 2—it did come out nonetheless in Case 1. Through the VE, participants included sustainability into their career trajectories, with one participant from Case 1 choosing to study agriculture and food systems, and one other from Case 2 who decided to go into political ecology (Hiraya and Natalia, respectively). Inspired by the climate justice course, Carmen from Case 2 was inspired to study climate change from her background of translation linguistics, using it for her master's thesis. It should be noted that these outcomes, while they could easily fall within the hands dimension, are placed under the feet dimension (situated domain) because this exhibits something other than behavior or competences but a personal commitment to sustainability rooted in their respective backgrounds or career trajectories. This may not reflect the same "groundedness" to a place that Horlings et al., (2019) calls for when speaking about embedded researchers, yet given the age of the participants from whom this theme emerged—they were no older than 24—this could represent the buds of growth.

Summary

In summary, through VE, learners from both cases gained a more nuanced understanding of sustainability (head), became more hopeful through extended (human) relationality (heart), were inspired towards ideas and actions for sustainability (hands), and wove sustainability into their personal pathways (feet). It is worth mentioning that the sustainability-related outcomes were more pronounced in Case 2 due to the larger sample size and data sources that were available to the researcher. Aside from the student and instructor interviews that were mainstays for both cases, all other methods differed. This will be further explicated in the [Critique of the research design](#) in Chapter 7 (Discussion), but for this section on outcomes, Case 2 had the Greencomp pre- and post-survey questionnaire that also included open-ended questions, thereby providing richer data on the outcomes. This survey was not administered to participants in the first case since it was not part of the original research design. It was only included upon prompting by the parent research project of the second case, when the LAS was not deemed sufficient enough to substantiate changes in students' sustainability paradigms. However, data collection for Case 1 had already been completed when this change was made.

Reviewing the transformative outcomes, those recorded would include changes in learners' worldview (having more open perspectives), self (having a deeper self-awareness), capacity, and to a lesser extent, behavior (acting differently) (Hoggan, 2016a, 2016b; Stuckey et al., 2014). However the experience of a deep shift in worldview does not seem to have emerged, as transformation that bespeaks such a shift requires time. This will be explained further in the limitations and areas for future research.

7. Discussion

This chapter provides a discussion of the findings, starting with a further exploration of the transformative potential of VE by clarifying the structural, cultural, and agential properties of the context vis-à-vis the mechanisms and outcomes established in RQ1 and RQ2, respectively. This will be followed by the theoretical implications of the revised TSL framework and the use of CR to ground TL research. Practical implications will also be discussed in terms of dialogic education, the concept of safe-enough spaces, and VEs as potentially transformative third spaces. The chapter will close with a critique of the dissertation, which includes considerations for research validity, limitations, and recommendations for future research.

Exploring transformation using the morphogenetic approach

The findings in the previous chapters revealed the dispositional themes—the mechanisms in the VE—that prove it to be an effective pedagogy for fostering TSL. They also revealed the results of the VE in terms of the transformative outcomes experienced by students. Aided by data collection methods that were designed to explore structural, contextual, and agential elements within each VE, these dispositional themes were generated according to CR-oriented thematic analysis of the collected data, starting with experiential themes that reflect the empirical realm or what could be observed. This was followed by the formulation of inferential themes that provide tentative general statements based on patterns observed from the initial list of themes. Once consolidated, these inferential themes were theoretically redescribed by reviewing existing literature to hypothesize what could cause the inferred phenomenon. Indeed, the findings section of both cases showed this abductive process by explaining each dispositional theme with references to existing literature. In addition, both research questions reveal elements of the CMO configuration (CMOc), with RQ1 (How does VE foster TL for sustainability?) uncovering mainly the mechanisms and RQ2 (How does VE contribute to transforming sustainability paradigms?) revealing the outcomes. Indeed, the previous sections focused on conditions within the social interaction—that is, the VE—but did not provide details on the structural and cultural conditions surrounding it, although these were implied in some of the themes. Identifying and explaining such conditions are crucial in having a clearer idea of any change process, whether it results in morphogenesis or

morphostasis (Archer, 2020). As Pawson and Tilley expressed: “Programs are always introduced into pre-existing social contexts and... these prevailing conditions are of crucial importance when it comes to explaining the successes and failures of social programs” (1997, p. 70).

Table 7.1

Themes in response to research questions

RQ1 How does VE foster TL for sustainability?	RQ2 How does VE contribute to transforming sustainability paradigms?
(1) Criticality and diversity to enrich learning • Leveraging diversity for trans-perspectival learning • Using a critical lens to explore complex issues • Using student-centered teaching approaches	Gained a more nuanced understanding of sustainability
(2) Safe enough spaces for dialogue and reflection • Creating safe-enough spaces for dialogue • Giving voice to first-person, living narratives • <i>Partners with varying objectives and commitments</i>	
(3) Integration of sustainability competence • Integrating practical skills through active learning	Increased hope through extended (human) relationality
(4) Place-based approaches • Instilling place-based sensitivity	
(5) Virtual learning opportunities • Leveraging virtual learning for increased access to education • Existing digital divides affecting learning	Wove sustainability into their personal pathways

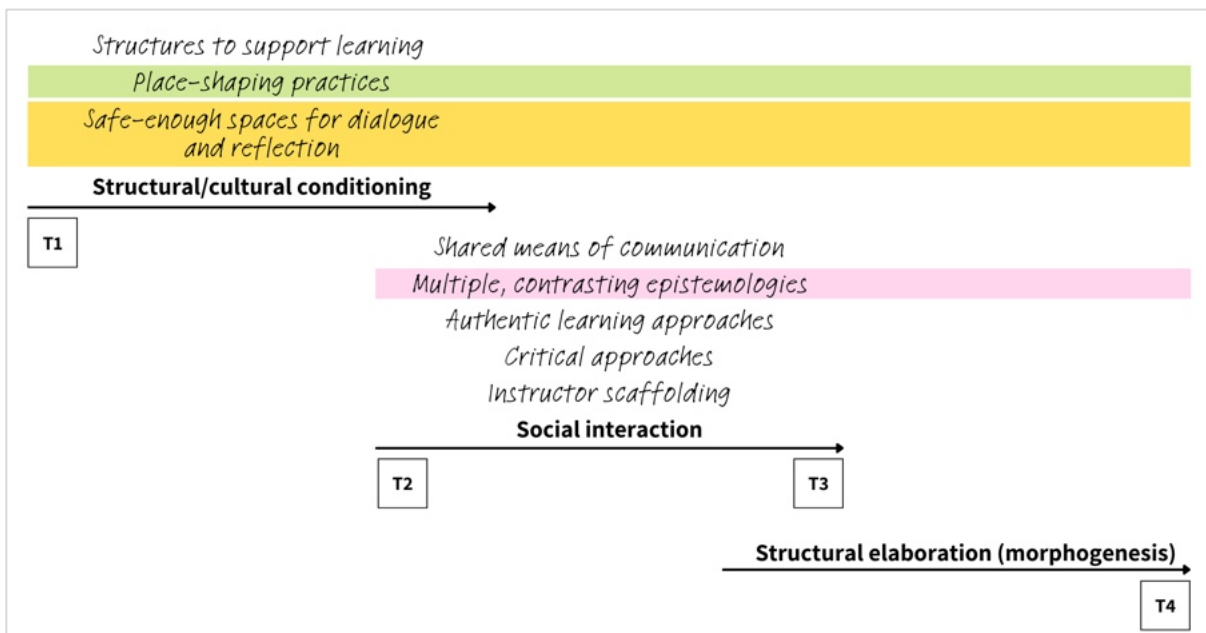
Thus, what needs further clarification are the structures or conditions that must exist for participants in a VE to experience a shift in their paradigms once they are introduced to ideas regarding sustainability (Weizenegger, 2022). This should be followed by the link between the identified outcomes, mechanisms, and contexts to assess not only what works (RQ1) and how it worked (RQ2) but “what works, for whom, and in what context” (Tennant et al., p. 3). The efficacy (or ineffectiveness) of educational programs and interventions depends on contextual factors that could have contributed to their success (or failure) as much as the intervention itself. This would help determine how feasible or effective it would be to replicate

the same program in a different setting. Looking back at the morphogenetic approach, the dispositional themes that emerged from the VE only speak about the social interaction, and only imply rather than clearly identify the prior structural and cultural conditioning. Table 7.1 lists all the themes that emerged in response to the two research questions.

These changes listed in the column on the right were outcomes of the mechanisms—pedagogical approaches and learning conditions—reflected in both VEs that fostered TL for sustainability. What needs to be elucidated now are the structures that must exist, whether a COIL or a dialogue-based VE, one co-designed or ready-made, for participants in a VE to experience TL for sustainability. Conducting a cross-case analysis supported the empirical collaboration necessary in retrodictive analysis. Therefore, the dispositional themes that emerged from the cross-case analysis will be revisited, first by disentangling the contextual factors implied by the identified mechanisms and then by scrutinizing if there is a need for more vertical explanations (Collier, 1994)—mechanisms underlying the identified mechanism. After which, the outcomes will be delved into, connecting them with the mechanisms and context that could have produced them. To better understand this causal relationship, this section discusses the findings using the morphogenetic approach.

Eight mechanisms were identified, and they were reformulated from the original list of dispositional themes to provide both horizontal and vertical explanations. Horizontal explanations are the “explanation of events by mechanisms and antecedent causes” (Collier, 1994, p. 48), while vertical explanations entail the explanation of an identified mechanism for a more basic one, which reveals the object of science being the deepening of such knowledge—excavating the strata of reality (Collier, 1994). For example, the themes “safe-enough spaces for dialogue and reflection” and “multiple, contrasting epistemologies” are reinventions of the initial theme “criticality and diversity to enrich learning” and they provide horizontal explanations of the outcome “gained a more nuanced understanding of sustainability” that was present in both VEs. Other themes such as “language proficiency” or “instructor scaffolding” were not among the dispositional themes due to their lack of strength or absence in the data. However, these were included after a review of the themes and the literature on VE efficacy. CR literature posits that mechanisms could be latent or dormant, and so their absence in the data does not mean that they were not there at all (Mingers & Standing,

Figure 7.1 Mechanisms mapped onto the morphogenetic sequence



2017). Unlike inductive reasoning, abduction is not data-driven but theory-led. While the data is an important jump-off point, abductive reasoning requires knowledge of existing theories surrounding a phenomenon and cross-checking with the data gathered. The eight mechanisms are: (1) Structures to support learning; (2) Place-shaping practices; (3) Safe-enough spaces for dialogue and reflection; (4) Shared means of communication; (5) Multiple, contrasting epistemologies; (6) Authentic learning; (7) Critical approaches; and (8) Instructor scaffolding. These mechanisms were mapped onto the morphogenetic sequence (Figure 7.1) to reflect the presence of these mechanisms either within the structure or culture or the interaction itself. Three mechanisms were highlighted to reveal the importance of their existence across the sequence (place-shaping practices, safe-enough spaces for dialogue and reflection, and multiple, contrasting epistemologies). What this reveals is that for a VE to foster transformative learning for sustainability among learners, it must consider learners' language proficiency, multiple, contrasting epistemologies, authentic learning approaches, and instructor scaffolding. However, the potential of the VE in effecting transformation (or morphogenesis) is also dependent on the structures and culture surrounding the learner: firstly, the existing ICT structures that could support engagement in virtual learning environments. Additionally, place-shaping practices and safe-enough spaces for dialogue and reflection must exist, not only prior to the VE but also during and after to prompt

transformative learning. The same goes for multiple, contrasting epistemologies—their presence even after the VE could help in elaborating the pre-existing structures and cultures.

Structures to support learning

As VE is a technology-enabled form of learning, there must be sufficient and reliable ICT structures that would sustain learner interaction online. Connectivity was an issue for many of the students in both VEs, affecting the level of engagement in the dialogues. As noted in Case 1, Cara from Uni F commented on the cameras of her Uni P counterparts being switched off, and how this affected the flow of the conversation in the breakout rooms. Other participants, especially in Case 2, reported their unreliable internet connection as a source of stress, affecting their ability to connect to the video call and participate. Some learners had to keep their cameras switched off to manage their poor connectivity. During the interviews, Isla mentioned how the interaction in their group revolved mainly around those whose cameras were switched on. This is, indeed, one of the challenges in implementing VE based on the literature (Hackett et al., 2023; Hahn & Radke, 2020; Oviedo & Krimphove, 2022). Undergirding this mechanism is that of providing structures to support learning in general, be it online or in person. An environment that can house or facilitate learning is necessary and is thus an important mechanism to learning.

Shared means of communication

Having a shared means of communication means that students not only share the same means of communication but have roughly the same proficiency. Language proficiency emerged as one of the issues in Case 2, and while it did not emerge as strongly in Case 1 (only one student talked about language difficulty in terms of understanding the accent of their counterpart), fluency in the agreed-upon language, which is mainly English, is one of the impediments to VE efficacy (B. Barbosa et al., 2020; Hackett et al., 2023; Oviedo & Krimphove, 2022). In the observation notes for Case 1, it was noted that the students from Uni P were speaking more than those from Uni F, and this might also be explained by the familiarity students from Uni P had with each other or their number outweighing those from Uni F. Drawing from current practices and theories, however, shows that language has always been an issue in multicultural settings, bringing forth issues tied to power structures, especially colonial legacies tied to language. Thus, proficiency in a shared means of a

communication is a key mechanism as it gives participants enough lexicon and confidence to engage with others, and this is especially important for VEs that center on complex issues such as climate justice and integrate rhetorical activities such as debates. Language proficiency need not be the only means of establishing a shared means of communication. Even among learners with varying levels of proficiency, instructors could bridge these gaps by rephrasing, paraphrasing, typing things out, or clarifying (Helm, 2024). For example, a participant in Case 2 talked about translating for a colleague who found it difficult to express her feelings in English. Establishing these shared means and techniques could enable meaningful learning experiences among learners with a rich multilingual repertoire.

Authentic learning approaches

Authentic learning approaches refer to the use of student-centered, collaborative, and active learning approaches that bring real-world relevance into a learning setting. Whether done through a case-based approach as in Case 1 or through dialogues in Case 2, the use of such approaches could enable TL for sustainability. For example, the use of real-life cases in the COIL, paired with the critical questions to allow students to examine each case further, provided students with the opportunity to put sustainability concepts and competencies in practice. Authentic learning also pertains to the dialogue sessions in Case 2, where participants conversed with each other about their personal lives or shared their climate stories. These examples of authentic learning help in building a deeper relationality, whether it is with a distant group of people or with a local context.

Instructor scaffolding

This mechanism, adopting the term attributed to Bruner (1978), refers to the support that instructors (facilitators, teachers, and professor) provide to the learners in being able to reach the established learning outcomes that they might not be able to accomplish on their own. This recalls Vygotsky's idea of the Zone of Proximal Development (ZPD) that teachers lead their students to by scaffolding the learning process. The role of the instructor is to gauge the kind and amount of support that their learners would need to move from their Actual Level of Development (ALD) to the ZPD. This refers not only to knowledge but to skills and capacity-building, such as critical thinking (Wass et al., 2011). Depending on the aims of the VE, instructor scaffolding is important in enabling the kind of depth that would lead to

transformative learning experiences. While this was less pronounced in Case 1, instructors of the COIL provided guide questions for the breakout rooms and would occasionally enter the rooms to foster discussion. For Case 2, this scaffolding was more visible, given that the facilitators were present in all the dialogue sessions and were engaging participants in a variety of activities that they initiated depending on what they perceived to be appropriate for their respective groups. In fact, as mentioned in the findings, the respondents found the role of the facilitator as crucial in creating a safe-enough atmosphere for dialogue and relationship-building. In Case 1, while dialogue was not central to the VE, the skills and capacity building to view the cases from a systemic point of view was introduced to the students to help them better understand the case. This was supported by the questions that were provided for every case analyzed. This scaffolding becomes part of the purview of instructors in VEs as they help in creating the conditions necessary for student engagement, particularly in multicultural, virtual settings.

Multiple, contrasting epistemologies

The multicultural setting as a springboard for TL is seen in the mechanism “multiple, contrasting epistemologies,” which represents the centrality of diverse perspectives, be it among the participants or the cases introduced—and how it was leveraged to demonstrate the complexity of sustainability issues. This reflects the call for SE approaches to integrate trans-perspectival learning to transcend usual boundaries (geographical, cultural, disciplinary, generational) or dichotomies (urban vs. rural, man vs. woman, interpretivist vs. positivist) in order to produce novel ideas or approaches to address wicked sustainability problems (Lange, 2018, 2019; Wals & Benavot, 2017). Although Case 1 involved only two partners, they come from starkly different contexts that epitomize the Global North and Global South divides. This contrast is even more evident in VEs that feature multiple partners such as in Case 2. More contrasts emerged—not just Global North or Global South but even those living in situations of peace versus conflict, religious divides, as well as perceptions regarding the role of women. Such contrasts are vital in the emergence of third spaces where new meanings and paradigms could be explored and potentially lead to the transformation of old ones. As previously mentioned, trans-perspectival interactions could expose learners to knowledge from diverse disciplines applied across various scales and contexts, thereby better

equipping them to respond to and solve sustainability problems. Having multiple epistemologies in a single learning setting increases the opportunity for liminal spaces that, despite being disorienting and uncomfortable due to the contrast, could also be empowering and transformative for learners (Kalua, 2009). This mechanism, however, should not only be present in the social interaction—during the VE itself—but also after, as it would help in facilitating structural and cultural elaboration. Continuous exposure to difference would aid in reflexive agency, sharpening the ability to “[see] our worldview rather [see] *with* our worldview (Sterling, 2011, p. 23).

Place-shaping practices

This mechanism pertains to the meaning and value ascribed to places that enable TL for sustainability. While sustainability is a global issue, it is manifested locally and thus needs local efforts without losing sight of the global view. These local efforts are ascribed to places, to concrete contexts or communities—whether human or non-human—to where sustainable practices or solutions are directed. Embodying sustainability values and behaviors implies a body in space, enrooted to a place (Horlings et al., 2020). Places are more than just the physical landscapes but constitute the actors, practices, histories, traditions—the “entanglement of processes” (Horlings, 2016, p. 33)—within it. They also hold within them political meaning, especially when speaking of climate justice. The existence of such place-shaping practices is seen throughout the whole sequence, where individuals shape and are shaped by their places. While a sense of place can be cultivated through the social interaction, what was common and effective in both VEs was how they drew from existing place-shaping practices using contexts meaningful to learners, whether they featured problems or solutions—plastic pollution in the Philippines for Filipino students in Case 1 or gardens in Gaza for Palestinian students in Case 2, for instance. Despite being virtually “located,” the VE still tied the content with specific contexts, thereby shaping this sensibility towards place. Case 2 pushed this even further through the inclusion of the CAP, and although only a few engaged with local communities, this place-shaping practice is nonetheless a powerful mechanism that could enable TL *for* sustainability. Nurturing this sense of and value for a place extends even during structural and cultural elaboration as newfound or deepened relations to a place could prompt transformation, as evidenced by the continued popularity

of place-based education, which includes practices such as experiential learning, service learning, and community-based learning, as well as place-based approaches in sustainability research and practice—hence the way place-shaping spans the entire morphogenetic sequence.

Safe-enough spaces for dialogue and reflection

Finally, the other mechanism that should exist across the entire sequence to foster TL for sustainability is a safe-enough space for dialogue and reflection. This was especially poignant for Uni P students in Case 1, who mentioned that the openness to and criticality of their dialogues in the VE mirrored the practices in the university. Indeed, Amihan from Uni P mentioned that the critical study of cases might not have been as effective if another group of students had been there, as he and his colleagues, who mostly came from development studies or life sciences backgrounds, were more accustomed to critical approaches. On the other hand, even the absence of such spaces could be effective in amplifying the transformative potential of VEs, as seen among the participants in Case 2, who mentioned that the lack of space for dialogue and interaction in their university classes made the VE experience even more special and impactful.

During the VE, this space is important to have, and the level of safety—whether safe or safe-enough—determines the depth participants are willing to go (Glimäng, 2022; Pereira et al., 2020; Singer-Brodowski et al., 2022). In Case 1, the space was described as merely “safe” because there was no disagreement or contrast observed nor expressed despite clear differences in participants’ ways of life. In Case 2, however, some groups seemed to typify safe-enough spaces as participants were brave enough to share opposing perspectives and question each other’s opinions. Safe-enough spaces are more likely to enable transformative learning experiences, as they allow learners to navigate through conflict, contradictions, disorientation, dissonance—the very experience of liminality in third space literature (Adefila et al., 2021; Wimpenny et al., 2022; Yeh & Heng, 2023)—in order to unlearn problematic frames of references and learn new ones. Safe-enough spaces represent the support structures that could guide students through the often-uncomfortable process of transformation, which is why they are also necessary during structural elaboration. When learners do not feel safe enough to make changes based on their newly-formed paradigms,

they could retreat to structural reproduction, thereby going back to their ways pre-transformative experience. The activation or absence of these mechanisms influenced the potential of the VEs for transformative sustainability learning. Aside from the TSL approach utilized by the VE, it is also essential to consider these mechanisms when developing a VE or seeking to replicate the same VE content and approach to a different context. It was not just the elements within the program, within the social interaction, that produced the outcomes of the VE. The structural and cultural context also have a part to play.

Theoretical implications

Revised transformative sustainability learning framework

This research sought to understand the potential of VEs as TL pedagogies for SE. To do so, it explored the pedagogical approaches and learning conditions within two VEs and mapped them according to the TSL framework conceptualized by Sipos et al., (2008) but expanded by the researcher to highlight the importance of place-based approaches as originally reimagined by Horlings et al., (2020) and Singleton (2015). For the findings, this mapping followed the figure of the embodied researcher to more easily illustrate the strength of the dispositional theme per dimension. However, the use of the figure does not reflect the synergies of the domains nor the reality of learning experiences—where multiple domains could be tapped by a single approach or condition, similar to what was done in the original TSL framework. Figures 7.2 and 7.3 show the dispositional themes mapped according to the four dimensions, including their overlaps, to demonstrate how they impact the different domains of learning. This better illustrates the complexity and richness of authentic learning experiences using the revised TSL framework. Unlike Singleton's (2015, 2024) version that showed the head, heart, and hands dimensions—without any overlaps—embedded in a place, this version shows the situated or place-based interacting with the other three, forming synergies in the overlaps. In addition, through a critical realist TA that theoretically redescribed events and experiences to generate dispositional themes (thereby articulating their generative mechanisms or in critical realist shorthand—what y must exist in x for x to exist?), the themes mapped on the framework do more than enumerate the existing pedagogies that would enable both TL and SE; rather, they show the mechanisms—as well as their interplay—that would enable TL for SE in a whole, full learning experience. The revised

Figure 7.3 Interplay of TSL – Case 1 (COIL)

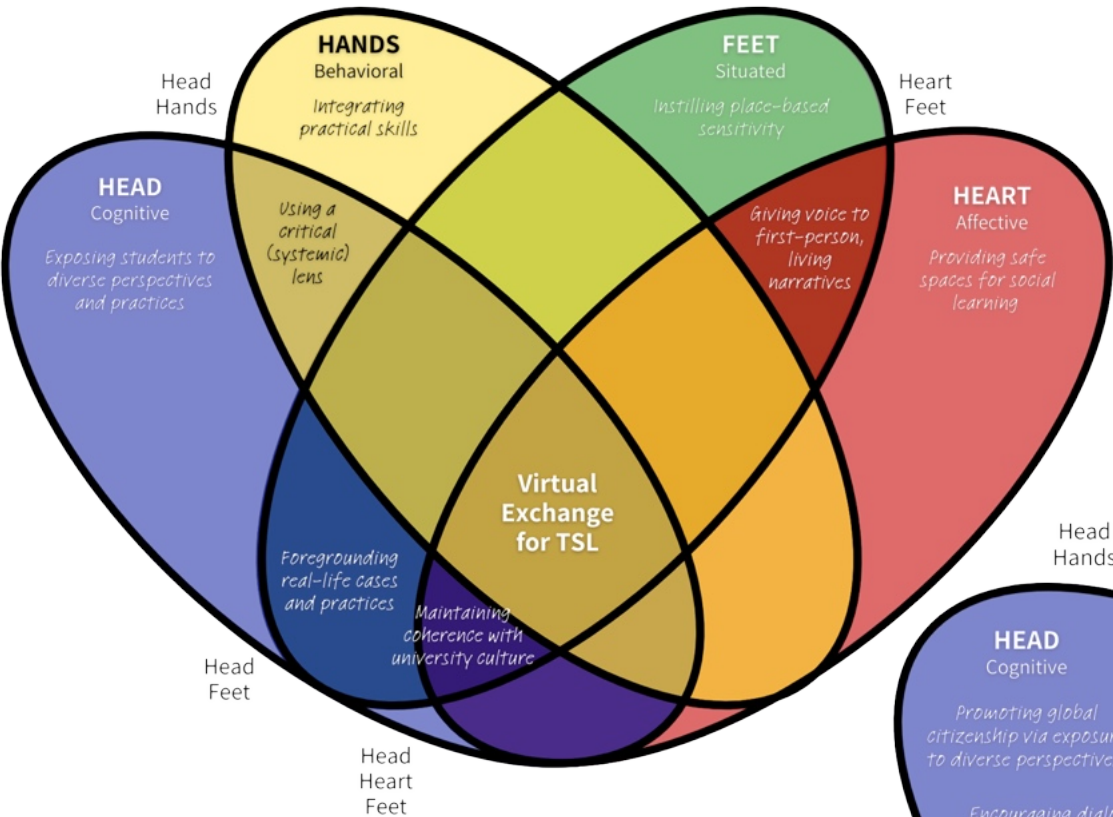
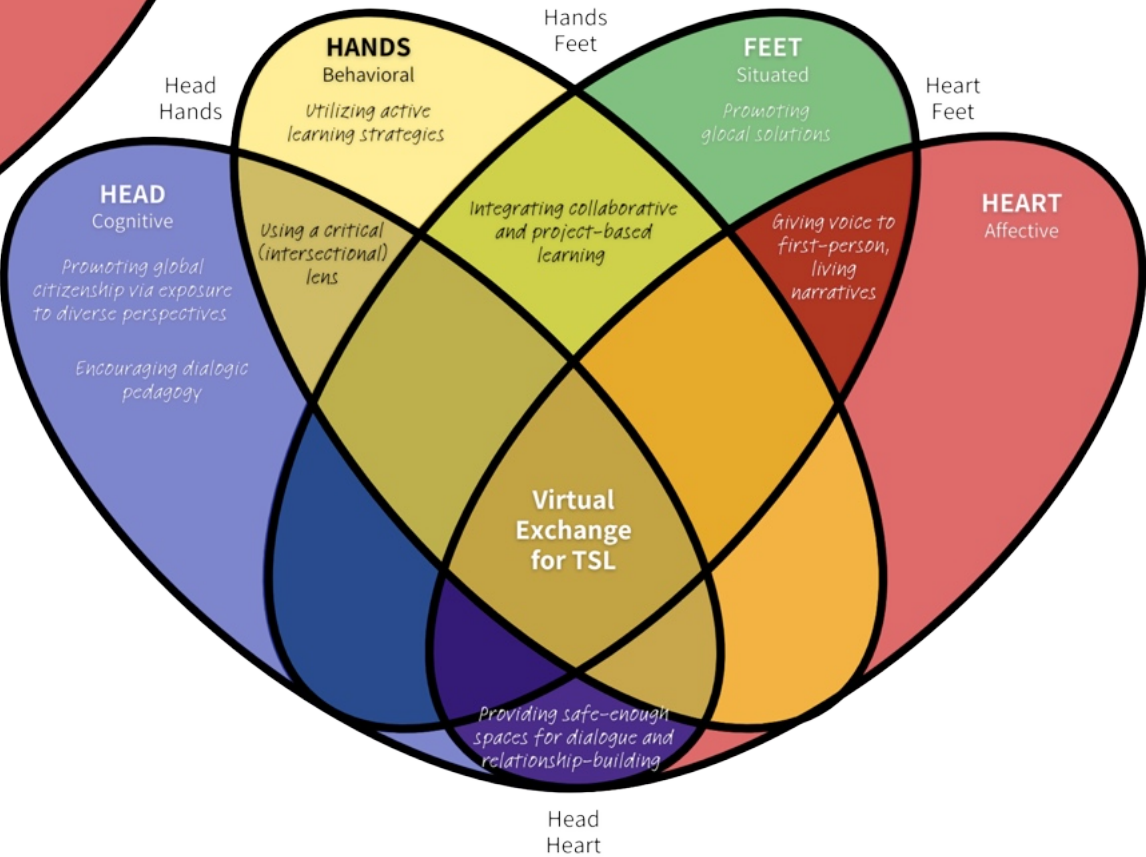


Figure 7.2 Interplay of TSL – Case 2 (Dialogue-based VE)



framework provides more clarity on the differences and synergies of the four domains, aided by its application in two different virtual learning contexts. For example, in Figure 7.2, the themes exposing students to diverse perspectives and practices, integrating practical skills, and using a critical (systemic) lens, fall under the head, hands, and head-hands dimensions, respectively. These three reveal the characteristics of the case-based approach used by Case 1 and how they activate multiple dimensions. The instruction of systems-thinking techniques such as causal loop diagramming provided them with the skills (hands) to more critically approach a systemic issue (head and hands) in diverse contexts (head).

Clarifying the different dimensions, the **head** focuses on the acquisition of sustainability knowledge and understanding, as well as the critical reflection of their implications. This cognitive domain entails providing more nuance to *what* students know about sustainability—be it by going more deeply into a problem by revealing the nodes and connections of a systemic issue or by expanding its scope by tracing the other issues that it intersects with—and having them reflect on why these issues are such (Anderson & Tonner, 2023; Singleton, 2024; Sipos et al., 2008). The **hands** dimension provides students with the practical skills and competencies to understand and address sustainability issues. While the hands originally represented the psychomotor domain, it comprises not just physical or manual skills development but the skills, in general, that would increase learners' capacity to activate the other dimensions for sustainability—whether it will allow them to better unpack a complex issue (head), increase their emotional resilience (heart), or engage with local stakeholders (feet)—and act towards sustainability (Anderson & Tonner, 2023; Wakefield et al., 2022). Therefore, the hands concern learner actions and behaviors for sustainability. The **heart** dimension is the *why* of action. Indeed, the literature has shown that having knowledge on the CEC is not enough to propel individuals to transform towards sustainability—there is an inner dimension to sustainability, one shaped by values and personal motivations, that must be nurtured (Ives et al., 2020; Wamsler, 2019; Woiwode et al., 2021). This affective domain comprises the emotions, values, relations, and motivations of learners and activating it entails providing a space where learners' affects can be explored and nurturing a deeper sense of relationality with others—whether humans or non-humans. Lastly, the **feet** dimension pertains to the *where* of sustainability knowledge, emotions, and action—it is the

learner's locus of enunciation. Activating the situated or place-based domain involves enrooting learners to a context or to a place that is or could be meaningful to them. Initially, this sense and value of place was under the affective domain because of how it evokes the sense of relationality and kinship that should be cultivated to enable learners to engage with and enact sustainability. However, given the richness of places—the people, the histories, the physical landscapes—a separate dimension is necessary to represent *where* one's purpose is anchored (Horlings, 2015; Pisters et al., 2019; Yemini et al., 2023). The literature on place-based sustainability has yet to include virtual settings—whether they can be regarded as “places” in the first place and how they can inculcate a sense of place when it is everywhere and nowhere at the same time. From the cases, VEs can do so by encouraging learners in activities and honing the skills that would allow them to explore their environment or community. This entails guiding learners to be autonomous agents of their local contexts.

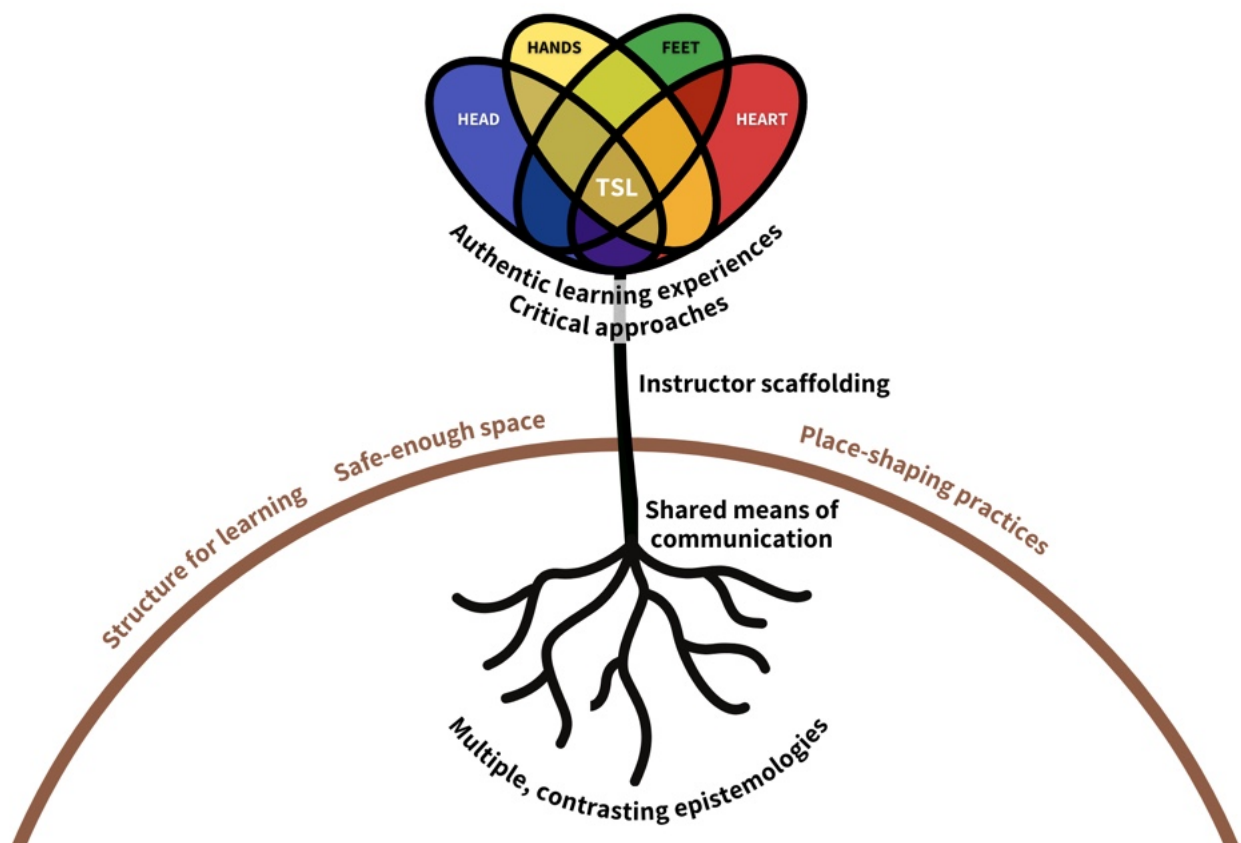
This revised TSL framework requires more study—as will be explained in the section with the [recommendations for further research](#). The dimensions need to be delineated further, and the framework would need more practical applications to demonstrate its robustness and relevance. Nevertheless, from a pedagogical perspective, it could be a useful heuristic for educators who would need a guide in reshaping their lessons in a way that would foster TL for sustainability. It could provide a means to reflect on the syllabus design with questions such as: “What dimensions are my lessons activating in my students? How are they being activated? Which dimensions am I prioritizing or setting aside? Why?” Furthermore, its use could compel the exploration of the extra-rational dimensions of transformation, especially that which concerns emotions (Mälkki, 2019) and place-shaping practices (Grenni et al., 2020; Horlings, 2016).

Using the morphogenetic approach to explain transformative learning

Another theoretical implication concerns the use of CR to explain TL. As previously mentioned, both aim for the same thing—the *critical* in CR bespeaks the aim of emergence within realist evaluation, thus sharing parallels with TL whose aim is, naturally, transformation. This research demonstrates how CR could provide TL with the theoretical robustness that the latter has been critiqued for (Taylor & Cranton, 2013). TL has been criticized for seeing the forest for the trees, blurring out the structural and cultural factors

that shape individual transformations. By anchoring on the morphogenetic approach (using it as a guide for the interview and survey questions and as a means to explain the transformative process in the data analysis), the study showed how a dialogue between CR and TL could broaden the view of transformation. The morphogenetic approach helps in visualizing the cyclical process of transformation or morphogenesis—transformation does not begin with a disorienting dilemma that occurs during social interaction but is a result of several contextual factors. And while transformation is a personal experience, the process is not individual, as human agency shapes and is shaped by social conditions. Adding to contextual component to the TSL framework and indicating the mechanisms that would prompt TSL would result in Figure 7.4. These mechanisms for TSL illustrate the conditions both within and outside a learning environment that would foster TL for SE. It may appear banal, but the figure helps in visualizing and explaining the process through a tangible setting. The ground reflects the structural and cultural conditions—structure for learning (ICT structure for VL), safe-enough spaces (for dialogue and reflection), and place-shaping practices—outside of a learning

Figure 7.4 Updated TSL with mechanisms



experience that nonetheless impact it. The roots reflect the multiple, contrasting epistemologies, whether cultural, disciplinary, or generational, that are necessary for tensions and contradictions to emerge—the roots of transformation. They need to come together, though, using a shared means of communication. The learning experiences from which these multiple epistemologies could blossom should be supported by instructors, who scaffold learning by equipping students with enough knowledge, skills, and attitudes to engage in authentic learning experiences that adopt a critical approach. This criticality is crucial in facilitating dialogue and reflection—necessary components to transformative learning experiences. Whether through a case-based approach or dialogic learning, such authentic learning experiences should tap into the different domains of learner engagement for sustainability (cognitive, affective, behavioral, and situational) and their activation and interplay would greatly depend on the learning objectives as well as the opportunities in the learning setting. Using this framework with a view of the mechanisms could aid in transplanting an educational program into a different setting or in assessing their effectiveness.

This dissertation has also shown a practical application of the theory with the use of CR-oriented TA and Archer's morphogenetic approach to inform data collection and analysis (Archer, 2013; Fryer, 2022; Wiltshire & Ronkainen, 2021). The morphogenetic approach served as a guide in developing the interview guide and the survey questionnaires, including items to explore both the social interaction (the VE) and the broader context that could foster or hinder transformative learning. The findings were then analyzed using the CR-oriented approach to TA that Fryer (2022) adapted from Wiltshire and Ronkainen (2021). Fryer's approach was especially useful in considering aspects of validity—descriptive, interpretive, and theoretical—while analyzing the data, while Wiltshire and Ronkainen's approach provided a systematic and thorough process in generating themes—experiential, inferential, and dispositional—to better hypothesize the mechanisms that could lead to transformation. It thus proved the relevance and feasibility of using CR, not only as a theoretical foundation but also as a methodological structure.

Practical implications

Transformative pedagogies for sustainability

The updated TSL framework demonstrates how to design and construct learning experiences that enable TL for SE. By revealing mechanisms rather than specific pedagogies, instructors or teachers are free to use strategies and techniques at their disposal, keeping only in mind the conditions that would impact its transformative potential. These mechanisms were reflected in the two VEs that served as cases for this study as well as the broad literature on TL and SE. As previously explained, both internal and external factors contribute to TL for sustainability. External factors such as safe spaces for dialogue and reflection, structures to support learning (whether physical or virtual), and place-shaping practices (such as local initiatives or communities engaged in sustainability work) nurture and therefore affect learning. These are embedded in the context yet are woven deeply into the learning experience. TL experiences also need difference—they are rooted in them, as only in the tensions of conflicting meaning-perspectives can transformation emerge (Grund et al., 2024; Hoggan & Kloubert, 2020; Lange, 2018). Instructors must therefore find a way to bring in a polyphony of perspectives into their teaching. They could do it by bringing in experts from various fields that would provide different lenses on how to view an issue or use COIL so their students could be exposed to a different way of life through the voices of fellow students.

An important but perhaps overlooked mechanism is the shared means of communication. If students are not able to encounter difference using a common means of communication, the transformative potential of the learning experience could be watered down, as evidenced by VEs where language became a barrier rather than an effective vehicle for understanding. This is especially important when tackling complex, thorny issues that would have learners grapple with their thoughts and emotions (Singer-Brodowski et al., 2022). Although verbal communication is not the only means to converse or discuss, VEs lack the opportunity to have students engage in other ways—via non-verbal cues or movement, for instance. One way of addressing communication gaps is by using techniques to support understanding such as paraphrasing, rephrasing, transcribing, clarifying, or constant checks for understanding (Helm, 2024).

Within the social interaction itself, symbolized by the mechanisms sprouting from the soil, instructors (teachers, professors, facilitators) must scaffold student learning towards authentic learning experiences marked by criticality and holistic engagement (head, hands, heart, feet). The interplay of these mechanisms could lead to TL experiences towards sustainability.

Virtual exchanges as trans–perspectival third spaces

VE, a technology-enabled form of learning that brings together multiple epistemologies in a shared virtual setting either to engage in dialogue, compare contexts, or collaborate on a task, could foster TSL by activating all four domains of TSL. The cases in the dissertation showed how two types of VEs tapped into the head, hands, heart, and feet dimensions, albeit in different ways. VEs “have the potential to expand the pluriverse” (Helm, 2024, p. 10), and this expansion could benefit individual learners as well as institutional practices by opening spaces where dominant paradigms could be challenged, and reciprocal relations could be nurtured and reinforced. In sustainability discourse, there have been continuous calls to bring in alternative ontologies, as the Western model of development has contributed greatly to the climate and environmental crisis (Adefila et al., 2021). VEs could be a space where dominant ideologies could interact with alternative ones—a third space to explore new ways of thinking and being. Being virtual, they could also help in overcoming physical and geographic barriers that remain to be real obstacles to many of those outside of the Global North. The primacy of diversity in VEs encourages trans–perspectival learning, which is deemed important in SE (Wals, 2010). These encounters with difference have greater transformative potential and thus VEs could be powerful seedbeds of transformation and empowerment.

Nevertheless, VEs are not immune to hegemonic practices, as shown by how some VEs focus more on task completion rather than intercultural exchange (Glimäng, 2022). For diversity not to be tokenized, critical approaches must be woven into VEs, examining disparities and structural inequalities rather than simply glossing over them for the sake of solidarity. Furthermore, other conditions must also be taken into consideration, as represented by the mechanisms identified by this dissertation. The creation of safe-enough spaces for learners entails group dynamics—and this was evident in Case 2, where facilitators

engaged participants in a variety of activities for relationship-building, managing conflict, synthesizing ideas, building confidence, etc. Indeed, compared to Case 1, participants from Case 2 reported more about the interpersonal aspect of the VE. This could also explain why there were more instances of divergence that emerged from Case 2 than Case 1, as having a safe-enough space encourages learners to be engage with diverging opinions and beliefs. This, however, takes time and requires constructing activities that would facilitate the creation of safe-enough spaces (Singer-Brodowski et al., 2022). Another mechanism to consider is criticality, that is, the integration of critical approaches. If learners focus on asking *what* questions rather than deepening the discourse through *how* or *why* questions, then VEs could run the risk of instrumentalizing multicultural interactions and reproducing harmful, dominant paradigms.

Critique of the research design

The present study had many limitations, most of which were previously discussed (see [Data quality](#) and [Methodological limitations](#)). Therefore, this section will provide a summary of the strategies employed to ensure research validity and an acknowledgment of the limitations encountered. First, there were limitations in the multiple case study research design. From the three types of VE (dialogue-based, comparative, challenge-based) identified by Helm (2024), only two were represented. Although the initial intention was to include all three types to increase the generalizability of the results, the researcher was unable to find a case that would allow her deep access within the period of time available. In addition, there is a disparity in the sample size between the two cases. This cannot be helped, as the set-up of each VE impacted the number of participating students, but for Case 1, in particular, only half of the targeted number of students participated in the study, despite all of them consenting. Furthermore, more data sources were available in Case 2, as it is part of a parent research study with access to more information. To level the playing field, the researcher made sure that the interviewees were roughly the same in number and that the findings would be based primarily on the findings from there.

Secondly, another methodological limitation concerns the use of different survey questionnaires. As previously explained, the LAS questionnaire that was used for Case 1 had to be discarded to meet the needs of the parent study in Case 2. Even though the LAS was

presented as part of the proposal, after further exploration of the questionnaire with the other researchers in the larger research project of Case 2, it was decided that it needed to be replaced with a scale that could quantitatively measure KSCs. To address this, the researcher made sure to follow an embedded design in M/M case study research, where the quantitative data is secondary and used only to supplement the qualitative findings (Yin, 2018).

Thirdly, the study relied on self-reported measures through interviews and questionnaires that are limited by the participants' willingness to share and are prone to bias, thereby skewing the data (Cohen et al., 2007). The researcher attempted to mitigate this limitation by triangulating multiple sources of data—using observation and document analysis to corroborate the findings.

Lastly, the use of CR requires a deep exploration of the context to better unearth the structural and cultural conditions and more importantly, the mechanisms behind the researched phenomenon. Both VEs lasted for less than ten weeks, capturing only a sliver of time in the entire morphogenetic sequence. The researcher was able to spend three months in one of the universities in Case 1, but this did not occur for the other university, and neither was it possible for Case 2. However, CR is theory-led and not data-driven, meaning that while it draws from the data, through abductive reasoning, it also uses existing theories and concepts to explain events beyond the perceived experience. The researcher's constant back-and-forth with the literature, during data collection and several stages of the analysis, could have circumvented this issue.

8. Conclusion

This chapter synthesizes the entire research endeavor by revisiting the research questions and providing a summary of the findings. This is followed by a discussion of the significance of the study, especially in “greening” education and ends with recommendations for further research. This dissertation explored the potential of virtual exchange as TL pedagogy for SE by examining two VE cases, a co-designed comparative COIL between two universities, and a dialogue-based VE between 14 partner universities. Two research questions guided the study: (1) How does virtual exchange foster TL for sustainability in HEIs? (2) How does VE contribute to transforming sustainability paradigms? The first research question used a revised version of the TSL framework by Sipos et al., (2008) to understand how the VE engaged the four dimensions necessary in prompting TL for SE. The second research question used TL outcomes to better understand the kind of transformation that took place (Hoggan, 2016a; Stuckey et al., 2014). Furthermore, the research was anchored on CR, which involves uncovering causal mechanisms that would explain a phenomenon under study. This meant using a mix of methods that would aide in providing a fuller picture of both cases and using abductive reasoning to theorize such mechanisms.

Virtual exchange for transformative sustainability learning

The findings from both cases reveal that VEs are pedagogies that can foster TL for SE as they engage the multiple dimensions (head, hands, heart, feet) of the TSL framework, which correspond with the important domains of learning (cognitive, psychomotor/behavioral, affective). All four dimensions were activated but with the head and heart taking a preponderance of the findings. The head (cognitive domain) was the most activated through a learning environment that was characterized by criticality and diversity with the use of a critical and trans-perspectival lens to explore complex issues via student-centered approaches. Equally activated was the heart (affective domain) through the creation of safe spaces for learner interaction. Learners were able to interact and share their personal narratives, experiences, and thoughts about featured issues. However, the varying objectives and commitments between partners detracted from the effectiveness of both VEs. These two dimensions also reported the strongest outcomes, as the participants were able to gain a more nuanced understanding of sustainability and strengthen their sense of hope through an

extended (human) relationality. To a lesser extent, the hands (behavioral domain) and feet (situated domain) were also stimulated through the development of KSCs using active learning strategies for the former and embedding in learners in a place via place-shaping practices for the latter. In terms of outcomes in these dimensions, the VE inspired ideas and actions for sustainability in learners and prompted others to weave sustainability into their personal pathways. The affordances and limitations in the virtual setting determined the most actuated domains and realized outcomes and the kind of VE, whether dialogue-based or comparative, influenced the way these domains were activated.

Mechanisms of transformative sustainability learning pedagogies

More importantly, the findings also uncovered potentials and powers both within and external to the VE that lent to its transformative potential, and these could be described as mechanisms underlying TSL pedagogies. These were:

- Support structures for learning
- Place-shaping practices
- Safe-enough spaces for dialogue and reflection
- A shared means of communication
- Multiple, contrasting epistemologies
- Instructor scaffolding
- Authentic learning
- Critical approaches

This means that their presence (or not) as well as their interplay in an educational program could affect the program's potential as a TSL pedagogy. These eight mechanisms were generated through the critical realist morphogenetic approach that looks at transformation or morphogenesis within a social order consisting of structure, culture, and human agency. While TL provides insight on individual (learner) transformation, the morphogenetic approach situates the transformation within a context. The pre-existing social and cultural conditions include support structures for learning, place-shaping practices, and safe-enough spaces for dialogue. In VEs, support structures for learning would be ICT structures that would facilitate virtual interaction. Indeed, unreliable connectivity became a hindering factor for students in both VEs. This mechanism could also apply to in-person contexts. Without a classroom or a

space conducive to learning, the transformative potential of a program could be affected. With regard to safe-enough spaces, their presence or absence prior to an educational program could influence its transformative impact. For example, students from Uni P in Case 1 expressed the openness of their university to express dissenting views and engage in dialogues, thereby making it easier for them to apply this same criticality in the V. On the other hand, students who were interviewed in Case 2 mentioned how the lack of dialogue in their university amplified the impact of the VE, as the sustained and dynamic interaction was something they were not used to. However, during the educational program itself, this safe-enough space must be cultivated to enable transformative experiences to turn the discomfort and disorientation of paradigm change into something empowering and uplifting. A final pre-existing condition is that of place-shaping practices. What was effective in both VEs was how they introduced existing initiatives or practices tied to the contexts of the learners, and for Case 2, how they attempted to inculcate this through the CAP. This shows the significance of place-based approaches in sustainability education, and this could also be confirmed by the growing literature on this concept.

Another important mechanism is the presence of multiple, contrasting epistemologies that have a shared means of communication or interaction. Encounters with difference are key to opening up third spaces that are fertile ground for transformation. This mechanism is supported by concepts such as trans-perspectival learning and transdisciplinarity that scholars have cited as essential in sustainability transformation. The multiple epistemologies may be a mix of diverse cultures, ages, or disciplines, but to facilitate their exchange, there needs to be a shared means to interact with each other. It may not necessarily be a shared language, but for VEs that lack the physical cues of in-person interactions, language would need to be given greater consideration. During the social interaction itself, instructors (teachers, professors, or facilitators) need to scaffold student knowledge and skills related to sustainability, depending on the outcomes of the course. This could be done by introducing concepts or honing skills relevant to addressing sustainability problems. For example, Case 1, that took on a case-based approach to compare different contexts, developed systems thinking skills such as causal loop diagramming, to support their students in better understanding a case. In Case 2, the focus was on concepts intersecting with climate change,

such as racism, colonialism, and gender discrimination—to name a few—that served as topics for the weekly dialogue sessions. The knowledge and skills need to be developed in learners using critical and authentic learning approaches. This criticality is vital in challenging problematic and often dominant sustainability paradigms and practices. Coupled with authentic learning approaches that engage the four dimensions (head, hands, heart, feet), such an educational experience could better engage students and prompt sustainability-oriented TL. These mechanisms, however, are not definitive nor established. One of the strengths of CR as a philosophical underlabourer is its openness to new explanations, whether horizontal or vertical, that could help in better understanding a phenomenon.

Contributions of the research

Leveraging critical realist inquiry to uncover mechanisms

The findings reveal one of the strengths and contributions of this research, which is a critical realist M/M methodology. The use of various data sources, both quantitative and qualitative, and the constant referral to the literature in the abductive process, meant being able to capture contextual factors and provide a more comprehensive explanation. Using CR to guide the crafting of data collection methods (interviews and survey questionnaires) necessitated the inclusion of items on the structural and cultural conditions surrounding the VE and finding as many sources as possible to better explain the context of each case. In addition, the CR-oriented TA used to analyze the data provided structure, rigor, and depth to the process. The generation of experiential, inferential, and dispositional themes mirrors the deepening layers of reality in CR philosophy—empirical, actual, and real, respectively, and while this made the process even longer due to abduction and retroduction, they allowed the researcher to go beyond the data and delve deeper into theory to provide more robust explanations. Dispositional themes for each case were first identified before conducting a cross-case analysis, allowing the researcher to provide vertical explanations of causation and identify the eight aforementioned mechanisms that make VEs TL pedagogies for SE. Identifying mechanisms helps in providing a more comprehensive view of factors that could have contributed to the efficacy of an educational program or intervention—whether they were internal or external (contextual). Understanding “what works, for whom, and in what context”

(Tennant et al., p. 3) would also help in translating the same program in a different setting or with different set of actors.

Unearthing transformations through the morphogenetic approach

Moreover, this study contributes to the field of TL in two ways: by expanding the process of transformation through the morphogenetic sequence and by clarifying the *how* of transformation through the incorporation of third space theory. Although the latter has already been discussed by other scholars, the former—to the researcher's knowledge—has yet to be explored. The integration of a TL experience within a morphogenetic sequence could offset one of the weaknesses of TL theory—its concentration on individual transformation and disregard of the context that shapes and is shaped by human agency. It also provides a theoretical foundation by providing insight on the components of a social order (structure, culture, and agency) within which a transformation occurs.

Updated transformative sustainability learning framework

Another contribution of this research is by revising the TSL framework to include place-shaping practices (feet dimension). Thanks to the work of previous scholars (Horlings et al., 2020; Singleton, 2015) who integrated this concept of place in the TSL framework (Sipos et al., 2008), the researcher was able to reimagine the TSL using a visual to illustrate the interaction with the other three previously-established dimensions. It could better support teachers who aim to create educational spaces that would encourage TL towards more sustainable ways of living and being.

Practical implications

The research highlights the importance of advancing trans-perspectival interactions in both education and research. The cases in the study show how harnessing the pluriverse enriches learning experiences. When combined with critical and authentic learning approaches in safe-enough spaces, it could even prompt TL. The study itself could benefit from other perspectives, as the concepts culled from the broad literature to inform the abductive process are mainly from the researcher's field of study. Indeed, transdisciplinary collaborations have started to explore even the biology of TL experiences.

This dissertation also shows the need for VE practices in school settings. Although VE programs are growing, they are not given the same priority or granted the same importance

as physical mobility. Physical exchanges are a privilege—even in the Western context, and for some groups of learners, physical mobility would have been impossible due to realities of war and occupation. VEs could serve as a more economical and inclusive alternative that would not compromise learning and would also provide representation to those who are usually left out of the sustainability discourse.

Limitations and recommendations for further research

The limitations were already discussed in the previous section ([Data quality](#) and [Methodological limitations](#)), but in summary, this dissertation could have benefited from a longitudinal study with an additional case to cover all three types of VE. A uniform pre- and post-survey questionnaire and more respondents to the interviews and surveys would have also provided more data on the approaches, conditions, and outcomes of the VE. Further research could build upon these limitations by comparing the transformative potential of the three types of VE—dialogue-based, comparative, and project-based, understanding which could foster or hinder TL and how. Having a longitudinal study could provide further insight on the relative stability of the transformation, seeing how durable the transformation is over prolonged periods of time. Being able to follow the evolution of a TL experience over time, especially once learners step out of the confines of a learning environment, could reveal its impact and durability on the spheres (personal, political, and practical) of transformation.

Another potential area of research would be the updated TSL framework with the mechanisms and seeing its usefulness in learning settings—in planning a lesson and in evaluating its effectiveness. The place-based dimension was included based on the sustainability research literature but there has yet to be an application of this vis-à-vis the head, hands, and heart dimensions. Practical applications of the framework could prove its usefulness and relevance to SE. The eight identified mechanisms could also be further explored, seeing if they apply even to in-person learning contexts, and whether they require vertical explanations or additional mechanisms.

Finally, further research should look into the concept of transformative third spaces—delving deeper into the conditions to create them as well as the psychological and even biological dimensions of transformative processes through encounters with difference. The research on edge emotions has started this, and it would need to be supported by studies

that show supportive, safe-enough learning environments in practice. This could aid in the design and implementation of learning environments that are able to engage students in critical approaches towards transformation without pushing them away or having them dwell in their disorientation.

Final reflections

In response to the climate and environmental crisis, there have been calls to switch to more sustainable ways of living and being. However, *greening* processes and organizations without *greening the mind* (Kohl et al., 2021) will only reproduce the harmful paradigms that caused the crisis in the first place. The role of education in addressing the crisis is fundamental, yet it would be remiss to think that all educational systems and practices are for sustainability, especially when realizing that many of the top HEIs globally are located in countries with the highest historical emissions. Current practices must be deconstructed and alternative ones explored to ensure that learning does not perpetuate unsustainability. Marginalized voices must be encouraged to enter the discourse to help in imagining new approaches or simply relearning age-old ones. Especially when talking about the climate crisis, those who are most at risk—who are also often left out in the discourse—should be included. There can be no climate justice unless those who experience the brunt of injustice are either silenced or excluded.

This dissertation has attempted to study an alternative pedagogical practice that includes multiple, even marginalized student voices using an approach that would help in better understanding the mechanisms actuating or blocking TL for SE. With practices such as VE, rather than being singular ivory towers, HEIs could be potential bridges, to form networks of knowledge sharing and exchange. By leveraging digital channels, more people can be included in the sustainability discourse. Through the integration of holistic approaches that engage students' minds, enable their emotions, help them enact their aims, and enroot them to a context meaningful to them, we could cultivate in them a deep relationality and sense of stewardship towards our home.

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Appendix

Section A: General documents

Informed consent form (Case 1: Uni P)

INFORMED CONSENT FORM Title of the Research Study: Virtual Learning Strategies for Transformative Sustainability Learning Name of Sponsor / Funder / Grant-Provider [if applicable]: None Name of Principal Investigator (PI): Mariame Grace Z. Aranea Contact Information of PI: mariame.aranea@unipd.it Name of Faculty Partner: Dr. M. A. Cuyegkeng Contact Information of Faculty Adviser: acuyegkeng@ateneo.edu You are being invited to participate in a research study. Your participation is voluntary, which means you are free to choose whether to participate. If you decide not to participate, there will be no penalty or negative consequence. Your decision to participate or not will not have any impact on your job status or evaluations. Before you decide, you will need to know what the study is about, the possible risks and benefits of being in the study, and what you will have to do if you decide to participate. The researcher is going to talk with you about the study and/or give you this document to read. Do not sign or agree to participate if you are unsure or have remaining questions. Please ask the researcher to explain anything unclear to you, including any words in this form. If you decide to participate, you will be asked to sign this form, and a copy or record of your consent and the study information will be given to you. Keep this form as it has the contact information and answers to questions about the study. What is the purpose of the study? The purpose of the study is to explore the potential of virtual learning strategies in promoting transformative sustainability learning. Through the lens of Critical Realism, it will explore how teachers and students use virtual strategies to deepen their understanding and application of sustainability. Why am I being asked to participate in the study? You are being asked to join this study because you are a student at the university with experience in virtual exchange and/or sustainability transformation. What will I be asked to do? - Your course teacher would have already sent you a participant recruitment email. If you agreed to participate, you were also requested to share your email address with the principal investigator (PI). The PI will then ask you to sign this informed consent form. - The PI will countersign this form and send a copy to you. A soft copy will be stored in the PI's secure drive which will be password protected. - Only when you receive the countersigned ICF will a link to the first survey (powered by Limesurvey) be sent to you. To maintain your anonymity, you will be asked to generate a unique participant code. Before you finish answering, you have the option of v. July 2020 1	downloading a copy of your responses. Upon submission of the survey, your responses will be kept secure in the Limesurvey database and only the PI and the faculty adviser will have access to the data. - If you consent to the SMI survey, you will be shared a link to the SMI website, where you will register to have access to the tool. Your responses to the SMI survey will be stored in the SMI database and only the PI and the faculty adviser will have access to group-level data. They cannot trace responses back to the individual. - In addition, an email will be sent to you requesting for an interview schedule. It will be conducted online through Zoom, and it will be recorded for transcription purposes. - Right before the interview begins, you will be asked for your permission to record the interview, and the PI will review this Informed Consent Form with you. After the interview, if the need for further clarifications arises, the PI will contact you through e-mail, or if necessary, schedule another interview with you if you can accommodate. - Questions to be asked will include sociodemographic information (age, gender identity, university, program of study), mobility experience whether virtual or physical, your sustainability mindset, and, if applicable, your thoughts about the COLL. - Within 24 hours after the interview, you will receive a link to a password protected folder which contains the interview recording. The folder name will be coded, and the password will be unique to you as a participant to protect your privacy. How long will I be in the study? The surveys will take approximately 20 minutes each to complete, and the semi-structured interview will take about one hour. The surveys and interview will be spread out during the semester. Where will the study take place? The study will take place online. The survey on the VE experience will be conducted via Limesurvey while the SMI survey will be conducted on the SMI website. The interviews will be conducted via a Zoom virtual room, at a schedule that is convenient to you. Are there any risks and what are they? There may be risks to participants associated with the recollection of challenging instances while studying through virtual or hybrid arrangements and with the critical reflection of sustainability mindsets. There is also potential physical risk in terms of eye and back strain. However, those risks would not exceed those encountered in daily conversation or operations in academic contexts. The risks to eye and back strain due to sitting for prolonged periods are also minimal since the interview will only be scheduled for an hour. What are the benefits of participating in the study? There are no direct benefits in participating in the study. However, your inputs will be greatly appreciated to enhance the understanding of and manner by which virtual strategies could promote and embody transformative sustainability learning. What happens if I do not choose to join the research study? Can I stop or withdraw from the study even after it has started? You may choose to join the study, or you may choose not to join the study. Your participation is <u>voluntary</u>. There will be no penalties or negative consequences if you decide not to participate. v. July 2020 2
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This is not a class requirement, and if you choose not to join or withdraw your participation later, your teacher will not be upset with your decision.

You can stop your participation in the research study and withdraw your data at any time even after it has started. There is no penalty or loss of benefits if you decide to do so.

If you no longer wish to be part of the research study, or if you want to withdraw your data so that the research will no longer use it, you may contact the PI at marianne.araneta@unipd.it.

How will confidentiality be maintained and my privacy protected? What personal or identifiable data will you obtain? Who will have access to or see my data?

The information you provide is confidential. The interview transcript will be anonymized. Your full name will not appear on any of the questionnaires, and information identifying you will not appear in any report or publication of this research. Only the PI and the faculty adviser will know the identity associated with the information collected for this study, and they will not reveal it to anyone else.

For more information on the data privacy policies of the programs to be used, you may refer to the following resources:

- Zoom privacy data sheet and privacy statement
- Limesurvey data privacy policy

Will I have to pay for anything?

There are no financial costs associated in participating in the study.

Will I be paid for participating in this study?

There are no financial benefits associated in participating in the study.

Who can I call for questions about the study or if I'm concerned about my rights as a research participant?

If you have questions or concerns regarding the study and your participation in it, please contact the PI or the faculty adviser listed on page 1 of this form.

If a member of the research team cannot be reached or you want to talk to someone other than those working on the study, you may contact the University Research Ethics Office at the Ateneo de Manila University by calling mobile no 0945 2136758 or landline (632) 8426-4001 local 4030 for any question, concern, or complaint about your rights as a research subject.

v. July 2020

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Certificate of Consent

I have been invited to participate in a study about how *virtual/learning strategies could promote and embody transformative sustainability learning*. In the study, I am asked to participate in a survey and interview.

I have read the information about the study, or it has been read to me. I have had the opportunity to ask questions about it and they have been answered to my satisfaction.

I consent voluntarily to be a participant in this study.

Signature of Participant:

Printed Name of Participant:

Date (month/day/year):

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Signature of Witness:

Printed Name of Witness:

Date (month/day/year):

Statement by the researcher/person obtaining consent

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this document has been provided to the participant.

Signature of Researcher/ person taking the consent:

Print Name of Researcher/person taking the consent:

Date (month/day/year):

v. July 2020

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Research title Digital spaces for sustainable learning: Exploring virtual exchanges as fertile ground for sustainability transformation

Doctoral dissertation (Doctor of Philosophy)

Marianne Grace Araneta, PhD Candidate
Department of Philosophy, Sociology, Pedagogy and Applied Psychology,
University of Padova, Italy

Prof. Dr. Monica Fedeli
Department of Philosophy, Sociology, Pedagogy and Applied Psychology,
University of Padova
monica.fedeli@unipd.it

Dear participants,

You are invited to take part in the research study “Digital spaces for sustainable learning: Exploring virtual exchanges as fertile ground for sustainability transformation” which focuses on your experience in the Clivex Climate Justice course organized by the Sharing Perspectives Foundation.

Your participation is voluntary, which means you are free to choose whether or not to participate. If you decide not to participate there will be no penalty or negative consequence. Your decision to participate or not will not have any impact on your job status or evaluations. Before you make a decision, you will need to know what the study is about, the possible risks and benefits of being in the study, and what you will have to do if you decide to participate. The researcher is going to talk with you about the study and/or give you this document to read.

Do not sign or agree to participate if you are unsure or have remaining questions. Please ask the researcher to explain anything unclear to you, including any words in this form. If you decide to participate, you will be asked to sign this form, and a copy or record of your consent and the study information will be given to you. Keep this form as it has the contact information and answers to questions about the study.

What is the purpose of the study?

The purpose of the study is to explore the potential of educational technology and digital pedagogies in promoting transformative sustainability learning. Through the lens of Critical Realism, it will explore

Why am I being asked to participate in the study?

You are being asked to join this study because you are a student at the university who went through the recent Climate Justice VE.

What will I be asked to do?

- Should you agree to participate in the study, the principal investigator (PI) will secure this informed consent form and will provide a link to schedule an interview with you. This interview will be set at your convenience, conducted through Zoom, and will be recorded for transcription purposes.
- Right before the interview begins, you will be asked for permission to record the interview (audio only), and the PI will review this Informed Consent Form with you.
- Questions to be asked will include sociodemographic information (age, gender identity, university, program of study), mobility experience whether virtual or physical, your ideas of climate justice, and your VE learning experience.

How long will I be in the study?

The interview will last for approximately an hour.

Where will the study take place?

You will be asked to log-in to a Zoom or virtual room, at a schedule that is convenient to you.

What are the benefits of participating in the study?

There are no direct benefits in participating in the study. However, your inputs will be greatly appreciated to enhance the understanding of and manner by which virtual exchanges could promote and embody transformative sustainability learning. Sustainability is a growing concern worldwide, and virtual contexts have gained significant use in organizations. Your input may assist in facilitating the use of digital pedagogies to support sustainability.

What happens if I do not choose to join the research study? Can I stop or withdraw from the study even after it has started?

You may choose to join the study or you may choose not to join the study. Your participation is voluntary. There is no penalty if you choose not to join the research study. Your professor/instructor will not be upset with your decision.

You can stop your participation in the research study and withdraw your data at any time even after it has started. There is no penalty or loss of benefits if you decide to do so.

If you no longer wish to be part of the research study, or if you want to withdraw your data so that the research will no longer use it, you may contact the principal investigator at marianne.araneta@unipd.it.

How will confidentiality be maintained and my privacy protected? What personal or identifiable data will you obtain? Who will have access to or see my data?

The information you provide is confidential. A participant-generated code will be used for the survey. The interview transcript will be anonymized. Your full name will not appear on any of the questionnaires, and information identifying you will not appear in any report or publication of this research. Only the principal investigator and her dissertation advisor will know the identity associated with the information collected for this study, and they will not reveal it to anyone else.

Will I have to pay for anything?

There are no financial costs associated in participating in the study.

Will I be paid for participating in this study?

There are no financial benefits associated in participating in the study.

Who can I call for questions about the study or if I'm concerned about my rights as a research participant?

If you have questions or concerns regarding the study and your participation, please contact the principal investigator or adviser listed on page 1 of this form.

Informed consent form (Case 1: Uni F)

Informed consent to participation and to the use of personal data

I have read and understood the information sheet you have given and I agree to participate in the project.

I understand that my participation is entirely voluntary and that I am free to withdraw at any time without giving any reason.	YES ☐	NO ☐
I agree to the interview being audio-recorded.	YES ☐	NO ☐
I agree to be identified using a pseudonym [i.e. alternative name generated by the researcher] within the research outputs.	YES ☐	NO ☐

Name of Participant

Date

Signature

Name of person taking consent

Date

Signature

Section B: Interviews

Interview guide for students

1. What do you understand of virtual learning (VL)?
2. Could you describe an experience of virtual learning at the university?
3. How would you define sustainability? How did you come to this definition? What influences or informs the way you define sustainability?
4. Did you have a VL experience that incorporated sustainability? In what way?
5. Thinking back over your VL experience, was there a time when you realized that your values, beliefs, or expectations on sustainability had changed? Why do you think it had to change? (social action/structural conditioning)
6. When and how did you first realize this change had happened? Was it while it was happening, mid-change, or once it had entirely happened (retrospective)? How did you respond to this change? (social action – micro)
7. What or who do you think influenced this change? Was it part of the class activity or something else? Could you describe their/its influence? (agent)
8. How do you manifest this change in your actions? How does this contribute to sustainability transformation at the university? (social action/structural elaboration)
9. How conducive a space is the university in supporting your sustainability values and action?
10. Would you continue to use virtual learning to deepen your sustainability mindset? Why or why not? What are some potential areas for improvement?

Interview guide for instructors

1. What do you understand of virtual learning (VL)? How do you incorporate VL strategies into your teaching?
2. Could you describe your experience of virtual learning at the university?
3. How would you define sustainability? How did you come to this definition? What influences or informs the way you define sustainability?
4. How did you incorporate sustainability into your VL?
5. Thinking back, could you describe an experience that changed your values, beliefs, or expectations towards sustainability? What or who do you think influenced this change?
6. When and how did you first realize this change had happened? Was it while it was happening, mid-change, or once it had entirely happened (retrospective)? How did you respond to this change?
7. Because of the VL experience, did you sense any change in the attitudes of your students during the course? How is it manifested?
8. How did this VL experience on sustainability contribute to sustainability transformation at the university?
9. How conducive a space is the university in supporting your sustainability values and action?
10. Would you continue to use virtual learning to deepen your students' sustainability mindset? Why or why not?

Section C: Surveys

Survey questions: LAS questionnaire (Case 1)

To maintain your identity for the pre and post-test surveys, your support is needed in generating participant ID codes. Generate your unique code 11-character code using the following:

- First letter of own first name (A-Z)
- First letter of father's first name (A-Z)
- First letter of mother's first name (A-Z)
- Birthday – From “01–31” (Make sure there is a 0 for numbers less than 10)
- Birth month – From “01–12” (Make sure there is a 0 for numbers less than 10)
- Birth year – “yyyy”

For example, if your first name is Maria, your father's first name is Paolo, and your mother's first name is Ava, and if you were born on August 10, 2022, your code will be: **MPA10082022**

Part 1: Socio-demographic characteristics

1. How old are you?
 - 16–19
 - 20–24
 - 25–29
 - 30 and above
2. To which gender identity do you most identify?
 - Female
 - Male
 - Transgender female
 - Transgender male
 - Gender variant/non-conforming
 - Not listed: _____
 - I prefer not to say
3. What is your nationality? _____
4. What is your current country of residence?
 - The Philippines
 - Finland
 - Other (please specify): _____
5. In which institution are you currently enrolled?
 - Ateneo de Manila University
 - The University of Turku
 - Other (please specify): _____
6. What is your current degree program?

Please specify if it's a bachelor's (first cycle) or master's (second cycle) degree:

7. What year of your program are in?

- 1st
- 2nd
- 3rd
- 4th

8. Which languages are you fluent in?

Please include your level of language proficiency for each language based on the [Common European Framework \(CEFR\)](#), where A1 = Beginner, A2 = Elementary, B1 = Intermediate, B2 = Upper intermediate, C1 = Advanced, C2 = Proficient

Part 2: Prior experience with VEs

9. Which statement would best describe your prior experience with Virtual Exchange (VE)?

A VE is “a pedagogic approach that uses technology and pedagogic designs to facilitate dialogue, discussion and collaboration amongst students who are situated in different geographic contexts often with the aim of fostering intercultural/global learning as well as disciplinary knowledge” (Helm, 2023, p. 5).

- This is the first time I've heard about VEs
- I've heard about VEs before (or similar programs such as Collaborative Online International Learning, e-tandem, virtual mobility, computer-assisted language learning) but I've had no prior experience
- I've experienced VE once
- I've had two to three VE experiences
- I've had more than three VE experiences

10. For those with prior experience in a VE, which statement would best describe the VE set-up of previous VEs?

Check all that apply:

- It was a dialogue-based VE, where the focus was on engaging in dialogue with others
- It was a challenge-based VE, where we were required to work with others on a particular task or challenge
- It was a comparative VE, where we used a theme or topic and compared it according to different cultural/geographic contexts

Part 3: Prior intercultural experience

11. Which statement would best describe your experience with international, university, or school-sponsored mobility?

- I have not yet gone abroad through a university or school-based international mobility program
- I have gone abroad once through a university or school-based international mobility program

- I have gone abroad two to three times through a university or school-based international mobility program
 - I have gone abroad more than thrice through a university or school-based international mobility program
12. For those with international, university, or school-sponsored mobility experience, on average, how long would the mobility last?
- Less than a month
 - 1–3 months
 - 4–6 months
 - 7–12 months
 - Over a year
13. Aside from university or school-based international mobility, how much have you traveled outside your country of residence?
- I've never traveled outside my country of residence
 - 1–2 times
 - 3–5 times
 - 6–10 times
 - More than 10 times
14. For those with experience traveling abroad aside from university or school-based international mobility, on average, how long would this trip last?
- Less than a week
 - 1–2 weeks
 - 3–4 weeks
 - 5–10 weeks
 - More than 10 weeks
15. For those with experience traveling abroad aside from university or school-based international mobility, which countries have you visited?
- List as many as possible

Part 4: Virtual Exchange Program on Sustainability

16. Thinking about your educational experience within the course, check off any statements that may apply:
- ☐ A. I had an experience that caused me to question the way I normally act.
 - ☐ B. I had an experience that caused me to question my ideas about social roles. (Examples of social roles include what a mother or father should do or how an adult or child should act)
 - ☐ C. As I questioned my ideas, I realized I no longer agreed with my previous beliefs or role expectations.
 - ☐ D. Or instead, as I questioned my ideas, I realized I still agreed with my beliefs or role expectations.
 - ☐ E. I realized that other people also questioned their beliefs.
 - ☐ F. I thought about acting in a different way from my usual beliefs and roles.
 - ☐ G. I felt uncomfortable with traditional social expectations.

- ☐ H. I tried out new roles so that I would become more comfortable or confident in them.
- ☐ I. I tried to figure out a way to adopt these new ways of acting.
- ☐ J. I gathered the information I needed to adopt these new ways of acting.
- ☐ K. I began to think about reactions and feedback from my new behavior.
- ☐ L. I took action and adopted these new ways of acting.
- ☐ M. I do not identify with any of the statements above.

17. Since the time the course began, do you believe you have experienced a time when you realized that your values, beliefs, opinions or expectations had changed?

- ☐ Yes. If "Yes", please go to question #3 to continue the survey.
- ☐ No. If "No", please go to question #6 to continue the survey.

18. Briefly describe what happened.

19. Which of the following influenced this change? (Check all that apply)

Was it a person who influenced the change? ☐ Yes ☐ No

If "Yes," was it ... (check all that apply)

- ☐ Another student's support
- ☐ Your classmates' support
- ☐ Your advisor's support
- ☐ A challenge from your teacher
- ☐ Your teacher's support
- ☐ Other: -----

Was it part of a class activity or experience that influenced the change?

☐ Yes ☐ No

If "Yes," what was it? (check all that apply)

- ☐ Term papers/essays
- ☐ Personal journals
- ☐ Period of deep thought
- ☐ Assigned readings
- ☐ Case studies
- ☐ Personal reflection

- ☐ Class/group dialogues or discussions
- ☐ Discussion of concerns
- ☐ Self-evaluation in courses
- ☐ Personal learning assessment
- ☐ Writing about concerns
- ☐ Sharing concerns within the class
- ☐ Personal journals
- ☐ Logbooks
- ☐ Nontraditional structure of the course
- ☐ Experiential workshops
- ☐ Laboratory experience

☐ Other: _____

Was it a significant event or change in your life that influenced the change?

☐ Yes ☐ No

If "Yes," what was it? (check all that apply)

- ☐ Marriage
- ☐ Birth/adoption of a child
- ☐ Moving
- ☐ Divorce/separation
- ☐ Death of a loved one
- ☐ Change of job
- ☐ Loss of job
- ☐ Other: _____

20. Thinking back to when you first realized that your views or perspectives had changed, what did your being in the class have to do with your experience of change?

21. Would you characterize yourself as one who usually thinks back over previous decisions or past behavior? ☐ Yes ☐ No

Would you say that you frequently reflect upon the meaning of your studies for yourself, personally?

☐ Yes ☐ No

22. Which of the following have been part of your experience in the course?

- ☐ Another student's support
- ☐ Your classmates' support
- ☐ Your advisor's support
- ☐ A challenge from your teacher
- ☐ Your teacher's support
 - ☐ Term papers/essays
 - ☐ Personal journals
 - ☐ Period of deep thought
 - ☐ Assigned readings
 - ☐ Case studies
 - ☐ Personal reflection
 - ☐ Class/group dialogues or discussions
 - ☐ Discussion of concerns
 - ☐ Self-evaluation in courses
 - ☐ Personal learning assessment
 - ☐ Writing about concerns
 - ☐ Sharing concerns within the class
 - ☐ Personal journals
 - ☐ Logbooks
 - ☐ Nontraditional structure of the course
 - ☐ Experiential workshops
 - ☐ Laboratory experience

Which of the following occurred during the course (check all that apply)?

- ☐ Marriage
- ☐ Birth/adoption of a child
- ☐ Moving
- ☐ Divorce/separation
- ☐ Death of a loved one
- ☐ Change of job
- ☐ Loss of job
- ☐ Other: _____

Survey questions: Pre-VE survey (Case 2)

To maintain your identity for the pre and post-test surveys, your support is needed in generating participant ID codes. Generate your unique code 11-character code using the following:

- First letter of own first name (A-Z)
- First letter of father's first name (A-Z)
- First letter of mother's first name (A-Z)
- Birthday – From “01–31” (Make sure there is a 0 for numbers less than 10)
- Birth month – From “01–12” (Make sure there is a 0 for numbers less than 10)
- Birth year – “yyyy”

For example, if your first name is Maria, your father's first name is Paolo, and your mother's first name is Ava, and if you were born on August 10, 2022, your code will be: **MPA10082022**

Part 1: Socio-demographic characteristics

1. How old are you?
 - 16–19
 - 20–24
 - 25–29
 - 30 and above
2. To which gender identity do you most identify?
 - Female
 - Male
 - Transgender female
 - Transgender male
 - Gender variant/non-conforming
 - Not listed: _____
 - I prefer not to say
3. What is your nationality? _____
4. What is your current country of residence? _____
5. In which institution are you currently enrolled? _____
6. What is your current degree program?
Please specify if it's a bachelor's (first cycle) or master's (second cycle) degree:
7. What year of your program are in?
 - 1st
 - 2nd
 - 3rd
 - 4th
8. Which languages are you fluent in?

Please include your level of language proficiency for each language based on the [Common European Framework \(CEFR\)](#), where A1 = Beginner, A2 = Elementary, B1 = Intermediate, B2 = Upper intermediate, C1 = Advanced, C2 = Proficient

Part 2: Prior experience with VEs

9. Which statement would best describe your prior experience with Virtual Exchange (VE)?

A VE is “a pedagogic approach that uses technology and pedagogic designs to facilitate dialogue, discussion and collaboration amongst students who are situated in different geographic contexts often with the aim of fostering intercultural/global learning as well as disciplinary knowledge” (Helm, 2023, p. 5).

- ☐ This is the first time I've heard about VEs
- ☐ I've heard about VEs before (or similar programs such as Collaborative Online International Learning, e-tandem, virtual mobility, computer-assisted language learning) but I've had no prior experience
- ☐ I've experienced VE once
- ☐ I've had two to three VE experiences
- ☐ I've had more than three VE experiences

10. For those with prior experience in a VE, which statement would best describe the VE set-up of previous VEs?

Check all that apply:

- ☐ It was a dialogue-based VE, where the focus was on engaging in dialogue with others
- ☐ It was a challenge-based VE, where we were required to work with others on a particular task or challenge
- ☐ It was a comparative VE, where we used a theme or topic and compared it according to different cultural/geographic contexts

Part 3: Prior intercultural experience

11. Which statement would best describe your experience with international, university, or school-sponsored mobility?

- ☐ I have not yet gone abroad through a university or school-based international mobility program
- ☐ I have gone abroad once through a university or school-based international mobility program
- ☐ I have gone abroad two to three times through a university or school-based international mobility program
- ☐ I have gone abroad more than thrice through a university or school-based international mobility program

12. For those with international, university, or school-sponsored mobility experience, on average, how long would the mobility last?
- ☐ Less than a month
 - ☐ 1–3 months
 - ☐ 4–6 months
 - ☐ 7–12 months
 - ☐ Over a year
13. Aside from university or school-based international mobility, how much have you traveled outside your country of residence?
- ☐ I've never traveled outside my country of residence
 - ☐ 1–2 times
 - ☐ 3–5 times
 - ☐ 6–10 times
 - ☐ More than 10 times
14. For those with experience traveling abroad aside from university or school-based international mobility, on average, how long would this trip last?
- ☐ Less than a week
 - ☐ 1–2 weeks
 - ☐ 3–4 weeks
 - ☐ 5–10 weeks
 - ☐ More than 10 weeks
15. For those with experience traveling abroad aside from university or school-based international mobility, which countries have you visited? List as many as possible

Part 4: Sustainability Competencies

The following pages contain a number of statements that you may or may not disagree with. There is no right or wrong answer; what's important is for you to rate how much these statements reflect what you feel, think, or know personally based on your level of agreement or disagreement. Use the following scale:

- A. Strongly Disagree (SD)
- B. Disagree (D)
- C. Neither Agree nor Disagree (NA/D)
- D. Agree (A)
- E. Strongly Agree (SA)

	Statement	SD	D	NA/D	A	SA
45	I am concerned about the short- and long- term impacts of personal actions on others and the planet;	1	2	3	4	5
16	I know the main views on sustainability: anthropocentrism (human-centric), technocentrism (technological solutions to ecological problems) and ecocentrism (nature-centric), and how they influence assumptions and arguments;	1	2	3	4	5
47	I listen actively and show empathy when collaborating with others to frame current and potential sustainability challenges;	1	2	3	4	5

32	I can analyze sustainability problems cutting across different domains/sectors (e.g. environmental, economic, social, and cultural) and scales (i.e. from local to global);	1	2	3	4	5
37	I can synthesise sustainability-related information and data from different disciplines;	1	2	3	4	5
50	I am committed to considering sustainability challenges and opportunities from different angles;	1	2	3	4	5
17	I know that ethical concepts and justice for current and future generations are related to protecting nature;	1	2	3	4	5
40	I can act promptly, even in the face of uncertainty and unforeseen events, keeping in mind the precautionary principle;	1	2	3	4	5
18	I know that our wellbeing, health, and security depend on the well-being of nature;	1	2	3	4	5
31	I can assess my own impact on nature and consider the protection of nature an essential task for every individual;	1	2	3	4	5
19	I know systems concepts including systems ontologies, cause-effect structures, cascading effects, inertia, feedback loops, structuration, and that every human action has environmental, social, cultural, and economic impacts;	1	2	3	4	5
46	I trust science even when lacking some of the knowledge required to fully understand scientific claims;	1	2	3	4	5
36	I can develop and test systemic interventions, transformational actions and transition strategies toward sustainability, accounting for local circumstances, unintended consequences, and cascading effects;	1	2	3	4	5
54	I recognize my own emotions, desires, thoughts, behaviors, and personality when engaging in sustainability issues;	1	2	3	4	5
20	I know sustainability claims without robust evidence are often mere communication strategies, also known as greenwashing;	1	2	3	4	5
49	I am willing to discontinue unsustainable practices and try alternative solutions;	1	2	3	4	5
34	I can establish a transdisciplinary approach to framing current and potential sustainability challenges and develop viable solution options;	1	2	3	4	5
21	I know different problem-solving frameworks that include diverse stakeholder perspectives to identify fair and inclusive actions;	1	2	3	4	5
39	I can initiate, facilitate, and support transparent, inclusive, and community-driven processes in sustainability efforts;	1	2	3	4	5
22	I know the difference between expected, preferred and alternative futures for sustainability scenarios;	1	2	3	4	5
53	I am confident about anticipating and influencing sustainable changes;	1	2	3	4	5
30	I can apply equity and justice for current and future generations as criteria for environmental preservation and the use of natural resources;	1	2	3	4	5

23	I know that human actions may have unpredictable, uncertain and complex consequences for the environment;	1	2	3	4	5
42	I am prone to acting in line with values and principles for sustainability, informed by concepts of justice, equity, responsibility, etc., in various processes, including visioning, assessment, and evaluation	1	2	3	4	5
24	I know that sustainability problems must be tackled by combining different disciplines, knowledge cultures and divergent views to initiate systemic change;	1	2	3	4	5
38	I can develop plans that leverage assets, mobilise resources, and coordinate relevant social, political and economic stakeholders in one's own community and region to address a sustainability problem;	1	2	3	4	5
25	I know policies that assign responsibility for environmental damage (e.g. 'polluter pays');	1	2	3	4	5
41	I can avoid personal health challenges and burnout in advancing sustainability transformation through resilience oriented self-care;	1	2	3	4	5
26	I know how to work with diverse participants to create inclusive visions for a more sustainable future;	1	2	3	4	5
44	I care about a harmonious relationship existing between nature and humans;	1	2	3	4	5
33	I can analyze and assess arguments, ideas, actions, and scenarios to determine whether they are in line with evidence and values in terms of sustainability;	1	2	3	4	5
51	I demand political accountability for unsustainable behaviour;	1	2	3	4	5
27	I know that preventive action should be taken when certain actions or inaction may damage human health and all life forms (precautionary principle);	1	2	3	4	5
48	I am aware that the projected consequences on self and community may influence preferences for certain scenarios above others;	1	2	3	4	5
29	I can articulate and negotiate sustainability values, principles, and objectives while recognising different viewpoints;	1	2	3	4	5
43	I am committed to respecting the interests of future generations.	1	2	3	4	5
35	I can envisage alternative futures for sustainability that are grounded in science, creativity and values for sustainability;	1	2	3	4	5
28	I know the importance of regulating, motivating, and continually improving myself, drawing on competencies related to emotional intelligence and social and emotional learning;	1	2	3	4	5
52	I am willing to engage with others to challenge the status quo;	1	2	3	4	5

Part 5: Virtual Exchange Program

Please answer the next questions based on what has been explained to you regarding the VE program integration into your course of study. In case it has not yet been explained, kindly specify.

55. What are your expectations for the VE? What do you look forward to?

56. Do you have any fears, doubts, or hesitations about the VE? Could you describe them?

57. In case there's anything else you'd like to share about the upcoming VE, you could share your thoughts/feelings in this space.

Survey questions: Post-VE survey (Case 2)

What is your participant ID? In case you've forgotten, your unique code was generated using this order:

- First letter of own first name (A-Z)
- First letter of father's first name (A-Z)
- First letter of mother's first name (A-Z)
- Birthday – From “01–31” (Make sure there is a 0 for numbers less than 10)
- Birth month – From “01–12” (Make sure there is a 0 for numbers less than 10)
- Birth year – “yyyy”

For example, if your first name is Maria, your father's first name is Paolo, and your mother's first name is Ava, and if you were born on August 10, 2022, your code will be: **MPA10082022**. Make sure it has 11 characters.

Part 1: Sustainability Competencies

The following pages contain a number of statements that you may or may not disagree with. There is no right or wrong answer; what's important is for you to rate how much these statements reflect what you feel, think, or know personally based on your level of agreement or disagreement. Use the following scale:

- Strongly Disagree (SD)
- Disagree (D)
- Neither Agree nor Disagree (NA/D)
- Agree (A)
- Strongly Agree (SA)

	Statement	SD	D	NA/D	A	SA
1	I am concerned about the short- and long- term impacts of personal actions on others and the planet;	1	2	3	4	5
2	I know the main views on sustainability: anthropocentrism (human-centric), technocentrism (technological solutions to ecological problems) and ecocentrism (nature-centric), and how they influence assumptions and arguments;	1	2	3	4	5
3	I listen actively and show empathy when collaborating with others to frame current and potential sustainability challenges;	1	2	3	4	5
4	I can analyze sustainability problems cutting across different domains/sectors (e.g. environmental, economic, social, and cultural) and scales (i.e. from local to global);	1	2	3	4	5
5	I can synthesise sustainability-related information and data from different disciplines;	1	2	3	4	5
6	I am committed to considering sustainability challenges and opportunities from different angles;	1	2	3	4	5
7	I know that ethical concepts and justice for current and future generations are related to protecting nature;	1	2	3	4	5

8	I can act promptly, even in the face of uncertainty and unforeseen events, keeping in mind the precautionary principle;	1	2	3	4	5
9	I know that our wellbeing, health, and security depend on the well-being of nature;	1	2	3	4	5
10	I can assess my own impact on nature and consider the protection of nature an essential task for every individual;	1	2	3	4	5
11	I know systems concepts including systems ontologies, cause-effect structures, cascading effects, inertia, feedback loops, structuration, and that every human action has environmental, social, cultural, and economic impacts;	1	2	3	4	5
12	I trust science even when lacking some of the knowledge required to fully understand scientific claims;	1	2	3	4	5
13	I can develop and test systemic interventions, transformational actions and transition strategies toward sustainability, accounting for local circumstances, unintended consequences, and cascading effects;	1	2	3	4	5
14	I recognize my own emotions, desires, thoughts, behaviors, and personality when engaging in sustainability issues;	1	2	3	4	5
15	I know sustainability claims without robust evidence are often mere communication strategies, also known as greenwashing;	1	2	3	4	5
16	I am willing to discontinue unsustainable practices and try alternative solutions;	1	2	3	4	5
17	I can establish a transdisciplinary approach to framing current and potential sustainability challenges and develop viable solution options;	1	2	3	4	5
18	I know different problem-solving frameworks that include diverse stakeholder perspectives to identify fair and inclusive actions;	1	2	3	4	5
19	I can initiate, facilitate, and support transparent, inclusive, and community-driven processes in sustainability efforts;	1	2	3	4	5
20	I know the difference between expected, preferred and alternative futures for sustainability scenarios;	1	2	3	4	5
21	I am confident about anticipating and influencing sustainable changes;	1	2	3	4	5
22	I can apply equity and justice for current and future generations as criteria for environmental preservation and the use of natural resources;	1	2	3	4	5
23	I know that human actions may have unpredictable, uncertain and complex consequences for the environment;	1	2	3	4	5
24	I am prone to acting in line with values and principles for sustainability, informed by concepts of justice, equity, responsibility, etc., in various processes, including visioning, assessment, and evaluation	1	2	3	4	5
25	I know that sustainability problems must be tackled by combining different disciplines, knowledge cultures and divergent views to initiate systemic change;	1	2	3	4	5

26	I can develop plans that leverage assets, mobilise resources, and coordinate relevant social, political and economic stakeholders in one's own community and region to address a sustainability problem;	1	2	3	4	5
27	I know policies that assign responsibility for environmental damage (e.g. 'polluter pays');	1	2	3	4	5
28	I can avoid personal health challenges and burnout in advancing sustainability transformation through resilience oriented self-care;	1	2	3	4	5
29	I know how to work with diverse participants to create inclusive visions for a more sustainable future;	1	2	3	4	5
30	I care about a harmonious relationship existing between nature and humans;	1	2	3	4	5
31	I can analyze and assess arguments, ideas, actions, and scenarios to determine whether they are in line with evidence and values in terms of sustainability;	1	2	3	4	5
32	I demand political accountability for unsustainable behaviour;	1	2	3	4	5
33	I know that preventive action should be taken when certain actions or inaction may damage human health and all life forms (precautionary principle);	1	2	3	4	5
34	I am aware that the projected consequences on self and community may influence preferences for certain scenarios above others;	1	2	3	4	5
35	I can articulate and negotiate sustainability values, principles, and objectives while recognising different viewpoints;	1	2	3	4	5
36	I am committed to respecting the interests of future generations.	1	2	3	4	5
37	I can envisage alternative futures for sustainability that are grounded in science, creativity and values for sustainability;	1	2	3	4	5
38	I know the importance of regulating, motivating, and continually improving myself, drawing on competencies related to emotional intelligence and social and emotional learning;	1	2	3	4	5
39	I am willing to engage with others to challenge the status quo;	1	2	3	4	5

Part 2: Virtual Exchange Program

64. How did doing this project collaboratively with international partners impact your learning experience?

65. How did doing this project online impact your learning experience?

66. How did the VE impact your views on sustainability?

67. What are the strengths of the VE?

68. How could the VE be improved?

69. In case there's anything else you'd like to share about the VE, you could share your thoughts/feelings in this space.

Section D: Observation notes

Session 1: Case 1 (COIL)

OBSERVATION NOTES

Lesson no.	1	Date and time	October 3, 2023
Time started	3:30 PST	Time ended	5:00 PST
No. of breaks	0		
No. of instructors	2 Uni P, 1 Uni F	Guest instructors	Yes, 1
No. of students (start)	18	No. of students (end)	
No. of cameras (start)	2	No. of cameras (end)	

Teaching event 1	
Start time	3:30
Topic	General class introduction, housekeeping, rules
Instructor	Shared between three mainstay instructors
Other instructional strategies	Mentimeter and word cloud
Notes	<i>(Student-instructor and student-student dynamics; points of convergence/divergence; questions; cameras switched on/off; internet connectivity)</i> - Students were asked to follow the nomenclature of institution_name - Mentimeter was used after the introduction, asked about the word "culture"; only 12 students shared responses - Only two students from Uni F had camera on at the beginning, none from Uni P - Some students had profile photos (4), while the rest were represented using letters
End time	3:54

Teaching event 2	
Start time	3:54
Topic	Cultural ecology
Instructor	Guest speaker
Lesson format	Lecture
Other instructional strategies	Break-out room discussions
Groupings	Four breakout rooms, with 3 to 5 students each
Notes	<i>(Student-instructor and student-student dynamics; points of convergence/divergence; questions; cameras switched on/off; internet connectivity)</i> Introduction provided by Emman spoke about cultural ecology, featured buildings and traditional ecological knowledge (TEK) from the Philippines; included even Apo

Whang-od, issues of ancestral domains in the Philippines (Cordilleras during Martial Law: Macfi-ing Dulag)	
- Activity 1 in breakout room: Culture Captured in our Camera Roll – upload photo from phone gallery which depicts your culture: Photo on Padlet - Use of emoji function in Zoom - Everytime they share an external activity, they share on the screen, a link, a QR code, I joined a breakout room but only the Uni F students had their cameras switched on; all Uni P students had their cameras switched off; Emman joined the break out room and only he reacted - Emoji reactions rather than facial reactions - Someone shared about mother's day in Finland and one student asked about the practice in the Philippines—two students from Uni P would respond (sharing of similar practices) - One girl started sharing and then she stopped all of a sudden—hard to understand because there was no camera, talked about her project that involves technology and agriculture - One student switched her camera on when she shared about her photo "I also heard that in the Philippines Christmas starts in September" - One student from Uni F kept asking about myths or stereotypes in the Philippines - A number of students from Finland are not Finnish; I think most of the students from Uni P are Filipino	End time 4:27

Teaching event 3	
Start time	4:28
Topic	Problems regarding culture (tensions)
Instructor	Guest speaker
Lesson format	Lecture
Other instructional strategies	Break-out room discussions
Groupings	Four breakout rooms, with 3 to 5 students each
Notes <i>(Student-instructor and student-student dynamics; points of convergence/divergence; questions; cameras switched on/off; internet connectivity)</i> - Emman: Tensions between culture and technology – spoke of colonization by Global North of Global South - Tension between culture and profit (Kaliwa Dam) - Gives Philippine examples	

- Breakout room: similarities and differences in culture, tension between culture and technology/profit
 - Filipino students were invited to be hospitable to “guests” – therefore the set up is Filipinos as hosts
 - I joined breakout room 4, with only one student from Uni P with a camera on, two students from Uni F had cameras on, one P had camera off
 - One difference is that of space (from Uni F) – so much space in Finland compared to elsewhere
 - I joined another breakout room where everyone had their cameras switched on, only one student from Finland who is also from Vietnam
 - There was talk of culture being a part of “collective memory”
 - Collective memory being a source of tension, as memory is relative
 - The conversation centered around tension
 - One spoke of land conversion: agricultural land being converted to industrial land
 - At the end of the session, more people had their cameras on (majority were Uni F students)
 - There was a wrap up at the end of the course
 - Presentation had a refreshing look
 - The idea of cultural ecology puts culture as importance
 - Additional class material on cultural ecology: video
- | | |
|----------|------|
| End time | 5:00 |
|----------|------|

Thoughts and questions

- As a researcher, I was not sure whether to switch on my camera or leave it off, as majority had their cameras switched off. I didn't want to draw attention to myself but I also didn't want to appear rude
- While Emma was introducing the Philippines, I was wondering if colleagues from Finland would do the same thing
- Students took their time to explain certain backgrounds or locations that might be taken for granted—fast days, etc. Spanish influence on culture
- It's hard to have the students lead sessions unless there is one who takes initiative; there should always be a facilitator present

Session 2: Case 1 (COIL)

OBSERVATION NOTES

Lesson no.	2	Date and time	October 27, 2023
Time started	3:31 PST	Time ended	5:00 PST
No. of breaks	0		
No. of instructors	2 Uni P, 1 Uni F	Guest instructors	No
No. of students (start)	14	No. of students (end)	14
No. of cameras (start)	2	No. of cameras (end)	0

Start time	3:31	Teaching event 1	
Topic	Textile production, consumption, and waste		
Instructor	Uni F instructor, Mona		
Lesson format	Lecture		
Other instructional strategies	Break-out room discussions		
Groupings	Four breakout rooms, with 3 to 5 students each		
Notes	<i>(Student-instructor and student-student dynamics, points of convergence/divergence, questions, cameras switched on/off, internet connectivity)</i> • Video of a fast fashion landfill in Chile shown to student; audio intermittent; technical problems • Lecture resumes • Introduces circular economy as a solution to the textile problem • Uni F instructor speaks of CE from a European Union perspective • Talks about Uni F as a prime example of a city for sustainability • One student came in late • Gave the example of second hand shops as a solution that still has tradeoffs—people not reducing fast fashion consumption because of option to recycle textiles or to have them up for reuse • Another example: Finnish sustainable brands are becoming more expensive and inflation makes it difficult for people to purchase them; brands appealing to Finnish people to make responsibly-produced clothes; responsible consumption is still consumption • Showed the complexity (mentions “systemic structure”) of textile industry • Introduction lasted for about 20 minutes		
End time	3:53		

Teaching event 2	
Start time	3:54
Topic	Textile production, consumption, and waste
Instructor	Uni F instructor
Lesson format	Case-based approach via breakout room discussions
Other instructional strategies	Guided questioning, case presentation
Groupings	Four breakout rooms, with 3 to 5 students each
Notes <i>(Student-instructor and student-student dynamics; points of convergence/divergence; questions; cameras switched on/off; internet connectivity)</i> • Prior to break out, some guidelines given: ◦ Students should get each others' contact info ◦ Someone should take notes ◦ Task: Answer discussion points provided at the end of the case study material ◦ Compare experiences and insights, knowledge and contextual issues: "was something, for example, different, similar, or surprising?" ◦ Be prepared to share the main insights ◦ Detailed presentations next week (Friday) ◦ Presentation guidelines shared • Next Tuesday sessions will be independently organized, however classes were suspended for the Philippine students • Students given 45 minutes to discuss • Professors jumping from room to room but only as observers Group 1 • I joined Group 1, with 1 student from Uni F and 2/3 from Uni P • Uni F student had camera on while Uni P students had cameras off • One said she switched her camera off due to poor internet connectivity • A Google doc was shared • Uni F student eventually switched off camera • Filipino students code switching • Finnish student shared first, since the presentation was based on the Finnish context • Finnish student seemed to have difficulty speaking in English • Alexis mentioned Filipino context differing from Finnish context • A Filipino student shared, highlighting differences between the two contexts • One Filipino student eventually switched on camera, Finnish student also kept camera on	

• Finnish student asked question about Filipino context • One FIL student talked about herself personally (being an online consumer and also buying secondhand clothing online)	
Group 2 • Two FIN students, and three FIL students • All cameras switched on • Students were sharing their contexts • One of the FIN students seemed to be Vietnamese • There was talk about influencers making an impact on the fashion industry • People talking about their contextual experiences • The Vietnamese student seemed to have been called by a different name • Students are connecting via Facebook—they might meet outside of the class • Mona entered the class but there was no need to intervene because of the ease of the discussions	
End time	4:43
Teaching event 3	
Start time	4:44
Topic	Textile production, consumption, and waste
Instructor	Uni F instructor
Lesson format	Case presentation in plenary session
Other instructional strategies	N/A
Groupings	Plenary sharing
Notes <i>(Student-instructor and student-student dynamics; points of convergence/divergence; questions; cameras switched on/off; internet connectivity)</i> • Mona welcomed students back; asked students to share main themes and topics • Reminded them that next Friday, there will be a ten-minute period for students to get organized for their presentations • Around 6 Finnish students • Around 9 Filipino students • Sharers kept their cameras off • Sharing per group—some groups were more comprehensive than others • Sharing had diverse foci • One mentioned how differences in context helped them learn from each other • Mention of interwoven social and economic issues • Students using emojis every now and then	
End time	5:00

Thoughts and questions • Students only asked to participate (by speaking) during the breakout rooms and not within the plenary while the professors are lecturing • Only form of participation being asked of them is via Mentiimeter • Why is student VOICE limited to break out rooms? • When professors speak, they do so only of their own context, but not of the context of others (Guest speaker from Uni P gave Philippine examples; Mona from Uni F gave Finnish examples) • Poor internet connectivity really is a hindrance to Filipino students—perhaps they should be taught how to “troubleshoot” or even circumvent such issues (writing notes first, having audio, shared document) • Filipino students code switching—perhaps they should be made aware • There was difficulty getting the discussion going and Alexis had to intervene when she jumped into the breakout room • Students not talking about themselves personally but in general—guide questions not written to have students think about their own contribution • Students going through guide questions rather than conversing • I kept my camera off, so as not to seem too intrusive and to more easily blend into the background • There is an age difference between FL and FIN students—Fins are much older • There really needs to be facilitators of discussions, whether students or teachers • It seems that most of the FIN students are female • I had to add “observer” to my name for students to know that I was not another student • Having cameras on really affects interaction • Perhaps there needs to be getting to know you or interactive activities first before going into the groups • Filipino students are more comfortable with the language of exchange (in general)	
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Session 3: Case 1 (COIL)

OBSERVATION NOTES

Lesson no.	3	Date and time	November 3, 2023
Time started	3:30 PST	Time ended	5:00 PST
No. of breaks	0		
No. of instructors	2 Uni P, 1 Uni F	Guest instructors	No
No. of students (start)	14	No. of students (end)	14
No. of cameras (start)	2	No. of cameras (end)	0

Teaching event 1

Start time	3:30
Topic	Preparation time (pre-presentation)
Instructor	Mona, Ria, and Alexis
Lesson format	Preparation time
Other instructional strategies	N/A
Groupings	N/A
Notes	

(Student-instructor and student-student dynamics; points of convergence/divergence; questions; cameras switched on/off; internet connectivity)

- Class began on time; only professors had their cameras switched on (Mona, Ria, Alexis)
- Students were given ten minutes to prepare their presentations
- After the ten-minute prep time, participants back in the room with one Uni F student having her camera on
- Students presented with Q&A after

Presentation assignment

- You'll prepare a short 10 minutes presentation about this case with your group during an **independently organized** small group meeting on **October 31**.
- The presentation should include:
 - 1 slide presenting the **benefits and problems of a circular economy solution** you identified in the case. Think this in relation to socio-ecological problems of textile industry. You may utilize analytical tools, such as Iceberg Framework or influence diagrams to structure the **systemic relations** of your findings.
 - 1 slide outlining possible **differences** of problems and/or solutions relating to textile industry and the reasons of these differences in the Finnish and Philippine context.
 - 1 slide with a suggestion on **how to further develop** sustainable textile industry solutions

The presentations are given in the joint session November 3.

End time 3:40

Teaching event 2	
Start time	3:40
Topic	Presentation on circular economy solution for textile production
Instructor	Uni F Instructor
Lesson format	Group presentation with one student representative
Other instructional strategies	
Groupings	Three groups
Notes	
<i>(Student-instructor and student-student dynamics; points of convergence/divergence; questions; cameras switched on/off; internet connectivity)</i>	
Group 1	
3 out of 4 participants switched on their cameras - Students used Iceberg model - Instructors asked questions after	
Group 2	
- Half Finnish, half Filipino: 4 participants; one Finnish student is from Vietnam - Cameras on - Students used Iceberg model - Instructors asked questions after and gave feedback after	
Group 3	
- Went deeper - Feedback given by instructors	
End time	5:00

Thoughts and questions

- I decided not to be there during the students' prep time to give them the space to prepare
- There are just 1–2 Finnish students per group
- Students not questioning each other, Q&A comes from the teachers

Session 4: Case 1 (COIL)

OBSERVATION NOTES

Lesson no.		4	Date and time		November 7, 2023
Time started		3:34 PST	Time ended		5:00 PST
No. of breaks		0			
No. of instructors		1 Uni P, 1 Uni F	Guest instructors		1 from Uni F, but as observer
No. of students (start)		13	No. of students (end)		13
No. of cameras (start)		0	No. of cameras (end)		0

Teaching event 1	
Start time	3:34
Topic	Food Waste and Sustainable Systems
Instructor	Mona
Lesson format	Lecture with slides
Other strategies	N/A
Groupings	N/A
Notes	
<i>(Student-instructor and student-student dynamics; points of convergence/divergence; questions; cameras switched on/off; internet connectivity)</i>	
- Mona and Ria introducing the class, Oliva (guest instructor) also present but with camera off - Presentation on Food Waste and Sustainable Systems - Mona speaks about a food crisis in the Philippines; she talks about various issues tied with food systems, with a particular focus on food waste (EU context)	
End time	3:54

Teaching event 2	
Start time	3:55
Topic	Food waste throughout the supply chain
Instructor	Ria
Lesson format	Lecture with slides
Other strategies	N/A
Groupings	N/A
Notes	
<i>(Student-instructor and student-student dynamics; points of convergence/divergence; questions; cameras switched on/off; internet connectivity)</i>	
Ria asked her (Uni P) students about what they remember about food production and food waste in the Philippines—difference between the Philippines and Finnish context; she talked about it in previous classes	

- Ria's presentation has a slide with comparisons among world regions (food waste throughout the supply chain) – Production, handling and storage, processing, distribution and market, consumption - North America and Oceania: CONSUMPTION while in South and Southeast Asia: PRODUCTION <table><tr><td>End time</td><td>4:10</td></tr></table>		End time	4:10												
End time	4:10														
<table><tr><td colspan="2">Teaching event 3</td></tr><tr><td>Start time</td><td>4:11</td></tr><tr><td>Topic</td><td>Food waste and sustainable systems</td></tr><tr><td>Instructor</td><td>Mona and Ria</td></tr><tr><td>Lesson format</td><td>Breakout room discussions</td></tr><tr><td>Other strategies</td><td>Guided questions, case presentation</td></tr><tr><td>Groupings</td><td>Four breakout rooms</td></tr></table> Notes <i>(Student-instructor and student-student dynamics; points of convergence/divergence; questions; cameras switched on/off; internet connectivity)</i> - Students to go to breakout rooms for group discussion - Mona prepared nine questions to guide the discussion - Students given 30 minutes to talk Group discussions What strategies to reduce food waste and Marko encountered during his day? What problems relating to food systems you recognize? To what social, economic and environmental issues these relate to? What actors are involved in the creating the problems and their solutions? What factors are complicating these solutions? What sort of effects the Covid-19 pandemic has had to food consumption and waste. What Marko could write about the promotion of sustainable food systems? Other perspectives to consider: Why food waste is an important issue to solve? What are the similarities and differences in the Finnish and Philippine contexts? The layers of the iceberg models, systemic relations, gender, social class / income... Break-out room 2 - One UNI P student with camera on, one Uni F student with camera on 2 other UNI P students talking but with cameras switched off, and another Uni F student with camera off - Students seem to be working on a document, they are typing out what they previously wrote down - One UNI P student switches on camera - Three students were leading the discussion (from UNI P) Break-out room 4 - All cameras are switched off		Teaching event 3		Start time	4:11	Topic	Food waste and sustainable systems	Instructor	Mona and Ria	Lesson format	Breakout room discussions	Other strategies	Guided questions, case presentation	Groupings	Four breakout rooms
Teaching event 3															
Start time	4:11														
Topic	Food waste and sustainable systems														
Instructor	Mona and Ria														
Lesson format	Breakout room discussions														
Other strategies	Guided questions, case presentation														
Groupings	Four breakout rooms														
- Three UNI P students and one Uni F student - One student asked a question about the Finnish context and it took a while for the Finnish student to respond—but they were able to have a conversation - Students exchanging information about their context but they aren't that familiar with some aspects of the local context Break-out room 3 - When I entered, no one was talking - Two UNI P students and one Uni F student - I waited about three minutes then moved to a different room Break-out room 1 - Three Uni P students and one Uni F student - They were talking about differences in seasons - They were asking questions about different contexts - One student leading the discussion (facilitating) from Uni P but the other students were engaging in the discussion - Two students seem to be within the same classroom (Uni P) - Students seem to be comfortable with each other - Students were unsure about their information (agriculture in the Philippines) I revisited break-out room 3 with three minutes left and the students were talking, two Uni P students with cameras on, one with camera switched off. Another Uni F student with camera on—she was in Break-out room 2, previously but she was moved to this break-out room. <table><tr><td>End time</td><td>4:45</td></tr></table>		End time	4:45												
End time	4:45														
<table><tr><td colspan="2">Teaching event 4</td></tr><tr><td>Start time</td><td>4:45</td></tr><tr><td>Topic</td><td>Food waste throughout the supply chain</td></tr><tr><td>Instructor</td><td>Mona and Ria with guest instructor, Alexis caught up</td></tr><tr><td>Lesson format</td><td>Case presentations per group in the plenary session</td></tr><tr><td>Other strategies</td><td>N/A</td></tr><tr><td>Groupings</td><td>N/A</td></tr></table> Notes <i>(Student-instructor and student-student dynamics; points of convergence/divergence; questions; cameras switched on/off; internet connectivity)</i> - Alexis joined the plenary - Students asked to share the insights from their discussions - Starting with Group 4: Cara from Uni F sharing about Finnish context: Filipino student sharing about Philippine context; Ria and Mona wrapping up after the group		Teaching event 4		Start time	4:45	Topic	Food waste throughout the supply chain	Instructor	Mona and Ria with guest instructor, Alexis caught up	Lesson format	Case presentations per group in the plenary session	Other strategies	N/A	Groupings	N/A
Teaching event 4															
Start time	4:45														
Topic	Food waste throughout the supply chain														
Instructor	Mona and Ria with guest instructor, Alexis caught up														
Lesson format	Case presentations per group in the plenary session														
Other strategies	N/A														
Groupings	N/A														

• Other groups unable to share because bell was rung in the Philippines but Ria asked students if there was something pressing to share • One Uni P student talked about huge difference between Finnish and Filipino contexts (hunger for the PH context)
End time5:00

Thoughts and questions

- There seems to be only two students from Finland
- Ria's presentation seemed to be more comprehensive, looking at the psychology or cause of food waste
- In groups with cameras switched on, I felt uncomfortable being the only one with the camera switched off
- I wanted to correct students when they were not sure about the information they were sharing
- Uni P students seem more versed in discussing using the iceberg framework—seems that they had more lectures on the topic

Session 5: Case 1 (COIL)

OBSERVATION NOTES

Lesson no.	5	Date and time	November , 2023
Time started	3:30 PST	Time ended	5:00 PST
No. of breaks	0		
No. of instructors	2 Uni P, 1 Uni F	Guest instructors	Yes, from Uni P
No. of students (start)	14	No. of students (end)	14
No. of cameras (start)	0	No. of cameras (end)	See details below

Teaching event 1			
Start time	3:32		
Topic	Social enterprises		
Instructor	Guest speaker from Uni P		
Lesson format	Lecture with slides		
Other strategies	Breakout room discussions as follow up		
Groupings			
Notes			
<i>(Student-instructor and student-student dynamics: points of convergence/divergence; questions; cameras switched on/off; internet connectivity)</i>			
• All students had their cameras switched off—hard to determine which were from Uni F and which were from Uni P • Topic was mainly centered on the Philippine setting but questions for breakout discussions were applicable to both contexts			
Questions for breakout room discussions			
• What makes social enterprises different from a regular SME? • What role can or do social enterprises play in the larger community? How do they interact with other stakeholders in the system? • How can social enterprises become vehicles for leadership in sustainability? Conversely, what are some of the challenges or barriers that they have to content with?			
End time	4:01		
Teaching event 2			
Start time	4:01		
Topic	Social enterprises		
Instructor	Guest speaker from Uni P		
Lesson format	Breakout room discussions		

Other instructional strategies		Guided questions with case presentation
Groupings	4	
Notes <i>(Student-instructor and student-student dynamics; points of convergence/divergence; questions; cameras switched on/off; internet connectivity)</i>		
Break-out room 4 - All students had their cameras off but the discussions continued - They were able to carry out a conversation - Students were confused about what social enterprises were versus SMEs - They were able to establish a difference between the Finnish and Filipino setting		
Break-out room 1 - All cameras were switched on (3 Filipino students, 1 Finnish) - It seemed as if the students were in the same room		
Break-out room 3 - No one was talking - All cameras were switched off (only 3 students)		
Break-out room 2 - All Filipino students - Three students, 2 with cameras on		
End time	5:00	
Thoughts and questions • Filipino students were the ones leading the discussion • It doesn't seem like there is a lot of conversing going on in most groups • More camaraderie in one group—with cameras on • Why are all their cameras switched off?		

Session 6: Case 1 (COIL)

OBSERVATION NOTES

Lesson no.	6	Date and time	November 21, 2023
Time started	3:30 PST	Time ended	5:00 PST
No. of breaks	0		
No. of instructors	2 Uni P, 1 Uni F	Guest instructors	None
No. of students (start)	7	No. of students (end)	7
No. of cameras (start)	0	No. of cameras (end)	0
Teaching event 1			
Start time	3:30		
Topic	The Sachet Economy: Small but terrible?		
Instructor	Alexis, Ria		
Lesson format	Lecture with slides		
Other instructional strategies	Icebreaker activity—guess a photo Follow-up breakout room discussion		
Groupings			
Notes	<i>(Student-instructor and student-student dynamics; points of convergence, divergence; questions; cameras switched on/off; internet connectivity)</i> • No students have cameras on • Only the instructors have cameras on • Ria asked students to guess a photo, only four Filipino students answered • Around 3 Finnish students out of 13 students • Students using emojis to react • Only two breakout rooms because of small number of students		
End time	4:13		
Teaching event 2			
Start time	4:14		
Topic	The Sachet Economy (plastic pollution)		
Instructor	All three instructors		
Lesson format	Breakout room discussion		
Other instructional strategies	Guided questions with case presentation		
Groupings	2		
Notes	<i>(Student-instructor and student-student dynamics; points of convergence, divergence; questions; cameras switched on/off; internet connectivity)</i>		

Discussion prompts

1. What is the root cause of the plastic pollution problem?
 - Is it a technology issue? Is it a collection issue?
 - Is there a more fundamental problem?
2. Who are the players within this system?
3. Does the problem lie with the consumer, the waste manager, the manufacturer, or the government?
4. Is Extended Producer Responsibility possible? What are the social, economic and technological issues associated with this?
5. What is the definition of recycling? Is recycling sachets technically and economically feasible?

Break out room 2

- Only one Finnish student
- No one had their cameras on

Break out room 1

- Two students had their cameras on, one Filipino, one Finnish
- The Filipino student with her camera on was leading the discussion

In the plenary session, students didn't switch on their cameras

End time

Thoughts and questions

- A small number of students were leading the discussion
- There wasn't anyone left in the class—I think only three students from Uni F were present, and one of them had intermittent connection

Section D: Codebook

Inferential themes – Case 1 (from student interviews)

Inferential theme <i>It is plausible to claim that...</i>	Case 1	
	Freq	Ref
Dilemmas, tensions, or conflicts can help bring about SUS transformation	6	1
Enabling SUS transformation involves understanding context and culture	3	3
Exposure to diverse perspectives could affirm one's experience	3	2
Exposure to diverse perspectives could help in building empathy	4	1
Exposure to diverse perspectives could help in understanding differences	4	3
Exposure to diverse perspectives could inspire transformative ideas and action	16	4
Facilitation of dialogues can support students' critical reflection	1	1
Service learning could enable SUS transformation	3	1
Some skills can be taught to deepen SUS conceptualization	2	2
SUS at uni level fosters SUS transformation in the teaching–learning community	25	5
SUS at uni level needs to be coherent	9	2
SUS conceptualization and operationalization has political undercurrents	1	1
SUS conceptualization and operationalization is dependent on the context	19	5
SUS conceptualization as a way of living and being	1	1
SUS conceptualization as complex and multidimensional	12	3
SUS conceptualization is deeply emotional and spiritual	13	3
SUS conceptualization must consider structural inequalities	5	1
SUS conceptualization recognizes interconnections by adopting a systemic view	5	3
SUS in the classroom could inspire SUS change at the uni	3	2
SUS interested motivated by novelty or market demands	5	2
SUS leaders or mentors can enable transformation	1	1
SUS teaching strats catered to student background and needs	1	1
SUS teaching strats involve application of SUS concepts in real life	11	5
SUS teaching strats involve collaborative and participatory approaches	2	1
SUS teaching strats involve creative and flexible teaching strategies	1	1
SUS teaching strats involve critical and reflexive approaches	20	5
SUS transformation considers new ways of thinking and being	2	1
SUS transformation entails showing SUS alternatives	2	1
SUS transformation involves a change in values and behaviour	5	2
SUS transformation involves critical and participatory practices	4	1
SUS transformation involves harnessing local alternative practices	1	1
SUS transformation motivated by community	2	1
Teachers and students need to be trained to effectively use VL	3	2
Teachers are not intrinsically motivated to use VL strats	1	1

The learning process must include autonomous and independent forms of learning	3	2
There must be an aspiration for SUS to prompt transformation	1	1
Transformation involves critical reflection	3	1
Transformation involves having greater sense of agency	1	1
Transformation is a process that takes time	3	1
Transformative processes come with maturity	2	2
VE groups must be well-organized are important to ensure efficacy	3	3
VE helps in building criticality and reflexiveness	3	2
VE helps in building solidarity and instilling hope	12	4
VE helps in humanizing distant experiences/learned information	10	4
VE helps in preventing discrimination and stereotyping	2	1
VE participants need to be open and knowledgeable	10	2
VEs are open to misunderstanding due to language and communication barriers	1	1
VEs are opportunities to interact with and understand different realities	23	5
VEs can enhance VL by providing rich interactions	2	2
VEs can help in decolonizing education	4	2
VEs help in building a global community	3	2
VEs need coordination between partners	6	3
VEs need to be well-designed and organized to be effective	7	1
VEs should have more opportunities for relationship-building	8	3
VEs take a lot of time and effort in terms of preparation and execution	5	2
VL can supplement rather than substitute effective F2F teaching strategies	13	4
VL cannot guarantee the same depth of interaction	1	1
VL empowers marginalized to engage in global SUS discourse	3	1
VL enables access to SUS practitioners	5	3
VL enables easier access to global SUS perspectives	2	2
VL has issues related to access, adoption, and quality	5	3
VL needs to leverage creative and flexible tools and strategies	14	3
VL provides greater access to education and ensures learning continuity	14	3
VL strats need to be adapted to student needs and maturity	2	2
VLs can foster sense of interconnectedness across different spheres	1	1

Dispositional themes – Case 1

Dispositional theme (TSL lens) <i>The inferred phenomenon is dependent on the existence of X...</i>	Total Freq	Uni P	Uni F	Ref
head ped: exposing students to diverse perspectives and practices	34	12	22	6
head ped: foregrounding real-life cases and practices	10	3	7	5
head ped: integrating critical and reflexive teaching strategies	13	8	5	5
heart ped: giving voice to first-person, living experiences	12	4	8	4
heart ped: providing opportunities for sharing and collaboration	15	3	12	5
heart prob: differences in timing, attendance, and target group	10	8	2	5
heart prob: interactions that were more transactional discussions than relationship-building conversations	9	6	3	3
hands ped: integrating practical skills	4	4	0	3
feet ped: maintaining coherence with uni culture	24	19	5	5
feet ped: unearthing the context that underlies sustainability knowledge, values, and practices	9	5	4	4
virtual learning: issues related to access, adoption, and quality	7	2	5	4
virtual learning: leveraging opportunities for learner autonomy	11	0	11	3
virtual learning: extending the learning environment	15	5	10	5
head fx: having a more nuanced understanding of sustainability	16	13	3	4
heart fx: stretching one's empathy	6	5	1	2
heart fx: discovering companions in sustainability	10	4	6	4
hands fx: inspiring transformative ideas and action	7	7	0	3
feet fx: affirming one's experience	3	2	1	3

Experiential themes – Case 2

Experiential theme	Files	References
chat gpt, preachy, or poor translation	11	18
emotions	17	30
ashamed or embarrassed	1	1
comfort and ease	1	1
empathy	2	2
helplessness	1	1
hopefulness	10	11
inspired	1	2
motivated to act	7	8
skepticism	4	4
greencomp competencies	38	159
adaptability	0	0
collective action	24	45
critical thinking	10	15
exploratory thinking	0	0
futures literacy	2	2
individual initiative	13	16
political agency	12	17
problem framing	11	18
promoting nature	0	0
supporting fairness	8	15
systems thinking	15	17
valuing sustainability	11	14
group interaction	39	181
autonomy to discuss	1	1
breakout rooms	4	4
concordance due to fear	1	1
convergence	9	11
divergence	11	15
age and experience of participants	2	4
expected more divergence	8	9
mutual respect	7	14
no right or wrong	1	1
openness	8	14
preferred big group rather than break-out room	1	1
relationship-building	21	39
rigidity of opinion	1	1
safe space	10	15
sense of comfort or closeness among group members	1	1
supportive environment	8	9
impact_dialogues	42	246
conversations off track	1	1
course motivation differs	1	1

debate during discussions	2	3
desire to learn more	1	1
digital divide	2	2
do not make assumptions	1	1
exposure to other contexts or POVs	31	66
hard to build conversation	5	5
improved interaction in another language	5	8
increased awareness of other ways of knowing and being	3	3
increased confidence when speaking	3	3
interaction with real people with real experiences	10	12
knowledge or understanding of climate change differs	11	13
knowledge of topic	1	1
language as barrier	10	16
language as bridge	1	1
learning from others	4	6
learning through dialogue	23	40
less time to talk about climate justice	2	3
listen more or ask more questions	6	7
more time needed	6	9
need to expand conversation	1	1
prompted reflection	4	8
scientific foundation needed	2	2
seeing or questioning own context	8	10
sharing feelings and POVs rather than information	2	3
sharing of culture and traditions	9	11
technical issues	5	7
unequal participation	3	3
impact_learning resources	14	22
enrich dialogue sessions	2	2
expanding understanding	3	5
information as basic	1	1
inspired by resources	3	3
limited focus of materials	1	1
not as engaging	3	3
preparation impacts participation	5	6
insights_climate change	41	349
access to credible information on climate change	4	4
accountability for climate impact	6	8
green guilting	1	1
personal accountability	3	5
behavioral changes needed	3	3
capitalism and corporations	18	29
climate change not a priority or not as important	3	4
climate concern as privilege	13	15
climate issue as complex and wicked problem	2	2
climate issues as urgent and important	4	7

climate justice	21	33
colonialism and oppression	4	4
conflict or war as more urgent reality	8	9
consumption and consumerism	8	9
degrowth	4	4
diversity and equal representation in climate action	5	6
finding solutions	1	1
first-hand experience on impact	8	8
gender or racial discrimination and climate issues	7	9
geo engineering	2	2
global north and south divide	5	7
globalization	4	4
greenwashing	8	8
impact and responses differ	21	31
impact of the pandemic on climate change behaviors and attitudes	4	4
indigenous or local and alt forms of knowledge as impt	9	10
individual actions	5	7
inspired by climate change activists	1	2
intersectionality	14	18
participatory and collaborative solutions to climate issues	4	5
political aspect of climate change	19	25
religion or spirituality and climate change	2	2
systemic view of climate issues	8	11
underlying social and structural inequalities	18	38
unifying problem	5	7
war and climate issues	9	10
Western-centric discourse or decision-making	2	3
insights_others	35	75
diversity as important to humanity	2	3
diversity to enhance learning	17	24
education for sustainability	2	2
information not new	2	3
misinformation and distortion of narratives	11	14
personal connection	5	5
power of storytelling	5	5
role of the youth	1	2
transdisciplinarity	1	1
war in Palestine	14	16
positioning of participants	7	14
privileged	7	14
underprivileged	0	0
project	39	84
obstacles or challenges	1	1
opportunities or strengths	9	11
role of facilitator	12	25
transformative shift	0	0

Dispositional themes – Case 2

Dispositional theme (TSL lens) <i>The inferred phenomenon is dependent on the existence of X...</i>	Weekly reflections	Post-VE survey	Interviews
Expanding knowledge of climate justice and structural inequalities	65	26	16
Encouraging exchange of knowledge and opinions	40	33	12
Exposure to diverse perspectives and experiences	66	43	17
Crowded curriculum	9	22	6
Different levels and sources of knowledge	20	5	0
Giving voice to first person, living narratives	12	25	10
Providing safe enough spaces for dialogue and relationship-building	58	42	14
Differences in motivation and participation	4	1	11
Misunderstandings and miscommunications	19	6	0
Integrating collaborative and project-based learning to promote climate solutions	11	9	4
Utilizing active learning, group-based strategies	21	26	8
Working with group members from diverse backgrounds and geographies	3	8	0
Engaging in a real project	60	2	5
Learning flexibility and convenience	9	14	10
Internet connectivity and digital proficiency	25	13	7

Section E: Others

Reflection Journal Prompt

Each week, reflect and record your experience of the week's session by answering the question in the online form linked below. This will create a personal record of your experience and development through the 10-week Virtual Exchange process. When read together, they will showcase what you have learnt.

Use this opportunity to reflect honestly on valuable insights, strong feelings towards an issue, significant moments in the group process, or key turning points in your thinking.

You could reflect on one of the following topics:

- Your expectations
- The relationships and emotions in the group
- You and your fellow participants' beliefs, values and experiences
- The specific topics of the video lectures
- Moments that have inspired you
- Your understanding of others and of yourself
- Challenging moments
- Negative experiences
- Climate justice

Your reflections should be 1–2 paragraphs in length. Please make sure to use a minimum of **75 words** in order to receive points for this assignment.

Topic Outline – Case 2

4. TOPIC OUTLINE

The main theme of this course is climate justice, with a focus on inclusive climate action. The proposed curriculum aims to inform students on this large theme by addressing sub-themes in a manner that allows them to comprehend its complexity and intersections with other social issues, reflect on power dynamics and global politics, while ultimately empowering them to engage in civic action to contribute towards inclusive climate action.

Week 1: Introduction to the Climate Crisis and the Concept of Climate Justice

An introduction to the course and the concept of climate justice, as well as a preview of the content students will engage with. They will discuss what experience and knowledge they are bringing into the course, what they hope to learn, and what aspects of climate justice they are eager to discuss with their Virtual Exchange group.

Week 2: Climate Change and Inequality (Part I)

Climate change does not impact everyone the same way or to the same extent. This week students will look at the inequality of vulnerability, the concept of environmental racism, and how their social identities can play a key role in how climate change affects their lives.

Week 3: Climate Change and Inequality (Part II)

What is intersectionality, how is one intersectional, and what does this have to do with climate change? This week, students will look at how social identities combine and shape a person's perspectives and circumstances. They will also explore how understanding this is important to taking inclusive climate action.

Week 4: Power and Climate Action

Who has the power to make impactful decisions about climate action? How or where are these decisions being made? This week, students will look at examples of inclusive action and responses to climate change, identify stakeholders at different levels, and analyse what their own role can be.

Week 5: Climate Justice Through a Personal Lens

This week, students will turn the focus to personal experiences. They will reflect on their identities, their lived experiences, and their participation in change-making. They will get to hear the personal climate stories of individuals from around the world, and share their personal stories as well.

Week 6: Global Politics and Climate Policy

How do politics affect (and are affected by) sustainability efforts worldwide? This week, students look at the politics of climate change, including the key actions and debates taking place on the international level.

Week 7: Critical Lens on Climate Initiatives

The world is seeing a rapid rise in initiatives, policies and products that are carbon-neutral, environmentally friendly, and explicitly taking climate change into consideration - but are these initiatives authentic, or might they be too good to be true? This week, students will take a critical look at some of the most popular climate 'solutions,' their outcomes, and where to most effectively direct our support.

Week 8: Climate Communication and Advocacy

What stories do we hear about climate change, and what narratives and frames are used to tell them? This week students will look at the media landscape, ways climate stories are communicated, and how this translates into action.

Week 9: Climate Crisis Strategies: Mitigation, Adaptation and Resilience

What powers do technology, nature, and our creativity have to mitigate climate change? This week students will explore how nations, cities and people are rising to meet the challenges posed by their changing environments.

Week 10: Your Climate Actions

In their final week, students will reflect on their journey together and the road ahead. They will look back on their personal and collective accomplishments throughout the course, and look ahead to the role they want to play in their future and the future of our planet.