Disruptive Learning: Re-orienting Frames of Mind Towards Becoming Sustainability Change Agents

Tanja Annemarie Tillmanns, BSc, MSc

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Dublin City University

Supervisors: Dr Charlotte Holland & Dr Francesca Lorenzi

School of STEM and Global Studies

DCU Institute of Education

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Declaration

I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of PhD is entirely my own work, and that I have exercised reasonable care to ensure that the work is original, and does not to the best of my knowledge breach any law of copyright, and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

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Abstract

Author: Tanja A. Tillmanns

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Education for Sustainable Development (ESD) is a key driver of change agency for sustainability. Nonetheless, the infusion of ESD within higher education remains at a low level, despite efforts at national and international levels by organisations such as UNESCO. This research set-out to explore teaching and learning approaches that could be used to [re]-orient higher education students' anthropocentric frames of mind. Inspired by Jack Mezirow's concept of Transformative Learning (1991, 2009) and Kurt Lewin's notion of Re-education (1948), a series of pedagogic interventions were designed with the intention of 'disrupting' learners' mind-sets, which progressively stimulated more critical thinking about interdependencies that exist between self, society and sustainability *inter alia*. The pedagogic intervention opened with the presentation of a 'Visual Cue', image or video accompanied by a critical question (each Visual Cue representing a disorienting dilemma), which was followed by rational discourse and critical reflection on key sustainability themes and principles. This qualitative research was conducted with participants, drawn from cohorts of initial teacher education students, between 2014 and 2016. Kathy Charmaz' Constructivist Grounded Theory approach guided the research process, which ultimately resulted in the articulation of the theory of, and processes within, Disruptive Learning. The findings clearly demonstrate that participants recognised concepts, contexts and issues within sustainability; critiqued sustainability contexts and self; re-oriented their perspectives/worldviews with respect to sustainability; and engaged in change agency for sustainability. Key recommendations include the integration of this Disruptive Learning framework in initiatives aiming to foster sustainability education within teacher education, other disciplinary areas in higher education, and other educational contexts. Further suggestions for future research involve the exploration and design of alternative Disruptive Learning interventions, the applicability of this theory and associated pedagogic processes in sustainability education within (higher) education contexts.

Chapter 1: Introduction

1.1 Introduction

The Japanese philosopher Tetsuro Watsuji (1889-1960) explored human beings through their interrelations with the wider community. He argued that an individual can only be understood through these 'betweeness', and the individual's only true moral choice is through self-sacrifice for the community (McCarthy 2010). This awareness, however, is less present in Western ideologies, which are influenced by Decartes' dualism or the Cartesian division, separating humanities and science, downplaying the subjective realm, and resulting in more "*mechanistic, atomistic and reductionist*" worldviews (Hay 2005, p.319). The colonial domination is one example, demonstrating the oppression of Western society against the 'other' be it human or non-human (Ladson-Billings and Donnor 2005). Furthermore, the ethos of industrial capitalism, promoted and valued throughout Western ideologies, shapes not only economy, but increasingly societies, cultures, environments, education *inter alia*; and its terminology of efficiencies and improvement influences collective thinking and acting, frequently resulting in negative consequences for the global society. González-Gaudiano and Gutiérrez-Pérez, (2017, p.134) point out that: "*the ideology of economic growth and progress is a fallacy […] and in implementing this ideology, citizens are placed in a state of collective hypnosis while root causes are concealed*." This ideology and Western individualisation contribute to increasing tensions between the global and the local; tradition and modernity; competition and equality of opportunity (Delors 1996) to name but a few. Consequently, individuals of industrialised nations tend to be anthropocentric - increasingly perceiving themselves separate from nature (Vining et al. 2008) and from one another.

One of the most valuable and powerful public goods is sustainability – an inherent solicitude for the survivability of life on Earth as we know it. To tap into the potential of this public good, a shift towards a relational worldview is urgently required. Instead of borrowing principles and procedures from other cultures, Western cultures should explore own 'cultural resources' for the identification of sustainability solutions (Bonnett 1999). The renowned ocean explorer, Robert Ballard points out that it is difficult for humankind to grasp that Earth is alive (National Geographic 2012). He discovered that organisms are thriving on the chimneys of underwater volcanos in the oceans depths, and his research of hydrothermal

vent ecosystems contributes to the understanding of the conditions for life on Earth. The mineral physicist Robert Hazen notes: "*life begets rock, rocks beget life*" (Wei-Haas 2016) as Earth "*may have forced life into existence as a means to alleviate the buildup of free energy stresses*" (Morowitz and Smith 2006, p.1). Bonnett (2013) notes that a re-evaluation of our relationship to nature requires a holistic perspective where an assault on a human is equal to illegal deforestation or pollution of a river. Potentially, holistic thought processes support the understanding of humankinds' position in the whole ecosystem, implying the importance of recognising sustainability as a "*frame of mind in terms of basic values, motives and attitudes towards nature*" (Bonnett 1999, p.319), including all living and non-living beings. Sustainability as a frame of mind has the potential to result in similar examples such as the Whanganui River in New Zealand, demonstrating how nature can be given a legal voice, as the river received the same recognition/ rights as a person (Postel 2012).

Minas Gerais is a 'hot spot' for mining of minerals in Brazil. One major extraction company active in this area is Samarco. Between 2008 and 2012, Samarco was responsible for the construction of the Fundão Dam to stock waste from iron extraction. On the 5th of November 2015, the Fundão dam burst, triggering a three meter 'toxic mud wave' that swept away the nearby town Bento Rodrigues before it entered the river Rio Doce, ending in the Atlantic Ocean after it had passed approximately 200 towns (Fernandes et al. 2016). On its destructive path to the Atlantic, which lasted for 16 days, the mud wave destroyed aquatic life and contaminated the water of the river and the ocean, affecting multiple livelihoods of fishermen, farmers, and indigenous communities, depending on Rio Doce (ibid). For the Krenak people, as of many other communities, Rio Doce was a source of all life and was used for fishing, bathing and celebrating ceremonies (Fadnes 2016). Through the initial impact of the mud wave, at least nineteen people, including children, lost their live because no warning sign was given (Fernandes et al. 2016). Samarco was aware of the risk. Researchers reported about the dam's poor conditions two years prior to the disaster (Saleem 2015; Kiernan 2016). One year after the tragedy, residents at Rio Doce still didn't trust the water as aquatic life showed red spots and wart like bumps (Fadnes 2016). Residence at the riverside also avoided tap water as Rio Doce feeds into a network of water reservoirs (ibid). However, the company had no obligation to care for the environment (Fadnes 2016). The clean-up by Samarco is slow and ineffective (Yeomans and Bowater 2016). The company emphasises that the quality of the water is comparable to the level before the dam spill, but daily supplies communities near Rio Doce with water from tanker trucks, which

nevertheless, are not covering their water needs (Naghettini and Lopes 2015). In addition, fishermen receive a monthly compensation of $400 and $80 for each dependent, which is less than what they would earn from their fishing (Fernandes et al. 2016). The government suspended Samarco's mining license after the spill. Samarco has been preliminarily fined with 250 million Reais (Naghettini and Lopes 2015). The long-term effects on international waters remain largely unknown (Fernandes et al. 2016).

This example demonstrates the importance to focus on the interconnections of all relevant aspects when making sustainability decisions. Environmental, social, ethical, cultural, political, legal or economic challenges cannot be seen in isolation from one another. Instead of trying to define the nature of each element of a challenge it is more important to focus on the in-betweens. Beyond an understanding of the interconnectedness, sustainability requires a deep and critical engagement with human values. Here, the example illustrates how moral questions can be raised to confront the industrial ethos and anthropocentrism, which is deeply embedded in dominant Western thinking. Samarco's moral obligation to restore the landform and its continuous destruction of ecosystems can be questioned from different angles. What would be the value of the restored environment facilitated by Samarco (the human agents) in comparison to the 'original' natural environment? If we put forward that sustainability equates to human wellbeing of present and future generations, it can be argued that it is morally wrong to destroy and pollute the 'original' natural environment. How can humanity adapt to changes, make use of scientific progress and simultaneously consider traditions and the rights of all life forms? These questions highlight the anthropocentric or human-centeredness that shape Western value systems, resulting in the prioritisation, protection and promotion of human interests and well-being at the expense of non-human things. They also relate to the paradoxes and tensions of the 21st century, such as between modern and tradition or spiritual and material (Delors 1996). Sustainability education should aim to build the capacity in students to be aware of these tensions. Education should provide a safe space of exploring these tensions to motivate the re-orientation of existing frames of minds and actions based on both an improved self-knowledge and an improved understanding of the interconnectedness and interdependencies of all life forms on this planet. Industrialised nations can build the capacities to learn to live in alternative ways and to create alternative ways of living. Education should support citizens to build this capacity to become sustainability change agents.

1.2 Research Overview

This qualitative research set-out to explore (pedagogic) processes that enable [re] orientations of higher education students' mind-sets towards sustainability, and promote change agency for sustainability. The pedagogic interventions for this study took the form of Visual Cue interventions – integrated activities triggered by using image or video and accompanied in most cases by a critical question - which were designed according to Jack Mezirow's theory of Transformative Learning, with a view to unsettle and challenge the frames of reference of students, and move them towards critical consideration and discourse on their role and that of others in enabling sustainable futures for all. The research was guided by the following questions:

- What impact do Visual Cue pedagogic interventions have on participants' frames of reference (thoughts and/ or feelings)?
- Which elements of Visual Cue interventions impact participants' frames of reference, and to what extent?
- To what extent do Visual Cue interventions enable participants to critically review the self in the context of sustainability, and/ or enable change agency?

This research took place in a higher education institution in Ireland within an undergraduate degree of teacher education. Kathy Charmaz' Constructivist Grounded Theory (CGT) approach, a systematic methodology in the social sciences, involving the possibility to construct a theory through the analysis of data, guided this study. It contains two phases of research, each with a different cohort of students. The first research phase took place from September 2014 to August 2015, and comprised interventions with two different groups, participating in a sequence of three Visual Cue interventions. The data collection tools for the first research phase included: survey tool, audio recordings of group discussions, researcher's personal reflections, and follow up questions by phone/email. The second research phase took place from September 2015 to February 2017. Here, the number of Visual Cue interventions was increased to six, and the time for each Visual Cue was extended from thirty to sixty minutes each. In addition, the Visual Cues were integrated into a sustainability module delivered across two programmes of studies in teacher education. The data collection tools were adjusted to gather more detailed data for the exploration of the impact of the Visual Cue interventions on students. The New Ecological Paradigm

survey, observational notes, researcher's reflective diary, participants' reflective diary and interviews were the method of choice to collect a comprehensive set of data.

The findings include the articulation of the theory of, and processes within, Disruptive Learning. The theory of Disruptive Learning, as the title suggests, rests on the premise that if learners' *frames of mind* or *frames of reference* can be disrupted (in other words, challenged), then learners' mind-sets can be re-oriented towards sustainability and indeed learners can be motivated to engage in change agency for sustainability. Disruptive Learning is fully activated through pedagogic processes employed within Visual Cue interventions that offer opportunities for deep consideration and sharing of perspectives, values, and worldviews. This study has shown that Disruptive Learning can activate these transformations *in self* and *of self*, particularly re-orientation of mind-sets towards sustainability, with a view to enabling change agency for sustainability.

1.3 Research Rationale

To date, little or no research has been conducted that focuses on innovative pedagogic approaches to challenge anthropocentric worldviews in higher education in Ireland. While there is an increasing awareness of the need for sustainability education and extensive knowledge of its content and direction, there is a lesser awareness of "*how this education can be effectively delivered to learners*" (Thomas 2014, p.1705), especially in higher education (Eilam and Trop 2010). Education in the context of sustainability is about exploring the interrelation of biodiversity, global warming, climate change, disaster risk mitigation, consumption and production, war, poverty, human and non-human rights movements. A key challenge in education is to enable learners to critically review and re-orient anthropocentric (human-centric) perspectives on sustainability. The known sustainability challenges are complex and fluid, and demand non-human centric thinking in constructing viable solutions. Learners should be engaged in pedagogic interventions that enable them to critique dominant human-centric worldviews and grasp the multiplicity and interconnectedness of sustainability challenges.

Therefore, both, (sustainability) education (Jickling and Sterling 2017) and pedagogies of higher education (Tilbury 2011) should be re-envisioned to make a meaningful contribution

to the sustainability agenda. According to Ferrente and Sartori (2016), traditional pedagogy is based on the humanistic and anthropocentric tradition. This research attempts to re-consider pedagogy by referring to *betweeness* of human and non-human and avoiding the assumption of human superiority. The Visual Cue interventions invite participants to consider for themselves how to establish a relationship and co-evolve with otherness. There is a limited consideration of pedagogy that promotes *"practices of self and world care, as well as all the forms of otherness with which we share processes of co-evolution, being aware of our ontological bias*" (Ferrente and Sartori 2016, p.184).

Eernstman and Wals (2013, p.1657) argue that: "*ESD [Education for Sustainable Development] essentially starts with and revolves around re-embedding SD [Sustainable Development] in life and the act of living*". Whereas emotions have the potential to stimulate the process of ethics and value clarification (Eilam and Trop 2010), fostering a personal attachment to sustainability (Shephard 2015), the use of the affective domain in higher education is limited (Dirkx 2008). Similarly, art has been increasingly used to raise public awareness (Kilaru et al. 2014), but there seems little or no regard to the usefulness of public art or work from the public domain for teaching and learning in higher education classroom contexts and Eernstman and Wals (2013) note the lack of considering art in the context of ESD. Nussbaum (2010) suggests a holistic approach to education that should draw from different domains such as arts or Socratic Inquiry to build the capacity of students to become democratic citizens in the world. Hence, it is argued that the combination of different pedagogies (Cotton and Winter 2010; Eilam and Trop 2010) and the use of elements from various learning theories (Schwab 1969) may be beneficial for sustainability education. Drawing inspiration from several learning theories, this research study set-out to explore just this—exploring disruptive pedagogical interventions that were designed to challenge and re-orient anthropocentric frames of mind of students in higher education. The purpose of this study was thus, to explore how disruptive pedagogical interventions could be used to challenge and transform anthropocentric mind-sets/ frames of reference of higher education students. An anthropocentric mind-set values the nonhuman world only because it directly or indirectly serves human interests (McShane 2008), and it has little consideration for human's dependency on the non-human community of life for its wellbeing. According to Mezirow (2009), a frame of reference is a 'meaning perspective' which we use to filter our impressions of the world. Such filter is formed by our values, beliefs and even our language. An anthropocentric frame of reference can be exemplified by language when considering

the theory of linguistic relativity, which argues that language fundamentally shapes the way we interpret the world (Bratton 2010). For example, in English we would say that 'you are on my left side', whereas in Napalese we would say that 'you are on the West side*'*. Nepalese uses an environmentally centred description of position and English has an anthropocentric dimension (Adami 2013), which Robert (2006) defines as an egocentric frame of reference that positions objects based on the speaker's position. In the context of this thesis, *frames of reference* influence and construct mind-sets. The terms *frame of mind, state of mind*, *mind-set* and *worldview* are synonyms and used interchangeably.

Sustainability pedagogies mainly emerged from the environmental education perspective of education *for, in* and *about* the environment, a compartmentalisation that is also adapted to sustainability education. Thus, just as in education *for* the environment, education *for* sustainability focuses mainly on the transformative aspect of education which also considers innovative pedagogies that foster ethics, values and behavioural change. Besides some differing views of environmental and sustainability education, advocates of both fields share the common interest of care for the planet. The term sustainability education is an integrative perspective that includes other related signifiers such as ecology education, human rights education, gender education, peace education *inter alia* (Jickling and Sterling 2017). UNESCO's holistic and transformational concept is called Education for Sustainable Development (ESD), which focuses on the educational environment, content, learning outcomes, and pedagogy. This research focuses on the [re-]orientation of anthropocentric worldviews and therefore the terms 'education for sustainability', 'sustainability education' and ESD are used interchangeably. The terms sustainable development and sustainability are also perceived as synonyms, even though the author is aware of the ambiguity surrounding the terms. Sustainability and sustainable development as well as the many signifiers within this widely-travelled territory of "education *for* something" (e.g. environmental education, human rights education, global citizenship education, ecology education etc.) all emphasise the urgent need to re-envision and remake education (Jickling and Sterling 2017). This thesis does not follow any 'signifier bandwagon'. It attempts to disrupt and stimulate visions to remake education in the context of the Anthropocene, global challenges and crisis.

1.4 Researcher Context and Genesis of Research

> The 21st century […] must develop sophisticated ways to address not only the brute material relations of class rule linked to the mode and relations of capitalist production and imperialist conquest but also the epistemological violence that helps discipline the world (Kincheloe and McLaren 2005, p.307).

The inspiration for becoming involved in sustainability education was grounded in my childhood and student life experiences. I grew up being environmentally conscious. The family business was recycling, and as a family, we lived the ideals associated with being environmentally friendly in our daily practices and actions.

I also learned from an early age on that humans can radically convert natural milieus which can have destructive consequences on all life forms living in this transformed environment. Being born and raised in Düsseldorf, I grew up at the Rhine river. Due to the immense chemical pollution by a pharmaceutical company, as a child I was constantly reminded that the Rhine is poisonous and we were not allowed to swim in it. The critical conscious of the citizens resulted in active engagement of communities and led to political and legal changes that ultimately forced the company to stop the pollution of the river. This context taught me two important life lessons as a young adult. First, critical consciousness can mobilise communities to organise themselves in ways that they use the power of the masses to enforce positive changes. Second, nature has the capacity to bounce back, as I witnessed the recovery process of the Rhine riverbed. It was exciting when the first aquatic life, such as little crabs, were sighted again in the river and I was proud to be part of the generation that was once again able to bath and swim in the river.

As an undergraduate student, in the disciplinary area of business, I realised the lack of concern for ethics within certain commercial sectors and how a capitalistic and industrial ethos increasingly influences all spheres of life. During my studies, I had the opportunity to travel to different parts in the world. The first key travel was to Nigeria, where I experienced the devastating far-reaching consequences of inequality, exploitation and destruction of the wealth of this country, such as the Niger delta - a land rich of fertile soil and natural resources, but where its people struggling to survive. In Zaria, I witnessed the hardship of people with health conditions, such as leprosy, being out casted from society and living in abject poverty. I saw first-hand the issues of urban poverty, lack of access to education and other basic needs. Through this experience and other key moments in my life journey, I

recognised that awareness of sustainability is not enough, education should explore and critique the interconnectedness of society, environment, politics, culture, economy and even spiritual *inter alia*.

My undergraduate and master studies provided me with a holistic perspective on economics, management, organisational studies, sociology and psychology. The key take away message from these studies is the understanding that the industrialised Western nations maintain international capitalist systems to keep their power and control over former colonies. Through my travels, where I always visited and stayed with locals, I gained a first-hand perspective on the consequences of post-colonialism and I learned that capitalism impacts the ever-increasing inequality on this planet. I realised the urgency of ethical awareness and practices, and the importance of education as an indispensable means to give all people in this world the capacity to own their lives, to be responsible and make decisions for their own well-being. I became increasingly interested in the concept of sustainability and the ambition to conduct this research emerged out of my passionate interest and life experiences.

Pittman (2004) cites Thomas Berry, who explores the ills in the relationship of Earth and human to point out that

> […] the university has a special role to fill as the institution with the critical capacity, the influence over the professions and societal activities, and the contact with the younger generation needed to reorient the human community toward a greater awareness that we exist within a single great interconnected community of the planet Earth (Pittman 2004, p.199).

I decided to conduct this research on education for sustainability within the context of higher education, as it is predominantly from this sector that our future leaders, educators and knowledge workers will emerge, and these influential individuals need to be educated to become change agents for sustainability in the future. Thus, this study was initiated to counteract prevailing Western worldviews that

> […] result in a detached posture of objectively observing the external and material environment, commodified, knowledge and culture, delineates education and schooling as serving primarily an economic function and assumes human control over nature and elite groups having power and control over other people (Stevenson 2002, p.187).

Next to my own life experiences, Deleuze and Guattari's (1987) conceptualization of *rhizome* has inspired me to challenge how I perceive reality or realities within our cosmos, to critically reflect on the myriad of connections and relationships within the cosmos, and to identify when and how processes of change take-place. It has also provided me with a new interpretation and perspective on my life. The decision to structure these interventions, was inspired by a quest for stimulating criticality on dominating centric worldviews combined with the belief that this can be encouraged through a recognition of heterogeneity, interconnectivity and multiplicity within our complex world.

The rhizome is an inspiration for alternative ways of perceiving the construction of knowledge and understanding, and the enactment of processes and practices in the world around us. It centres on critically examining connections within and interconnectivity of our world, and within this process uncovering relationships that lead to transformations of self/selves/other, human/non-human, physical/meta-physical processes and practices, etc. Considering major global issues, such as global warming, extreme human deprivation, modern forms of slavery and racism *inter alia*, the rhizome rises as a philosophical standpoint that enables one to see the interconnectedness of these problems. The Rhizome has the potential to enlighten, broaden minds and/or shift values to move away from/ beyond anthropocentric attitudes and behaviours.

In my opinion, the purpose of the Rhizome is to inspire us towards re-considering our understanding of how we come to know, and of the processes of becoming (human) in this world. Furthermore, it has the potential to inspire us to extend our frames of reference; thus, empowering transformations of mind-sets. I believe introducing learners to the interconnectedness of contemporary challenges and discussing contradictions and dilemmas, can inspire them to approach future decisions with a reoriented frame of mind. Once reoriented, this mind is open for the recognition of the complexity at play thus, fostering eventually practices that respect the interconnectedness of living and non-living beings for the well-being of this planet as we know it.

Within sustainability education, there is a real urgency for learners to become more proactive in helping create just, sustainable and peaceable societies. For this to happen, learners need to become more critically aware and action oriented. To do this, learners need to adjust/ extend/ critically review what is considered within their *normal* frames of reference. The

rhizome can also be a creative inspiration for developing 'novel' approaches to learning, pedagogy and teaching strategies. It also has the potential to inspire sustainable thinking, actions, living and/or practice that individuals create themselves for themselves and suitable to their unique context.

1.5 Contribution to Knowledge

The contribution to knowledge of this study is twofold:

1) The research has resulted in the articulation of the theory of, and processes within, Disruptive Learning. This theory is based on the premise that if learners' *frames of mind* or *frames of reference* can be disrupted (in other words, challenged), then learners' mind-sets can be re-oriented towards sustainability and indeed learners can be motivated to engage in change agency for sustainability. Disruptive Learning is fully activated through pedagogic processes that offer opportunities for deep consideration and sharing of perspectives, values, and worldviews. This study has shown that Disruptive Learning interventions can activate these transformations *in self* and *of self*, particularly re-orientation of mind-sets towards sustainability, with a view to enabling change agency for sustainability. Disruptive Learning has its roots in Transformative Learning (Mezirow 2009), as well as in the concept of Re-education (Lewin 1948), as it is concerned with effecting change, in terms of re-orienting learners' frames of mind, and promoting action for sustainability.

2) This research has further elucidated pedagogic processes that activate and enable Disruptive Learning, which include the integration of Visual Cue interventions, entailing disorienting dilemmas, followed by opportunities for individual reflection and group discourse. This study has shown that these processes result in: (1) disruption – unsettling of learners' existing frames of reference vis-à-vis sustainability; followed by (2) deep learning, to critique and strategise for sustainability, **and** reorientation of frames of mind towards becoming more sustainability oriented; and/ or, (3) change agency, to conduct sustainability actions.

1.6 Overview of Chapters

Chapter two explores the literature to set the context for this research. It briefly flags the historical path of the terms sustainability and sustainable development, with an emphasis on the emergence of the relevance of sustainability education in international policies. The chapter progresses to present an overview of education for sustainability and related pedagogies in the context of higher education. Here, a section based on a publication from Tillmanns et al. (2014) will highlight the potential of the rhizome in reconceptualising the re-orientation of sustainability education. This chapter concludes by detailing and connecting the learning theories that underpin sustainability pedagogies in higher education, namely: Lifelong Learning, Transformative Learning, Re-education, Emotional Learning, Values Learning, Pedagogy of Discomfort, Deep Learning and Art-based Learning.

Chapter three explains the methodological framework and the research design. It begins with the rationale for choosing Constructivist Grounded Theory (CGT) as the chosen methodological approach, outlining also the historical roots in Grounded Theory. This chapter also covers how this research applied the theoretical sampling of CGT; handled the literature review and the research questions; included researcher's reflective diaries, and described the CGT strategies used in the analysis process. The last section details the design of each research phase. Here, the research setting and ethical approval; participants; data collection tools; the analysis process, its challenges and how one research phase evolved from the previous phase are outlined.

Chapter four presents an overview and findings from the first research phase. It integrates the book chapter "Crafting pedagogical pathways that disrupt and transform anthropocentric mindsets of higher education students" by Tillmanns and Holland (2017). It begins with an overview of the disruptive pedagogic interventions before it explains the emergent theoretical categories, namely: *Emotional and cognitive disjuncture, Recognising principles, practices, issues and/ or themes of sustainability, Critiquing concepts and contexts of sustainability, and Reorienting dispositions/perspectives for sustainability*. This chapter also presents design considerations for the pedagogic process and Visual Cues, that inform the second phase of this research.

Chapter five begins with a description of the pedagogic design and process of the Visual Cue interventions in the second research phase. Then, the research process is outlined before the presentation of findings begins with an overview of participant's learning journeys.

Chapter six presents the evidence of learning of/for sustainability within the Visual Cues intervention, captured in the second research phase. It begins by comparing and contrasting the six theoretical categories that emerged in the second phase with those emergent from the first phase of research. The discussion progresses to explore the evidence for 'disruption' within the Visual Cue interventions - articulating the trigger/s for learning, and the stimulus for participant' re-orientation of self towards sustainability. This is followed by presentation of the evidence of the learning value of the Visual Cues, through presentation and discussion of the five different theoretical categories aligning with different "depths" or "levels" of learning. This chapter concludes with an exploration of participants' perspectives on the Visual Cue design considerations to stimulate disruption.

Chapter seven of the thesis opens with an explanation of Disruptive Learning, and what this constitutes within the context of sustainability education. It moves forward to summarise the nature of, and findings from, the Visual Cue interventions that enabled processes of Disruptive Learning within this study. This is followed by researcher reflections on the process of utilising Constructivist Grounded Theory (CGT) to explore Disruptive Learning processes. This chapter finishes with recommendations for future study in this area and conclusions drawn from this exploration of the activation of Disruptive Learning in the context of sustainability education.

Chapter 2: Literature Review

2.1 Introduction

This chapter presents a review of the literature, relevant to the context for this research. It briefly flags the historical path of the terms sustainability and sustainable development, with an emphasis on the emergence of the relevance of sustainability education in international policies. The chapter progresses to present an overview of education for sustainability and related pedagogies in the context of higher education. The potential of the rhizome in inspiring the re-orientation of sustainability education is articulated. This chapter concludes by detailing and connecting the learning theories that underpin sustainability pedagogies in higher education, namely: Lifelong Learning, Transformative Learning, Re-education, Emotional Learning, Values Learning, Pedagogy of Discomfort, Deep Learning and Art-based Learning.

2.2 Flagging Historical Path of Sustainability & Sustainable Development

The term "sustain" has been part of the Latin language for thousands of years. The Latin word "sustinere" means *hold back* or to *support something* and the term was mainly used in a micro or personal context (Henn-Memmesheimer et al. 2012). The shift towards using the term 'sustain' in macro contexts, as in the current understanding of sustainability, emerged according to Grober (2010) for the first time in print in relation to the European silviculture (forestry management). In 1713, Hannß Carl von Carlowitz used the word *nachhaltend* to advise the then-king in early economic thinking of forestry management, in a time when wood was the main source for energy and construction materials (Carlowitz 1713). Consequently, the term sustainability tends to be mainly associated with forestry and nature (Leal Filho 2000). However, sustainability is not any longer purely related to sustain the forest, and ultimately raises the question "what is to be sustained" (Bonnett 1999) – the ecosystems, economic growth, human and non-human well-being? To question what should be sustained illuminates the dominating anthropocentric frames of mind of Western societies, as the question implies that not everything can be sustained equally. It suggests that a prioritisation and a selection process is required, which in the light of anthropocentrism, hinders an interrelated perspective to tackle sustainability challenges

(Bonnett 1999). Sustainability should be approached from a holistic perspective, concentrating on the interrelationships of contemporary challenges and acknowledging that we do not know what is 'truly sustainable' (Bonnett 1999). Thus, it might be more accurate to question: "*what can I do?"* (Le Grange 2017, p.102).

There is growing evidence of the emergence of a new geological epoch, the Anthropocene. This epoch emerged during the mid 20th century, the beginning of rapid environmental changes and increased consumption of materials such as aluminium, concrete and plastic, leaving their imprint on our planet and turning into 'technofossils' (Waters et al. 2016). In the 1970s, the world experienced the impacts of its first oil crisis, and the attention of governments was once again directed to the need of long-term availability of natural resources (Stables 2004). Accordingly, sustainable development emerged as a policy statement (Bonnett 1999). The United Nations Environment Programme (1972) emphasised the importance of environmental education at the Stockholm Conference in 1972. However, it was only in 1987, through the Brundtland Report (WCED 1987), that the terms sustainability and development were put together, defining that sustainable development "*meet[s] the needs of the present without compromising the ability of future generations to meet their own needs*" (WCED 1987). This definition combines economic interests with ecological concerns (Stables 2004) and prioritises human needs (Bonnett 1999). Critiques soon revealed the contradicting nature of the term sustainable development, underplaying the emphasis on economic growth and its problematic anthropocentric stance of undermining non-human beings by reducing their right to "*protection of natural resources"* (Kopnina 2012, p.707; Bonnett 1999). Thus, the sustainability discourse is influenced by the ongoing debate within Environmental Values Education of anthropocentric vs non-anthropocentric worldviews (Pepper 1996). McShane (2008) defines anthropocentrism as *"the view that the nonhuman world has value only because, and insofar as, it directly or indirectly serves human interests, and nonanthropocentrism as the denial of this claim"*. However, Norton (2008) points out that there are differences in anthropocentric viewpoints, which he defines as weak and strong. "Weak anthropocentrists" can develop strong reasons for protecting the environment and value some aspects of nature. "Strong anthropocentrists" do not question humans-centred values which dictate that nature serves human interests (Norton 2008). Seghezzo (2009) notes that sustainability has multiple meanings and that various visions can coexist and enrich one another. Therefore, he proposes sustainability as a framework that captures the territorial (place), temporal (permanence) and personal

aspects, which are not considered in the mainstream understanding of sustainable development (Seghezzo 2009). Regardless of the empirical dilemma, the term sustainable development, emerged as a dominating discourse of international organisations (Kopnina 2012) and became a political slogan that also increased the interest of (environmental) educators in sustainable development (Stables and Scott 2002).

The Agenda 21 of the Rio Earth summit in 1992 officially prioritised education, training and public awareness as areas of sustainable development. Despite this, there was not a lot of action in education for sustainability between 1992 and 2002. This led to the decision by the UN General Assembly (2002) to declare the period between 2005-2014 as the United Nations Decade of Education for Sustainable Development (UN-DESD). The UN-DESD was an outcome of the Johannesburg Implementation Plan and was formulated at the World Summit on Sustainable Development in Johannesburg in 2002. The intent of the decade was to focus the attention of countries on integration of sustainability education policies, practices and initiatives. The increase of ESD national policies is one of the most notable accomplishment of the UN-DESD (UNESCO 2014b). Ireland is one nation that developed an ESD strategy in 2014, concentrating on: "*recommendations that are pragmatic rather than aspirational in nature*" (Department of Education and Skills 2014, p.3). The final report of monitoring and evaluating the UN-DESD in 2014 states that "*Education for Sustainable Development (ESD) empowers everyone to make informed decisions for environmental integrity, economic viability and a just society for present and future generations, while respecting cultural diversity*" (UNESCO 2014b, p.20). The core of ESD focuses on empowering people for change. It requires that learners develop a personal understanding and knowledge of sustainability, and evaluate existing values and mind-sets that are influential to their unsustainable dispositions and actions (Tilbury 2011). In 2014, the UN-DESD still had many shortages. Leal Filho (2014, 2015) highlights the lack of financial resources for collaborative work between UN members; the limitation of sharing best practices; and the shortcoming of capacity building of educators. Moreover, Jickling and Sterling (2017) point out that ESD initiatives follow an instrumentalist ideology, which according to Le Grange (2017) are manifested in transcendence - underpinning dominant assumptions of dualism and the idea that humans are separated from and superior to nature. As a result, the achievements of education and sustainability are rather insufficient (Jickling and Sterling 2017). Hence, (the relation between) sustainability and education should be re-envisioned (ibid). Le Grange (2017) refers to *after sustainability* to emphasise that

> […] sustainability education does not signify an a priori image of sustainability nor defines what the education pathway towards achieving sustainability should be. Instead it opens up possibilities for critical discussions on sustainability and suggests a process that is always in-becoming (p.96).

Following the end of the DESD, UNESCO endorsed in 2014 the Global Action Programme (GAP), representing a follow-up decade to foster actions in ESD (UNESCO 2014a). The GAP highlights, amongst other priorities, action of "*transforming learning and training environments*", focusing on networking with the broader community (ibid, p.18). The GAP emphasises greening of educational institutions (UNESCO 2014a, b) but does not specify the need for innovative strategies of learning and teaching. Similarly, the GAP priority action area of empowering and mobilizing youth' concentrates on networking through apps, offering information on ESD and sustainable lifestyles (UNESCO 2014a). Whereby, it is acknowledged that sustainability cannot be achieved without "*changes in the way we think and act*" (UNESCO 2014a, p.32), the Global Action Programme (GAP) on ESD announced in 2014 and the Sustainable Development Goals (SDGs) to be achieved by 2030 (announced in 2016) do not lay enough emphasis on a core aspect of ESD needed to be addressed – i.e. the identification of the ESD pedagogies that can bring about transformations of self (learner) and society. Neither the GAP nor the SDGs refer to how changes in the way we think and act can be initiated within ESD to empower the youth.

The Sustainable Development Goals (SDGs), also known as the 2030 Agenda, came into effect in January 2016, replacing the Millennium Development Goals (MDGs) that were advocated from 2000 to 2015. The SDGs are all encompassing. The seventeen SDG goals contain 169 associated targets, promoting prosperity, peace and partnership while protecting the planet and its people. In this regard, the SDGs encompass a variety of key areas such as: SDG1 No Poverty; SDG4 Quality Education; or SDG6 Clean Water and Sanitation to name but a few. The SDGs have the potential to raise awareness of a holistic understanding of sustainability as they mirror the complexity and heterogeneity of sustainability. However, critics describe the goals as encyclopaedic by declaring everything as a top priority, which may have the consequence that nothing is a priority (Easterly 2015). The fact that the goals are not legally binding further advocates critique. SDGs are based on the persisting dominating anthropocentric worldview, where the environment is "natural capital" belonging to humans and disregarding the value of non-human beings (Kopnina and Meijers 2014; Kopnina 2015). Additionally, the SDGs do not adequately ensure that ethics becomes

a matter of concern of the ESD agenda, even though many scholars are increasingly highlighting the importance of ethics (Deuchar 2006; Wiek et al. 2011; Biedenweg et al. 2013; Jickling 2013; Huckle and Wals 2015; Kopnina 2015). In this respect, the Earth Charter (The Earth Charter Commission 2000), a result of a worldwide collaboration that took a decade, remains the principal guide in moving towards ethics informed practices in education for sustainability. The Earth Charter is an international declaration, providing principles as an ethical framework that consider "*more bio-centric and eco-centric perspectives"* to enact educational initiatives (Wals 2014, p.13). The Earth Charter integrates the diversity and complexity of nature, culture and society required for a holistic approach and an inclusive understanding of sustainability. In 2003, the Earth Charter was endorsed by the UNESCO General Conference as a key ethical framework for sustainability education (UNESCO 2006).

Jickling and Wals (2008) conceptualise three approaches to ESD. The first approach is called 'Big Brother ESD'. It is based on an authoritarian and hierarchical perspectives of social interactions and perceives education as one of many tools to achieve sustainable development (Jickling and Wals 2008). 'The feel-good sustainable development' approach to ESD does not aim to challenge unsustainable systems or practices, which are controlled by authorities, while simultaneously providing individuals with a limited or disguised sense of control over their capacity to change the future (Jickling and Wals 2008). The third approach to ESD aims to 'enable thought and action', moving beyond sustainable development by actively engaging individuals and enabling environmental thought by exploring moral questions, values and justice (Jickling and Wals 2008). The third approach to ESD aligns with the perspective of sustainability as a frame of mind, based on values that respect both human and non-human nature (Bonnett 1999; Huckle 2006). Instead of focusing on sustainability as a non-legally binding policy, sustainability should be perceived as a frame of mind, that is inspired by the values and principles of the Earth Charter (Huckle 2006). In this way, "*sustainability conceived as a frame of mind may have positive and wide-reaching educational implications*" (Bonnett 1999, p.313). In order to perceive sustainability as a frame of mind and to re-orient anthropocentric frames of mind, which are inclined to accept a green rhetoric and unsustainable practices, sustainability education needs to provide opportunities for engagement in an exploration of values, status quo, norms and practices, to enable individuals to critically and creatively re-define conventional thinking and ways of living (Jickling 2013).

2.3 Educating for Sustainability in Higher Education

Education for sustainability in higher education is regarded only as an emerging field, of which most initiatives resulted since the launch of Agenda 21 in 1992 (Mintz and Tal 2014). Sterling's thesis (2003, 2004), based on a scholarly inquiry, proposes whole system thinking as a foundation for paradigm change in sustainability education. Within the thesis, he compares the stages of social and educational responses to sustainability (see Figure 1). In cooperation with Thomas (Sterling and Thomas 2006), this framework was later further developed and related to the curriculum in higher education, demonstrating how higher education institutions progressively move through four stages.

Figure 1: Stages for the Development of Sustainable Education in Universities

Sustainability transition	Response	State of sustainability	State of education
1. Very weak	Denial, rejection or minimum	No change (or token)	No change (or token)
2. Weak	'Bolt-on'	Cosmetic reform	Education about sustainability
3. Strong	'Build-in'	Serious greening	Education for sustainability
4. Very strong	Rebuild or redesign	Wholly integrated	Sustainable education

Adapted from: Sterling (2003, p.282) and Sterling (2004, p.58)

Sterling (2003, p.282) explains the four stages as follows:

- *The first step* 'response' is no response (or if there is *some* awareness, minimum response). This may be through ignorance or denial of the sustainability issue.
- *The second step* is accommodation: a 'bolt-on' of sustainability ideas to existing system, which itself remains largely unchanged. This is an adaptive, first order change or 'simple learning'. Through this response, the paradigm maintains its stability.
- *The third step* is reformation: this is a 'build-in' of sustainability ideas to the existing system through which the system itself experiences significant change. This is

critically reflective, adaptive, second order or 'metalearning' response, where paradigmatic assumptions are called into question.

- *The fourth step* is transformation: this is a deep, conscious reordering of assumptions equivalent to epistemic change, leading to change of paradigm.

Greening campuses and establishing networks within higher education institutions and/or with the wider society are clearly favoured approaches in higher education (Jones et al. 2010). These "bolt on" or "build in" approaches are also driven by governmental policies, fostering collaborations to bring together various stakeholders to transform campuses into green flagships. Most universities tend to focus on the 'bolt-on' and 'built-in approach' by focusing on the reduction of environmental impacts, adding new courses or modules that include ESD, and integrating ESD into existing programmes, research or professional development (Wals 2014; UNESCO 2014a). Thus, the bold-on or build-in approaches can be associated with Jickling and Wals' (2008) "Big Brother ESD" and "the feel-good sustainable development" approach to ESD. These approaches do not aim to challenge unsustainable systems or practices and are based on an authoritarian perspective, where education is just another tool to achieve sustainable development, while individuals are given limited capacities for change that lie within controlled boundaries (Jickling and Wals 2008). According to Armstrong (2011), the much-needed integration of sustainability-oriented pedagogies in higher education are much slower advancing then campus greening and research initiatives.

A main barrier of the "wholly integrative" approach to education for sustainability appears to be the lack of leadership in higher education (UNESCO 2014b). Yet, there is a noticeable increase of higher education leaders signing public charters and declarations, providing hope that the required link of innovation and learning will be more and more recognised (UNESCO 2014b; Tilbury and Wortman 2008). An optimistic outlook on changes in curriculum is also driven by the rising number of students entering higher education with a desire to learn and do more in relation to sustainability (UNESCO 2014b). Research into students' perception and their role within the whole-integration approach have so far received only minor attention, as research mainly concentrated on opportunities for professional development in sustainability education (UNESCO 2014b; Zeegers and Clark 2014; Birdsall 2013).

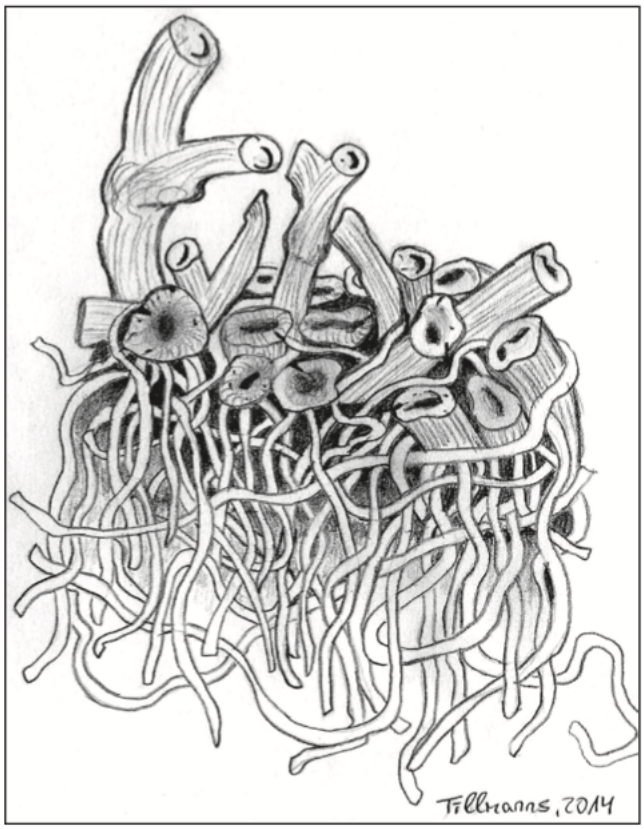
According to Wals and Blewitt (2010), we are now beginning to see "*the emergence of a 'third wave' of sustainability in HE, following the environmental and greening campus waves*. *This wave focuses precisely on the teaching and learning implications of sustainability"* (Wals and Blewitt 2010, p.57). While the literature portrays a clear need to reorient, shift and transform higher education, in practice, the academy shows a resistance to change (Corcoran 2010). This resistance seems to be mainly in relation to the required change to enable students to develop new values, skills and knowledge to transform into change agents. Therefore, academic staff needs professional development that moves beyond the cognitive domain (Shephard 2015), supporting university *"teachers to become transformative agents who treat students as active agents*" (Iliško 2007, p.17). Professionals require an understanding of their role of being change agents to enable students to become change agents for sustainability. Hence, teacher education should foster transformative intellectuals who provide guidance through the communication of critique and the emphasis on possibilities for a whole integration of sustainability (Huckle 1996). Pipere and her colleagues (2015) highlight that overall scholars agree that ESD research should focus on the re-orientation of perception and actions to develop lifestyles that acknowledge everyone's global responsibility. Researchers and educators alike should approach ESD "*as an opportunity to ensure the circumstances for the emergence of a sustainable future*" (Pipere et al. 2015, p.14), to tackle the tensions of different conceptual and methodological approaches to ESD, the various aims of ESD, and the non-anthropocentric or anthropocentric orientation of ESD (Pipere et al. 2015). Moreover, sustainability educators should perceive sustainability as a process that is always *in-becoming* and create opportunities for critical discussions on sustainability (Le Grange 2017).

2.4 Re-orienting ESD

With permission of the 'Journal of Teacher Education for Sustainability', this section is based on the article 'Interplay of Rhizome and Education for Sustainable Development' by Tillmanns et al. (2014). The previous sections have emphasised that one of the central challenges within ESD is the empowerment of learners to reorient their frames of mind, particularly those that result in unsustainable behaviours and/or actions. The concept of *rhizome*, articulated by Deleuze and Guattari (1987), is utilised in this discussion to inspire re-conceptualisation of the processes of education for sustainable development (ESD). So, what is the *rhizome*?

From a botanical perspective, a rhizome is a horizontal, non-hierarchical root system (Photograph 1). An examination of the botany of the rhizome reveals a root system that contains various points; that sometimes interconnect with other root formations, other times simply form an end-point for that part of the root. Therefore, the rhizome sometimes forms multiplicities (of roots), which, in turn, can themselves change, multiply or divide into other roots through complex encounters across the entire rhizome root system (Deleuze & Guattari 1987).

Photograph 1: A Botanical Representation of a Rhizome



From a philosophical perspective, Deleuze and Guattari (1987) perceive the rhizome as a collective of ever changing, interconnecting multiplicities, with no central control system, which acts as an inspiration for re-conceptualising the nature of reality. The rhizomatic view of the world considers the whole inextricable combination of interrelated assemblages of individuals and groups and includes: humans, non-humans, material resources, non-material resources. In this regard, the rhizome offers a novel way of perceiving our world and, in doing so, enables us to consider the interconnection of knowledge construction, society, culture, attitudes and/or values.

The rhizomatic perception of reality elucidated by Deleuze and Guattari is offered as a viable alternative to more traditional, arborescent modes of conceiving and understanding our world. The arborescent or tree-like view of reality tends to rely on hierarchical understandings of our world. Such hierarchical understandings are characterised by a universal acceptance of the processes of segmenting our world into discrete entities, to which fixed meanings are attributed. The rhizome offers a means to move away from traditional and hierarchical frames of thinking as it promotes multi-perspectivity of being and becoming. The rhizome captures complexity and generates a fluidity that facilitates re-orientation of mindsets towards greater sustainability and harmony with the world we live in. For this reason, a rhizomatic view of ESD can make a positive contribution in inspiring the reorientation of thinking and practices towards the sustainment of all living and non-living entities within our biosphere.

A rhizomatic view of ESD perceives sustainability education as distributed, interconnected, co-constructed and emancipatory through educational processes involving critical consideration of the complex interplay of human and non-human entities. The rhizome can thus be considered within the context of ESD as the on-going transformation of self, as a fertile milieu for continuous becoming for the learner. The process of ESD, when considered in rhizomatic terms, involves mapping the multiple ways key sustainability concepts, attitudes and dispositions present and develop in the mindset of learners. Furthermore, within the context of education for sustainability, consideration of the extent of rhizomatic interconnectedness leads to "*alternative ways of knowing and being which include indigenous ones*" (Le Grange 2011, p.744).

The ensuing discussion begins by outlining key constructs within the *rhizome*, namely, assemblages, nomadism, war machines and lines of flights, and discusses the relevance of these to ESD. The principles of the rhizome - connection, heterogeneity, multiplicity, signifying rupture, cartography and decalcomania - are then examined in the context of six processes necessary for effective ESD, as outlined by Tilbury (2011) - collaboration, dialogue, whole system engagement, innovation within curricula, teaching and learning and active and participatory learning. The final section critically considers how this weaving of rhizomatic principles with the processes of ESD impacts on educating for sustainability.

2.4.1 Constructs of the Rhizome

The key constructs within the rhizome are: assemblages, nomadism, war machines and line of flights.

2.4.1.1 Assemblages

The rhizome, in its botanical form, consists of assemblages of roots and root systems, connected through unstructured root developments. In philosophical terms, the rhizomatic view of the world entails assemblages of individual/s, groups - human, non-human, material or non-material. Assemblages are perceived not from an insider-looking- outwards lens of our world, but rather from a meta-level perspective (outsider-looking- inwards) that considers the whole inextricable combination of interrelated parts (Deleuze & Guattari 1987) or as wholes identified by relations of exteriority (DeLanda 2006). Assemblages are multi-scaled, emerging at every level of the rhizome. They contain multiplicities and can indeed become further multiplicities when they connect with other assemblages. The components that form assemblages can be simultaneously part of other assemblages (DeLanda 2006). For instance, sustainability as an assemblage consists of multiplicities, to name a few: nature, cultures, science, technology, economy, politics, conflict and peace, health, social justice, emotions, desires, interests and needs. However, economy and technology, for instance, can also be constituents of a 'knowledge economy' assemblage.

Assemblages present two dimensions corresponding to the characteristics of the multiplicities that form assemblages. Deleuze and Guattari (1987) elaborate that:

> On a first, horizontal, axis, an assemblage comprises two segments, one of content the other of expression [...] Then on a vertical axis, this assemblage has both territorial sides, or reterritorialized sides, which stabilise it, and cutting edges of deterritorialization, which carry it away (p.88).

DeLanda's (2006) interpretation defines the horizontal axis as variable roles of an assemblage component and defines the vertical axis as variable processes of components. The extremes of the horizontal axis are either purely material or purely expressive. By nature, a component may be a mixture of material and expressive roles, exercising different sets of capacities (DeLanda 2006).

A pertinent example to illustrate these key dimensions of an assemblage would be an educational intervention within a higher education setting. The material/content role in an educational context can be simply the lecture materials, the physical interior of lecture-room, buildings or indeed the trees on campus. A teaching context can demonstrate an expressive role of assemblage components. The way in which the curriculum is delivered and/or the tone, body language, attitude, emotions of the educators, as well as the students' attitudes, attention and responses during the class, all form expressive roles of the assemblage.

The vertical axis or the variable processes of assemblage components (DeLanda 2006), "*either stabilise [processes of territorialization] the identity of an assemblage, by increasing its degree of internal homogeneity or the degree of sharpness of its boundaries, or destabilise it [processes of deterritorialization]"* (p.12). The processes of territorialisation stabilise and define territories (such as an educational institution's identity), while also sharpening the spatial boundaries of it - for instance, single gender schools increase the homogeneity through exclusion of the opposing gender. At university level, on the one hand, internationalisation can be seen as a process of deterritorialisation, which results in an increased heterogeneity of educational institutions achieved through the augmented presence of various cultures and ethnic groups. On the other hand, information and communication technologies illustrate a destabilisation of the boundaries of formal educational institutions through distance learning and online courses. Le Grange (2011) elucidated that: "*sustainability education has become territorialised into a global discourse, but the global discourse is also deterritorialised resulting in reterritorialisation occurring in local contexts*" (p.746). In other words, ESD has become territorialised on a global scale but also [de/re]-stabilised through identified competencies, learning and teaching approaches as well as ESD processes.

On the one hand, ESD can represent a common identity with spatial boundaries, which has, for instance, been identified by Wals (2012) in his report on monitoring and evaluation of the United Nations Decade of Education for Sustainable Development (DESD) in 2012. On the other hand, the suggested whole institution approaches deterritorialise the global discourse and the identity of ESD, as they call for different learning, teaching and research and a university-community network that brings about change (Wals 2012). As a result, reterritorialisation is taking place in local contexts of educational institutions, inspired by whole-institution approaches experimenting with alternatives that are suitable for their

specific context. In the process of doing this, educational institutions need to find a different purpose to be able to connect with communities, acting as open ESD resource hubs (Wals 2014) and sharing experiences and knowledge globally.

2.4.1.2 Nomadism and War Machine

Deleuze and Guattari (1987) refer to nomadism as a way of becoming that is contrary to being and that resists the types of centralisation promoted through capitalist models. Nomads "*exist only in becoming and in interaction*" (Deleuze and Guattari 1987, p.430). Nomadism can be associated with free spaces for thinking. Nomads think without limits or boundaries and, in the process, generate creative and imaginative frames of thinking. Imaginative frames of thinking allow for the emergence of a *war machine* which is *"a war of becoming over being [...] becoming different, to think and act differently*" (Deuchars 2011, p.2885), invented by the nomads and exterior to the State. In turn, the war machine is an assemblage that makes thought itself nomadic (Deleuze and Guattari 1987, p.4) and is the condition of creative change. The function of the war machine assemblage is to oppose dominating forms of state and capital; thus, to resist control and the various kinds of power of the state (Deleuze & Guattari 1987). Deleuze and Guattari (1987) state, "*war machines have a power of metamorphosis, which of course allows them to be captured by States, but also to resist the capture and rise up again in other forms*" (p.437). As war machines can trigger substantial transformation and change, they carry the potential of being an icon of emancipation and creative change within ESD, specifically in terms of shifting neo-liberal type ontologies and resisting the global capitalist power of the state.

2.4.1.3 Lines of Flight

War machines can exist in diverse forms such as frames of mind and free movements. However, such movements or innovations can only be realised along 'line of flights' (Deleuze & Guattari 1987). A key construct within the rhizome is the 'line of flight'. Lines of flight are acts of deterritorialisation or processes of creation. "*The assemblage that draws lines of flight is [...] of the war machine type (pp.229). [Deterritorialization] is absolute when it [...] brings about the creation of a new Earth, in other words, when it connects lines of flight*" (Deleuze & Guattari 1987, p.510).

Lines of flight are the enactment of actions that can re-define whole societies, but can only emerge through the existence of a war machine. They can lead whole societies, groups or

individuals to either achieve their maximum potential or to face the greatest dangers. In this respect, Deleuze and Guattari (1987) note the potential for global change through these lines of flight, "*the Earth asserts its own powers of deterritorialisation, its lines of flight, its smooth spaces that live and blaze their way for a new Earth*" (p.423). A creative line of flight can transform something into something else. This may mean progressing a social movement or the transformation of the mind-set of an individual. Lines of flight thus open up other territories of living and, in doing so, generate opportunities to foster alternative ways of thinking (Avolos & Winslade 2010).

A line of flight is a rupture with unexpected potential or indeed dangers and leads to new assemblages. It emerges from transformative moments or experiences that lead to shifts in frames of mind. The transformative experience of lines of flight offers much hope in ESD, precisely because of its potential in reorienting learners ways of thinking and acting.

2.4.2 Aligning Processes of ESD with Rhizomatic Principles

The principles of the rhizome - connection, heterogeneity, multiplicity, signifying rupture, cartography and decalcomania - are now examined in the context of six processes necessary for effective ESD outlined by Tilbury (2011) - collaboration, dialogue, whole system engagement, innovation within curricula, teaching and learning, active and participatory learning. The purpose of drawing connections between processes of ESD and rhizomatic principles is not to be prescriptive or to follow a hierarchical, top-down, instrumental approach, but rather to stimulate critical thought on perceptions of reality, teaching methods, mindsets and/or institutional processes *inter alia* rhizomatic principles. Therefore, the following discourse sets out to explore the potential of rhizomatic principles for re-imagining ESD contexts, with a specific focus on their capacity to inspire shifts in ontologies and to serve as an inspiration for educators and learners to grasp, rethink and/or re-imagine ESD.

2.4.2.1 Collaboration and Dialogue, Connection and Heterogeneity

In this section, the ESD processes of collaboration and dialogue (Tilbury 2011) are aligned with the rhizomatic principles of connection and heterogeneity (Deleuze & Guattari 1987). The rhizomatic principles of connection and heterogeneity highlight the importance of maximal connections across assemblages and the creation of dialogues based on global outlooks (Nikolopoulou et al. 2010). Sustainability appears in diverse disciplines and entails an array of distinct concepts and advocates from different disciplines and from different

contexts (Escrigas et al. 2014). Therefore, as outlined by Tilbury (2011), processes of collaboration and dialogue need to be encouraged among educators and learners in order to foster trans-disciplinary understandings of sustainability within ESD. This involves valuing differing perspectives from various disciplines, universities, business, governments, civil society and communities across regions and on a global scale. It also calls upon intercultural (Tilbury 2011) and intergenerational dialogues. Collaborations with areas of art, sport, literature, fashion, culinary, media etc. (as promoted by Barber and Rousseau in 2013) would enhance heterogeneity within ESD. Furthermore, indigenous peoples, contexts and knowledges need to be considered to extend heterogeneity within processes of collaboration and dialogue in ESD. In this regard, our understanding of indigenous peoples aligns with that of Breidlid (2013), and includes those with a shared experience of domination, that "*originates with and is perpetuated by, their contact with Western hegemonic epistemology*" (Breidlid 2013, p.31). Therefore, overall ESD should highlight the connectivity of humans and non-humans, including organisms such as animals and plants (Farrell 2013) and focus on interconnectedness, embeddedness and interdependencies within and across ecosystems.

We could use bees, drawing on the knowledge of foresters, biologists, economists and on Paris rooftop bee-keeping revolution (Clarke 2012), to exemplify the high interconnectedness of everything on this planet, highlighting that everyone and everything interacts. Through the act of pollination, bees are not only closely connected with plants, humans are connected to bees too. We need them to cultivate our crops. We also enjoy as much as other species nuts, berries, fruits, not to mention nutritious honey from bees. Other animals are connected to bees, acting as parasites, living within their nest or nourishing from their brood, pollen or wax (Bradbear 2009). In the same way, there is a connection of bees and trees. High trees in forests are a common nesting place for bees. Bees improve the regeneration of plant-life and the conservation of the forest's biodiversity through the process of pollination (Bradbear 2009). If natural forests disappear, bees disappear and vice versa. If the bees are extinguished, we may experience a collapse of our food supply chain and, therefore, of our economy as we know it today. As a result, we come to understand that agriculture, through bees, is as much connected to the forests as economy.

There is no superior position within the rhizome, as within the realm of the rhizome everyone and everything can be an actor (Deleuze & Guattari 1987). The rhizomatic principle of heterogeneity thus demands openness to knowing different disciplines and learners.

Diversity should be reflected in ESD in order to make learners aware of the interconnectedness and heterogeneity of Earth and to acquire the type of understanding essential to make sense of sustainability, and ultimately to promote collaboration and dialogue.

2.4.2.2 Active and Participatory Learning and Multiplicity

In this section, we examine how processes of active and participatory learning (Tilbury 2011) align with the rhizomatic principle of multiplicity (Deleuze & Guattari 1987). Assemblages within the rhizome contain connections between multiplicities, formed to enable the multiplicity to become some form of functional apparatus. For instance, the self is a multiplicity with several elements, such as organs, mind, gender etc. The heart itself is a multiplicity containing various elements, such as heart cells, aorta, left atrium etc. The heart is a multiplicity, that together with the self, forms the functional apparatus and assemblage that constitutes the human being. Sustainability is also a multiplicity by nature. The principle of multiplicity of the *rhizome* makes it impossible to define a centre (humans), elements or a hierarchy (of elements) "*there are no points or positions in a rhizome, such as those found in a structure, tree or root*" (Deleuze & Guattari 1987, p.8). The "*increase in the dimensions of a multiplicity that necessarily changes in nature as it expands its connections*" (Deleuze & Guattari 1987, p.8) indicates that the nature of sustainability can change entirely as all participants or aspects of sustainability are in constant flux. Thus, applying the principle of multiplicity to ESD enables us to understand progress in understanding or acting on sustainability as it underpins the progressive growth, expansion, transformation of knowledge and understanding.

The processes of active and participatory learning are necessary conditions for growth in dimensions of the multiplicities within ESD. In the context of sustainability education, this growth in multiplicity demands a perspective of the world through interchangeable lenses of ecologies. Guattari (1989) names three ecologies: the mental, the *socius* and the environment or, as Le Grange (2011) interpreted, the ecologies of self, society and nature. Rather than focusing on the constitution of one ecology and teaching about or for it, we should focus on the contradiction, discrepancies and oppositions between these ecologies (Guattari 1989). This may activate isolated and heterogeneous perspectives, nurture individual cultures and simultaneously foster the imagination of new forms of thinking and practices. In turn, it may also encourage the imagination of a state order in which singularity, exceptions and rarity

coexist (Guattari 1989) to name but a few creative shades of multiplicity. For instance, as our mental ecology is often dominated by arborescent ways of thinking, we tend to make sense of the social through hierarchy expressed by classes. Furthermore, we humans often assume a superior position over nature. This is exemplified through our urban living conditions, which not only excludes other life of this planet, allocating minor areas for nature, but is dominated by unsustainable architecture, whose construction requires the abuse of natural resources and, at a later stage, consumes high volumes of electricity for lightning, heating and cooling.

Photograph 2: César Manrique's Residence

However, within these three ecologies lie capacities for creativity. For instance, the artist and architect César Manrique felt "*true nostalgia for the real meaning of things. For the pureness of people. For the bareness of my landscape and for my friends*" (César Manrique Foundation 2014). This inspiration influenced the construction of his house in his homeland Lanzarote that connects his work of art and architecture with nature. The residence was built on top of a volcanic trail, the lower level of the house is positioned within the natural formation of five volcanic bubbles that are used for living spaces (Photograph 2). The outside of the residence has influenced the traditional architecture of the island of Lanzarote. The

island is still today characterised by the harmony of art, natural environment and Lanzarote's culture, and Manrique's work - found throughout Lanzarote is an expression of such harmony.

2.4.2.3 Curriculum, Teaching, Learning Innovation and Signifying Rupture

We now need to examine how processes that innovate curriculum, teaching and learning (Tilbury 2011) align with the rhizomatic principle of *signifying rupture* (Deleuze & Guattari 1987). The principle of signifying rupture indicates that a rhizome can be broken or disrupted at any point but it does not get damaged and will regenerate (Deleuze & Guattari 1987). My first visit to César Manrique's house exemplifies such a rupture. Being physically in a house that was built in harmony with nature, disrupted and consequently expanded my imagination of housing. Planet Earth also provides many illustrations of this principle of signifying rupture.

Let us imagine for a moment the Earth as a rhizome. As we know, there is a tendency of humans to imagine the end of the world - particularly through cinema - as an armageddon (Dawson 2013). Let us consider a nuclear holocaust. Would it mean the end of planet Earth? It would probably mean the end of many species, including humans, but Earth seen as a rhizome would begin again or continue as, for instance, we know that cockroaches are radiation resistant (Wright 2010). The nuclear holocaust would be a signifying rapture. For instance, history taught us that the extinction of the dinosaurs or of ancient civilisations did not terminate life on this planet. Even if a nuclear holocaust or global warming do become signifying ruptures, causing destruction of our living spaces, it may not imply the end of the planet, but rather a further challenge to our adaptability as a species living on this planet. Within sustainability education, there is a worthy focus on preventing such catastrophes, but very often the approach taken is human-centric in nature and doesn't always critically consider the significance of these ruptures beyond that which impacts the wants or needs of humanity on planet Earth.

Returning to ESD, educators and learners need to be more aware that any existing framework or definition of sustainability is incomplete, as sustainability is a fluid, complex concept, which does not lend itself to being generalised. Rhizomatic principles enable us to think of sustainability as being in constant flux and transformation. They allow us to relate as much new meaning as new knowledge, through the binary process of deterritorialisation current

understanding/reterritorialision of novel understanding. Processes which innovate curriculum as well as teaching and learning experiences (Tilbury 2011) entail in a broader sense, changing mindsets, fostering active and inter- active engagement, questioning social assumptions and dominant ways of thinking (Tilbury 2011).

The pedagogy of ESD should enable transversal thinking (Guattari 1989) which moves beyond learners' current abilities for critical thinking (Huckle & Sterling 1996) and linking knowledge to the fate of humanity (Nikolopoulou et al. 2010). A basic approach to the development of transversal thinking could be teaching about the universe and the histories of the world, before focusing on national histories (Nikolopoulou et al. 2010). ESD should also encourage the imagination of a post media age and raise awareness of capitalist societies depicted by mass media (Guattari 1989). ESD should also consider the Re-education of holders of power. They too would benefit from an understanding of the necessity of evaluating profits or growth interest having in mind international interests of humanity as a whole, and acting according to a reformulated definition of wealth and nature (Nikolopoulou et al. 2010). The 2011 study at the Swiss Federal Institute of Technology in Zurich offers a useful starting point to examine the power dynamics in the world and the necessity of applying a broader and reformulated perspective on wealth. While mapping ownerships among the world's transnational corporations, this study revealed a core of 1318 companies with interlocking ownerships, and, when the web of ownership was unravelled, they discovered a superentity of 147 corporations that control 40 per cent of the total wealth (Vitali et al. 2011).

2.4.2.4 Whole System Engagement, Cartography and Decalcomania

We now examine how processes that engage the whole system (Tilbury 2011) are aligned with rhizomatic principles of cartography and decalcomania (Deleuze & Guattari 1987). A rhizome has no beginning, ending, centre or periphery. It has a very complex structure, making it unclear from which element or place the next will be reached, and how to get there (Deleuze & Guattari 1987). A rhizome can be considered as a map and is distinct from what one might consider tracing. Tracing follows an arborescent thought where tree-type (hierarchical) logic reproduces what already exist, following a given path from beginning to end. Mapping is generative. Mapping is open to various manifestations. It is created on the basis of fostering new connections, proceeding from any point, picking up from the middle and creating one or many paths (Deleuze & Guattari 1987), also coinciding with the process

of decalcomania, a technique that creates images or paintings largely by chance. Unlike tracing, that aims to reproduce or describe structures, mapping constructs connections, removes blockages and creates structures.

The problem in ESD to date is that the focus has been on tracing as opposed to mapping ESD landscape. Since sustainability has been introduced within the mainstream discourse, the reliance on tracing of its elements and its structure intensified. The pillars of sustainability defined by the United Nations Educational, Scientific and Cultural Organisation are an attempt to describe the structure of sustainability and now act as guiding principles for ESD at a global level. The reproduction of these pillars can be noticed in various disciplines connected with sustainability, not to mention its application within ESD. Furthermore, the tendency towards prioritisation of one pillar over the other represents a major blockage and an opposing perspective to the rhizomatic approach. Rather than conforming to a suitable definition, it is time to experiment, to learn from and to share these experiences in order to gain a novel and fluid understanding of the meaning of sustainability. Sustainability does not need a definition. Crucial elements that supposedly contribute to the understanding of sustainability can never be fully identified. Similarly, sustainability cannot be assigned to specific disciplines or be a pure matter of teaching and learning. Besides re-imagination of the purpose of education and the relationship between teachers and learners (Carp 2013), holistic approaches throughout the whole institution and educational system (Tilbury 2011), in which, for instance, students are likewise included in management decisions as much as in curricula design (Bruskotter et al. 2013) exemplify processes which engage the whole system, as promoted by Tilbury (2011).

The biosphere that we inhabit is interconnected in many different ways; we as human beings make contact, interact and strive to understand this planet at physical and metaphysical levels. Perhaps we can better understand and learn about sustainability by re-conceptualising the Earth in terms of rhizomatic constructs and principles. We can start this process by learning from the wisdom of plants, who, according to Deleuze and Guattari (1987), connect to multiple organisms and entities

> […] even when they have roots, there is always an outside where they form a rhizome with something else - with the wind, an animal, human beings (and there is also an aspect under which animals themselves form rhizomes, as do people, etc.) (p.11).

Our downfall has been to have taken a human-centric approach to understanding our world; one in which we have taken human-centric approaches to understanding our place and role within planet Earth. It has resulted in the depletion of many of our natural resources, damage to our environment and significant risk to the long-term sustainability of our biosphere.

The re-conceptualisation of ESD as rhizome or rhizomatic can foster an ontological shift towards perceiving the nature of reality as complex multiplicities, and, in so doing, the rhizome has the potential to inspire educators and learners alike to become more critically aware of the interconnectivity of, and disruptive influences within, sustainability, above and below the surface. Within ESD, we want to support the development of change agents. This process of inspiring and enabling change agency necessitates the development of Transformative Learning and of an enterprising mindset for learners. Deleuze and Guattari's work on rhizomatic principles provides a useful frame for developing such mindsets. As outlined in this paper, the weaving of rhizomatic principles within the processes of ESD can positively impact on educating for sustainability.

ESD needs also to support becoming other, resisting the arrogance of certainty and self sufficient knowledge (Cilliers 2005, p.265) and recognise the importance of learning sustainability from other species or indigenous people (Pigem 2007; Wals 2012). Chandra (2014) also points out that indigenous knowledge needs to be recognised to tackle ecological issues. In this regard, the alignment of processes of collaboration and dialogue, as detailed by Tilbury (2011), in conjunction with the rhizomatic principles of connection and heterogeneity (Deleuze & Guattari 1987) within ESD, generates a viable pathway for responding to and interacting with differing perspectives from trans-disciplinary, intercultural and varied contexts.

And what of the rhizomatic constructs of war machines and lines of flight? There is a real need for change to be effected within ESD - the evidence to date is that while some progress has been made in the DESD (2005-2014), more needs to be done. The rhizomatic construct of the war-machine presents us with a tool to tackle issues of sustainability. It offers emancipation from conformist understandings and approaches within ESD, by shifting neoliberal type ontologies and resisting the global capitalist power of states. In this regard, further research needs to be undertaken to map how rhizomatic constructs, such as assemblages, multiplicities, war machines and lines of flights, evolve within real-world ESD

settings. Only then can the synergies between rhizomatic principles and the six processes for effective ESD (as outlined by Tilbury 2011) be examined and the extent to which our interventions in ESD support positive transformations and change agency for sustainability be assessed.

2.5 Sustainability Pedagogies in Higher Education

Higher education is commonly seen as a significant contributor in enhancing learners experience of sustainability through its facilitation of opportunities to engage in critical thinking and provocative questions that stimulate discussions and debates about innovative and alternative ways of living (Ryan and Tilbury 2013). In so doing, actors within higher education need to realise that the fundamental change is not only about what to learn but also how to learn it, and it requires entire institutions to work towards sustainability (Huckle and Sterling 1996). The introduction of innovative forms of learning are required to re-orient higher education students towards sustainability. Wals (2014) recognises the role UNESCO Chairs of ESD play in promoting the use of innovative learning approaches, wholly integrative approaches to sustainability education within higher education institutions, and collaboration across universities to share knowledge and experiences of sustainability education. One such example is the UNITWIN UNESCO Chair on Teacher Education and Continuing Education, situated at Daugavpils University in Latvia, focusing on the interplay of tradition and innovation in education for sustainable development. Additionally, the Regional Centres of Expertise (RCE) - networks of local authorities, educational institutions, non-governmental organisations and/ or agencies - contribute through collaboration that promotes capacity building of ESD at national and local levels across the globe (Mochizuki and Fadeeva 2008). RCE Dublin is such network that established innovative ways of collaboration in ESD among higher education institutions, secondary educational institutions, local governments and other stakeholders. The sharing of practices with other RCEs will further promote international cooperation in ESD. The UN Decade for Education for Sustainable Development certainly increased the attention to the need for ESD, but it is still under discussion how it can and should be delivered in higher education (Thomas 2014).

There is an immense body of literature focusing on the relationship between environment education (EE) and sustainability education, indicating a close interrelation of these academic fields (Breiting 2009). Although the term ‘Education for Sustainable

Development' has in general replaced the term 'Environmental Education' within international policy contexts, there are some noticeable tensions regarding the relation of EE and ESD (Stevenson 2007). Eilam and Trop (2010) note that there are four different ways of how scholars perceive the relationship between ESD and EE: (1) The fields have some common interests but are distinct fields (2) ESD expands and incorporates the field of EE; (3) ESD evolves from EE, but both are distinct educational fields; (4) ESD and EE immerse into one another and are completely overlapping. Sustainability pedagogies are shared by and based on environmental pedagogies (ibid). Whereas both EE and ESD have contributed to significant curriculum and institutional changes in higher education, these fields have not paid enough attention to innovative pedagogic approaches (ibid).

Sustainability education relies on the pedagogical practices that emerged from the division of education *about, in* and *for* the environment (Cotton and Winter 2010; Kopnina 2013). Education *about* sustainability aims to maintain the current education paradigm (Sterling 2010), and education *in* sustainability perceives sustainability as a tool for enquiring and enhancing existing learning process (Cotton and Winter 2010). Education *for* sustainability explores alternative epistemologies, values alternative ways of knowing, and connects with its wider environment through a network of people and communities to foster sustainable change (Fien and Tilbury 2002). Education *for* sustainability outlines the continuous transformative element, which requires a sustainable/environmental ethic that demands a reorientation of existing dispositions (Cotton and Winter 2010). The transformative aspect is also visible in contemporary understandings of ESD, and it has the potential to provide examples of good practice, demonstrating alternative pedagogies that promote changes of perspectives, values and attitudes to motivate pro sustainability actions. However, the existing "*diversity of approaches and plurality of conceptualization of EE/ESD mask the 'elephant in the room,' namely robust anthropocentric bias*" (Kopnina 2013, p.609). Hence, ESD requires empathy and sensitivity of educators to select or design strategies of learning and teaching for sustainability without basing these on anthropocentric viewpoints (Kopnina 2012). In a sense, educators should aspire to practice education *as* sustainability, where centric perspectives are critically reconsidered in the context of what Sterling and Jickling (2017, p.142) describe as "*being in the world*". This refers to one's relationship with the world, requiring the contemplation of a relational ontology and a revision of "*what education can be*" (ibid).

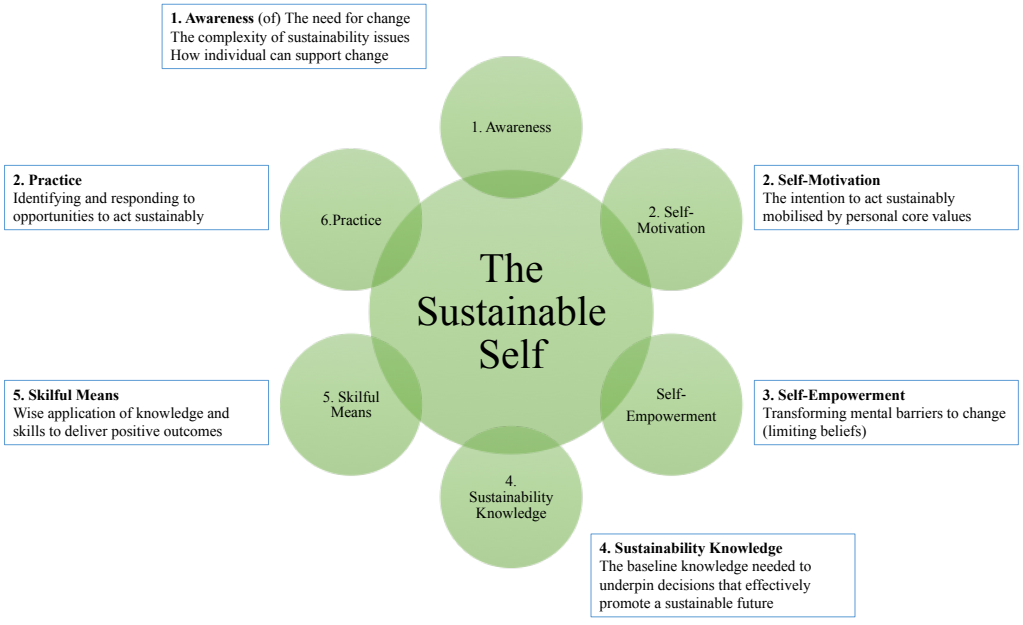
Eilam and Trop (2010) note that the basic literacy and the pedagogical supplements are complementary to each other. Whereas innovative pedagogies are needed for paradigm changes, educating for sustainability should not disregard traditional ways of teaching and learning. Therefore, Eilam and Trop (2010) claim that all EE/ESD pedagogies aim towards a holistic learning experience and incorporate four essential principles: academic learning, inter/multidisciplinary learning, multidimensional learning, and emotional learning. It is the combination of these four principles that fosters a synergy, motivating behavioural changes (Eilam and Trop 2010). Academic learning is required to understand an abstract concept such as sustainability. Inter/multidisciplinary learning stimulates systems thinking to enable multi-perspectives that are required for an in-depth recognition of sustainability challenges. Multidimensional learning refers to time and space. It enables contextualisation and thinking outside the box, which in the context of sustainability is needed to perceive the interrelation of systems, and the importance of past, present and future when making decisions regarding sustainability challenges. According to Eilam and Trop (2010), these first three principles form cognitive mental structures and alone would not motivate behavioural changes. The fourth principle of emotional learning, which emphasises the incorporation of emotions into EE/ESD learning, is necessary for behavioural changes. Emotions, are a 'philosophical hub' (De Sousa 1987), stimulating value and ethics clarification required to motivate behavioural change (Eilam and Trop 2010). Emotions create a personal connection with the content. Freire (1974) points out that the contextualisation of learning to the social reality of students enables the potential for action and change.

Several sustainability teaching strategies have been identified to further the essential principles of ESD pedagogy in higher education. Group discussions are a commonly acknowledged pedagogy of sustainability in higher education (Cotton and Winter 2010). Discussions have the advantage to expose participants to a range of perspectives and by doing so provide the opportunity to reconsider and discuss own and others' viewpoints (ibid). The pedagogy of critical incidents presents learners with a scenario and asks them "*what they would do, what they could do and what they should do*" (Cotton and Winter 2010, p.47). This strategy enables learners to ethically and morally consider own perspectives and behaviours in the context of sustainability. Reflexive accounts are a useful pedagogy to stimulate learners' own position or behaviour in relation to new knowledge about sustainability (Cotton and Winter 2010). Stimulus activities have the potential to evoke diverse viewpoints and involve watching Youtube clips, looking at images or written

accounts such as poems to stimulate discussions, or to imagine oneself in a given situation (Oulton et al 2004; Cotton and Winter 2010). Savageau's (2013) 'Resource Consumption and Waste Audit' is an example of how to trigger students' self-reflection and the development of intrinsic motivation to live sustainably. The audit was introduced and performed by learners at the beginning of the course, and resulted in an extensive self-reflection of personal habits throughout the course (ibid). Eilam and Trop (2010) emphasise that only the combination of the four principles (academic learning, inter/multidisciplinary learning, multidimensional learning and emotional learning) can stimulate behavioural change. Agreeing with Eilam and Trop (2010), Cotton and Winter (2010) point out that educators need to combine different teaching strategies to utilise behavioural change.

'The Sustainable Self model' (Murray et al. 2014; Murray 2011) is a personalised approach to sustainability education and exemplifies the combination of various teaching and learning strategies. The model (see Figure 2), which consists of six interconnected attributes, can: "*motivate, empower and equip individuals to move towards sustainability in their personal and professional lives*" (Murray et al. 2014, p. 721). It emerged from an audit of ESD programmes at Plymouth University and combines Bloom's affective domain with professional/ personal development and techniques that foster change (Murray et al. 2014).

Figure 2: The Sustainable Self Model of Personalised ESD



Source: adapted from Murray et al. 2014, p.720

Murray applied the model to face-to-face training in higher education. The training encompassed a variety of activities that were mentioned above (Cotton and Winter 2010), such as: reflection on various definition of sustainability; discussions of photographs with the aim to explore the interconnectivity of sustainability issues; briefings to enhance understanding of values systems, followed by an exploration of own values in contrast with sustainability values; use of stimulus activity in form of photographs and role plays, combined with discussions to explore their positions on sustainability issues; and briefings on the role of personal beliefs in empowering change, combined with reflexive accounts and discussion to reinforce and promote personal change (Murray et al. 2014). Murray et al. (2014) emphasise that focusing on a variety of attributes, when designing teaching and learning strategies, has the potential to foster changing mind-sets in ways that stimulate sustainable actions.

2.6 Theories Underpinning Sustainability Pedagogies in Higher Education

This section will highlight some learning theories underpinning sustainability education initiatives, namely, Lifelong Learning, Transformative Learning, Deep Learning, Re-education, Emotional Learning, Values Learning, Pedagogy of Discomfort and Arts-based Learning. Schwab (1969) points out that no single theory is sufficient for the practice of education. Instead educators should make use of elements from various theories combined with experience based on trial and error (ibid). In the context of the chosen theories, this section will explain how particular teaching and learning strategies can support a self-concept that enables students to perceive themselves "*as a life long learner and agent of change for SD*" (Svanström et al. 2008, p.349).

2.6.1 Lifelong Learning

Sustainability education has been influenced and inspired by the domain of Lifelong Learning. A holistic understanding of Lifelong Learning has been promoted since the Faure Report (Faure 1972). This report formally institutionalises the concept, acknowledges its diverse understanding in different cultural contexts; advocates individuals' rights to learn for social, economic, political and cultural development; and highlights the need to embed lifelong education as a fundamental concept of educational policies (Medel-Añonuevo et al.

2001). The significant impact of Lifelong Learning is also visible in the 2014 Global Action Plan, which advocates engagement of people and communities in meaningful lifelong learning processes and suggests explorations of how societies can live in more sustainable ways (UNESCO 2014a). Lifelong Learning, in the context of sustainability, should be considered as both the individual process of learning throughout ones' whole life and as a strategy through institutional processes encompassing formal, non-formal and informal learning contexts (Jarvis et al. 2003). Delors (1996) emphasised

> […] the need to rethink and broaden the notion of lifelong education. Not only must it adapt to changes in the nature of work, but it must also constitute a continuous process of forming whole human beings – their knowledge and aptitudes, as well as the critical faculty and the ability to act. It should enable people to develop awareness of themselves and their environment and encourage them to play their social role at work and in the community (p.19).

The importance of learning new ways of thinking and doing, while developing "*lifelong values that underpin sustainability*" (UNESCO 2014b, p.28), is also reinforced by contemporary features of ever faster-changing societies characterised by constantly increasing uncertainty (Bauman 1991) and risk (Beck 1992; 1999). The uncertainty of unexpected events will be a constant and fundamentally shape humans' outlook (Homer-Dixon 2006; Sterling 2010). A significant body of research concentrates on humans' perception of risk, particularly in relation to climate change and global warming (Helgeson et al. 2012). Hence, it is argued that through engagement in processes of Lifelong Learning, it might be easier for individuals to re-conceptualise complex and unpredictable changes in life as surmountable, enabling interaction with, the fast-changing transformations of world societies, environments, cultures *inter alia* (Redman and Wiek 2013). The UN calls for "*bold and transformative steps… to shift the world on to a sustainable and resilient path*" (UN 2015, p.1). Higher education has a profound responsibility in educating transformative ways of being (Thomas 2009). However, education must understand and overcome the tensions of the 21st century. The tension between the global and the local; the universal and the individual; tradition and modernity; long-term and short-term considerations; competition and equality of opportunity; the extraordinary expansion of knowledge and human beings' capacity to assimilate it; and the spiritual and the material (Delors 1996). Higher education requires Transformative Learning that stimulates pedagogies that are considering the key tensions of contemporary society and which enhance 'disruptive capacity-building' that

challenges "*the resilience of inherently unsustainable systems/practices/routines*" (Lotz-Sisitka et al. 2015, p.74).

2.6.2 Transformative Learning

Transformative Learning is a promising pedagogical approach to advance changes towards sustainability (Sterling, 2010). Cranton (2006, p.19; apud Thomas 2009) outlines that "*transformative learning occurs when people critically examine their habitual expectations, revise them, and act on the revised point of view*". According to Mezirow (2003), Transformative Learning concentrates on the transformation of problematic frames of references. Frames of references are meaning perspectives, formed by two dimensions, habits of mind and resulting points of view (Mezirow 2009). The holistic understanding of frames of reference acknowledges its emotional, intuitive and imaginative dimensions and includes: sociolinguistic, moral ethical, learning styles, religious, psychological and health aesthetic (Mezirow 2009, p.93). According to Mezirow (2009, p.94), Transformative Learning contains ten steps or 'phases of meaning':

- Experiencing a disorienting dilemma;
- Self-examining with feelings of fear, anger, guilt or shame;
- Critically assessing assumptions;
- Recognising that one's discontent and the process of transformation are shared;
- Exploring options for new roles, relationships, and actions;
- Planning a course of action;
- Acquiring knowledge and skills for implementing one's plan;
- Provisionally trying new roles;
- Building competence and self-confidence in new roles and relationships;
- Reintegrating new perspective and capacities into one's life on the basis of conditions dictated by the new perspectives.

These ten phases of meaning serve as a description of procedural elements of progressing Transformative Learning (Mezirow 1991). Transformative Learning can be facilitated through experiencing a disorienting dilemma, critical reflection and a rational discourse (Mezirow 1991). A disorienting dilemma is a significant stimulus that triggers meaning perspective transformation as it causes a disruption or disturbance in a person (Mezirow 1991). Cranton (2006) articulates a disorienting dilemma as a trigger directing self-

examinations towards changing perspectives and understandings. Sustainability scenarios have the potential to present disorienting dilemmas. Through their challenging nature learners may be required to form new frames of reference or alter existing frames of reference in order to be able to make sense of the given sustainability scenario. It requires critical, creative and reflective thinking to meet the needs of changing global and local contexts, as there is no blueprint of sustainability practices or processes, where outcomes are most frequently unknown. The processes of critical reflection and rational discourse facilitate Transformative Learning (Brookfield 2000; Merriam 2004; Feinstein 2004). Moon (2004) describes reflection as

> […] a form of mental processing – like a form of thinking – that we use to fulfil a purpose or to achieve some anticipated outcome. It is applied to relatively complicated or unstructured ideas for which there is not an obvious solution and is largely based on the further processing of knowledge and understanding and emotions that we already possess (p.82).

Critical Thinking involves and incorporates reflection (Moon 2008; Brookfield 2005; 2012). Following Brookfield (2005), the theory of Critical Thinking is characterised by four processes: (1) hunting assumptions, when discovering underlying assumptions that shape the way we think and act; (2) checking assumptions, when we begin to question those guiding assumptions; (3) seeing things from different viewpoints; and (4) taking informed action (Brookfield 2012). Thus, critical thinking is not only reflective but also "*clearly transformative and exist to bring about social change*" (Brookfield 2005, p.18; apud Jarvis et al. 2003). Critical-thinking is also a key dimension of sustainability education (Sterling and Thomas 2006).

Through the processes of reflection and rational discourse learners are encouraged to evaluate dominating worldviews that influence knowledge and perspectives. O'Sullivan's (2002) Integral Transformative Learning, rooted in cosmology, highlights:

> Transformative learning involves experiencing a deep structural shift in the basic premises of thought, feeling and action. It is a shift of consciousness that dramatically and permanently alters our being in the world. Such a shift involves our understanding of ourselves and our self-locations; our relationships with other humans and the natural world; our understanding of the relations of power in interlocking structures of class, race, and gender; our body awareness; our visions of alternative approaches to living; and our sense of the possibilities for social justice and peace and personal joy (p.11).

Transformative Learning is a promising approach within higher education, but it depends on whether students are mentally and emotionally equipped and whether higher education institutions are ready to provide transformative experiences (Moore 2005). The extent of changes in curriculum depend on a required paradigm shift, which is further aggravated by the extent to which transformative strategies of teaching and learning address the variety of individual learning styles (Bielefeldt 2013). Sipos and colleagues (2008) propose Transformative Learning through sustainability education initiatives guided by principles of *heads, hands and heart* for higher education, suggesting the use of the cognitive, psychomotor and affective domains of learning to create a transformative educational experience. Taylor (2006) describes a transformative classroom and notes that Transformative Learning has a tremendous potential, but requires an educator being willing to take some risks. The use of Transformative Learning requires a transformative educator, a transformative classroom environment, transformative texts, and transformative students (Taylor 2006). The transformative educator creates an authentic learning experience "*where educators develop a greater awareness of the self (both personal and cultural), an appreciation of the spiritual, and a recognition of the ethical dimensions associated with fostering transformative learning*" (Taylor 2006, p.92). The transformative classroom environment is "*safe, inclusive and open",* which includes *"expressive ways of knowing beyond the rational*" (Taylor 2006, p.93). Transformative texts are materials that enable students to 'read' their worlds. It is the material that represents "*artifacts of ideas of the mind*" that has multiple meanings and invites to a discourse and critical reflection (Taylor 2006, p.94). Taylor (2006) recognises that the role of the learner in a transformative classroom demands further research especially with respect to explanations of the resistance to transformations among students.

2.6.3 Transformations, Re-education and Change Agency

Iliško (2007) points out that Transformative Learning can be also seen as an ontological process, transforming not only worldviews but also being in the world. However, Transformative Learning tends to de-emphasise social action (Mezirow 2009). It does not explain the relationship between transformations of frames of minds and behavioural changes, nor does it include collective transformations (Lotz-Sisitka et al. 2015). Re-education involves the adaptation of

> […] patterns of thinking, acting, volition, and action that would be better suited to the realities and actualities of contemporary existence, both individual and social, and that would be more personally fulfilling and socially appropriate (Coghlan and Jacobs 2005, p.445).

Re-education was conceptualised by Kurt Lewin (1948). Nowadays, the term Re-education is rarely used and it is more common to refer to transformation (Reason & Tobert 2001 apud Coghlan and Jacobs 2005). Coghlan and Jacobs (2005, p.446) argue that "*transformation is inclusive of the process of re-education*" as it aims to change knowledge, beliefs, values, needs, emotional attachments and everyday conduct. Kurt Lewin (1948) describes Re-education in terms of ten observations. These ten observations of Re-education highlight that change involves cognition, values and behaviour, and depends on social perception as well as the belonging to a group. The ten observations (Lewin 1948, p.57-67) are:

- The processes governing the acquisition of the normal and abnormal are fundamentally alike
- The re-education process has to fulfil a task which is essentially equivalent to a change in culture
- Even extensive first-hand experience does not automatically create correct concepts (knowledge)
- Social action no less than physical action is steered by perception
- As a rule, the possession of correct knowledge does not suffice to rectify false perception
- Incorrect stereotypes (prejudices) are functionally equivalent to wrong concepts (theories)
- Changes in sentiment do not necessarily follow changes in cognitive structure
- A change in action-ideology, a real acceptance of a changed set of facts and values, a change in the perceived social world - all three are but different expressions of the same process
- Acceptance of the new set of values and beliefs cannot usually be brought about item by item
- The individual accepts the new system of values and beliefs by accepting belongingness to a group

The ten observations are critical in the design of ESD interventions that hope to enable change, which Lewin (1999) describes as happening in three stages: (1) unfreezing, the moment when people experience the need for change; (2) moving, when people internalise new perceptions, values and behaviours; and (3) refreezing, when the changes are incorporated and become 'normal' behaviour. A change agent is a rational actor who facilitates the implementation of change (Lewin 1999). Change agency is a key aspect to rational action and democratic values (Caldwell 2006). Agency refers to human wellbeing and empowers individuals to be able to live their life in accordance to their own values (Lozano et al. 2012). Stacey (2001, p.93) points out "*agency means doing and human agency means human bodies doing something […] and what they do to survive is interact with each other".* The creation of a personal connection with sustainability in an educational context has the potential to stimulate interest and a sense of responsibility toward the environment and society, producing a capacity for becoming change agents (Thomas 2009). Sustainability educators should be change agents and should be able to facilitate and support learners to become sustainability change agents themselves (UNESCO 2014b). Tilbury (2004) notes that sustainability learning is about building the capacity as agents of change. A value system and self-concept that is in favour of change agency motivates to be a change agent (Svanström et al. 2008). As individual change agency relates to changes of conventional ways of acting and thinking, that have contributed to contemporary crisis (Senge 1999), education should stimulate people's agency to empower learners to determine the biography of their own lives (Lozano 2012). Therefore, educators, who are sustainability change agents, should not tell students what they must do, but encourage students to ask themselves *what one can do* (Le Grange 2017).

2.6.4 Deep Learning

Deep Learning is a form of higher order learning that requires the examination or re-orientation of values and beliefs, including awareness of alternative perspectives, dispositions and actions (Sterling 2001). Deep Learning is "*integrating and synthesizing information with prior learning in ways that become part of one's thinking and approaching new phenomena and efforts to see things from different perspectives*" (Nelson Laird et al. 2005, p.4). Students re-orient perspectives, when they are personally engaged with the topic (Warburton 2003). Deep Learning requires personal commitment to grasp the underlying meaning, determining how we perceive a presented scenario (Nelson Laird et al. 2005). It involves behavioural change, but the extent of these changes is influenced by personal

characteristics (Nelson Laird et al. 2005). Therefore, Deep Learning is associated with transformations of the physical, emotional aesthetic, social, moral, spiritual, and personal dimension (Sterling 2001; 2010; Grauerholz 2001; O'Brien and Sarkis 2015).

Following Moon (2004, p.100), "*meaningful processes of learning involve reflection […] where there is reflection, there is a deep approach to learning and vice versa*". Deep reflection or deep critical thinking share more similarities than differences; deep critical thinking focuses more on making a judgement than making meaning, but both should be seen as an endless process that move from surface to deeper learning (Moon 2008). Reflection is represented in the sequence of five stages: (1) noticing; (2) making sense; (3) making meaning; (4) working with meaning; and (5) transformative learning (Moon 2004). Reflection plays a crucial role in the deeper approaches to learning which are the last three stages (Moon 1999)

The comparison of Transformative Learning and Deep Learning by Howie and Bagnall (2015) concludes that these two theories are fundamentally complementary. Deep Learning can enrich Transformative Learning, offering clear pedagogic structures that may enrich transformative processes. In addition, Deep Learning may support the structuring of disorienting dilemmas as Deep Learning aims to enhance reflective and cognitive processes that increase the potential of a disorientation (Howie and Bagnall 2015). Transformative Learning can enhance Deep Learning through its critical examination processes, which can be applied to facilitate self-reflection. The ten phases of meaning may be useful to structure the curriculum (Howie and Bagnall 2015). The table below summarises the criteria in which these two theories are fundamentally similar.

Table 1: Overlapping Criteria of Deep Learning and Transformative Learning (adapted from Howie and Bagnall 2015)

Criteria	**Transformative learning and Deep Learning**
The origin of the theory	Both theories aim to develop a more unified understanding of learning. Deep Learning initially focused on pedagogical activities. Transformative Learning initially focused on the facilitation of self-development. Both aspects are required in higher education contexts.
The epistemology of the theory	Both theories are grounded in social constructionism.
The learning content	Both theories are relevant to a variety of learning content and are applied to common curricular areas.
The learning context	The theories are influential in overlapping areas of learning. Deep Learning focuses on higher education and Transformative Learning focuses on adult education.
The place of the learner	Albeit Transformative Learning paying more attention to the learners' state of mind and Deep Learning to student activities, both theories are learner centred, in which the learner has autonomy and self-direction.
The teacher's role	Both characterise the role of the teacher as being instrumentally influential in the facilitation of an 'encouraging atmosphere'.
The place of intentionality	For both theories, the role of intention of the teacher and the learner is significant. Conative aspects motivate to invest time and effort in the learning process.
The place of cognition and rationality	Both theories recognise cognitive capacities as a necessary condition for these types of learning. Both theories are rational, suggesting that human development requires rationality, science and formal education.

The learning outcomes	The complementary nature of procedural, descriptive and dispositional learning outcomes of both theories can be potentially applied in adult and higher education settings.

Sterling (2017) points out that: "*a deep learning response within educational thinking, policymaking, and practice is required based upon an emerging relational or ecological worldview*" (p.31). Jickling (2017) further speculates that: "*creating educational experiences that are held, felt, and disruptive might just be the basis for learning that is, indeed, transformational*" (p.28). Deep Learning is therefore synonymous with Transformative Learning and in the context of sustainability education it requires individuals and whole societies to become aware of alternative worldviews and practices towards sustainability.

2.6.5 Emotional Learning, Values Learning and Pedagogy of Discomfort

Goleman (1998) defines Emotional Learning as the ability to manage, express and control feelings in an appropriate and effective manner. Emotions are essential to give meaning to life, as they support the ability to transform and make sense of perception, thoughts and actions (De Sousa 1987). Recent studies on the relationship between emotions and cognitions revealed that "*the neural basis of emotion and cognition should be viewed as governed less by properties that are intrinsic to specific sites and more by interactions among multiple brain regions*", and consequently, "*emotion and cognition conjointly and equally contribute to the control of thought and behaviour*" (Pessoa 2008, p.155). Brockbank and McGill (1998, apud Moon 2008) point out that emotions are the bridge needed to foster shifts in perceiving the world, which influences knowledge, self and action. Moon (2008) defines 'emotional insight' as a type of learning that includes an unexpected, recognisable re-orientation of ones' individual outlook but where processes that resulted in this shift are unconscious. Moon (2008) exemplifies that

> […] emotional insight in critical thinking involves a student teacher's reflection on a painful incident that occurred when she was at school. It is an incident that has always bothered her – and is very much around as she works in schools. One evening she is watching a 'soap' and suddenly the incident comes to mind and she sees it in a different light. This influences the whole of her orientation to teaching – worries fall away and she feels 'different', though she cannot describe the feeling or the process (p.72).

Thus, the consideration of the affective domain in educating for sustainability fosters a personal attachment to sustainability and has the potential to influence future decisions (Shephard 2015). As mentioned earlier, Eilam and Trop (2010) emphasise that emotions stimulate the process of ethics and value clarification. Rachels and Rachels (2012) note that

> […] the conscientious moral agent is someone who is concerned impartially with the interests of everyone affected by what he or she does; who carefully sifts facts and examines their implications; who accepts principles of conduct only after scrutinizing them to make sure they are justified; who is willing to 'listen to reason' even when it means revising prior convictions; and who, finally, is willing to act on the results of this deliberation (p.13).

The consideration of ethics in sustainability education, can build the capacity to make future decisions in accordance to the consequences on the interconnected dimensions of sustainability for future human and non-human generations (Jickling 2009; Kopnina 2012; Biedenweg et al. 2013). Values influence and shape actions and lifestyles, and individuals can prioritise values that may result in responsible sustainability actions (Murray et al. 2014). In the context of Values Education, indoctrination is highly debated and a well-researched territory. Indoctrination should be not only associated with religious and political doctrines, it can also occur through lecture content or through the style of belief of educators (Tan 2008). It was once used as a synonym for the term education and its etymological meaning refers to "instruction" (ibid). Tan (2008, p.xiii) defines indoctrination as "*the paralysis of one's intellectual capacity, characterised by the inability to justify one's beliefs and consider alternatives*". Educators should consider a reflective approach, focusing on the development of students' rational capacity (Tan 2008). In this respect, sustainability education should not be concerned with the identification of sustainability values and instead focus on encouraging learner to identify and question own values that underpin non-sustainable practices and lifestyles (Cook et al. 2010). Cook and his colleagues (2010, p.323) note that when sustainability "*is approached with Socratic inquiry as to the motivations students feel for their personal behavior and how they believe it will influence their future happiness, the class is transformed*". Chesters (2012) also advocates the use of a Socratic inspired facilitation, as it has the potential to enable students to learn the skills and dispositions required for a democratic living and aiming to stimulate reason about existing beliefs. There are two styles of Socratic Methods to date, the Classic and the Modern Socratic Method.

The Classic Socratic Method is a 'two-phase freestyle form of dialectic' (Maxwell and Melete 2014). The first phase is the deconstructive phase, which is the work of the questioner – or the facilitator, preparing individuals to think (Maxwell 2014). In this phase, individuals' prior understanding is deconstructed by using their own words, creating the experience of being unsure of what they previously understood with certainty (Maxwell 2014). The deconstructive phase may result in distress as the burden to find answers is put on the individual itself – and as such the learner becomes one's own teacher (Maxwell 2014). The role of the facilitator is being a seeker of understanding. Maxwell and Melete (2014) describe the Socratic facilitator in the Classic Socratic Method as completely ignorant, and willing to learn from the students. There are certain traits that a facilitator of Socratic Inquiries should own, such as: loving to discover own errors; being aware of own ignorance; modelling the joy of hard work in the quest for knowledge; experiencing deep curiosity and desiring self-improvement (Maxwell and Melete 2014). The second phase is the constructive phase, which focuses on the work of the respondent or the student. The constructive phase begins when individuals admit to themselves that an understanding they held was wrong in some regards and they begin to construct new ideas and understandings.

In the Modern Socratic Method, the Socratic facilitator assumes the position of the teacher who knows the answers and/or has a constructive agenda (Maxwell and Melete 2014). The Modern Socratic Method has often a pre-designed set of questions and can be explained through seven steps: *"(1) choose an appropriate question, (2) choose a personal experience to apply to the question, (3) find a core statement, (4) identify the experience in the core statement, (5) formulate a definition, (6) test the validity of the core statement, and (7) find counterexamples*" (Chesters 2012, p.57). Van de Kelft and Venselaar (2013) applied the Modern Socratic Inquiry in the context of engineering education to challenge and encourage students to incorporate their understanding of sustainability into their actions. The research concluded that Socratic Inquiry is an effective approach to raise awareness of own and other's values and believes in the context of sustainability (Van de Kelft and Venselaar 2013).

Contemporary societies require higher education to teach values that result in re-oriented behaviours of change agency for sustainability (Jickling 1992; Shephard 2015), but higher education very often focuses on, and prioritises the dissemination of knowledge. In addition, higher education tends to disregard the affective domain (Dirkx 2008) due to the potential

risk of using education as a means of indoctrination (Shephard 2015; Pipere et al. 2015). Whereas, emotions are a 'philosophical hub' that motivates changes of behaviour and the ability to express oneself (De Sousa 1987), the relationship between higher education and emotions is rather complicated (Walker and Palacios 2016).

A main challenge in Emotions and Values Learning is the identification of appropriate strategies and/ or techniques to enable learners to identify and record own emotions, values, ethics orientation, and [re] orientations of same. Expressive Writing is one technique that connects "*thought and feeling, reason and intuition, idea and action*" (Adams 2014, p.ix), enabling students to become more aware of present thoughts and feelings and to express themselves (Pennebaker and Smyth 2016; Adams 2014). Expressive Writing is as a useful tool in educational contexts as is supports "*students to better understand what they are learning, who they are as people, and how they as individual live on their own but in harmony with other people*" (Evans 2014, p.xiv). Usually students write about an upsetting experience for 5 - 15 minutes a day, either for a couple of consecutive days or once a week during each class period (Couch 1991; Pennebaker and Smyth 2016; Pennebaker and Beall 1986; Meads et al. 2003). The facilitator decides how Expressive Writing is integrated into a class activity, but it is recommended that the individual Expressive Writing should be followed by a class discussion (Foulk and Hoover 1991). The benefits of this technique are subjective and can vary from person to person (Pennebaker and Smyth 2016). Research highlights its potential to "*improve participants' long-term psychological, physiological, behavioural, and social functioning*" (Kállay 2015, p.242).

The use of Expressive Writing is very diverse and can be used for any topic or prompt (Pennebaker and Smyth 2016). Depending on the creative insight of educators and the chosen thematic area, prompts (such as: poems, images or puppets *inter alia*) can be used to stimulate Expressive Writing processes (Pennebaker and Smyth 2016; Adams 2014). Expressive Writing has been used to stimulate open mindedness and respect for marginalised or discriminated groups in society. It has been effective to engage students with topics such as youth at risk, special needs, imprisonment, immigration or refugee integration (Adams 2014). Expressive writing has been applied in classroom contexts in various ways and emerged as a useful tool to enable "*students to better understand what they are learning, who they are as people, and how they as individual live on their own but in harmony with other people*" (Evans 2014, p.xiv). In educational contexts, it is not only used to deal with

traumatic experiences (Margola et al. 2010), but also to raise self-awareness of present thoughts and feelings about any given stimulus (Pennebaker and Smyth 2016; Adams 2014).

Discomforting feelings play an important role in challenging dominating habits, beliefs, values, and behaviours, to motivate individual and social transformation (Zembylas 2015). Both, students and educators should to be taken out of their 'comfort zones', creating the possibility for transformations (Zembylas and McGlynn 2012). The Pedagogy of Discomfort has been conceptualised based on the premise that the interplay of emotions and power are essential to the creation of social norms (Boler 1999). When social norms are disrupted one begins to recognise the consequences of such norms as a gain or loss (Ahmed 2004). This eventually requires a re-orientation of emotions that were previously related to these norms, and in so doing, it is argued that emotions stimulate a reproduction or transformation of the given norms (Ahmed 2004). Therefore, *"understanding how emotions are (re)produced enables educators and students to see how social justice operates through our emotional connection to certain values and beliefs*" (Zembylas and McGlynn 2012, p.43).

Pedagogy of Discomfort has been sharply criticised, regarding the role of the educator. The educator uses his/her privileged position of power to force student in to the experience of discomfort, imposing 'democratic principle's' which create a form of ethical violence (Zembylas 2015). The Pedagogy of Discomfort has been used to engage students and teachers with race, social justice or difference. Felman (1992) utilised discomfort in a higher education context by showing videotapes of autobiographical life accounts of Holocaust survivors. Felman (1992) recalls that

> […] the class itself broke out into a crisis…during the screening some were crying […] they remained, after the screening, inarticulate and speechless. They looked subdued and kept their silence even as they left […] the experience…fermented into endless and relentless talking in the days and weeks to come; a talking which could not take place, however, within the confines of the classroom […] the students […] could only talk about the session and could focus on no other subject […] the class was entirely at a loss, disoriented and uprooted (p.47-48).

This example demonstrates that the students were left in a state of disturbance, trauma, shock or 'crisis'. Felman, a literary critic, confessed that she never repeated this course in the same way (Felman 1992). Zembylas and McGlynn (2012), analysed a classroom experience where a teacher deliberately intended to make students uncomfortable, by adapting the classic 'Blue-Eyed, Brown-Eyed' exercise, placing some 10 to 11-year-old children in a

disadvantaged position to learn first-hand about prejudice and discrimination by fostering intensely discomforting emotional experience. The teacher "*was aware of the risk that some [students] may not have the capacity to cope with the situation*" (Zembylas and McGlynn 2012, p.54). During a post-interview, one student confirmed that she did not find this activity valuable, and the study revealed that the children were "*uncomfortable, with effects reported months after*" (Zembylas and McGlynn 2012, p.55). This example signals that the teacher used his differential power to force some students to assume a disadvantaged place and as such imposed a norm on them that become violent and caused harm (Zembylas 2015). Zembylas and Papamichael (2017) published a study on a series of teacher workshops that used the Pedagogy of Discomfort combined with empathy in the context of multicultural and antiracist teacher education. These workshops included discussions, debates, videos, role play games and quizzes (Zembylas and Papamichael 2017). Despite all efforts of the facilitator, some participants did not enjoy the workshop as some "*adapted an antiracist position, others resisted and still others experienced intense distress*" (Zembylas and Papamichael 2017, p.15). This research also demonstrates that within the context of Pedagogy of Discomfort, facilitators assume a non-neutral position. The facilitator of this study agreed with some participants' standpoints in order *"to avoid being constructed as overly critical towards the participants' approaches to intercultural education in their classrooms and her need to minimise the feeling of discomfort and intensity of debate*" (Zembylas and Papamichael 2017, p.10).

Within the Pedagogy of Discomfort, educators should provide a 'relatively' safe space (Zembylas 2015; Zembylas and Papamichael 2017). Zembylas and Papamichael (2017) emphasise that "*discomfort should not be confused with absence of safety (…) create safe spaces that do not dismiss discomfort, but rather encourage a way of thinking, feeling and acting that fosters teachers' critical rigour and empathetic understanding*" (p.15). Nevertheless, there is a chance of 'turning' an educator into a counsellor, making it difficult to remain on the edge of discomfort between transforming or paralysing participants (Zembylas 2015; Walker and Palacios 2016). The main tenet of Pedagogy of Discomfort is the notion for a need of pedagogies that consider emotions as a source of learning (Zembylas and Papamichael 2017). While this pedagogy concentrates on social justice, stimulating feelings could also be beneficial to advancing equity and justice in the field of sustainability education. However, sustainability justice should not only consider social justice, but should

also encompass environmental, ecological, intergenerational justice *inter alia* (Parris and Hegtvedt 2014; Kurian and Bartlett 2009).

2.6.6 Art-based Learning

Art has been recognised as a way of stimulating intellectual, affective, visual and kinaesthetic elements of learning, that fosters deep reasoning and reflection, which eventually results in cognitive evaluations and perhaps transformation (Robinson 2005; Van den Akker 2014). An emerging body of literature argues education and learning should link with humanities and arts to enable democratic sustainable world citizens (Nussbaum 2010), and art could be of value in environmental education (Song 2012). Herron (2009) directly connects art and sustainability when concluding

> […] whether we create art or are its audience, art carries us into deeper awareness and compassion. The integration of our renewed understanding begins with a refinement of feelings through reflection and then nudges its way into the psyche as a whole, displacing, replacing, and educating our other functions […] Through art we feel our way toward an extended empathy that includes not only people but also Earth and other species. With the full extension of that larger identity, it becomes possible to imagine a sustainable world, one in which we see ourselves as independent in a nonhierarchical web of living systems, each essential for the survival of all (p.121).

Art-based learning concentrates on the use of visual arts to facilitate the exploration of issues such as society, environment, politics *inter alia* (Van der Akker 2014; Van Boeckel 2013). Blenkinsop and Morse (2017) highlight Albert Camus's account of suicide during the plague, which asserts that the act of not deciding to commit suicide contains both, a negation when saying no to suicide, and an exaltation when saying yes to life. They relate Camus's concept of freedom to the contemporary need to negate our own suicide based on "individualistic anthropocentrism" to describe the need for "rebel" educators to become creative artists who ask

> […] how am I inviting the local more-than-humans to be part of my teaching practice? How am I considering and creating learning environments that demonstrate that the human is not the single centre of the world? How, in honouring the chosen negation and exaltation, am I focusing on that which is created—even if it pushes me into the background? (p.59).

In the digital age, social media and art have been increasingly combined to raise public awareness (Kilaru et al. 2014), but there seems little regard to the usefulness of public art

for teaching and learning in higher education classroom contexts. Jickling (2013) provides an example of using artefacts from the public domain to foster conversations about social values, norms, the status quo and transformative possibilities. He presents challenging images that portray real-world examples, such as new metaphors or creative experiments that challenge unsustainable practices and assumptions (Jickling 2013). These images are the starting point of imaginations to create a space for new values to evolve by posing challenging and critical questions, critique cultural artefacts, broadening the cultural context and how we relate to other humans and the 'more-than-human world' (Jickling 2013). "*Importantly, though as potential anomalies they [the examples] have capacity to resist or disrupt some aspects of the status quo*" (Jickling 2013, p.196). As part of Murray's training, guided by the Sustainable Self Model' (see section 2.5 and Figure 2), images are used to stimulate emotional engagement, fostering a personal connection with sustainability to increase "*awareness of the need for change, the understanding that sustainability issues are complex and interconnected and the acceptance that we as individuals matter*" (Murray 2011, p.22). Murray applies different images in combination with various individual tasks, but mainly asked students to record their interpretations of the images. The selected images portray real-life situations related to different sustainability themes, such as deforestation, social deprivation, consumerism, child labour, gender inequality, waste *inter alia*. Street art, such as Banksy's satirical graffiti, has the potential to be used in ESD contexts. Street art does not necessarily 'vandalise' nor 'decorate' the urban environment, but aims to disrupt everyday urban life by challenging the population in creative ways to question and explore environmental, social or political issues (Desai and Darts 2016).

2.7 Chapter Summary

In the beginning of this chapter, this literature review points to the historical emergence of the terminology surrounding sustainability. It emerged from the Silviculture, which used early economy thinking for forestry management. Currently, there is a tendency to ask, 'what should be sustained?' This question demonstrates that contemporary Western societies have an urgent need to not only take good care of our natural habitat but much more, such as indigenous or social habitats *inter alia*. However, Western societies are underpinned by anthropocentric worldviews that open a space to perceive humans as superior and separate from nature and one another. From this perspective, the question invites one to select and

prioritise what should be sustained. Conventional anthropocentric ways of acting and thinking have contributed to contemporary crisis. As no one can say what it means to be sustainable it is more appropriate to assess what can be done, or how one can take good care of their all-encompassing habitat.

From the review of international policies, it can be concluded that sustainability policies tend to be based on anthropocentric frames of mind, and are inclined to accept and advocate a green rhetoric. Unsustainable practices, require education that engages in an exploration of values, status quo, norms and actions, enabling individuals to critically and creatively re-define conventional thinking and ways of living. Sustainability challenges require an empathy and sensitivity of educators to select and design strategies of learning and teaching that consciously avoid basing these on anthropocentric viewpoints. Sustainability and education needs to be re-envisioned (as highlighted by Jickling and Sterling 2017) to motivate individuals to question what they can do in the light of a relational ontology, aiming to create possibilities for critical discourse on sustainability that is constantly in-becoming (Le Grange 2017). Sustainability should be understood as a frame of mind (Bonnett 1999), valuing and respecting human, non-human and/or (more than) Earth. This chapter suggests that the conceptualisation of sustainability education can be inspired by reflection on the rhizome. The synergy between rhizomatic principles and the six processes of ESD demonstrates the inspirational potential of the rhizome for positive transformations and change agency in ESD. Sustainability educators should recognise the interconnections of sustainability challenges to become change agents for sustainability so they can support students to become change agents.

The review of literature in this chapter has shown that while attention to innovative pedagogic approaches is scarce (Eilam and Trop 2010), EE and ESD have contributed to significant curriculum and institutional changes in higher education. The much-needed integration of sustainability-oriented pedagogies in higher education are much slower advancing then campus greening and research initiatives (Armstrong 2011). It has been found that research into students' perception and their role within the whole-integration approach have so far received only minor attention, as research tends to concentrate on professional development (UNESCO 2014b; Zeegers and Clark 2014; Birdsall 2013). Sustainability requires actors within higher education to realise that the fundamental change is not only about what to teach and learn, but also how to teach and learn. This literature

review has pointed out that there is only an emerging field of education and sustainability that concern pedagogies with the potential to bring about transformations of self (learner) and society.

This chapter names some advocates who suggest that the combination of different pedagogies (Cotton and Winter 2010; Eilam and Trop 2010) and elements from various theories (Schwab 1969) is necessary for behavioural change. This requires educators to take some risks (Taylor 2006) and the willingness to become 'rebel teachers' (Blenkinsop and Morse 2017), to creatively combine existing pedagogies with experiences of trial and error.

The last section of this literature review presents several theories of learning underpinning sustainability education, namely: Lifelong Learning, Transformative Learning, Re-education, Deep Learning, Emotional Learning, Values Learning, Pedagogy of Discomfort, and Art-based Learning. It also provides some examples of useful teaching strategies and tools with respect to the chosen learning theories.

Sustainability requires teaching and learning strategies that support a self-concept of being a lifelong learner and a change agent for sustainability (Svanström et al. 2008). Engagement in processes of Lifelong Learning, potentially prepares educators and learners for a life in ever faster-changing societies characterised by constantly increasing uncertainty and risk.

Transformative Learning reminds educators to be transformative themselves, creating a transformative classroom environment, using transformative material, and stimulating students to become transformative (Taylor 2006). Transformative Learning is closely related to Re-education, which emphasises social action and collective transformations, providing insights into the relationship between transformations of frames of minds and behavioural changes. Moreover, Transformative Learning and Deep Learning are fundamentally complementary. Deep Learning can enrich Transformative Learning with pedagogic structures that may enrich transformative processes. Additionally, it may support the construction of disorienting dilemmas by enhancing reflective and cognitive processes that increase the potential of disorientation (Howie and Bagnall 2015).

This chapter emphasises that scholars are increasingly highlighting the importance of ethics. However, the sharing of appropriate or successful strategies and/ or techniques to enable

learners to identify and record own emotions, values, ethics orientation, for [re] orientations of same, is scarce. This literature review introduced Expressive Writing and the Socratic Dialogue as potential tools where the learner becomes one's own teacher. Furthermore, it becomes apparent from the review of the literature that current practices to identify a prescribed list of sustainability values may be misguided in terms of progressing sustainability education. Instead, educators should enable learners to identify and question their values that underpin their anthropocentric practices and lifestyles, and use that as the springboard for re-orientations of values-bases towards sustainability.

The role of emotions was also investigated and it can be concluded that higher education practitioners tend to be reluctant to educate purposefully within the affective domain (Dirkx 2008), due to the risk of indoctrination. Emotions can be seen as a 'philosophical hub' (De Sousa 1987), stimulating value and ethics clarification required to motivate behavioural change (Eilam and Trop 2010). Emotions create a personal connection with the content. The contextualisation of learning to the social reality of students creates the potential for action and change (Freire 1974). The Pedagogy of Discomfort exemplifies that affections can potentially initiate the recognition of the consequences of discriminative norms.

This chapter concluded with the consideration of Art-based Learning. In the digital age, social media and art have been increasingly combined to raise public awareness (Kilaru et al. 2014), but there seems little regard to the usefulness of works such as art from the public domain for teaching and learning in higher education classroom contexts. The experimentation of work from the public domain combined with various pedagogies and elements of various learning theories, contains the potential to disrupt anthropocentric frames of mind and stimulate people's change agency for sustainability through the empowerment of learners to determine the biography of their own lives.

In light of gaps identified in the overall review of the literature, it is clear that research is needed that identifies and provides an evidence base for pedagogy strategies and/ or practices that can be integrated within higher education, to engage learners in critical reflection of own values bases, perspectives and worldviews with respect to sustainability, with a view to challenging their existing frames of reference (mind-sets) with respect to sustainability, and in enabling or enhancing change agency for sustainability.

Chapter 3: Philosophical and Methodological Framework

3.1 Introduction

This qualitative research study set-out to explore (pedagogic) processes that enable (re-) orientations of higher education students' mind-sets towards sustainability, and promote change agency for sustainability. The pedagogic interventions for this study took the form of Visual Cue interventions, which were inspired by Jack Mezirow's Theory of Transformative Learning, with a view to unsettle and challenge the frames of reference of students, and move them towards critical consideration and discourse on their own role and role of others in enabling sustainable futures for all. This chapter explains the methodological framework and the research design. It begins with an outline of the rationale for choosing qualitative research, and in using Constructivist Grounded Theory (CGT) as the chosen methodological approach, outlining its historical roots in Grounded Theory. Furthermore, the processes of choosing the research sample; handling of the literature review in context of CGT; the research questions; the researcher's reflective processes are explained. The last sections detail the design of each research phase. Here, the research setting; ethical approval processes; participants; data collection tools; analysis process, its challenges are presented.

3.2 Qualitative Research Design

Qualitative research emerged out of the desire to understand the 'other'. The tipping point in history for the emergence of qualitative research can be associated with European colonisation, when explorers and ethnographers sailed to foreign lands to systematically observe the indigenous way of life (Vidich & Lyman 2000). In the 1920s and 1930s researchers at the Chicago School pioneered qualitative research methods, highlighting the importance of qualitative inquiry to understand social processes through observations of others' lived experiences (Denzin and Lincoln 2005). Qualitative research acknowledges that reporting on researchers' observation can never be fully objective as such are interpreted though the existing lenses of the researcher, such as language, ethnicity, social class or gender, and the subject of interest may not provide a comprehensive account of actions or intentions (Denzin and Lincoln 2005). Therefore, interpreting processes of the social cannot

be understood through experimentation and measurements in terms of quantitative research (Denzin and Lincoln 2005). Instead, conclusions based on qualitative research derive from the enacted relationship between the subject and the researcher.

Qualitative research is difficult to define as it has a multidimensional nature that incorporates different paradigms and variety of methods (Denzin and Lincoln 2005). Researchers' values (axiology) define and shape the entire inquiry process. The researcher's values and worldviews influence the choice of a framework (ontology) from which the researcher approaches the social, the nature of the research questions (epistemology) and the set of chosen methods, to collect empirical material, guiding the exploration of social processes in a specific way (methodology) (Denzin and Lincoln 2005; Guba and Lincoln 2005).

This exploratory research study investigates how to reorient higher education students' mindsets towards sustainability. A qualitative research approach was considered pivotal to deep exploration of the following research questions, which set out to explore whether pedagogic processes could be designed and structured in a manner (in this case as Visual Cue interventions) that would re-orient students' frames of reference and enable change agency towards sustainability:

- What impact do Visual Cue pedagogic interventions have on participants' frames of reference (thoughts and/ or feelings)?
- Which elements of Visual Cue interventions impact participants' frames of reference, and to what extent? and,
- To what extent do Visual Cue interventions enable participants to critically review the self in the context of sustainability, and/ or enable change agency?

These research questions guided the exploration of the impact these Visual Cue interventions had on participants' frames of reference, with the aim of determining the extent to which these interventions enabled critical review of self in the context of sustainability, and/ or change agency. The nature of these questions demanded a qualitative and exploratory research approach, which uses thick descriptions and individual points of view as empirical data to inquire, in an interpretive way, how pedagogic processes enabled within Visual Cue interventions, unsettle and reorient existing mind-sets and enable change agency of students. Qualitative research gives space for multiple data sources to gain a complex and detailed

understanding of the impact of these interventions that focuses on participants' points of view and meaning perspectives (Creswell 2007). Moreover, this type of research requires that the researcher, who also acts as the facilitator of these pedagogic interventions, reflects on her role as both, an educator and researcher, in order to get a holistic understanding of these social and pedagogic phenomena (Creswell 2007).

3.3 Methodology

This research took place in a higher education institution in Ireland within an undergraduate degree of teacher education. This research applies Kathy Charmaz Constructivist Grounded Theory (CGT) approach, a systematic methodology in the social sciences, involving the possibility to construct of a theory through the analysis of data. It contains two phases of research each with a different cohort of students. The first research phase took place from September 2014 to August 2015 and comprised interventions with two different groups who participated in a sequence of three thirty minutes Visual Cue interventions. The data collection tools for the first research phase include: survey type tool, audio recordings of the group discussions, researcher's personal reflections, and follow up questions by phone/email. The second research phase took place from September 2015 to February 2017. Here, the number of Visual Cue interventions was increased to six, and the time for each Visual Cue was extended to sixty minutes each. In addition, the Visual Cues were integrated into a sustainability module delivered across two programmes of studies in teacher education. The data collection tools were extended to gather more detailed data of the impact of the Visual Cue interventions on students. The New Ecological Paradigm survey, observational notes, reflective diary and interviews were the method of choice to collect a comprehensive set of data. This section contextualises the rationale of adopting a Constructivist Grounded theory (CGT) by Kathy Charmaz and it will outline the historical roots of CGT in Grounded theory and continues with my CGT research story, where I elaborate on the key tenets of this methodology that have been applied throughout this research.

3.3.1 From Grounded Theory to Constructivist Grounded Theory

Constructivist Grounded Theory is based on Grounded Theory. The origins of Grounded Theory are within the science of sociology, or more precisely the sociology of health and illness (Glaser and Strauss 1967). It emerged from a study by the sociologists Barney G.

Glaser and Anselm L. Strauss (1965), who observed and analysed the process of patients dying in a hospital. Their research focused on how and when doctors and patients knew they were dying and how this information was managed. Through the analysis, the two founding fathers developed systematic methodological strategies for analysing in-depth conversations and detailed observational notes (Charmaz 2006). The book, *The Discovery of Grounded Theory (1967)* made a strong argument for the value of qualitative research in a time of predominantly quantitative research and positivist conceptions (Charmaz 2005).

During the 1960s the dominant understanding was that knowledge can only be true and perceived as a verifiable fact when it could be tested, which limited the creative aspect necessary to discover or develop a theory (Glaser and Strauss 1967). Glaser and Strauss (1967), propose that qualitative research could be made more rigorous and observations could be made more reliable by using analytical guidelines that moved qualitative research away from an oral tradition towards explicit analytical strategies, emphasising data collection methods and the role of the researcher (Charmaz 2006). Grounded Theory has the overarching aim to develop abstract theoretical explanations of social processes. Grounded Theory research begins with the data and does not entail a hypothesis that is tested through collected data. Through the process of coding data, emerging codes are subsequently grouped in a hierarchical fashion into concepts, until a theoretical model emerges where concepts represent theoretical propositions (Wasserman et al. 2009).

By the 1990s Glaser and Strauss had each created a separate and modified approach of Grounded Theory which can be called *traditional, or classical,* or Glaserian grounded theory, and *evolved* or Straussian grounded theory, the latter was co-developed with Juliet Corbin (Higginbottom and Lauridsen 2014; Mills et al. 2006). From both perspectives Grounded Theory has a positivist orientation. Traditional Grounded Theory emphasises objective analytical procedures, comparative methods and conceptual development of an external unbiased discovery of a theory (Charmaz 2005). Evolved Grounded Theory further enhances these original positivist procedures and includes additional technical strategies, such as axial coding (Mills et al. 2006).

While traditional and evolved Grounded Theory are important historical contribution to the development of CGT, they both have not been elected as suitable for this research. Philosophically, both the traditional and evolved approach contain positivist underpinnings

where the researcher adopts a neutral position. From a procedural perspective, the traditional Grounded Theory approach appears rather complex and is arguably not easily implemented. Charmaz (2000, p.512) points out that "*the abstract terms and dense writing Glaser employed rendered the book inaccessible to many readers*". The evolved approach has been deemed not suitable as it is open to interpretations of their philosophical stance as "*people can find support in it for any ontology they wish*" (Schreiber and Macdonald 2001, p.45). Kathy Charmaz chose to apply a constructivist lens to Grounded Theory. She advanced Grounded Theory and moved it away from its positivist past of the traditional and evolved approach (Charmaz 2005; Charmaz 2006; Clarke 2003). CGT has been elected for this research. The main tenets to employ CGT are its flexible approach to the methods, the acknowledgment of the role of the researcher in the analysis process, and its emergent approach to the data that may or may not result in the development of a theory (Charmaz 2015). Jiao (2010) further highlights that a constructivist framework is particularly suitable when a holistic and inclusive picture, resulting in an in-depth understanding of the case under investigation, is required. It mirrors this research of the impact of Visual Cue interventions, which can only be determined when considering the multiple experiences of the learners themselves.

CGT aligns with Grounded Theory that focuses on social processes (Glaser and Strauss 1967) and dialogues with the nature of the research questions. Strauss and Corbin (1990, p.38) highlight that "*grounded theory questions […] tend to be oriented toward action and process*". This study is action and process oriented, exploring the impact on and the subjective experience of participants engaged in Visual Cue interventions. In addition, CGT follows the rigorous approach of Grounded Theory, enabling the researcher to apply strategies to gather, collect and analyse the data (Glaser and Strauss 1967). It also provides insight into the relationship of meaning that individuals attach to experiences and actions (Charmaz 2015). Both, Grounded Theory and constructivism have been widely applied within the field of educational studies (Laws and McLeod 2004; Murphy 2002). Pereira (1996) states that constructivism is about knowledge and learning. Jonassen (1991, p.35) summarises the following principles to demonstrate how constructivism can be facilitated for instructional design:

- Provide multiple representations of reality;
- Represent the natural complexity of the real world;
- Focus on knowledge construction, not reproduction;
- Present authentic tasks (contextualising rather than abstracting instructions);
- Provide real-world, case based learning environment, rather than pre-determined instructional sequences;
- Foster reflective practice;
- Enable context-and content dependent knowledge construction;
- Support collaborative construction of knowledge through social negotiation.

The use of an exploratory methodology, such as CGT, can develop a deep understanding of the Visual Cue phenomenon, and is particularly suitable within the field of education for sustainability in the context of limited understanding of innovative sustainability oriented pedagogies within higher education (Armstrong 2011).

According to Denzin and Lincoln (2013) social constructionism "*assumes a relativist ontology (many possible realities), a subjectivist epistemology (understandings are co-constructed by the researcher and research participant) and naturalistic (non-experimental) methodologies*" (p.26-27). Epistemologically, constructivism emphasises the subjective, active and cooperative interrelationship between the researcher and the participant that results in the co-construction of meaning, as

> […] we generally count as knowledge that which is represented in linguistic propositions and social practices, meaning that knowledge is not something people possess somewhere in their hands, but rather, something people do together (Gergen 1985, p.270).

Charmaz (2006) assumes that we do not discover data or theories. Instead, we are embedded in the world we study and are part of the data we collect. Thus, grounded theories are constructed through past and present engagement with "*people, perspective, and research practices*" (Charmaz 2006, p.10).

CGT contains a set of flexible principles and practices but not rigid prescriptions. Charmaz adopts the strategies of the traditional Grounded Theory within the paradigm of constructivism, and in so doing, abandoning objectivity and emergence (Mills et al. 2006).

Glaser repeatedly criticised Charmaz's constructivist approach in arguing that the interactive approach appears more important than the participants, and as a result forcing the data and feeding the researcher's bias (Glaser 2012). Whereas Glaser (2012) believes that constant comparison is all that is needed, Charmaz recognises that qualitative research can never be fully free of bias. Acknowledging and giving space for the voice of the researcher can add value to the findings and offer insight into the rational of the research. The researcher, positioned as a co-producer, contributes with descriptions of the situation and the impression as well as perceptions of how the interaction and personal affections influenced the research process (Charmaz 1995).

3.4 CGT Research Story

In this section, the fundamentals of CGT are detailed, beginning with an explanation of the research sample in respect to the theoretical sampling of CGT, followed by handling of the literature review, the research questions, the inclusion of researcher's reflective diaries and an explanation of the CGT strategies used in the analysis process.

3.4.1 Research Sample

One critical aspect of CGT is the design of an appropriate sampling strategy, where the data collection commences with a fairly random group of people (Charmaz 2006). The target participants for this research were first year undergraduate students undertaking a degree course in education and training. At the outset of this study, it was hoped that participants could be attracted from other disciplines of higher education. However, due to difficulties in gaining access to wider cohort of participants, I enrolled only participants from the discipline of education. Some students were traditional students with little to no educational experience and others were mature students who had some experience with education and training. In the first research phase, two entire class-groups participated in the study. This data provided insight into the impact of Visual Cue interventions and helped elucidate an emerging theory of 'Becoming sustainability [re-]oriented', which then guided the **sampling strategy** as it highlighted the need for research engagement at level of individual learner to articulate the theory of, and processes within, Disruptive Learning. In the second research phase, the size of sampling was consequently adjusted based on the need to delve deeper into individual cases.

3.4.2 Literature Review and Research Questions

A highly-debated aspect of Grounded Theory is the utilisation of existing literature within the research study (Bryant and Charmaz 2007). The first publication of Grounded Theory advocates the delay of the literature review until the analysis has been completed (Glaser and Strauss 1967). In the context of this research, the literature review was a continuously evolving process throughout the research process, which served to "*clarify my ideas, make intriguing comparisons, invite readers to begin a theoretical discussion that shows where my work fits or extends relevant literatures*" (Charmaz 2006, p.167).

3.4.3 Researcher's Reflections

One crucial reason for employing CGT is the participative and active engagement of the researcher in the research process. It is arguable that the quality of the data is influenced by the nature of the relationship between the participant and the researcher, as for grounded theorists' data is a result of a process of interaction (Hall and Callery 2001). Besides considering the nature of this relationship, attention is also required towards the researcher. A key aspect of CGT is the reflexive approach that considers the researchers' contribution to the theory development (Charmaz 2006), as the researcher plays a role for example in the coding process when identifying relevant data. **Theoretical sensitivity,** the researcher's ability to grasp subtleties and nuances in the data, is important for the emergence of a theory. At the same time, theoretical sensitivity can be associated with the ability of the researcher to manipulate the data to highlight explanations that mirror an apprehended reality (Hall and Callery 2001). Whereas theoretical sensitivity does make a fundamental contribution to the rigor of Grounded Theory it can be further enhanced though the incorporation of reflexivity in the research process (Hall and Callery 2001).

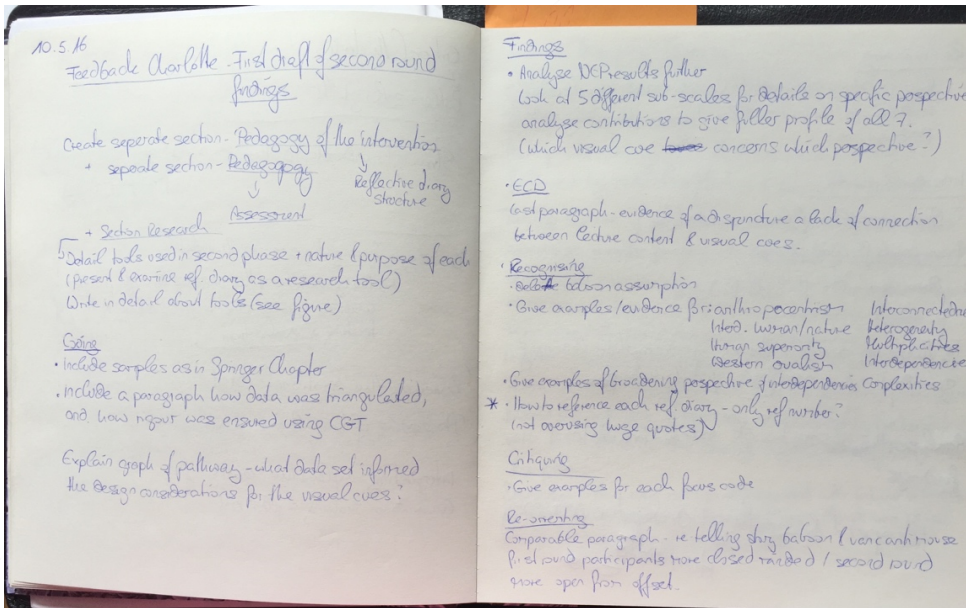
Reflexivity is inherent to being human when we attempt to understand the other (Holland 1999) and it bridges epistemological considerations with method (Alvesson 2003) through a continuous "*evaluation of subjective responses, intersubjective dynamics, and the research process itself*" (Finlay 2002, p.532). **Reflection** can be understood "*as the interpretation of interpretation and the launching of a critical self-exploration of one's own interpretations of empirical material (including its construction)"* (Alvesson and Sköldberg 2009, p.9).

Researchers reflections are part of all areas of this research. I used reflective diaries as a method to: "*complement other approaches to qualitative data analysis, rather than stand in*

opposition to them" (Charmaz 2006, p.9). Being reflective is not easy as we are often not conscious about the values that influence and guide our actions. Therefore, conducting reflective research demands a conscious attention of the researcher pointed to oneself. In this way, I accept that my behaviour always directly or indirectly influences the participants' responses and that both, the researcher and the participants have taken for granted assumptions that shape the data collection. By using reflective diaries, I attempt to capture my own presence with all the implications on the research process that it may entail. It also underpins the role of the researcher, positioned as a co-producer, who contributes with descriptions of the situation and the impression as well as perceptions of how the interaction and personal affections influenced the research process (Charmaz 1995).

To do so, I made use of **two reflective diaries**. One reflective diary captured the chronology of the research and analysis process as well as the feedback loops of supervisors, conferences, publications etc.

Photograph 3: Example Reflective diary of Chronological Feedback, May 2016

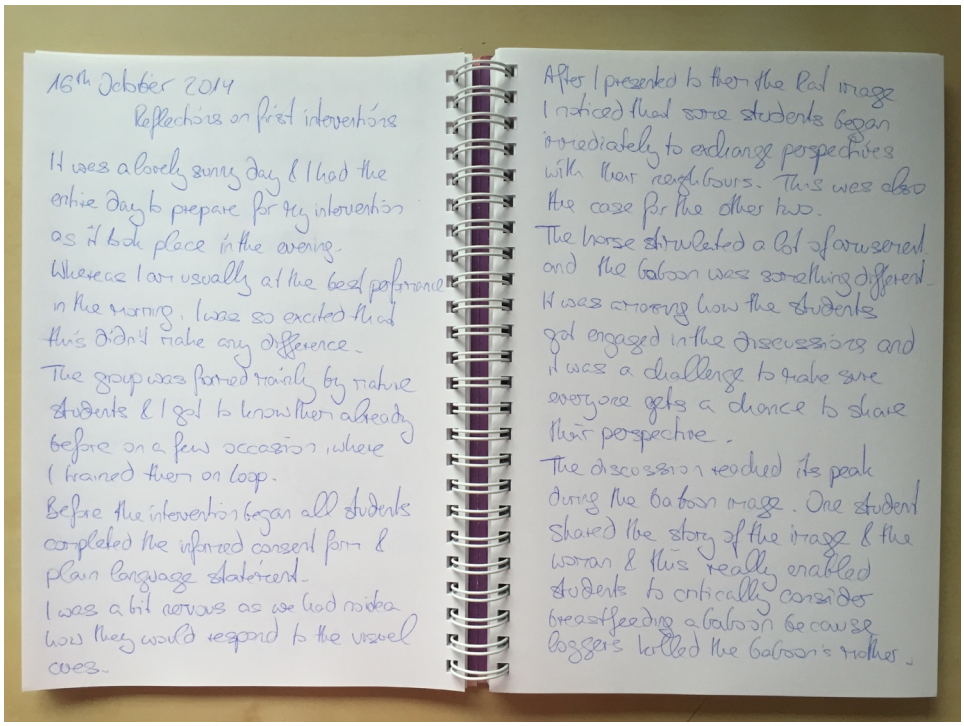


The example above (see Photograph 3) is a record of feedback to a written draft of findings from the second research phase in May 2016. This reflective diary served the chronological recording of everything that directly or indirectly influenced, or contributed to, the research process. It contained notes taken during supervisory or panel meeting and summaries of feedback. It kept track of how the researcher and the research were shaped and influenced

by discourse, discussions and feedback. Keeping chronological track of meetings, submission of draft chapters and other influential events, such as conferences, provided a record of how the research progressively evolved and resulted in the final product.

The other reflective diary (see Photograph 4) kept record of the researcher's learning within the research process, and includes my affections, struggles and personal circumstances during the research process.

Photograph 4: Example Reflective Diary of Personal Backstory, October 2014



I used this diary as a tool for free writing. I wrote down anything that came to my mind such as, aspects of the research I was struggling with in terms of research progress, or events and personal circumstances that were impacting the research design, the data collection and analysis process. The example above describes my first impression of the first Visual Cue intervention in October 2014. In addition, I reflected on my learning process. This reflective diary was useful as it allowed my voice to be heard in an informal way.

Ultimately, the reflective diaries were critical in terms of deep level critique of both research phases and became particularly useful to elaborate why and how the design of the pedagogy and data collection changed from one phase to another and how I realised that changes were necessary for the research process.

3.4.4 Analytical Process

Coding is the categorisation of segments of data and the fundamental strategy of the analysis in CGT. It establishes a link between data collection and the development of an emergent theory, explaining "*what is happening in the data*" (Charmaz 2006, p.46). Coding consist of two main phases, an initial coding phase and a focus coding phase, before conceptualising theoretical categories based on selected focused codes. Theoretical sampling is the on-going process of coding the data (Charmaz 2006). It involves comparing and grouping data to develop categories. **Theoretical sampling** advanced my analytical thinking as it enabled me to elaborate and refine the data and properties of categories of the emerging theory. Theoretical sampling was conducted until no new properties of categories emerged. This moment is also called **theoretical saturation** (Charmaz 2006). Brown et al. (2002) emphasised that the moment of theoretical saturation can be identified when no need for new data can be distilled form any category; the categories incorporate most noticeable variations and process; and the interrelationships between categories has been clarified. My meaning of verification aligns with Charmaz' constructivist understanding, and I assert that verification is done throughout the research process and is ultimately achieved through theoretical saturation (Charmaz 2006).

Another fundamental strategy of analysis is the **constant comparison** and the follow up on emerging key findings in subsequent research phases (Glaser and Strauss 1967). In so doing, the researcher initially compares data with data, progressing to comparison of data with codes, and codes with codes throughout the inquiry (Charmaz 2015). The aim of constant comparison is to determine commonalities, variations and to establish analytical distinctions (Charmaz 2006).

According to Glaser and Strauss (1967), the **emerging theory** should be recognisable by participants, and their experience of the studied phenomena should be mirrored in the theory. Consequently, the emerging theory is grounded in the data and explored, instead of preconceived by the researcher (Charmaz 2006).

One challenge of CGT is to demonstrate how one moves beyond descriptive accounts and raises the analytical process to a conceptual level (Snow et al. 2003). Wassermann et al (2009) points out

> […] while it may be clear how the technique promotes insight in the development of initial codes, the ones that are explicit in the data, it is not clear exactly how this promotes insight into conceptual structures, and thereby leaves one with the impression that the latter may be based merely on the musings of the individual researcher (p.360).

Although this study describes Disruptive Learning, and processes within Visual Cue interventions, its primary aim is to generate a theory grounded in the accounts of participants who were engaged in Visual Cue interventions, rather than describing merely the learning experiences or progression of these participants.

Grounded theorists are actively engaged in the writing of memos about the collected data and the analysis process. **Memo-writing** is an essential analytical feature of Grounded Theory, which captures emerging thoughts when comparing and drawing connections within the analysis process (Charmaz 2006). Memo-writing is a helpful tool to raise codes to a conceptual level. Through the free writing about 'whatever' comes to mind, when comparing for example codes with codes, distinctive properties of codes emerged and were simultaneously captured. The memo below (Figure 3) exemplifies how ideas were initiated and discussed, in this case in February 2015.

Figure 3: Example of a Memo, February 2015

12th February 2015: Emotions and Cognitions

The more I compare the statements made for emotions with those of cognitions I struggle to understand the difference. How can I differentiate between someone stating "I feel sad" or "I am sad". Students don't seem to care too much about how they phrase their statements under the sections, and as a result I find statements such as "I feel sad" under the column of frame of mind. This indicates to me that emotions and cognitions have a very close relationship and are equally part of our minds. To get some clarification on this matter, I did some research and I found an interesting article published in Nature by Pessoa (2008) called 'On the relationship between emotion and cognition'. She demonstrates through her research that "emotions and cognitions conjointly and equally contribute to the control of thought and behavior" (p.155) and that "behavior is a product of the orchestration of many brain areas; the aggregate function of these brain areas leads to emotion and cognition". For the exploration of the impact on frames of mind I will consider emotions and cognitions being equally part of it and impossible to distinguish. Although phrasing it for the students may be not a bad idea as it is easier to respond to what do you think and feel then how does this impact on your frame of mind. In terms of the research I can only move forward in the analysis process if stop trying to explore what is happening to the emotional and cognitive response. When I see them in relation I can notice a change of frame of mind when I compare and contrast their initial responses with the responses to the discussion phase.

Memos were used to write down any idea during the analysis process as quickly and fully as possible. Through the practice of memo writing, I began to notice a link between participants' initial reaction and their subsequent engagement in reflection and discussion within the Visual Cue intervention. The exemplified memo above provides some insight into how I established the theoretical categories 'emotional/cognitive disjuncture' (later renamed 'being disrupted'). I constantly compared initial codes of emotions with codes of cognitions and questioned: How do these codes fit together under a category? While I treated these as separate entities, at the beginning of the analysis, my memos helped me to realise that there is no clear distinction between emotions and cognitions and how they are closely interrelated.

3.4.5 Research Design and Data Collection

The following section will detail each research phase. Here, I will highlight the research setting and ethical approval; participants; data collection tools and the analysis process with regard to challenges and how one phase evolved from the previous research phase. Table 2 summarises the two research phases.

Table 2: Overview of Research Process

Characteristics	**First Research Phase**	**Second Research Phase**
Timeline	September 2014-August 2015	September 2015 – February 2017
Participants	55 participants (25 part-time & 30 full-time students)	7 participants (4 part-time and 3 full-time students) Interviewed twice – shortly after the event, and 14/15 months later.
Context	1 stand-alone intervention (containing 3 consecutive Visual Cues)	6 integrated interventions (each contained one Visual Cue)
Methods	• Survey type tool • Audio recording of discussions • Researcher's reflections • Follow-up questions	• Reflective diary • Direct observations • Researcher's reflection • In-depth interviews • New Ecological Paradigm (NEP) scale • Follow-up interviews

3.5 Research Phase One

In the first research phase, from September 2014 to August 2015, two identical interventions with two different groups were undertaken. The two interventions included the three Visual Cue activities of 30-minute duration each. This first research phase served as a **pilot** to explore the pedagogy of Visual Cue scenarios and simultaneously articulate and craft the design of Visual Cues and its most suitable pedagogical process.

This research was born out of the idea that in order to make students critically consider self in the context of sustainability they would have to be disrupted in some form. This idea of creating (what later would be called) Visual Cues emerged from a discussion with my supervisor about her experience at a conference where a speaker presented to the audience an image of a woman from the South American Yanomami tribe, breastfeeding both her baby and a baby baboon (heretofore referred to as the Baboon Cue), and the audience were asked to consider whether they would breastfeed a baboon. This image sparked intense responses with a few leaving the conference room. Based on discussions about this event in the context of my proposed research study, I made the decision to identify and/ or design images that had the potential to disrupt learners' frames of reference, in the same manner as the Baboon Cue. I selected disruptive visual stimulations from the public art domain within the context of sustainability and of which I thought would disrupt but not disturb students. The parameters to determine what is disruptive and not disturbing, was initially based on my own reaction to potential imagery when searching for Visual Cue material. Here, I paid close attention to my initial reactions (if potentially disturbing, the imagery was ruled out) and material was further selected on the basis that it could support multiple interpretations and could be related to more than one aspect of sustainability. Three images emerged for integration within phase one of research, namely, Baboon image, Horse -Man image, and Vacanti Mouse image. These images were combined with a question to create what was hoped would constitute a disorienting dilemma, that would propel students to critically reflect on self and society in the context of sustainability. In addition, the presentation of Visual Cues required a process that facilitated critical engagement. Consequently, the simple method of *think, pair, share* was used as an initial pedagogical framework, which was combined with a tool to be handed out to students to capture the impact of the Visual Cue interventions for both research and pedagogical purposes.

3.5.1 Research Setting and Ethical Approval

The Research Ethics Committee of DCU approved this research (see Appendix A). Informed consent was sought and granted by all these participants at the beginning of each intervention. Participants filled the Informed Consent Form, signed it, had someone witness it and returned it to the researcher. The participation in this research was voluntary and participants were advised they could withdraw from this research at any stage. Every participant received a copy of the Informed Consent Form (see Appendix B), for their own record, and a Plain Language Statement, summarising the nature of this research (see Appendix C). The identity of participants was kept confidential, through the use of codes during the analysis process, the writing up and any publication that derived from this research.

3.5.2 Participants

This first phase of the study comprised interventions with two different groups: twenty-five part-time students (mainly direct entrants from post-primary education) and thirty full-time students (education practitioners and professionals). Both groups were undertaking the same sustainability related module as part of the first year of their undergraduate studies in education and training. The Visual Cue intervention was implemented across a 90-minute session (including three Visual Cue activities of 30-minute duration each), with each group.

3.5.3 Data Collection Tools

The first research phase contained four data collection tools, namely, survey, audio-recording, researcher reflection, and post-study clarification phone-calls/ emails, as summarized in Table 3.

Table 3: Methods Overview of Research Phase One

Survey type tool (55 participants)	*Data from Participants experience of Visual Cue interventions* • To explore which parts of the pedagogic design/ processes underpinning the Visual Cue, impact on frames of reference and why? • To uncover the impact of each pedagogic element, to provide evidence of appropriateness of pedagogic framing of the Visual Cue intervention. • To uncover the design considerations for Visual Cues (what factors need to be addressed when creating Visual Cues). • To show evidence that learning in respect to sustainability is happening.
Audio recording (2 group discussions)	*Data from audio recorded in-class discussion within Visual Cue interventions* • To identify the sustainability theme/s, principles, concepts and contexts students critically engaged with during group discussions. • To show that 'learning about/ for sustainability' is happening - in other words, provide evidence that key sustainability themes, concepts, principles, etc. are touched upon within and across the Visual Cue intervention/s. • To triangulate results with the emerging data from tool 3 of the survey type tool.
Researcher's personal reflections	*Data from Researchers' recording of observations on process of designing and implementing the Visual Cue intervention (aesthetic/ pedagogic), as well as on the research process.* • To capture own thoughts on aesthetic and pedagogic design considerations for the Visual Cue, and on own development as researcher within the research processes. • To continuously inform the research process, and to weave critical considerations into the fabric of discussion of emerging findings. • To present the voice of the researcher within the thesis. • To capture changes in own development as a researcher throughout the study.
Follow-up questions by phone/ email (3 participants)	*Data from audio recorded interviews* • To clarify the meaning of recorded statements in the survey type tool and participants' statement have been accurately interpreted. • To inquire whether Visual Cue intervention had any lasting effect.

Participants' perspectives were documented using three **survey-type research tools** that were used to allow students to self-document the extent to which their thoughts or feelings were challenged, and to identify influential elements of the Visual Cue activity (see Appendix D). The request to participants to write down initial thoughts about and/ or feelings towards the Visual Cue directed the attention of the participants to reflecting on their own mind-sets and frames of reference. This generated data, offering the first insights into the impact of the Visual Cue intervention on students' self. Furthermore, the 90-minute sessions were audio-recorded with the aim of ascertaining the extent to which the cohort of students critically engaged with sustainability theme/s under examination. Upon completion of the three sequential Visual Cue activities, participants were asked to rate the extent to which each Visual Cue activity disrupted their emotional and cognitive states when compared with overall activities. This tool was designed with the intention to determine whether Visual Cues were disrupting or disturbing students. Finally, participants were asked to complete a summative reflection on the whole experience by answering two open questions, as follows: What is going through your mind right now? What have you learned about sustainability today?

The data that emerged from tool 1 (see Appendix D) was organized and analysed using CGT (Charmaz 2006). I used **memos** and kept my **diaries**, recording critical thoughts on concepts, contexts, processes and practices, which informed the data analysis process. Some participants were invited to answer some **follow-up questions** (by phone/ email) to clarify ambiguously formulated statements where I was unsure about the participants meaning (see Appendix E). The data of tool 2 (see Appendix D) was intended to be used to examine the appropriateness of each Visual Cue and to inform the future design of Visual Cues. Data of tool 3 (see Appendix D) was useful to be triangulated with the data of the audio recordings of the discussions. It was also used to ascertain the extent to which students identified sustainability theme/s, principles, concepts and contexts when learners critically engaged in the group discussions. In addition, the data from the survey-type tool was used to determine whether Visual Cue intervention/s stimulated 'learning about/ for sustainability'.

Both my reflective diaries and memos (critical thoughts on concepts, contexts, processes and practices of the Visual Cue interventions and research process) were also used to inform the data analysis process and the design of consecutive Visual Cue interventions in the second research phase.

3.5.4 Data Analysis Process of Phase One

The following section will detail the analysis process of the first research phase. It will begin with an overview of the analysis process of the data from tool 1 (see Appendix D), for which CGT was employed, and completes with a description of the data analysis process of the remaining data-sets.

3.5.4.1 Initial Coding

The data analysis process began with an **in-depth reading** of the entire data set. Through this activity, the data of tool 1 became most interesting as I sensed changes of perspectives and dispositions that I wanted to examine closer. The CGT coding was used for the comments that emerged from participants' self-recordings of tool 1.

The analysis began with initial **line-by-line coding** of participants' responses (see tool 1, Appendix D), constantly questioning 'what is happening?' to discern what the data set revealed about the impact of the Visual Cue activities on participants' thoughts and feelings. Hereby, I made use of **Excel spread sheets**. For each pedagogical phase (viewing, reflecting, pair and group discussions) one sheet was created per group and per Visual Cue. Line-by-line coding was used to include the entire data set of tool 1. Coding line-by-line gave me an insider's perspective. It kept me close to the participants' experience and enabled full immersion in the data. It also ensured that I would not disregard any clues the data entails about the impact on students' thoughts and feeling. Each comment represented an utterance and initial codes were created for all utterances with **the use of gerunds**. Charmaz (2006) advocates the use of gerunds, action verbs, to create a sense of action within the coding process and to identify potential temporal sequences in the data.

Figure 4: Examples of First Draft Initial Codes

Having no thoughts, shocking and disgusting, disagreeing, disapproving, condescending animals, caring for all beings, disliking image, amusing, considering self and family, thinking differently, considering ethics, sympathizing with animal, feeling sad for animal being abused, feeling detached from animals, feeling confident through discussion, being human centric, considering self, considering it for the first time, surprising, disagreeing mutually, considering human rights and consequences for humans, perceiving it unlikely, having mixed views although generally disagreeing, rejecting it for oneself, thinking it was odd, comparing with first two images, interesting, recognizing self is confronted with something not used to, questioning why she breastfeeds an animal, rejecting idea, appearing unnatural, highlighting cultural differences, thinking closed minded about idea, wondering how our worlds are so different, caring for child – wondering if it suffers, agreeing to give baboon expressed

milk, being a male and feeling not related to idea, thinking that woman has a happier live and self would like to live in her tribe, gaining more understanding, thinking about ones passion for culture, agreeing as it preserves the eco-system, thinking about various perspectives and that most women agree on the gesture of giving, realizing differences in response to monkeys or other animals (maybe rats) – relating to previous images

After the first generation of **initial codes,** the organisation of spread-sheets of initial codes for each group, was soon disregarded. Through the process of initial coding I realised that I did not need to distinguish the data of both groups. The two interventions were identical in nature and format, and were also embedded in the same course, with the only difference being in part-time or full-time enrolment. There was also no apparent reason to have separate sheets for each Visual Cue. Consequently, the data of the two interventions and all three Visual Cues were merged together, leaving me with four spreadsheets for each pedagogical phase. These alterations enabled me to get also a better understanding of what is happening in each pedagogical phase. Nevertheless, I spend a considerable amount of time rephrasing the initial codes. Throughout the process, I transformed my initial codes several times until I deemed that they represented as accurate as possible the meaning of the participants.

It was a challenge to discern the meaning of some participants' comments, and to create initial codes from the utterances in a way that they remain close to the data, and simultaneously adequately abstract the meaning. This may have been influenced by the fact that I conducted the analysis not in my mother language. In addition, participants spoke Irish-English which has its own linguistic expressions that I was not necessarily familiar with. The use of follow-up questions to clarify statements of participants, I struggled with most, and the repeated examination of all statements, constantly refined and improved the initial codes.

The follow-up questions were recorded and clarified what participants meant, for example I was able to understand that when a participant stated "*pretty sick"* in their initial reaction to the Baboon Cue (participant 2.12), that the participant thought the scenario was not normal (thus, it challenged this participant's sense of what should / should not be permitted). I used the opportunity of call-backs to ask participants to rephrase some phrases. One statement I struggled to interpret the meaning of was *"the woman is really giving"* (Participant 1.13, Baboon Cue). Through the follow-up questions the meaning of this expression was explained to me: "*God, she's very kind, you know, to be willing to do this. You know, to be*

willing to be coming out of her comfort zone completely. And to actually do this for an animal" (Follow-up questioning, participant 1.13). The follow up-questions in the first research phase add another verification element to the research and confirmed that interpretations of the meaning of statement were accurate. Figure 5 provides an overview of some examples of the final initial codes that emerged from the first research phase.

Figure 5: Final Initial Codes of First Research Phase

Expressing personal existing stance that use of animals is not appropriate for vanity purposes; Emphasising awareness of similar scenarios; Realising that human-animal bioengineering is actually used for vanity reasons; Being aware of humans assumed superiority over other living beings; Feeling compassion for the rat when recognizing rat has no voice in scenario; Feeling offended when viewing mouse cue; Initially questioning why woman is breastfeeding an animal; Describing woman as a content, happy and caring person helping the baboon; Confusing self when comparing response to horse scenario with response to rat scenario; Feeling weird; Being amused; Assuming human-animal bioengineering is unrealistic; Critical appraising the metical and societal consequences for humans; Responding emotionally when relating scenario to own dog; Acknowledging to consider the reverse scenario of the mouse for the first time; Critically considering human-animal bioengineering for own pets

3.5.4.2 Focus and Theoretical Coding Phase

Alongside the constant refinement of the initial codes and the clarification of the meaning of some statements, I entered simultaneously the focus-coding phase. Hereby, the guiding question was: ***What is this a study of?*** Writing memos about observations in the data was a pivotal element throughout the analysis and supported the writing of the first drafts about tentative focused codes.

Initially, I struggled to see the impact of the interventions due to the complexity and individuality of each participant that was somehow distorted by the spreadsheets for each phase. The division of students' comments based on the pedagogical phases made the identification of **what is happening** overall to the participants in each Visual Cue activity challenging.

This initial struggle may be also related to being a novice researcher of CGT who was **feeling challenged to get into the habit of coding**. While constant comparison helped me to understand the construction of interrelationships, it was difficult to raise the initial codes to a higher level of abstraction. As a result, I made use of the software MindMapleLite to visualize the dataset. In a way, I felt it would represent more accurately its complexity. While

I was optimistic that such a visualisation could help to continue raising initial codes and collapse them into focus codes, I could not 'see the forest for all the trees', and only described what was happening rather than analysing and abstracting it. Reflecting on this phase of analysis, it was perhaps useful to **'play' with the data** to get more familiar with it, but it did not result in suitable focus codes.

I was determined to solve my confusion and struggles. Therefore, I returned to the Excel sheets. But instead of having one spreadsheet for each pedagogical phase (viewing, reflecting, pair and group discussion), the **pedagogical phases were simplified** to two phases, an initial individual phase (viewing and reflecting) and a discussion focused phase (pair and group discussion). This enabled me to compare the impact on individual participants in the individual phase with the group phase. Through the help of memo writing and constant comparison of the initial codes the following first tentative focus codes were developed.

Figure 6: Overview of First Tentative Focus Codes

Perspectives after discussion, initial perspectives, perceiving no impact, participating and engaging, initial positive emotions, initial negative emotions, positive emotional responses to discussion, negative emotional responses to discussion, feeling intense in individual phases, feeling intense in discussion phases, critical self-reflection in individual phases, critical self-reflection in discussion phases, reflecting critically in individual phases, reflecting critically in discussion phases

After several re-examinations of the first set of tentative focus codes, I realised that these focus codes were still not accurately synthesising and explaining the data. For example, in relation to the code 'perspectives after discussion', I re-examined all the sources of the data to see what these perspectives contain and noticed that the perspectives that have been grouped together contain several nuances, which were not represented through the phrasing of this focus code. Some participants recognised or questioned various elements of sustainability themes, or considered alternative perspectives. Therefore, naming the focus code 'perspectives after discussion' was too broad.

However, through **constant analytical engagement** some final focus codes were emerging, while I simultaneously constructed the **first tentative theoretical categories** such as 'recognising' and 'critiquing'. A category is a theme that makes sense of what participants have recorded.

When I focused on initial responses, I began to perceive participants' initial reactions as evidence of a disorientation, dilemma, disjuncture or disequilibrium, indicating that participants are being challenged to make sense of the presented Visual Cue scenario. Accordingly, the category 'emotional/cognitive disjuncture' emerged from the data. Hereby, disjuncture means "a difference or lack of connection between two things" or simply "a separation or disconnection". It indicates that participants' frames of reference cannot easily connect with presented scenarios and participants may even experience a disconnection of existing frames of references and presented scenario. Therefore, participants are required to seek out new frames of reference or alter existing frames of reference to be able to give meaning to the stimulus. The table below outlines how definitions from dictionaries supported the refinement and identification of suitable focus codes that were grouped together for 'emotional/cognitive disjuncture' which emerged mainly from the individual phase of viewing and reflecting on the Visual Cues.

Table 4: Focus Codes of Emotional/Cognitive Disjuncture

Focus Code	**Definition**
Experiencing empathy	"The ability to understand and share the feelings of another" (http://www.oxforddictionaries.com/definition/english/empathy) • I am/I feel happy, sad, angry
Experiencing cognitive/emotional dissonance	"A lack of agreement; especially: inconsistency between the beliefs one holds or between one's actions and one's beliefs" / "an instance of such inconsistency or disagreement" (http://www.merriam-webster.com/dictionary/dissonance) • It is weird/strange/shocking • I feel weird/strange/shocking
Experiencing discomfort	"Worry or embarrassment" / "Something that causes one to feel uncomfortable" (http://www.oxforddictionaries.com/definition/english/discomfort) • I am/ I feel embarrassed • I am upset • I am/ it made me uncomfortable
Experiencing cognitive emotional disruption	"Disturbance or problems which interrupt an event, activity or process" (http://www.oxforddictionaries.com/definition/english/disorientation) • Feeling repulsed/ disturbed/ridiculous/distress • It is disturbing/ridiculous/disgusting

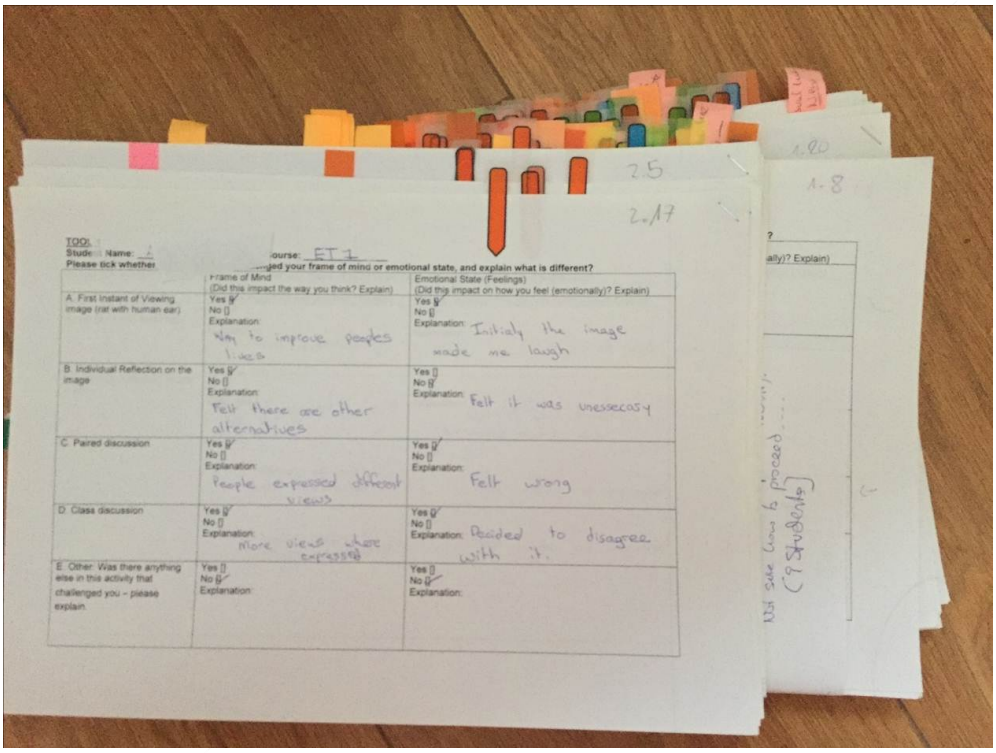
Experiencing disorientation	"A state of mental confusion" (http://www.oxforddictionaries.com/definition/english/disorientation) • It is confusing • I am confused • Being surprised
Experiencing disconnection	"The state of being isolated or detached" (http://www.oxforddictionaries.com/definition/english/disconnection) • Being closed minded
Getting to know a new/unfamiliar idea	"Not known or recognised"/ "Not having knowledge or experience of" (http://www.oxforddictionaries.com/definition/english/unfamiliar) • Never thought/considered it before • Considering it for the firsts time
Experiencing amusement	"The state or experience of finding something funny"/ "Something that causes laughter or provides entertainment" (http://www.oxforddictionaries.com/definition/english/amusement) • Funny • Made me laugh

Through the intensive engagement with the initial and focus codes I could not ignore that the spreadsheets could not accurately be used to represent self-recorded changes of perspectives and dispositions. The interconnection of these comments and an examination of the original data set ultimately indicated changes in learners' perspectives or dispositions. While it was possible to recognise these changes in the original datasets, it was difficult to present these changes with the use of spreadsheets. I experimented with the **support of software**, such as Nvivo, but I realised that the only way to raise initial codes into focus codes was to return to the original data set. I felt that even the spreadsheet, not to mention any other software I encountered, would only distance me more from the participants' statements. The software did not enable me to illustrate changing perspectives or dispositions. These changes are noticeable in the raw data when statements of one participant for a Visual Cue were compared and related to the statements made in the different pedagogical phases.

I moved back and forth from the spreadsheets to the raw data and closely engaged with each participant's statements. This allowed me to have a holistic view on the statements and being able to see them in relation to one another. The **return to the original data set** enabled me

to identify changes, which were highlighted with coloured Post-Its (see Photograph 5). Through this analytical practice, the theoretical category 'reorientation of perspectives and dispositions for sustainability' emerged and indicates those participants that self-recorded transformation or change. In addition to the following analysis process I **allocated a colour to each theoretical category,** highlighting these in the raw data set through the Post-Its (see Photograph 5).

Photograph 5: Coloured Post-Its Highlighting Theoretical Categories in Raw Data Set of Research Phase One



This analytical practice was supported by memo writing and diary entries.

The following elaboration offers a concise summary of the **coding process** and provides examples of utterances, initial codes and focus codes, demonstrating how these are collapsed together into conceptual categories. For example:

> Participant 1.9 response: *"[Baboon] made me feel uncomfortable"*; **Initial Code:** *Feeling uncomfortable*

The question **'what is happening?'** (Charmaz 2006) raised the initial code into a focus code. It guided the analysis of what this utterance and initial code suggest about the impact of the Visual Cue interventions on participant 1.9 thoughts and feelings. The example demonstrates that participant 1.9 was feeling discomfort:

> Participant 1.9 response: *"[Baboon] made me feel uncomfortable"*; Initial Code: *Feeling uncomfortable*; **Focus Code:** *Experiencing Discomfort*

The use of Charmaz's (2006) constant comparison of codes method, while recording detailed memos about the observation of such comparisons, resulted in formation of conceptual categories.

> Participant 1.9 response: *"[Baboon] made me feel uncomfortable"*; Initial Code: *Feeling uncomfortable*; Focus Code: *Experiencing Discomfort*; **Theoretical Code:** *Emotional/cognitive disjuncture*

Through deep engagement with the original data set, comparison with tentative focus codes and intensive discussions, theoretical categories were emerging from the focus codes and were further used for theoretical sampling in the second research phase. The four theoretical codes of research phase one are: *emotional and cognitive disjuncture, recognising principles, practices and themes of sustainability, critiquing concepts and contexts of sustainability,* and *reorienting disposition/ perspectives for sustainability*. These theoretical codes became conceptual categories that formed the basis for continuous theoretical sampling, and ultimately provided the evidence that the disruptive pedagogical framework employed within these Visual Cue interventions can be used to support learners in becoming sustainability [re]-oriented. Table 5 below gives an overview of the final categories with their focus codes that emerged from the first phase. Please note that chapter 4 fully explains how these focus codes and categories emerged, and the presentation here of Table 5 is for explanatory purposes only in terms of understanding the coding process.

Table 5: Details of Theoretical Categories

Theoretical Categories	Focus Codes
Emotional and cognitive disjuncture	• Experiencing empathy • Experiencing cognitive/emotional dissonance • Experiencing discomfort • Experiencing cognitive emotional disruption • Experiencing disorientation • Experiencing disconnection
Recognising principles, practices and themes of sustainability	• Recognising different hierarchies that exist in the world • Recognising interdependencies that exist in the world • Acknowledging human centrism/superiority • Acknowledging lack of voice
Critiquing concepts and contexts of sustainability	• Questioning context/ perspective • [Re]Considering alternative contexts or perspectives • Striving to understand other perspectives • Could include human- centric views
Reorienting dispositions/perspectives for sustainability	• Changing dispositions (attitudes, beliefs, values) of sustainability • Changing perspectives on sustainability • Could include non-human centric views as well as non-centric views

3.5.7 Analysis of Remaining Data from Phase One

Tool one (see Appendix F) generated quantitative data, collated from participants' responses (yes/no) to what pedagogic dimensions resulted in them feeling disrupted or challenged to think about the scenario. The emerging data of this tool showed that the majority of participants were emotionally and/ or cognitively challenged on first sight of and/ or

individual reflection on the Visual Cues, which resulted in the further exploration of what is happening to participants during the initial individual phases.

Tool two (see Appendix F) contained a rating scale, asking participants to indicate whether the activities did not disrupt; mildly disrupt; moderately disrupt; highly disrupt; or most disrupt their frames of mind and emotional state. The rating scale was very ambiguous and vaguely formulated. It was difficult to differentiate between 'highly' and 'most disruptive' or between 'mildly' and 'moderately disruptive'. Moreover, some participants made their indications in between, making it impossible to accurately present and analyse the data.

The transcriptions of the **audio recordings** of the group discussions and the responses of **tool 3** were coded with the question in mind 'What sustainability themes have emerged within each Visual Cue activity?' The collection of this data was useful as it helped to identify the sustainability themes, principles, concepts and context students covered during the group discussions. In addition, it provided evidence that learning about/ for sustainability was happening as data shows evidence of the key sustainability themes, principles etc. that are touched on within and across the Visual Cue interventions. However, it did not provide any relevant insight to the conceptualisation of the emerging theoretical codes, nor the emergent theory of 'becoming sustainability [re-]oriented' (which in the second research phase evolved to the theory of Disruptive Learning).

3.5.8 Moving from Research Phase One to Research Phase Two

This section details the rationale behind the alterations made to the research process.

Upon completion of the first research phase, I was still unsatisfied with the theoretical category 'emotional and cognitive disjuncture'. This dissatisfaction was related to the phrasing/naming of the focus codes and the category. After several consecutive deep engagement phases, focusing on the refinement of this category, I realised that I needed more data to further clarify the nature of this category.

Instead of inviting the entire cohort of students who took part in the Visual Cue interventions, I decided to recruit fewer participants in the second phase. This enabled me to explore in-depth the impact of Visual Cue intervention at an individual level. In addition, the second phase serves the **theoretical sampling**, where the process of data collection is determined

by the emerging theoretical categories. Consequently, a smaller sample of 7 students was chosen for phase two of the research, with the addition of a variety of data collection tools chosen to focus on an exploration of the impacts of the pedagogical process, while analysing the collected data in depth to refine the emerging theory of 'becoming sustainability [re-]oriented'.

I realised that the data collection tools of the first research phase were limited as responses were captured in-action, and the tools did not offer any insight into potential impact on participants' lives. **'Thicker descriptions'** were required to gain a comprehensive and detailed understanding of students' experience, filling the gaps in the emerging theoretical model. Consequently, I **altered the methods** applied in the second phase. A **reflective diary template** was designed to be used during the Visual Cue interventions. The aim of this template was to capture the impact on students' frame of reference during each pedagogical phase, and to provide space to extend opportunity for reflection by the individual students beyond the classroom. The template contained open-ended questions to allow space for detailing responses. Although I realised in the first research phase that emotions and cognitions cannot be separated from one another, I decided nevertheless to phrase the template accordingly. Based on a few trials on appropriate phrasing, it became notable that students seem to struggle to respond to a more general phrasing such as *'*write down what comes to mind*'*, while they could easily comprehend and respond to *'*writing down thoughts and/or emotions'. As a result, this phrasing in plain language terminology was maintained and employed in the reflective diary template to guide participants through their reflections.

Another data collection tool that has been included to the second phase is **the New Ecological Paradigm (NEP) scale** (Dunlap 2008). This tool provided a sense of student's ecological worldviews prior to participation in the module. Students were asked to complete the NEP online before the module commenced. It captured participants' incoming worldviews and enabled the triangulation with their self-recorded re-orientations within the reflective diaries and interview responses, providing evidence of changing perspectives or dispositions through the Visual Cue interventions.

Instead of using follow-up questions, purely for the reason to clarify meaning of ambiguously expressed words or phrases, I employed **semi-structured interviews** (3 months after completion of the module) and follow-up interviews (up to 15 months after

completion of the module). The data emerging from these interviews allowed me to explore further if and to what extent reorientations with respect to sustainability have taken place. The data of the interviews were triangulated with the responses of the reflective diaries, as participants self-reported during the interviews whether expressed intention of changing perspective, dispositions or actions towards becoming sustainability became reality.

Another alteration of the methods concerns the audio-recording of the group discussions. It has been highlighted that in phase one, the recording of the in-class discussion was useful to show that learning about and for sustainability was taking place. However, it was a major challenge to transcribe the recordings of multiple voices speaking up simultaneously during the discussions. Therefore, I decided to employ **observational notes,** taken by the lecturer of the module during the discussions of the Visual cue interventions, to provide further evidence that students engage with key sustainability themes, concepts, principles etc.

Unlike in the first phase, where the Visual Cue intervention was a pilot of an innovative pedagogy with respect to sustainability, in the second phase **six Visual Cue interventions** were directly **integrated** into an ESD module and aligned with the relevant content of each weekly session. In doing so, between each Visual Cue interventions students were given a week to let the learning experience sink in and critically reflect on it before being introduced to the next Visual Cue.

3.6 Research Phase Two

This section will outline the research setting and ethical approval, describes the participants and the data collection tools, and details the analysis process of the second research phase, which took-place from September 2015 to February 2017.

3.6.1 Research Setting and Ethical Approval

The second research phase was undertaken to further explore ways in which students' frames of reference could be disrupted and re-oriented towards more critical (non-human centric) examinations of the world we live in. This time, students participated in **six 30-minute Visual cue interventions** that were integrated into the sustainability module and spread throughout the twelve weeks of the modules' duration. These interventions were delivered in cooperation with my supervisor, where she would assume the role of the lecturer for initial

part of lecture slot, and I would be the researcher and facilitator of the Visual Cue interventions in latter 30 minutes. The reflective diaries, that students used to reflect on the Visual Cue scenario as well as on their learning process, counted 50% of their overall assessment and were submitted at the end of the module. I did not participate in the assessment of the reflective diaries and I did not have any access to the final grades to preserve my ethical integrity as a researcher. All students voluntarily participated in this research and informed consent was sought and granted by all students. To do so, participants filled the Informed Consent Form, signed it, have someone witness it, and returned it to me. Every participant received a copy for their own record of the Informed Consent Form (Appendix B) and the Plain Language Statement (Appendix C), summarising the nature of this research. Their identity was kept confidential, and all participants were made aware that they could withdraw from this research at any point in time should they wish to do so.

3.6.2 Participants

Participant of the second research phase were undertaking the same sustainability related module as part of their first year of an education and training undergraduate degree. In total **seven students**, four part-time and three full-time, participated in this research phase. The students attending the sustainability module were contacted by email, asking if they wished to participate in the study. The seven students who replied were briefed individually by the researcher on the research, and signed the Informed Consent form agreeing to participate in the study. All seven participants were mature students and had professional experience in the field of education. I tried to enrol younger students to this research, but I was not successful in doing so. After I competed the initial in-depth reading of their reflective diaries, I met each participant again to conduct the interviews. The initial interviews took place three month after completion of the module, with additional interviews taking place 14-15months post-intervention to ascertain participants' perspectives or impacts of Visual Cue intervention in the longer term.

3.6.3 Data Collection Tools

The following methods were chosen in accordance to the theoretical sensibility and the categories that emerged from the first phase. Charmaz (2006, p.102) points out that: "***theoretical sampling*** *involves starting with data, constructing tentative ideas about the data, and then examining these ideas through further empirical inquiry*". The emerging categories could only be further examined through thicker description of participants'

reactions, filling conceptual gaps such as the nature of the 'emotional/cognitive disjuncture' category. Table 6 below summarises the data collection tools that have been employed in the second research phase, and the reason why each was chosen.

Table 6: Overview of Data Collection Tools of Research Phase Two

Data Collection Tool	**Purpose**
Reflective diary (7 participants)	*Data from Participants reflections on visual cue scenario and process of learning using Visual Cue* • To ascertain whether there is further evidence of additional theoretical categories such as change agency for sustainability. • To uncover further evidence of existing elements within pathway to becoming sustainability re-oriented. • To provide evidence of appropriateness of pedagogic framing of the Visual Cue intervention. • To uncover the design considerations for Visual Cues (what factors need to be addressed when creating Visual Cues).
Direct observation (2 cohorts)	*Data from Observation of participants' reactions and their comments in-class discussion within Visual Cue interventions* • To identify the sustainability theme/s, principles, concepts and contexts students critically engaged with during group discussions. • To show that 'learning about/ for sustainability' is happening - in other words, provide evidence that key sustainability themes, concepts, principles, etc. are touched upon within and across the Visual Cue intervention/s. • To triangulate results further with evidence of 'learning about/for sustainability' of first research phase.
In-depth interviews (7 participants – 3 months after completion of the module)	*Data from Participants reflections on experience of and impacts of Visual Cue interventions [Post-intervention]* • To ascertain whether self-reported cognitive development, and self-development resulted in change agency, & to ascertain their post-intervention worldviews with respect to sustainability. • To further examine if transformations have taken place, and what form/s these take. • To triangulate data with from reflective diary

NEP (7 participants)	*Data from Participants initial worldviews with respect to sustainability (at outset of course)- Pro-ecological/ Anthropocentric, Exemptionalist, etc.* • To compare and contrast ecological perspectives/ worldviews expressed in NEP, with those expressed within reflective diaries, and in interviews. • To identify participants incoming worldviews, in order to provide evidence of changing their perspective/ dispositions through engagement in the Visual Cue intervention.
Follow-up interviews (5 participants – 14/15 months after completion of the module)	*Data from Participants reflections on experience of and impacts of Visual Cue interventions [Post-intervention after one year]* • To ascertain whether self-reported cognitive development, and self-development resulted in long term change agency, & to ascertain their post-intervention worldviews with respect to sustainability. • To examine if further transformations have taken place, and what form/s these take. • To capture perspective on facilitation and pedagogical tools to inform the design considerations of Visual Cue interventions • To triangulate data with from reflective diary and interviews
Researcher's personal reflection	*Data from Researchers' recording of observations on process of designing and implementing the Visual Cue interventions (aesthetic/ pedagogic), as well as on the research process.* • To capture own thoughts on aesthetic and pedagogic design considerations for the Visual Cue, and on own development as researcher within the research processes • To continuously informing the research process, and to include into the fabric of discussion of emerging findings. • To include the voice of the researcher within the thesis • To capture changes in own development as a researcher throughout the study.

3.6.3.1 Reflective Diary

Structured reflective diaries were used to record live students' responses to the relevant Visual Cue interventions (see Appendix F). In addition, students could complete their entries retrospectively in their own time. There is a wide range of methodological tools referred to as "diary methods" (Bell 1998). In the context of this research, reflective diaries act as both, a **pedagogical and research tool**. From a research perspective, the diaries provide primary data and are understood as a precursor to interviews (Nicholl 2010). Through the combination of diaries and interviews, I aimed to examine the impact of the Visual Cue interventions in depth. The diary templates were phrased in plain language as I realised from

the first research phase that language needs to be clearly understood by the participants to avoid misunderstandings.

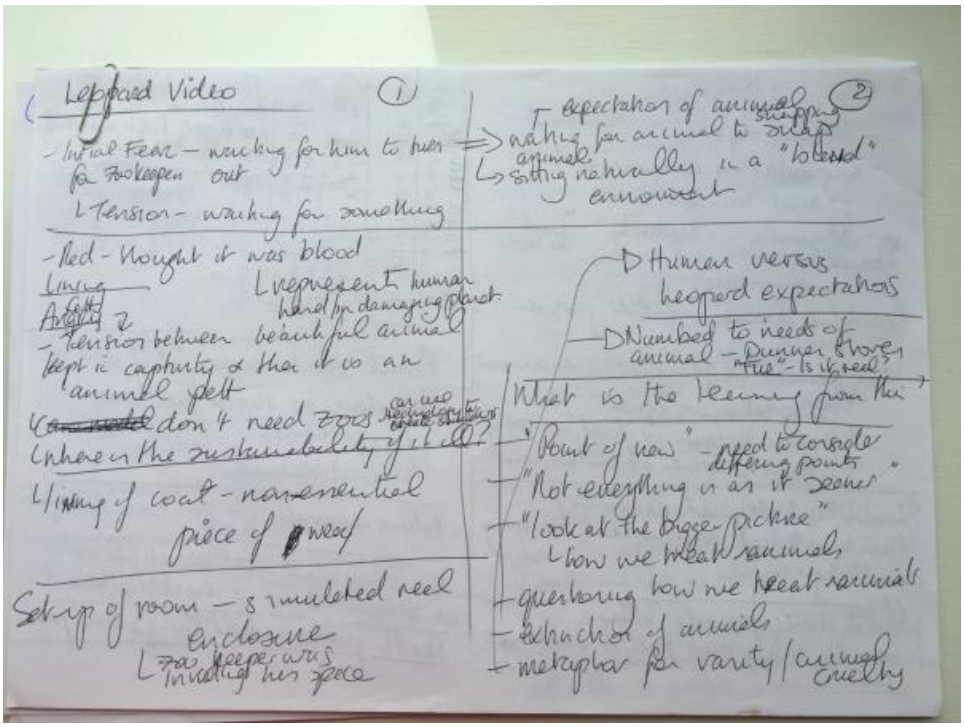
In total, **students completed eight diary entries**. The first entry (see Appendix F) was completed in advance of the Visual Cue interventions and the last entry after completion of the six Visual Cue interventions. These entries asked them what they have learned about sustainability and ESD, as this module is part of an education and training undergraduate degree. These entries were used to make a comparison of students' understanding of sustainability and ESD before and after the interventions. The remaining six entries were used in combination with the Visual Cue interventions (see Appendix F), including three parts. In the first part students recorded their initial responses on the presented Visual Cue scenario while individually reflecting on it. Here, students were asked to write down thoughts and/ or emotions triggered when first viewing a Visual Cue and explain why they think these thoughts or emotions were triggered within them. The second and third part were completed after the group discussion. In the second part students were asked to write down what now comes to mind when viewing the relevant Visual Cue, and whether their emotional state remained the same or changed during this process. In addition, students were asked to outline what they have learned about sustainability. As the phrasing of the question was kept open students could include what they have learned about sustainability in regard to the Visual Cue scenario and/or the content of lectures. The last part of the diary template asked students to reflect on the process of learning. This was documented through a survey-type research tool that was used to allow students to self-document the extent to which their thoughts or feelings were impacted by the process of viewing, reflecting and discussing the Visual Cue. Students were encouraged to become aware of their learning style, or in other words they learn how they learn. The data of the third part was be used to further inform the design of the pedagogical process of Visual Cue interventions.

These diary entries (along with interviews) provided the raw data-set from which the focus codes and categories emerged, and ultimately informed the resultant theory of Disruptive Learning, and articulation of (pedagogic) processes that facilitate reorientation towards sustainability and change agency.

3.6.3.2 Direct Observation

Observational notes of the Visual Cue discussions were taken by the lecturer. She manually recorded in real-time the **themes, principles, concepts and contexts** that students engaged with **during the group discussions**. This data set was used to provide further evidence that learning about/for sustainability was taking place within and across the Visual Cue interventions. The photograph 6 below exemplifies observational notes taken during the Leopard Cue.

Photograph 6: Example of Observational Notes of Group Discussions



3.6.3.3 In-depth Interviews

Through the emerging categories I realised that I would need information about the impact of the Visual Cue scenarios on participants' actions and behaviours with respect to sustainability. The interviews were semi-structured to explore in-depth the impact beyond students' immediate perspectives and dispositions on sustainability. The **interview guide** (see Appendix G) was designed to ascertain dimensions of learning within the Visual Cue interventions; themes of learning; memorability of Visual Cues; the impact of Visual Cues and the appropriateness of them; the contribution to learning of the pedagogical process; their experience of the reflective diary as a form of assessment; and the role of the NEP with respect to their individual learning process. The interviews were also useful to **clarify the**

meaning of phrases or words students used within their diary. During the interviews, I assumed the role of a traveller (Kvale 2007). The interview guide served as a checklist to cover key areas I wanted to ask them, while inviting participants to tell their own story about the Visual Cue interventions. I encouraged interviewees to bring forth new and unexpected aspects of the Visual Cue interventions, establishing a **flexible conversation**, where knowledge is constructed in the dialogue (Kvale 2007), and the participant has space to construct a narrative to raise issues/themes that matter to them (Davies 2014). In this way, I learned from the participants about the impact of the Visual Cue interventions, but could steer the conversation back to relevant issues, if needed. I **actively listened** to the participants' contributions, and I was attentive to the participants' content. I made use of pauses for the interviewee to continue an answer, or continued with follow-up, probing or specifying questions depending on the flow of the conversation (Kvale and Brinkmann 2009). The interview duration varied from approximately one hour to a minimum of twenty minutes, depending on the interviewee's contributions.

3.6.3.4 New Ecological Paradigm Scale

Students completed the New Ecological Paradigm Scale (see Appendix H) in advance of the module, capturing their initial worldview with respect to sustainability. It offered opportunities to triangulate understandings of sustainability with the first and last diary entry. The revised version of Dunlap & Van Liere's (1978) New Ecological Paradigm (NEP) was utilised to measure the degree to which people view humans as a part of nature rather than separate from nature (ecological worldview). This scale contains 15 items and are rated on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Agreement with the eight odd number items indicates a pro-ecological view. There are five sub-scales of this measure, consisting of three items per sub-scale. These sub-scales and their corresponding item numbers are: *The Reality of Limits to Growth* (items: 1, 6, 11); *Anti-anthropocentricism* (items: 2, 7, 12); *the Fragility of Nature's Balance* (items: 3, 8, 13); *Rejection of Exemptionalism* (items: 4, 9, 14); and *the Possibility of Ecocrisis* (items: 5, 10 15). The results of the NEP scale offered a general understanding of participants' worldviews prior to the module. The individual results from the sub-scales were used to compare their ecological perspectives and worldviews with those expressed in their reflective diaries and during the interviews. The findings provided evidence of changing perspectives and dispositions through their engagement in the Visual Cue interventions.

3.6.3.5 Follow-up Interviews

Between January and February 2017, I conducted semi-structured follow-up interviews with the participants of the second research phase. Out of seven participants, five responded to my invitation via email. The purpose of the follow up interviews (See Appendix I) was to discern whether the Visual Cues resulted in lasting reorientations and engagement in change agency for sustainability, or not. The interviews were semi-structured and included questions around dimensions of learning within the Visual Cue intervention, including but not limited to queries on: memorable Visual Cues; the lasting impact of Visual Cues and their (continuous) engagement in change agency **one year after completion of the module**; the contribution of the pedagogical process and tools on the overall experience; their perspective on the phrasing of the reflective diary template; their perspective on the facilitation of the Visual Cue interventions; and clarification of NEP subscales with respect to their individual learning process.

3.6.3.6 Researcher's Personal Reflections

I kept using my two reflective diaries during the second research phase. I covered not only the research process but also **took notes on the pedagogical process** of designing and implementing the Visual Cue intervention and it captured the insights into the aesthetic dimension of Visual Cues. The diaries provided also further clarification of who informed how the research process. Those captured insights were woven into the discussion chapter and allowed my voice to be heard in the presentation of the findings.

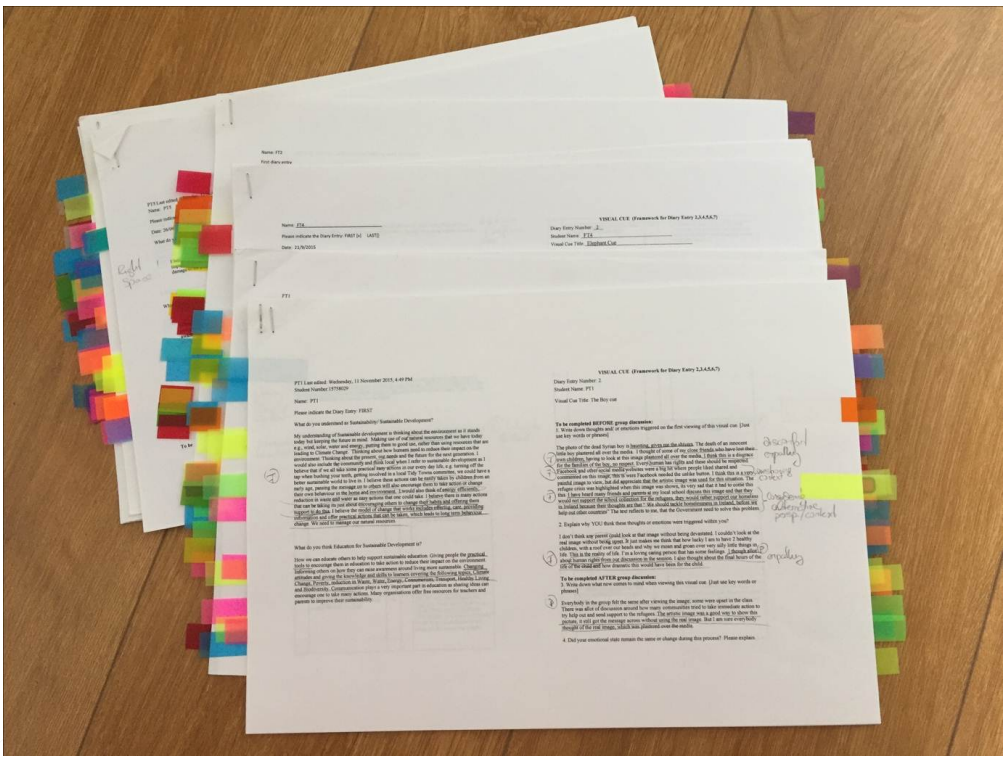
3.6.4 Data Analysis Process of Phase Two

The analysis process, began in December 2015 and was completed in February 2017. The second research phase was informed by the theoretical sampling of the first research phase. Whereas, the first phase aimed at developing emerging theoretical categories, in this phase, I returned to the field **seeking new data to fill gaps in the emerging theory**, to refine existing categories, and include new ones to elaborate a comprehensive theory. The aim of this research phase was to "*delineate the properties of categories; check hunches about categories; saturate the properties of a category; distinguish between categories; clarify relationships between emerging categories; and identify variation in the process*" (Charmaz 2006, p.104). This form of reasoning can be seen as the **abductive** approach of CGT, because after reasoning of students' experience in the first phase and having developed initial theoretical categories, this phase focuses on the **verification** of these categories (Charmaz

2006) through the examination of further student experiences. Researcher's reflective diaries were kept as in the first research phase and **memo-writing** supported the analysis process to further elaborate and refine the theoretical categories (see Section 3.4.4).

The second data analysis process began (or continued) with the analysis of the reflective diaries and the transcription of the interviews. I moved back and forth from the raw data to the Excel spreadsheets to closely engage with each participants' statements. The work with the original data set enabled me to highlight emerging new codes and existing codes with coloured Post-Its. I allocated a colour to each theoretical category (see Photograph 7) to highlight these in the raw data set through coloured Post-Its.

Photograph 7: Coloured Post-Its Highlighting Theoretical Categories in Raw Data Set of Research Phase Two



The three coding phases, initial, focus and theoretical coding, were deployed in line with Charmaz's (2006) CGT. The analysis began with initial coding of participants' responses, while constantly questioning what the data set revealed about the impact of the Visual Cue activities on participants' thoughts and feelings. The analysis of the interview scripts began with an in-depth reading and listening of the audio-recordings to get familiar with the data.

The following elaboration offers a concise summary of the **coding process** and provides examples of utterances, initial codes and focus codes while demonstrating how these are collapsed together into conceptual categories. For example:

> **Participant FT4 response:** *"[Elephant Cue] My initial reaction was sadness, It sickens me to see any creature treated in such a barbaric way"*; **Initial Code:** *Feeling sadness and empathy with animals being victims of cruelty and abuse*

Through memo writing about constant questioning of 'what is happening' to participant's thoughts and emotions, the initial codes were then categorised into focus codes. For example:

> **Participant FT4 response:** *"[Elephant Cue] My initial reaction was sadness, it sickens me to see any creature treated in such a barbaric way"*; **Initial Code:** *Feeling sadness and empathy with animals being victims of cruelty and abuse;* **Focus Code:** *Experiencing Discomfort/ Being sympathetic*

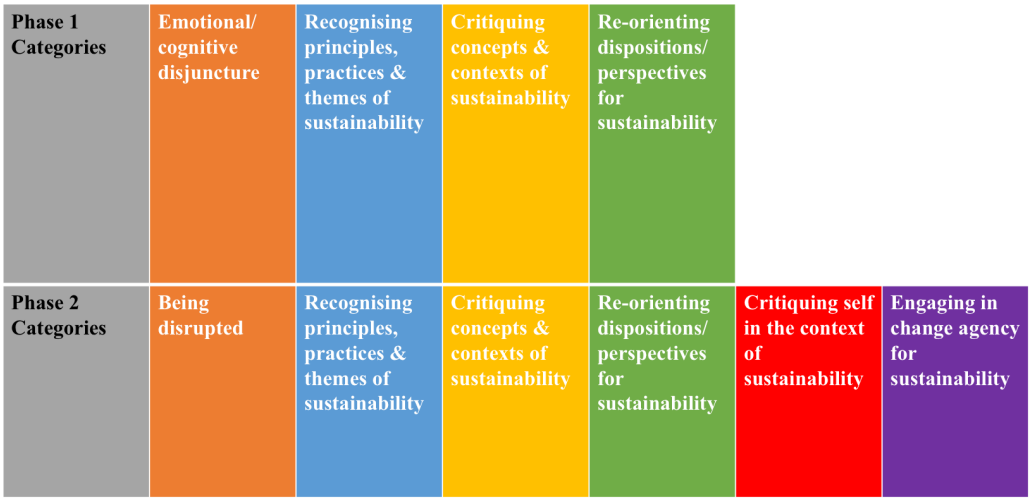
The use of Charmaz's (2006) constant comparison of codes, while recording detailed memos about the observation of such comparisons resulted in formation of conceptual categories.

> **Participant FT4 response:** *"[Elephant Cue] My initial reaction was sadness, it sickens me to see any creature treated in such a barbaric way"*; **Initial Code:** *Feeling sadness and empathy with animals being victims of cruelty and abuse*; **Focus Code:** *Experiencing Discomfort/ Being sympathetic*; **Theoretical Code**: *Being disrupted*

The data of the interviews, the reflective diary entries and the NEP results were **triangulated** for every participant. Here, the individual result of the NEP sub-scales of each participant were triangulated with the data of their diaries and the interviews. In addition, participants overall NEP results were combined with their first and last diary entries, providing evidence of how their perspectives and worldviews were re-oriented towards sustainability. Through this cross-verification process of the data, I could provide **individual participant profiles** which contained evidence of reoriented perspectives or worldviews with respect to sustainability.

Finally, I compared the learning that took place across the seven participants. Through this process, I realised that higher order learning was taking place and that this was initiated by the initial experience of disruption. From the Constructivist Grounded Theory approach, there was evidence of four categories that emerged in phase 1 of this research (see Figure 7 below). In phase 2 the coding process resulted in the addition of two new categories namely 'critiquing self in the context of sustainability' and 'engaging in change agency for sustainability'.

Figure 7: Comparison of Categories from Phase 1 and Phase 2



The use of Charmaz's (2006) constant comparison, while recording detailed memos about the observation of such comparisons, resulted in the transformation of 'emotional and cognitive disjuncture' (which emerged in phase 1) into the category called 'being disrupted'. This decision is based on two observations that emerged through the memo writing and the constant comparison. I noticed that the initial focus codes (such as disjuncture, dissonance, discomfort, disorientation, disconnection etc.) are all associated with a disruption in existing thoughts and emotions, which in its broadest sense are interruptions of frames of minds. During the second research phase, it became increasingly difficult to differentiate between them and organise the utterance of the second research phase to the initial focus codes of the first phase. In addition, the second data set provided thick descriptions, offering a deeper insight into the initial reactions and the meaning of disruption of frames of minds. As a result, new focus codes emerged and the **initial codes of the first phase were re-organised** and allocated to the focus codes of the second research phase.

Moreover, some **novel focus codes** were constructed and further raised into **two additional conceptual categories**. These two additional theoretical categories, called 'critiquing self in the context of sustainability' and 'engaging in change agency for sustainability', provided insights into the extent of enabling participants to critically review the self in the context of sustainability and transformations towards change agency of sustainability. The focus codes of the categories 'recognising principles, practices and themes of sustainability', 'critiquing concepts and contexts of sustainability' and 'reorienting disposition/ perspectives for sustainability' re-emerged in the data set and relevant utterances with their initial codes were added to the register of the respective focus code of each theoretical category. Figure 8 below presents the categories of phase 2 and details the final focus codes of each category. Please note that chapter 5 fully explains how these focus codes and categories emerged, and the purpose of presenting here Figure 8 is only to explain the process of moving towards theoretical saturation.

Figure 8: Overview of Categories and Focus Codes from Phase 2

Phase 2 Categories	Being disrupted	Recognising principles, practices & themes of sustainability	Critiquing concepts and contexts of sustainability	Re-orienting dispositions/ perspectives for sustainability	Critiquing self in the context of sustainability	Engaging in change agency for sustainability
Focus Codes	• Being sympathetic • Disapproving scenario • Discovering a new/unfamiliar idea/scenario/ practice • Experiencing discomfort • Experiencing Weltschmerz • Respecting scenario/practice • Acknowledging guilt/shame of lack of agency for sustainability	• Acknowledging lack of voice • Recognising interdependencies that exist in the world • Acknowledging human centrism/ superiority • Recognising different hierarchies that exist in the world	• Considering alternative contexts or perspectives • Questioning contexts/ perspectives • Striving to understand	• Changing perspectives on sustainability • Changing dispositions of sustainability • Internalising a more critical/holistic outlook for sustainability	• Being aware of critical self-examination • Recognising own role in transforming society • Questioning one self • Recognising own role in transforming self for sustainability • Acknowledging guilt/shame of lack of agency for sustainability • Building self-confidence in new roles and relationships	• Engaging in the wider community for sustainability • Adopting ethically minded consumer behaviour • Advocating for sustainability

All focus codes of the category 'emotional/cognitive disjuncture' were replaced by the focus codes of the category 'being disrupted'. The utterances and initial codes of 'emotional/cognitive disjuncture' that were presented in the findings of phase 1, were re-organised in alignment with the findings of phase 2. In keeping with the practice of CGT, the data of phase 2 gave a more detailed insight into the initial reactions, and upon

comparison of the data of both research phases, the utterances and initial codes of phase 1 had to be re-worked or removed accordingly.

The data of phase 2 enriched the evidence of the categories 'recognising principles, practices and themes of sustainability', 'critiquing concepts and contexts of sustainability' and 're-orienting dispositions/perspectives for sustainability'. The focus codes of these categories were maintained (which emerged in Phase 1). Only for the category 're-orienting dispositions/perspectives for sustainability' one additional focus code emerged from phase 2, namely 'internalising a more critical/holistic outlook for sustainability'. The evidence for this focus code emerged mainly from the interviews.

The focus code 'acknowledging shame/guilt of lack of agency for sustainability' is the only focus code that belongs to two categories 'being disrupted' and 'critiquing self in the context of sustainability'. Shame and guilt contains strong elements of feelings. This focus code was largely evident in participants' initial reactions. Simultaneously, it indicated that the individual reflected on self. Therefore, this focus belongs to both categories 'being disrupted' and 'critiquing self in the context of sustainability'.

At the end of this analysis process, I reached **theoretical saturation** (see Section 3.4.4). This means the properties of all categories were defined, and I could relate and distinguish between the categories. The initial theoretical conceptualisation of 'becoming sustainability [re-]oriented' evolved into the theory of Disruptive Learning. The pedagogical model of Visual Cue interventions was defined to demonstrate one way of how Disruptive Learning can be initiated. Here, the data of both interview phases was useful to learn about the design and pedagogic processes of Visual Cue interventions.

Furthermore, the entire data set of both research phases was revised for insights into the pedagogical process and the design of Visual Cues. Once focus codes were developed they were allocated to either the individual phase of viewing and reflecting, the discussion focused phase or to the design of the Visual Cues in general. This data was triangulated with relevant notes in my reflective diaries about the design of Visual Cue scenarios and aimed to create principles to design Visual Cues.

3.7 Chapter Summary

This chapter detailed the research methodology. It provided an overview of Constructivist Grounded Theory that was used to explore the impact on students frames of mind of Visual Cue interventions. It summarised and discussed the methodological tools of this research process and explained the data analysis process of both research phases. The following chapters discuss the findings from phases one and two of the research.

Chapter 4: Research Phase One

4.1 Introduction

This chapter presents an overview of phase one of the research. With permission of "Springer Nature" this chapter is mainly based on the book chapter "*Crafting pedagogical pathways that disrupt and transform anthropocentric mindsets of higher education students*" by Tillmanns and Holland (2017). In the following pages, the figures 10 and 11 as well as the sections 4.4, 4.5 and 4.6 have been added to the book chapter and were not part of the Springer publication. This chapter will begin with an overview of the disruptive pedagogic interventions before it explains the emergent theoretical categories, namely, 'emotional and cognitive disjuncture', 'recognising principles, practices, issues and/ or themes of sustainability', 'critiquing concepts and contexts of sustainability', 'reorienting dispositions/perspectives for sustainability'. The chapter will also present design considerations for the pedagogic process and Visual Cues, which informed the second phase of this research.

4.2 Disruptive Pedagogy Intervention

From September 2014 to August 2015, the first research phase was undertaken to explore ways in which students' frames of reference could be disrupted and re-oriented towards more critical (non-human centric) examinations of the world we live in. This research phase comprised interventions with two different groups: twenty-five part-time students (mainly direct entrants from post-primary education) and thirty full-time students (education practitioners and professionals) undertaking an undergraduate education and training degree in a higher education setting.

Three 30-minute pedagogic activities were designed, each opening with the presentation of an image and a critical question (referred to as a 'Visual Cue' heretofore). Each of these Visual Cues was intended to challenge students into thinking critically about anthropocentric world-views and Western dualisms, and other concepts and contexts of sustainability. The pedagogical design of the Visual Cue intervention was based on the core elements of Transformative Learning, namely, disorienting dilemma, critical reflection and rational

discourse. The Visual Cue interventions began with an individual phase in which a disorienting dilemma was presented, that required critical reflection by self. This was followed by a discussion focused phase which entailed paired discussions and a whole group discussion to stimulate engagement in higher order discourse and to challenge existing frames of reference with regards to sustainability.

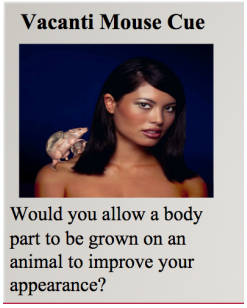
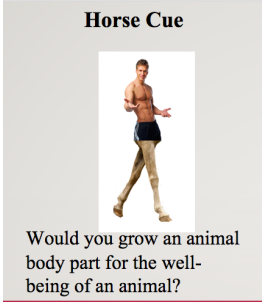
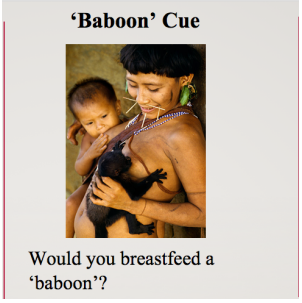
Learners' perspectives were recorded and documented using primarily survey-type research tools that were designed for learners to self-document the extent to which their frames of mind or feelings were challenged, and to identify influential elements of the Visual Cue activity. Thus, directly after the completion of each activity, learners were asked to complete a reflective tool (See tool 1, appendix D) to explain if and when their ways of thinking or feeling had been challenged while engaged in the activity. At the end of the session, participants were also asked to rate the extent to which each Visual Cue had challenged their thinking and emotions (See Tool 2, Appendix D). Finally, participants were asked to complete a summative reflection on the whole experience by answering two open questions (See Tool 3, Appendix D), as follows: What is going through your mind right now? and What have you learned about sustainability today? The data from the surveys was manually collated and analysed using the Constructive Grounded Theory approach (Charmaz 2006).

The Visual Cues were designed to create disequilibrium within participants' frames of mind; thus, emotional and/ or cognitive disjuncture was expected to result from exposure to and/ or consideration of unfamiliar contexts or practices connected to sustainability. The selection process of the visual elements was inspired by the pedagogy of discomfort with the aim of choosing images that would be likely to cause dissonance or disorientation. The chosen imagery was used to stimulate and challenge ways of thinking or feeling, within the context of sustainability. The trigger question for each Visual Cue was crafted to stimulate imaginative, critical thought processes, and to encourage the consideration of differing perspectives. The overall Visual Cue (combining image with a critical question, addressed to oneself), aimed to provoke thoughts and criticality, and through this, encourage reflective engagement and discourse about the complex and interconnected nature of sustainability.

The chosen Visual Cues comprised three different scenarios: the first required students to critically consider the context of human tissue or human organ growth on animals, for the benefit of humans - Vacanti Visual Cue; the second of which asked students to consider the

reverse scenario (animal tissue or organ growth on humans, for the benefit of animals) - Horse Visual Cue; and the third involved students having to critically consider whether they would engage in a particular tribal cultural practice to save vulnerable animal species (in this case, consider whether they would breastfeed a baboon, a cultural practice among the Yanomami tribe in South America) - Baboon Visual Cue. See Table 7 below and Appendix K.

Table 7: Visual Cues Research Phase One

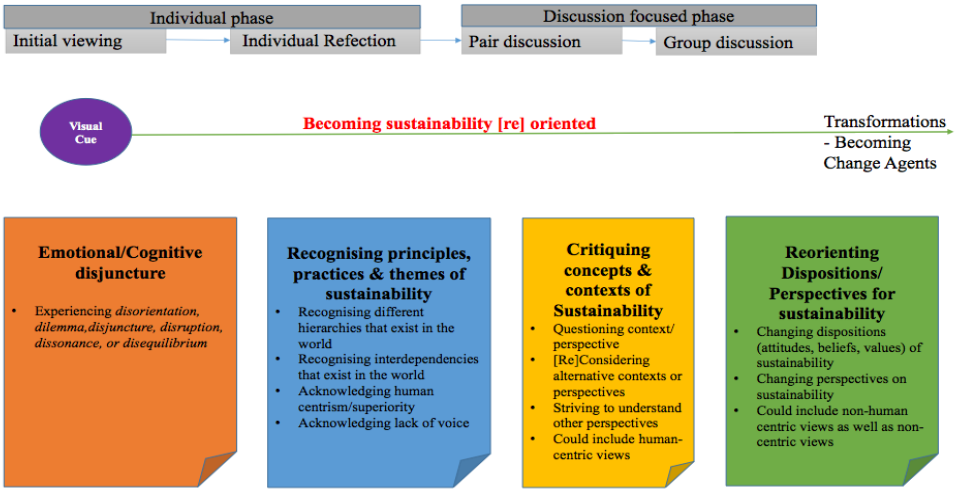
Visual Cue 1	**Visual Cue 2**	**Visual Cue 3**
Vacanti Mouse Cue 	**Horse Cue** 	**Baboon Cue** 
Description of image: The image shows a mouse with a human ear growing on its back – more commonly known as the Vacanti mouse (Cao et al. 1997), on the shoulder of a young woman.	**Description of image:** The image shows a young man with the legs of a horse.	**Description of image:** The image shows a woman from the Yanomami tribe breastfeeding both a human baby and a baby baboon (Mark Edwards, Hard Rain project).
Trigger Question: *Would you allow a body part to be grown on an animal to improve your appearance?*	**Trigger Question:** *Would you grow an animal body part for the well-being of an animal?*	**Trigger Question:** W*ould you breastfeed a baboon?*
Image accessed from: https://bendinggenre.files.wordpress.com/2013/11/girl-with-ear.jpg	Derivative image only available offline.	Image accessed from: http://www.hardrainproject.com/admin_images/yanomami800.jpg

The sequencing of the Visual Cue activities was chosen to facilitate a gradual exposure to differing (and arguably increasingly challenging) scenarios, each of which would, in theory, prompt learners to critically reflect on their own perspectives in the context of sustainability. In this regard, a conscious decision was made to begin with what was considered to be the least challenging Visual Cue (or discomforting Visual Cue from an emotional perspective), and progress to more challenging Visual Cues. Through the use of these Visual Cue interventions, students were expected to engage in examination and criticality of interconnectedness, heterogeneity, multiplicities, interdependencies and complexities within sustainability.

4.3 Emergent Categories

This study set out to explore ways in which participants' frames of reference could be re-oriented towards more critical (non-human centric) examinations of the world we live in. The findings indicate that the guiding framework of Transformative Learning (facilitated through a process of exposure to disorienting dilemma/s, critical reflection and rational discourse) was effective in progressing participants towards becoming sustainability-oriented. As can be seen from Figure 9, four conceptual categories emerged from this exploratory study, namely, 'Emotional/ cognitive disjuncture', 'Recognising principles, practices and themes of sustainability', 'Critiquing concepts and contexts of sustainability' and 'Reorienting dispositions/ perspectives for sustainability'. These conceptual categories contain evidence of specific cognitive processes (and emotional states) evoked within those participants who were on the pathway to becoming sustainability oriented/ re-oriented. Furthermore, it was evident that those who experienced disjuncture at the outset, were very likely to move into critiquing concepts and contexts of sustainability, and vice versa.

Figure 9: Pathway to Becoming Sustainability [Re] oriented (Phase One)



4.3.1 Theoretical Category - Emotional and Cognitive Disjuncture

Mezirow (1997) argues that deep reflection can be stimulated through a disorienting dilemma, one that promotes dissonance or dis-satisfaction with an existing meaning structure of a learner. This phase of the study showed that the majority of participants were emotionally and/ or cognitively challenged on first sight of and/ or individual reflection on the Visual Cues, with many participants recording strong emotional and/ or cognitive disruption. Figure 10 and 11 show that the Baboon Visual Cue was rated most disruptive (24 participants rated a high cognitive disruption and 20 participants rated a high emotional disruption), followed by the Vacanti Visual Cue (14 participants rated a high cognitive disruption and 11 participants rated a high emotional disruption). The Horse Visual Cue was rated least disruptive (10 participants rated a high cognitive disruption and 9 participants rated a high emotional disruption).

Figure 10: Results of Tool 2, Rating Extent to which Each Visual Cue had Challenged Thoughts

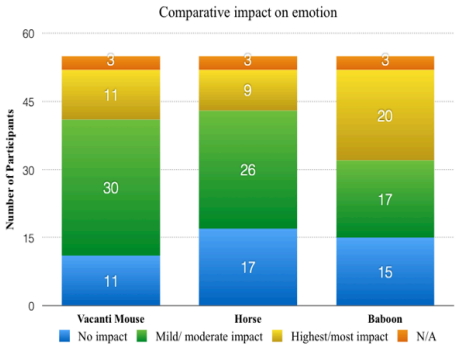
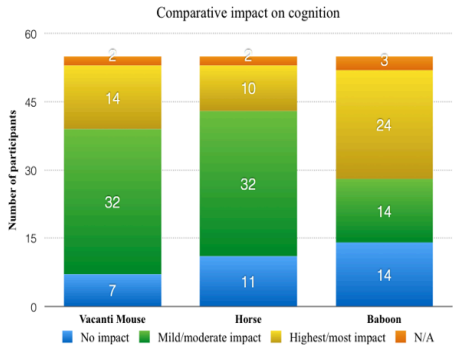


Figure 11: Results of Tool 2, Rating Extent to which Each Visual Cue had Challenged Emotions



There was evidence that some participants could not rely on their existing frames of reference to make sense of the Visual Cue under review. Within the Vacanti Visual Cue, the participants recorded feeling disturbed, weird, and strange, indicating a state of disequilibrium and some discomfort caused by this Visual Cue. Within the Horse Visual Cue, amusement and laughter comprised the initial reaction of the majority (indicating unfamiliarity and a sense of disjuncture with the scenario). In the case of the Baboon Visual Cue, the dominating reaction was of feeling shocked and uncomfortable and of perceiving the cultural practice of breastfeeding baboons as "*sick and unhygienic*" (Participant 2.8), indicating disjuncture or discomfort with the scenario. These emotional and cognitive

reactions of participants are indicative of Visual Cues being effective as tools to enable disjuncture, discomfort, disequilibrium, and/ or as disorienting dilemmas.

There was also evidence that disjuncture (in viewing the Visual Cue) caused some participants to seek out new frames of reference or alter existing frames of reference in order to be able to give meaning to the stimulus. In the Vacanti Visual Cue, some participants moved beyond initial reactions of liking or disliking the image, to consider scenarios when it might be okay to engage in the practice (such as to correct facial disfigurements), while others moved into a more critical space (highlighting for example the lack of voice of animals in these scenarios). Similarly, within the Horse Visual Cue, many participants moved beyond initial laughter to record, in their individual reflections, a willingness to engage in this action for a beloved pet suffering with a disfigurement. This suggests that even at this initial level of viewing and individually reflecting, Visual Cues can enable participants to gain a foothold on the pathway of becoming sustainability (re-) oriented.

Some participants (relying on existing 'narrow' frames of reference to make sense of the Visual Cue) were initially emotionally or cognitively blocked from engaging critically in particular Visual Cue interventions. In the Vacanti Visual Cue, negative pre-dispositions towards the animal (perceived as a rat) were recorded by many of the participants, which triggered an initial rejection or disliking of the image. Consequently, many students recorded feeling disturbed, weird, strange, disgusted or offended by the animal used, and didn't initially engage critically with the scenario. Similarly, in the Baboon Visual Cue, one participant noted how personally disliking the image limited her individual reflections on the scenario – *"didn't like the image and felt embarrassed […] I was closed minded when it came to my personal reflection"* (Participant 1.20, Baboon Cue). Furthermore, within the Baboon Visual Cue, some participants were blocked by their own narrow cognitive framing of the scenario. Consequently, they limited their responses to comments such as: "*it was the norm there [and] would not happen in Western society"* (Participant 1.21, Baboon Cue), demonstrating low levels of reasoning with the scenario (at the initial stage in this intervention).

It is interesting to note that the discussion-focused phases of all three Visual Cue activities also provide evidence of emotional or cognitive reactions. Participants commented on being "*surprised"* (Participants 2.29; 1.18; 2.13; 1.6; 2.13) or *"shocked"* (Participant 1.22) at

others' responses. Thus, discussions could also act as a catalyst in creating disjuncture beyond initial viewing and reflecting stages of Visual Cue interventions.

4.3.2 Theoretical Category - Recognising Principles, Practices, Issues and/ or Themes of Sustainability

The category of 'recognising principles, practices, issues and/ or themes of sustainability' refers to evidence of recognition by participants of different hierarchies that exist in the world; interdependencies that exist in the world; issues of human centrism/superiority, and/ or a lack of voice of animals, across the two phases of 'individually viewing and reflecting', and the 'paired and group discussion' of the Visual Cue interventions. In total, 18 of the 55 participants recognised issues or themes of sustainability; for the majority, the recognition is evident within a single Visual Cue, with just 4 participants recognising issues or theme of sustainability across two or more Visual Cues.

In the initial stages of viewing and reflecting on the Visual Cues, there was very limited evidence that participants had specific knowledge of, or recognised, key principles, practices, issues and/ or themes of sustainability. However, in those few cases where it emerged, the participants recognised the issue of superiority of human beings (in the Vacanti Mouse and Horse Visual Cues) – *"humans think less of other living things, we are always most important"* (Participant 2.19, Vacanti Mouse Cue). Furthermore, they recognized that animals don't have a say in what happens to them.

On the other hand, the comments following the paired and group discussions presented much more evidence of recognition of various principles, practices, issues and/ or themes of sustainability, such as: Human centrism, Interdependencies, Human Superiority, Western Dualism, etc. After discussion on the Vacanti Visual Cue, many participants repeatedly acknowledged the lack of voice of the animal and highlighted the cruelty and suffering of animals in this scenario. Participants felt "*sorry", "sad"* or *bad"* (Participants 1.24; 2.19; 1.20; 2.18; 2.21; 2.26; 1.15; 1.19; 1.7; 2.27; 1.2) for the mistreatment of the animal in this way, recognising that it has no voice to be subjected to this practice. However, only one participant connected to the thematic area of anthropocentrism, or human-centrism, within the Vacanti Visual Cue, and considered "*humans' attitude to nature [as] selfish and greedy and damaging"* (Participant 1.17, Vacanti Mouse Cue).

Interestingly, after discussion on the Vacanti and the Horse Visual Cue, participants recognised that issue of animals lacking a voice in what happens to them – "*humans can say no and animals can't"* (Participant 2.5; 1.14; 1.25), and recognised humans' assumed superiority over other living things – *"we can get an animal to do this for us but wouldn't do it for them"* (Participant 2.28, Horse Cue). Furthermore, a few participants recognised interdependencies that exist in the world, evident through statements reflecting a realisation that "*the ecosystem is effected by human interventions"* (Participant 1.22, Vacanti Mouse Cue). Other participants show awareness that "*upsetting nature will have consequences"* (Participant 1.8, Vacanti Mouse Cue) and noted that they were "*worried and upset with human [im]print on the planet"* (Participant 1.8, Vacanti Mouse Cue). Similarly, a few participants recognised different hierarchies existing in the world following deliberations on the Baboon Visual Cue, with one participant further commenting that the tribal woman in the Visual Cue lives "*in harmony with nature"* (Participant 2.2), and wisely concluding that the "*harmony of human and nature is a sustainable eco-system"* (Participant 2.2). After discussions of the Baboon Visual Cue, participants recognised the interdependencies that exist in the world, with participants connecting to far reaching consequences of our unsustainable ways of living – "*it was us that caused the mother [baboon] to die"* (Participant 2.6, also participants 2.12, 2.16) and "*Western civilisation destroying their future and our own"* (Participant 1.3). Interestingly, a minority of participants also highlighted Westerners assumed superiority to other cultures when acknowledging that "*we don't think or consider others around the world"* (Participant 1.13, Baboon Cue).

4.3.3 Theoretical Category - Critiquing Concepts and Contexts of Sustainability

The category of 'critiquing concepts and contexts of sustainability' encompasses the critical engagement of students with the subject matter presented in the respective Visual Cues. Students questioned contexts or perspectives, (re-) considered alternative contexts or perspectives and/or strove to understand other viewpoints (including human centric views). In total, 28 of the 55 participants critiqued concepts and contexts of sustainability, for the majority critiquing is evident within a single Visual Cue, with evidence of critiquing within two or more Visual Cues in just eight participants.

There is limited evidence of participants' critiquing concepts and contexts of sustainability within the initial viewing or reflecting phase. In one or two cases, participants record critical questions on the specific sustainability context *"Why was she breastfeeding an animal? Is*

human breast milk enough to keep the baboon nourished? What is the story behind it?" (Participant 1.14, Baboon Cue), and make interesting observations about tensions between differing cultural contexts – *"This impacted the way I think in the sense that a woman in Dublin will never have/want to do this. A woman there feels compelled. Animals are her neighbours"* (Participant 1.6, Baboon Cue).

There is more evidence of participants' critiquing concepts and contexts of sustainability in the paired and group discussion phase. The Vacanti Mouse Cue resulted in a reasonable degree of critical discourse with consideration of a range of contexts in which the use of animals in this way may be permissible, such as: disfigurement caused by an accident, medical conditions, and the closeness of the victim (family member), while ruling out its use for cosmetic reasons. The critiquing of the Vacanti Mouse Cue generally followed a human-centric line of thinking, concentrating on the benefit of changing a human life for the better. Only a few participants strongly condemned the use of animals in this process – "*It made me wonder about animal rights and why it is accepted that they are exploited. Also made me think about issue of consent*" (Participant 1.25).

During the Horse Cue, participants took into account the possibility of aiding an endangered or physically deformed animal. More frequently, however, students considered the Horse scenario in the context of growing a body part only for an "*animal one cared for"* (Participant 1.14), such as pets. Others critically considered their response to facilitating this for "*different animals"* (Participant 2.21). As with the Vacanti Mouse Cue, human-centric views dominated the critical considerations of participants. Participants who questioned the given context, thought about "*cruelty to the human race"* (Participant 1.19), thought about "*the health implication of it"* (Participant 2.25), and recognised that this scenario could well "*cause more pain"* (Participant 2.28) to the animal. Only a minority strove to understand the broader implication of this scenario, evident in statements that said the Horse scenario had promoted thinking "*about power, control, humans, animals"* (Participant 1.10) and "*that true sustainability would mean this [humans growing a body part for an animal] should be a consideration"* (Participant 1.17).

The Baboon Cue offered opportunities for critical consideration of Western norms and practices, in light of particular cultural practices among a specific tribe in South America. For some, the primate factor (baboon being human-like) within the Visual Cue enabled

critical consideration of the scenario – with one participant noting that the "*response to monkeys [baboon] is different from response to other animals (maybe rats)"* (Participant 1.25). For others, it was the story of the tribal cultural practice, of helping vulnerable animals survive, that stimulated consideration of the baboon scenario. The aspect of breastfeeding the baboon was a major issue for most, with concerns around the notion and act of having skin-to-skin contact in this process. Besides the fact that most participants expressed human-centric views, the majority of critiquing was supportive of the practice once it did not breach dominating cultural norms. In this regard, the preference was for human milk to be expressed into a bottle for the baboon to feed on, rather than to directly breastfeed the baboon. The majority of participants strove to understand cultural differences, recognising the value of learning from other cultures, with a minority of participants considering both the well-being of the child and the well-being of the baboon.

4.3.4 Theoretical Category - Reorienting Dispositions/Perspectives for Sustainability

This category covers changing dispositions (attitudes, beliefs, values) of, or perspectives on, sustainability. For this category, there needed to be evidence of participants re-orienting perspectives to include non-human centric views and/ or non-centric views over the course of each intervention. In total, 16 of the 55 participants showed changes to their disposition/ perspectives with respect to sustainability; for the majority the change is evident within a single Visual Cue, with just three participants showing change across all three Visual Cues. In terms of Visual Cues, the Baboon Cue led to the most re-orientations, followed by the Vacanti Mouse Cue, and the Horse Cue. It is important to note that for a small number of participants, who already held non-human-centric, sustainability-oriented views at the outset, the use of these Visual Cues in re-orienting dispositions or worldviews towards sustainability was not relevant.

Eight participants showed changes to their dispositions within the Vacanti Mouse Cue intervention. This resulted in deeper understanding of own beliefs, in some cases "*realising that they [sustainable or unsustainable oriented beliefs] are corruptible"* (Participant 1.17) exemplifies such a reorientation of dispositions. Furthermore, some of these participants' dispositional changes resulted when differences between 'needs and wants' became clearer.

Six participants showed dispositional changes within the horse cue. Participants commented on having their values-bases confronted – "*overall beliefs opened up"* (Participant 2.9), by

listening to others reasoning and critiquing the scenario. The comments recorded for the horse Visual Cue also indicate changing perspectives within and across participants. Some changed their view on the horse scenario, initially closed to the idea of growing an animal part on a human, then switching to consider the implications of doing this in the spirit of sustainability, and then resting with the viewpoint that interfering with nature (in all its forms – human or animal) is not a good trajectory to follow- "*it made me think of the potential damage to nature by perverting science in this way"* (Participant 1.17). A few changed their perspective when considering that it could be beneficial to an endangered species and realising that it may be considered "*very selfish not to return the favour"* (Participant 2.12) as one recognised that "*they are also living creatures"* (Participant 2.8).

With regards to the Baboon Cue, ten participants showed changes in their disposition towards breastfeeding the baboon. The re-telling of the back-story to the Visual Cue by a participant prompted the realisation that "*Westerners created this problem"* (Participant 1.17), *"that the baboon would otherwise die"* (Participant 2.19), and this appears to have contributed to some of the dispositional changes. This becomes evident through statements such as "*[the tribal cultural practice of breast feeding vulnerable animals] made me feel humble by what someone would do, my feelings changed a bit"* (Participant 1.9), and as one participant recorded to "*feel a little less superior to the animal"* (Participant 2.1). Furthermore, the exposure of male participants to viewpoints of female participants during the discussion phase has been mentioned as effecting change in dispositions towards the woman breastfeeding the baboon.

4.4 Design Considerations for the Pedagogic Process and Visual Cues

This section will first provide an overview of the sustainability principles, topics and thematic areas that emerged in the data from the audio recordings and tool 3, demonstrating that Visual Cues can be used in a stand-alone intervention that contains a sequence of Visual Cues. Then, considerations for the pedagogic process and future Visual Cues for phase two of this study will be detailed.

The data of tool 3 and the audio recordings of the group discussions highlight that students critically explored human/animal, human/nature and human/human dualisms. Figure 12

summarises the themes, principles and concepts that have been identified in the transcription of the audio recorded group discussion. It provides an overview of the content of the discussions for each Visual Cue scenario.

Figure 12: Sustainability Related Themes, Principles etc Emerging from Research Tool 3

Sustaining finite resources necessary to provide for the needs of future generations life on the planet / Interdependence of all beings and the value of every life regardless of its worth to mankind / Social and economic justice, enabling all to achieve a secure and meaningful livelihood that is ecologically responsible / The right of indigenous people in their spirituality, knowledge, land and resources, and to their related practice of sustainable livelihoods / The importance of lifestyles that emphasise the quality and material sufficiency in a finite world / The importance of preserving the traditional knowledge and spiritual wisdom in all cultures contributing to environmental protection and human wellbeing / Balancing and linking social and economic justice with environmental integrity / Self-reporting changing perspective on sustainability / Self-reporting learning of sustainability

Figure 13 summarises the responses to the question 'what have you learned about sustainability today?' (tool 3). The responses reflect the principles and thematic areas that emerged from the recordings of the group discussions.

Figure 13: Sustainability Related Themes, Principles etc. Emergent from Group Discussions

Vacanti Mouse Cue: Animal rights; humans' assumed superiority towards animals; voicelessness of animals – humans can give consent; humans growing body part for another human; unethical conduct of science; consequences for the animal; questioning if animal could become ones pet; using stem cells as an alternative; visibility and quality of the replaced body part; questioning social acceptance; humans destroy nature for own gain; sustaining humans on the short term at the risk of long term damage; considering individual values, opinions and circumstance; humans owe an apology to other species; veganism/vegetarianism – questioning if it originates from a place of privilege; humans should not interfere with nature; vanity; economic reasons; questioning the function of rat in the ecosystem; questioning if a beloved one would be needing it; considering scenario for someone involved in an accident; animals have sensibilities and emotions; depends on whether animal is a protected species or not; different relationships to different animals.

Horse Cue:
Comparing scenario to Vacanti Mouse Cue; questioning if scenario could be an opportunity for athletes; religion – humans are god creation; considering to make money with it; consequences for humans; long-term consequences on ecosystem; preserving the ecosystem; questioning if humans are more intelligent or have more power than other species; interference in natural life cycle; questioning if animal or human is more important; highlighting that image is created with Photoshop; depends on the animal body part and its visibility; considering scenario for a pet; questioning incentives for this act; cruelty to humans; humans can give consent; questioning if animal would not suffer more.

Baboon Cue:
Questioning if breast milk nourishes the baby baboon; noting similarity of baboons and humans; describing image as a representation of human and nature working in harmony; questioning the story behind the image; questioning if child is happy; questioning consequences for the child – malnourishment; questioning if westerners would breastfeed a rat or a dog; questioning which life is more important the child or the animal; questioning if woman is not aware of alternatives – expressing milk; highlighting that physical contact with animal creates discomfort; image represents helping a neighbour; questioning affection to animals; considering future generations; assuming that baboon is fed to be eaten later on; cultural differences; life in Western society vs. Tribal society; comparing it to bottle feeding a calve to which we get attached; baboon has the status of a pet.

Overall, students' comments depict critical thinking about human centrism, interdependencies within sustainability, and Western dualisms. Students related and compared the images and Visual Cues with one another, suggesting that the sequence of the three Visual Cues was influential to a progressively deeper reflection on critiquing anthropocentric views and the relationship of humans with animals and nature. The Vacanti Mouse and the Horse Cue resulted in an in-depth discussion of the human/animal dualism, while the Baboon Cue further broadened the discussion towards a critical engagement with the dualism of human and nature and amongst humans. It can be concluded that the chosen sequence of Visual Cues was beneficial to deepen the engagement and reflection of students with anthropocentrism and the consequences of humans assumed superiority.

During the analysis process, the four pedagogic processes of viewing, reflecting, pair and group discussion, were simplified to two phases: an initial individual phase (viewing and reflecting) and a discussion focused phase (pair and group discussion). Students' responses in the viewing or reflecting (and the pair and group discussion) sections tended to be

repetitive and some comments were written in an overlapping manner, making it difficult to determine to which pedagogic phase the comments belonged to.

In relation to the individual pedagogic phase, participants note that they became more open minded, especially "*after hearing the question"* (Participant 2.1. Vacanti Mouse Cue), as they "*just never considered it [the scenario] before"* (Participant 1.4, Horse Cue). Other participants highlighted that "*on reflecting on the question the image didn't matter anymore"* (Participant 1.7, Horse Cue) and noted that "*after hearing the question I had open mind"* (Participant 2.1, Vacanti Mouse Cue). These comments suggest that the individual phase is important to allow students to critically reflect on the Visual Cue scenarios and indicate that the trigger questions enhance their critical engagement. The exception was the Horse Cue, where the students highlighted repeatedly that "*the picture [of the Horse Cue] was photoshopped"* (Participant 1.2, Horse Cue). Consequently, students tended to regard the scenario as "*unlikely and unrealistic"* (Participant 1.6, Horse Cue). It became clear that Visual Cues should portray realistic and real-life scenarios.

Participants' comments on the pedagogical phase of discussion portrayed a positive impression and indicated that students enjoyed the discussions. Participants noted that they *"felt excited about the discussion"* (Participant 1.1, Vacanti Mouse Cue), "*more enlightened on other views"* (Participant 1.3, Vacanti Mouse Cue), that it "*broadened [their] views*" (Participant 1.5, Vacanti Mouse Cue), that it "*challenged [their] ideas"* (Participant 1.18, Horse Cue) or *"the way [they were] thinking"* (Participant 2.24, Horse Cue). Thus, student realised that "*other views impacted on [their] own"* (Participant 2.27, Baboon Cue), suggesting that the group discussion is an important pedagogic phase of Visual Cue interventions. The researcher's own reflection on the facilitation of the discussions concluded that there is a need to make use of trigger questions during the discussions. This was also confirmed by one student who noted that "*when [the researcher] asked would you do it to help your brothers and sisters, I contemplated*" (Participant 2.1, Vacanti Mouse Cue).

During the discussion of the Baboon Cue in the first group, "*someone explained [the] background [of the Yanomani tripe, which] made it [the scenario] clearer"* (Participant 1.13, Baboon Cue). Several students initially recorded that they questioned: *"what is the story behind the image?"* (Participant 1.14, Baboon Cue) and they only began to consider the baboon scenario once the backstory of the image was explained during discussion phase.

"When we found out the whole story, it changed me. Made me feel a little bit less superior than the animal" (Participant 2.1, Baboon Cue). Thus, the story of the Baboon Cue served as a catalyst to stimulate critical reflection. Therefore, the backstory of the Baboon Cue was shared with the second group while students were viewing and reflecting on the Baboon Cue. This finding clarified the importance of sharing background information with participants of Visual Cues as additional information helped participants to "*make sense"* of the scenario, and can "*change the way* they *thought about it*, such as stimulating *empathy for the baboon"* (Participant 2.21, Baboon Cue).

4.5 Findings from Research Phase One

This research study set-out to explore the potential of disruptive pedagogic interventions (Visual Cues scenarios) in reorienting anthropocentric frames of reference within sustainability. So, what impact did these pedagogic interventions have on learners' frames of references (how they think and/ or feel)?

The findings indicate that the guiding framework of Transformative Learning was effective in progressing participants towards becoming sustainability-oriented. The participants displayed differing cognitive skills-sets – with some primarily engaging lower cognitive skills, such as: identifying key principles, practices and themes of sustainability, and others engaging higher order cognitive skills in critiquing anthropocentric views and other concepts and contexts of sustainability. There is also evidence of a correlation between those who experienced emotional or cognitive disjuncture on viewing and reflecting on the Visual Cue at the outset, and the subsequent reorientation of the dispositions/ human-centric perspectives of these participants towards sustainability. Furthermore, the discussion is pivotal in promoting deep thinking on various principles, practices, issues and/ or themes of sustainability, such as: human centrism, interdependencies within sustainability, and Western dualisms.

The research study further sought to explore which elements of the intervention challenged participants' frames of reference. In this regard, the findings indicate that those who experienced disruption or dissonance during the initial viewing stage (disorienting dilemma) displayed more evidence of critical engagement during the latter stages of the intervention.

However, being emotionally or cognitively disrupted at the outset, did not by itself guarantee reorientations of dispositions/ perspectives for sustainability. These findings also highlight that discussions could also act as a catalyst in creating disjuncture beyond initial viewing and reflecting stages of Visual Cue interventions. Therefore, Visual Cue activities need to include opportunities for discourse and discussion. This enables engagement with cognitive processes facilitating the identification, recognition and/ or critique of key themes, concepts, contexts or issues within sustainability. The discussion-focused phase within the pedagogic framework of Visual Cue interventions thus further supports the reorientation of dispositions or perspectives for sustainability.

The design of the Visual Cue itself is very important in stimulating learners to critically reflect on their own dispositions and perspectives with respect to sustainable development. In this respect, the choice of image and trigger question is pivotal in disrupting or triggering dissonance within learners' frames of mind at the outset. Visual Cues have the potential to stimulate emotional and cognitive reactions that are deeply embedded in frames of mind, and which activate and signal a disequilibrium/ disjuncture/ disorienting dilemma, triggering the search for new meanings. Indeed, the majority of participants in this study experienced emotional or cognitive disjuncture on first sight of at least one of the Visual Cues, indicating that they could not rely on their existing frames of reference to make sense of the Visual Cue. However, the imagery for the Visual Cues needs to be carefully chosen so that it does not cause emotional or cognitive blockage, preventing the learner from engaging critically in the overall intervention. Furthermore, Visual Cues need to rely on real sustainability scenarios, using media that lead to disruption rather than disturbance of frames of reference. Consequently, future Visual Cues activities need to make use of art portraying real sustainability scenarios, with the added benefit of the protection offered by these artworks already being in the public sphere. In conclusion, evaluative frameworks for assessment of appropriateness of Visual Cue imagery should be extended to include authentic real-world contexts, and should avoid imagery that could lead to polarisation or disturbance of learners.

While this study has been effective in identifying a pedagogic framework and key cognitive processes in the pathway to becoming sustainability re-oriented, more research is needed in phase two to uncover pedagogic strategies that enable learners to fully transform into change agents for sustainability. Phase two of the research study also needs to identify the key

factors influencing learners' initial reactions to the Visual Cues, so that changes to learners' frames of reference with respect to sustainability can be fully explored.

4.6 Implications for Framing of Research Phase Two

Unlike the Vacanti Mouse Cue and the Baboon Cue, the Horse Cue was disregarded for the second research phase, as students found the horse scenario unrealistic and it had the lowest impact on students' frames of mind in phase one. Nevertheless, the Horse Cue demonstrates that Visual Cues needed to be realistic and portray real life scenarios. Therefore, there was a conscious decision in the design of additional Visual Cues for phase two to focus on current affairs and public art that portray real life scenarios. It was decided that the second research phase would not contain only Visual Cues based on images, but that it would also include videos to determine their effectiveness in stimulating disruption or unsettling frames of reference. Furthermore, the second phase included a Visual Cue that wouldn't have a critical question, in order to identify the relevance of combining visual stimulations with critical questions. Moreover, for the second research phase, it was decided that the Visual Cue interventions would be fully integrated into the sustainability module of the teacher education undergraduate degree, to examine if Visual Cues can also be effective when integrated into existing sustainability modules. Furthermore, observational notes would replace audio-recording of whole-group engagement in discussion within Visual Cue intervention, as the latter proved time-consuming and difficult to transcribe in context of live large-group discussions.

The second phase would adapt the simplified division of two pedagogic phases: an initial individual phase (viewing and reflecting) and a discussion focused phase (pair and group discussion). Furthermore, the sharing of potential backstories of Visual Cues, such as of the Baboon Cue, would be facilitated within the initial stages of the Visual Cue interventions in phase two of the research. Moreover, the facilitator would make use of freestyle trigger questions to support the facilitation of the group discussions.

Finally, the first research phase has also shown the need to revise the data collection tools to gather thicker descriptions of the impact of the Visual Cue interventions on students' frames of mind. To deepen the exploration of individual changes, with respect to frames of reference

for sustainability, a smaller number of participants (seven) were recruited in the second phase, instead of the entire cohort of students who took part in the Visual Cue interventions. Data collection tools were selected to capture learners' thoughts and perspectives were employed to record impact within and beyond the classroom, namely, reflective diary and interviews. In addition to this, the New Ecological Paradigm (NEP) tool was also implemented to provide a baseline of learners' worldviews with respect to sustainability at the outset of phase 2, in the hope of this contributing to analysis of development of mind-sets through the Visual Cue intervention.

Chapter 5: Research Phase Two

5.1 Introduction

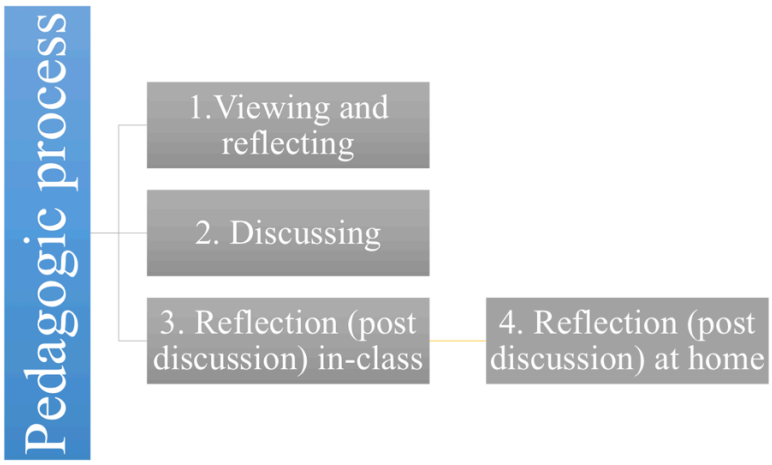
From September 2015 to February 2017, the second research phase was undertaken to further explore ways in which students' frames of reference could be disrupted and re-oriented towards more critical (non-human centric) examinations of the world we live in. Within phase two of the research, the number of Visual Cue scenarios was increased from three to six, and the time for engagement with each Visual Cue was extended to 60 minutes. The research was implemented within a sustainability module delivered across two programmes of studies in teacher education. This chapter begins with an explanation of the pedagogic design and process of the Visual Cue interventions. The research process is outlined and is followed by an overview of each participant's learning journey within the Visual Cue interventions. The following chapter presents the main thrust of findings with respect to pedagogic processes that lead to disruption and re-orientations of participants' frames of reference/ mind-sets in the context of sustainability.

5.2 Pedagogic Design and Process of Visual Cue Interventions

The Visual Cue interventions were delivered to two cohorts, comprising a group of part-time students (education practitioners and professionals) and a group of full-time students (mainly direct entrants from post-primary education) undertaking a sustainability module within a degree in education and training. Both groups participated in six pedagogic interventions, each opening with the presentation of an image and a critical question (referred to as a 'Visual Cue' heretofore). Each of these Visual Cues was intended to challenge students into thinking critically about anthropocentric world-views and Western dualisms, and other concepts and contexts of sustainability. The pedagogical design of the Visual Cue intervention was based on the core elements of Transformative Learning, namely, engagement with a disorienting dilemma, followed by critical reflection and rational discourse. The Visual Cue interventions began with an individual phase in which a disorienting dilemma was presented, that required critical individual reflection by self. This was followed by a discussion-focused phase, which entailed a whole group discussion to stimulate engagement in higher order discourse and to challenge existing frames of reference

with regards to sustainability. Each Visual Cue intervention lasted 30 minutes in class-time with an expectation that students would spend a further 20-30minutes at home completing reflections on the intervention.

Figure 14: Pedagogic Process Inspired by Transformative Learning



Students were required to keep a diary where they critically reflected on their understanding of sustainability and of their learning within the context of each Visual Cue scenario during and after engaging in the intervention in-class and continued at home. The reflective diary was integrated within the course assessment. As this was a relatively new experience for most of the students of the course, a prescribed template of the diary was given.

Here, the processes of Expressive Writing served as inspiration within the design of the Visual Cue intervention, in particular the framing of questions within the diary template. Expressive Writing is a technique that enables students to express themselves, creating a bridge between "*thought and feeling, reason and intuition, idea and action*" (Adams 2014, p.ix). The use of Expressive Writing, for the framing of questions within the diary template, dialogues with Shepard's suggestion (2015) that teaching in the affective domain is beneficial for sustainability education, as it enables students to "*become emotionally attached to the concept or to its application or outcomes*" (Shephard 2015, p.56).

In the context of this study, the Visual Cues were the prompts or stimuli, which in accordance to Pennebaker (1997) aims to trigger emotional experiences to connect students on a personal level with the chosen themes, principles and/or topics. Expressive Writing enhances engagement in discussions about otherwise obscure or complex topics (Pennebaker and Smyth 2016). Sustainability is by nature highly complex, ambiguous, controversial and uncertain. Sustainability also requires both, actions that reflect these characteristics (Lotz-Sisitka et al. 2015) and awareness of alternative worldviews (Sterling 2001). Pennebaker (2013) emphasises that Expressive Writing has "*the potential to change the way you see the world*" (p.xiv).

Each diary contained eight entries and had no word limit (see Appendix F). The first and last entries required students to reflect on their understanding of sustainability and Education for Sustainable Development at the outset and end of the course. The remaining six entries required students to critically reflect on the Visual Cues introduced during lectures. Before presenting a Visual Cue, students were given a hardcopy of the blank reflective diary template. To begin, students were asked to write down and explain why particular thoughts and/or emotions were triggered when viewing the Visual Cue and again after the completion of group discussions. Additionally, they were given space to reflect on the process of learning and asked to self-document the extent to which their thoughts or feelings were impacted, and to identify influential elements of each Visual Cue scenario. Approximately 60% of each diary entry were completed during each intervention and the remaining 40% were written at a later stage. The reflective diaries were a means of recording personal thoughts, emotions and insights of students' experiences in the learning process and gave a more detailed account of the impact of the Visual Cue interventions on students' frames of reference. Furthermore, it facilitated reflection on the process of learning through Visual Cue interventions.

The Socratic Dialogue was used as an inspiration for the trigger questions to support the facilitation of the discussions. Maxwell (2014) describes the Classic Socratic Method as a two-phase freestyle form of dialectic. It is freestyle because trigger questions were designed during the discussions, as it is impossible to predict students' responses or the flow of the discussion. The Classic Socratic Method has two phases (Maxwell 2014). The deconstructive phase focuses on the facilitator to use freestyle trigger questions to prepare students to think and reconsider their prior understandings. The constructive phase describes

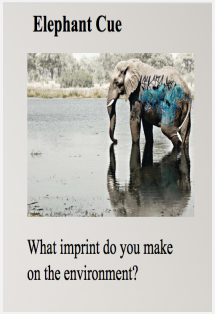
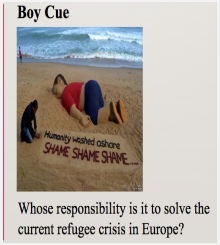
the moment were a student constructs new ideas or understandings (evidence presented in this chapter). The questions presented below are some freestyle trigger questions that were recorded through the observational notes and the researchers' diaries. These trigger questions were used during the Vacanti Mouse Cue based on students' contributions and the flow of the discussions:

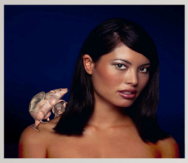
- Would it make a difference if the mouse was replaced with a dog/cat?
- Is there a difference when using the procedure for medical reasons or based on vanity?
- Would you grow a body part for an animal?
- Do humans in principle own the environment?
- Are technological advancements concerned with the well-being of this planet? Why/why not?

The facilitator remained neutral and did not assume the role of an expert but, as Chester (2012) recommends, aimed to enable "*students to think for themselves in order to provide a practical means for students to improve their ability to think about problems and issues they are likely to encounter in their lives*" (p.35). The facilitator role in the discussion was to pose questions to avoid that students feel a sense of certainty or aim to identify the "right" perspective. Chester (2012) points out that continuous questioning results in agreement and disagreement which in turn stimulates further questioning of the students. The facilitator should not influence the content of the discussion, rather the students should be responsible for the content of the discussion (Bolton 2001).

The chosen Visual Cues comprised six different scenarios that required students to critically consider different issues such as: the consequences of humans' far reaching imprint/impact on the environment – Elephant Cue; the collective responsibility of the European refugee crisis – Boy Cue; poverty in developed contexts of the world – Homeless Man Cue; the context of human tissue or human organ growth on animals - Vacanti Mouse Cue; whether they would engage in a particular tribal cultural practice to save vulnerable animal species (in this case, consider whether they would breastfeed a baboon, a cultural practice among the Yanomami tribe in South America) – Baboon Cue; and finally to draw critical connections within the thematic area of sustainability – Leopard Cue. Table 9 below describes each Visual Cue (see Appendix K), and the sustainability principles and the thematic areas within each Visual Cues.

Table 8: Overview of Visual Cues (Phase 2)

Visual Cue	Description	Trigger question & Visual Source	Sustainability principles	Thematic area
Elephant Cue 	The image shows an elephant standing in its natural habitat and has graffiti sprayed over his body.	*What imprint do YOU make on the environment?* **Source:** http://adsoftheworld.com/media/print/wwf_biodiversity_and_biosafety_awareness_elephant	Respect & Care for the community of life (interdependency of human/nature and human/animals) Ecological Integrity Fragility of Nature's balance Possibility of Ecocrisis Anti-anthropocentrism Democracy, non-violence & peace	Far-reaching consequences of human actions on environment Interdependencies of sustainability cornerstones Natural/Urban environment Graffiti as art/vandalism Animal extinction Animal poaching/hunting Animal rights
Boy Cue 	The image portrays a sand sculpture by the artist Sudarsan Pattnaik of the original image of Alan Kurdi with the tag line "Humanity washed ashore SHAME SHAME SHAME". Alan Kurdi is the three-year-old Syrian boy, who drowned along with his mother and brother, off the Turkish coast because their boat capsized shortly after leaving Bodrum.	*Whose responsibility is it to solve the current refugee crisis in Europe?* **Source:** http://www.bbc.com/news/world-europe-34150419	Respect & Care for the community of life (interdependency of human/humans) Ecological integrity Anti-anthropocentrism Democracy, non-violence & peace Social & Economical Justice	Human rights Discrimination and prejudice towards the unknown The role of mass media regarding fear vs awareness Refugees/Migrants

Homeless Man Cue **Homeless Cue**  What have you learned from the social experiment? https://www.youtube.com/watch?v=385QekwF-34	The video portrays a social experiment about prejudice towards homelessness.	*What have you learned from this social experiment? How can this social experiment inform our thinking on sustainable development?* **Source:** https://www.youtube.com/watch?v=385QekwF-34	Respect & Care for the community of life (interdependency of human/humans) Anti-anthropocentrism Ecological integrity Democracy, non-violence & peace Social & Economical Justice	Food wastage Inequality in northern nations Marginalised/vulnerable members of local communities Inequality between northern and southern nations Human rights
Vacanti Mouse Cue **Vacanti Mouse Cue**  Would you allow a body part to be grown on an animal to improve your appearance?	The image shows a mouse with a human ear growing on its back – more commonly known as the Vacanti mouse (Cao et al. 1997), on the shoulder of a young woman.	*Would you allow a body part to be grown on an animal to improve your appearance?* **Source:** https://bendinggenre.files.wordpress.com/2013/11/girl-with-ear.jpg	Respect & Care for the community of life (interdependency of human/nature and human/animals) Anti-anthropocentrism Ecological integrity Rejection of Exemptionalism Democracy, non-violence & peace	Animal rights Question consent of animals used for scientific advancements Animal testing Science vs. nature Vanity vs. well-being Lifestyle choices based on vanity or health Genetically modified organisms
'Baboon' Cue **'Baboon' Cue**  Would you breastfeed a 'baboon'?	The image shows a woman from the Yanomami tribe breastfeeding both a human baby and a baby monkey (Mark Edwards, Hard Rain project). The title is a word play relating to 'baby' and 'baboon'.	W*ould you breastfeed a baboon?* **Source:** http://www.hardrainproject.com/admin_images/yanomami800.jpg	Respect & Care for the community of life (interdependency of human/human, human/nature and human/animals) Reality of limits to growth Anti-anthropocentrism Fragility of nature's balance Possibility of eco-crisis Ecological integrity Democracy, non-violence & peace Social and economical justice	Comparison of Western culture with traditional culture Human rights of indigenous people Value of indigenous culture, knowledge for environmental protection and human well-being Impact of global industrial practices

Leopard Cue  https://www.youtube.com/watch?v=NnTlQB8DiaY	The video was created by Banksy. It shows what appears at first glance a leopard laying on a piece of wood in a room. The camera man touches the leopard before showing the front of the leopard, which reveals that it is only a coat.	*No trigger question* **Source:** https://www.youtube.com/watch?v=6IpriP5Bl20	Respect & Care for the community of life (interdependency of human/nature and human/animals) Ecological integrity Democracy, non-violence & peace Anti-anthropocentrism	Needs vs. wants Animal waste Quality of life and material sufficiency in a finite world Animal rights Questioning concept of Zoo Endangered species

The sequencing of each Visual Cue intervention, in the order displayed within Table 8, was a conscious decision. It aimed to align with the lecture content, and in doing so, in theory, prompt students to critically reflect on their own perspectives in the context of sustainability.

5.3 Research Process

Seven students (four part-time students and three full-time students) volunteered to participate in phase two of this research. Students were requested to complete the New Ecological Paradigm (NEP) scale, providing a snapshot of their worldview with respect to sustainability prior to participation in the course. All seven participants consented to the use of their NEP results and reflective diaries, and to engage in interview/s on the Visual Cue intervention. Furthermore, observations were captured in field notes by the lecturer about themes/ topics and connections made by students within the discussion phase in-class, which together with the researcher's personal reflections, were beneficial in informing the pedagogic design considerations. The data set (including the diaries, interviews, NEP results and observational notes) was collected between August 2015 and December 2016. The analysis process, using Constructivist Grounded Theory (Charmaz 2006), began in December 2015 and was completed in February 2017.

5.4 Presentation of Findings: Participants' Learning Journeys

This section presents the findings from a review of participants' diaries, interviews and NEP scores. The data of these multiple data sources are triangulated for each participant to present an individual account of each participant's learning journey in the context of the Visual Cue interventions, including instances of reorientation of frames of reference and engagement in change agency. The following summarises a detailed account of the learning journey with respect to sustainability for each of the seven participants.

5.4.1 Participant FT1

Prior to the module, FT1 understood sustainable development as the need to "*maintain [something] without impacting on the needs of future generations"* (first diary entry). Her NEP results showed that she had a somewhat pro-ecological outlook at the outset of the interventions. She had a full understanding of 'the fragility of nature's balance' as well as a of 'anti-anthropocentrism, thus had a good understanding of sustainability from an environmental perspective, but weaker understanding of 'limits to growth' and the dangers of reliance on humans to solve crises. Hence, FT1 had a solid environmental awareness before the module. She confirmed that through her responsibilities in her previous job as a facility manager she had understood the importance of "*energy consumption, resource consumption and emissions etc."* (first diary entry). However, while commenting on the development in her understanding of sustainability in her final diary entry, she acknowledged that to begin with she did not associate *"sustainability being about anything other than sustaining natural resources and the effects on the actual planet"* (last diary entry). She confirmed in her final diary entry that her previous understanding of sustainability was limited to "*the environment and that she had low understanding of the interdependencies that exists between all the other parts of it – society, economy, culture and environment are inter-linked"* (last diary entry). Her engagement in this module enabled her to "*look at sustainable development [from] a holistic* perspective" (last diary entry).

At the end of the module, she had a more holistic conceptualisation of ESD and highlighted that sustainability

> […] education should begin at home and be taught at every level and incorporated into all learning experiences so that it becomes a way of life and becomes 'just how things are done'. Respect and responsibility are two of the main concepts that should be highlighted in education (last diary entry).

Her realization of respect being a key disposition for sustainability emerged in other diary entries – "*if we just learn to respect each other and our natural resources the world would be in a much better state"* (Leopard Cue, diary), and re-emerged during the interview as she expressed her conviction that "*respect has become an underlying theme for her"* (interview).

Her existing 'pro-ecological outlook' was further fine-tuned through the Visual Cue scenarios. She became more aware of humans being part of the environment rather than separated from it. The NEP scores also indicate that she had a good understanding of 'anti-anthropocentricism' before the module. Her scores are lowest on the degree to understand the 'reality of limits to growth' and the 'rejection of exemptionalism'. Her assumption that Earth has enough natural resources and that humans need to learn how to develop them changed through the participation in this module. Through engagement in the Visual Cue intervention, she realised that humans need to respect and understand the limits of natural resources. At the outset, she was not sure about the possibility of the eco-crisis and thought that it has been greatly exaggerated. The diary revealed that she began to recognise the urgent need to acknowledge the possibility of eco-crisis and that humans will not be able to prevent it by learning to control nature, but instead re-connect with nature through respect. Consequently, FT1 developed a more enhanced pro-ecological worldview through the Visual Cue interventions.

Table 9: Changing Perspectives/ Dispositions of FT1

NEP Sub-Scale	NEP Statement	Results at Outset	Evidence of Change in Perspective or Development in Learning During Visual Cue Intervention
Reality of Limits to Growth	We are approaching the limit of the number of people the Earth can support	Slightly agree	*"We as humans are not capable of creating a more sustainable world for ourselves unless we have a greater understanding of the need to respect and understand the limits of all nature, all resources, all life to have any chance of creating a sustainable future*" (Vacanti Mouse, diary entry).
	The Earth has plenty of natural resources if we just learn how to develop them	Strongly agree	

	The Earth is like a spaceship with very limited room and resources	Slightly agree	
Anti-Anthropo-centrism	Humans have the right to modify the natural environment to suit their needs	Slightly agree	*"(...)that those that have no voice, be it a human voice or the inability of an animal to verbally fight their corner, were the ones that are most exploited and suffered from inequality"* (Leopard Cue, diary). *"We still perceive ourselves as the dominant species. Do we consider our species as a dominant force over nature overall?"* (Vacanti Mouse, diary).
	Plants and animals have as much right as humans to exist	Strongly agree	
	Humans were meant to rule over the rest of nature	Strongly disagree	
The Fragility of Nature's Balance	When humans interfere with nature it often produces disastrous consequences	Slightly agree	*"The Yanamomi tribe have not been 'contaminated' by a society that does not recognise the damage it is doing to the planet. Their basic needs are still what is important to them"* (Baboon Cue, diary entry).
	The balance of nature is strong enough to cope with the impacts of modern industrial nations	Strongly disagree	
	The balance of nature is very delicate and easily upset	Slightly agree	
Rejection of Exemptiona -lism	Human ingenuity will insure that we do not make the Earth unliveable	Unsure	*"It made me reflect on that although we have evolved and the huge advancements in so many areas of life we are in grave danger of destroying the planet for future generations and for many it will be death by ignorance"* (Baboon Cue, diary entry). *"That we as humans are not capable of creating a more sustainable world for ourselves unless we have a greater understanding of the need to respect and understand the limits of all nature, all resources, all life to have any chance of creating a sustainable future"* (Vacanti Mouse, diary).
	Despite our special abilities, humans are still subject to the laws of nature.	Slightly agree	
	Humans will eventually learn enough about how nature works to be able to control it	Unsure	
The Possibility of Eco-Crisis	Humans are seriously abusing the environment	Slightly agree	*"The tribe recognised that looking after nature and the environment they live in is as important for their own survival. Unless we make drastic changes our world will not survive"* (Baboon Cue, diary).
	The so-called 'ecological-crisis' facing humankind has been greatly exaggerated	Strongly disagree	
	If things continue on their present course, we will soon experience a major ecological catastrophe.	Strongly agree	

In the interview, FT1 internalised a more critical/holistic outlook of sustainability, noted that she raised her own voice more, became more critical with her own lifestyle and built self-confidence in new roles and relationships. The participation in this module "*changed [her] thought process"* (FT1 interview). She highlighted that she became more aware of sustainability related topics and interested in the "*background of news stories"* (ibid). She recognised social and cultural aspects of sustainability, raised her voice and advocated ethical consumer behaviour in her immediate reality, where she also incorporated the "*feeling of responsibility"* through various ethically consumer patterns. She noted that she became "*more conscious of talking to them [her children] about sustainability*" (ibid). She became eager to get her daughter "*to think that far ahead",* making her aware of the reasons behind ethical consumer behaviour, through walking her to school instead of taking the car, and explaining the reason behind recycling, as she believed "*education starts at home"* (ibid). FT1 felt more responsible as a result of the Visual Cue activities, which was enacted through her ethical consumer behaviour and by being a role module for her kids and other family members. In addition, she became more critical with her own lifestyle as she acknowledged to be able to "*get much more involved"* (ibid), for example "*when the elections were on and politicians were calling to the door, I was more inclined to ask them well what were they doing about climate change* or *the refugee crisis"* (ibid). She built confidence in her own perspective and realised "*that [she does] have a voice"* (ibid), while she became more self-critical with her own lifestyle when she showed awareness of being able to become even more active for sustainability.

She recalled in the interview that the Boy Cue was her most memorable Visual Cues. The Boy Cue was also most impactful on her emotional state as she connected to it as a parent. The Homeless Cue contributed most to her way of thinking about sustainability in terms of considering "*how human beings were treating other human beings"* (ibid). During the follow-up interview she recalled that the Homeless Cue motivated her to buy a homeless man food during her Christmas shopping in 2016. She emphasised that the homeless man

> was so grateful and actually she felt right for doing it and she actually did think of that Homeless Cue then because the fact that he did say to her, you know, can you buy me food as before I would have automatically thought that he was looking for money (follow up interview).

She identified both the Boy and the Homeless Man Cue as mainly contributing to a more holistic outlook for sustainability, as both Visual Cues drew attention to the social and

cultural dimensions of sustainability. She highlighted that she *"didn't realise the human right section on it [sustainability] […] and the young lad on the beach – [she] would never have thought of that as a sustainable development issue"* (ibid). When she was asked to identify one Visual Cue that had a low or no impact on her thinking and feeling she confirmed that she didn't think there was one that had only a minor impact," *as they were all really good [impactful]"* (ibid).

5.4.2 Participant FT2

The NEP results indicated that FT2 had a good understanding of 'the possibility of eco-crisis' before entering the module. She had some limiting preconceptions such as the thought that "*sustainability was (mainly) about recycling"* (interview). Furthermore, she "*never linked actions in [her] own private life with sustainability"* (ibid). In FT2's first diary entry, her portrayal of understanding of sustainability indicated vagueness on what constituted sustainability and a lack of specificity on education for sustainability. For her, ESD was concerned with "*long-term goals"* and perspectives as well as "*raising awareness at each stage of education"* (first diary entry). In contrast, her last diary entry showed a good understanding of some key dimensions of sustainability, offering specific actions necessary for sustainability such as "*conscious use of resources towards the survival of life"*. She defined ESD as a way to "*introduce learners, family, friends and peers to the wider concept of SD and open their minds to the butterfly effect of the actions of each human being*" (last diary entry), while simultaneously highlighting the intertwine of the cornerstones of sustainability.

Through the Visual Cue interventions, she became more aware of the consequences of anthropocentric worldviews, and that human control over nature might not be the solution to prevent eco-crisis or to the limitation of natural resources.

Table 10: Changing Perspectives/ Dispositions of FT2

NEP Sub-Scale	NEP Statement	Results at Outset	Evidence of Change in Perspective or Development in Learning During Visual Cue Intervention
Reality of Limits to Growth	We are approaching the limit of the number of people the Earth can support	Slightly disagree	*"So much of it is about using resources wisely. Once they are gone they are gone.* We *must consider all aspects of an environment, all its resources; nature, the animal kingdom and human beings"* (Homeless Man Cue, diary).
	The Earth has plenty of natural resources if we just learn how to develop them	Strongly agree	
	The Earth is like a spaceship with very limited room and resources	Unsure	
Anti-Anthropo-centrism	Humans have the right to modify the natural environment to suit their needs	Slightly agree	*"The need to move beyond human centric views of the world"* (Baboon Cue, diary). *"We must become more open to a dependence on all of nature. That perhaps much of our environmental problems actually stem from what the civilized world places a value on"* (Mouse Cue, diary). *"Humans' loss of the connection with nature"* (Baboon Cue, diary). *"How we as humans of the planet try to take control of the Earth we run the risk of losing sight of nature and its importance to our survival"* (Baboon Cue, diary). *"There is so much more to the interdependency between man and nature that I had previously thought"* (Vacanti Mouse Cue, diary). *"The respect that we should have for the animals"* (interview).
	Plants and animals have as much right as humans to exist	Slightly disagree	
	Humans were meant to rule over the rest of nature	Slightly disagree	
The Fragility of Nature's Balance	When humans interfere with nature it often produces disastrous consequences	Strongly agree	
	The balance of nature is strong enough to cope with the impacts of modern industrial nations	Unsure	
	The balance of nature is very delicate and easily upset	Slightly disagree	
Rejection of Exemptiona-lism	Human ingenuity will insure that we do not make the Earth unliveable	Strongly agree	
	Despite our special abilities, humans are still subject to the laws of nature.	Strongly agree	

	Humans will eventually learn enough about how nature works to be able to control it	Slightly disagree	
The Possibility of Eco-Crisis	Humans are seriously abusing the environment	Slightly agree	*"The realisation that we are all guilty of thoughtless actions that impact on way more than we realize"* (Leopard Cue, diary).
	The so-called 'ecological-crisis' facing humankind has been greatly exaggerated	Slightly disagree	
	If things continue on their present course, we will soon experience a major ecological catastrophe.	Slightly agree	

In the interview, FT2 exemplified how she became more critical with her own lifestyle, gained a more critical and holistic outlook for sustainability, which contributed to her confidence to raise her own voice and her engagement in her community. She also adopted and advocated various ethically minded consumer behaviours. FT2 noted in her last entry that "*this module changed the course of* her *life* (last diary entry). She *had been in a very unhappy marriage […] but [she] didn't do anything until the Elephant Visual Cue"* (interview). She became more critical with her own lifestyle and she recognised that everyone has a responsibility to be a role model. She *"realised that if [she] lives a lie, a dishonest life, [she is] telling [her] children that that's OK and that's when [she] decided [she] had to leave [her] husband and [she had] left him and [as a result she was] honest"* (ibid). Following the significant change of initiating a divorce, she emphasised that her kids "*have more respect for [her] because [she] was living the way [she was] saying they should be living rather than saying you should do this and [herself] doing something differently and that is sustainability 100%"* (ibid). During the follow up interview she pointed out that she is "*feeling good"* and that she has "*no regrets over her decision"* (follow up interview) to initiate the divorce. Through the recognition that "*the impact of [her] actions [did not] just end with [her]",* she began to think differently about herself, the future and her daily decisions. She gained a more critical and holistic outlook and adapted various ethically minded consumer patterns. She recalled that

> it changed the way [she] shops, it changed the way [she] thinks about the future, about how [she] makes decisions, that [she] actually thinks beyond now and [she did not] know if [she] had every actually done that before (interview).

Besides avoiding the generation of waste and purchases based on wants, she focused on being a role model and successfully encouraged her family and friends to become ethical consumers as well. During the follow-up interviews she confirmed that more than a year after the participation in the module she still followed ethical consumption habits. She exemplified "*that [she] haven't bought any new clothes"* and that she continued to *"remind [her] children of sustainability"* (follow-up interview). As a teacher of a module in "*care for the older person"* within the community, she used "*some of the Visual Cues"* (interview). She also highlighted that the Homeless Man Cue motivated her to engage in a conversation with a homeless man instead of *throwing €5 at him* (ibid).

FT2 perceived the Leopard Cue as most impactful on the way of thinking. It "*changed the way [she] processed thoughts […] – [she] questioned things a little bit more deeply, not accepting things for what they are"* (ibid). Through the Elephant Cue, the most memorable and impactful Visual Cue on her feelings, she became more critical with her own lifestyle and she realised that everyone has a responsibility to be a role model. She noted that the Baboon Cue was the most impactful Visual Cue on her thoughts, due to the "*whole idea of mother nature and our responsibility for mother nature and our stewardship of nature"* (ibid). She emphasised that "*all [Visual Cues] had an impact on[her], and some of them come back at different stages"* of her life (follow up interview), for example "*when [she] says the word 'grain' [she] thinks of the Boy Cue because of the sand […] and [she] tries to be one of those tiny little pieces of sand that contributes to the bigger picture"* (follow up interview).

5.4.3 Participant FT4

FT4's NEP scores confirmed a good level of environmental awareness, especially in relation to climate change, which may have resulted from her involvement in the Green School's committee and in the "*Irish Wheelchair Association"*, where she gained experience in environmental activism (interview). She had a good understanding of the need to move beyond human's assumed superiority. She paraphrased in her first diary entry the Brundtland definition of sustainable development (Brundtland Commission, 1987). For her, ESD was about raising awareness about "*climate change, poverty, knowledge of food production etc."* (first diary entry). Her last entry was comparable and very similar to her first entry, indicating a critical and holistic outlook before entering the module. From her diary, it could be deduced that she gained a better understanding of the dangers in pursuing unlimited humans'

advancements to the expense of natural resources, but that it instead requires respect for the balance of eco-systems.

Table 11: Changing Perspectives/ Dispositions of FT4

NEP Sub-Scale	NEP Statement	Results at Outset	Evidence of Change in Perspective or Development in Learning During Visual Cue Intervention
Reality of Limits to Growth	We are approaching the limit of the number of people the Earth can support	Strongly agree	
	The Earth has plenty of natural resources if we just learn how to develop them	Strongly agree	
	The Earth is like a spaceship with very limited room and resources	Slightly disagree	
Anti-Anthropo-centrism	Humans have the right to modify the natural environment to suit their needs	Slightly disagree	*"Animals are wonderful creatures and deserve as much respect as humans and the rest of nature"* (Leopard Cue, diary). *"I wish we could live in a world where there are no boundaries between humans and nature"* (Baboon Cue, diary). *"It made me think of my own actions and whether I give the animal kingdom the utmost respect it deserves"* (Leopard Cue, diary).
	Plants and animals have as much right as humans to exist	Strongly agree	
	Humans were meant to rule over the rest of nature	Strongly disagree	
The Fragility of Nature's Balance	When humans interfere with nature it often produces disastrous consequences	Strongly agree	
	The balance of nature is strong enough to cope with the impacts of modern industrial nations	Strongly agree	
	The balance of nature is very delicate and easily upset	Slightly agree	
Rejection of Exemptiona-lism	Human ingenuity will insure that we do not make the Earth unliveable	Slightly disagree	*"People can easily go back to their roots and find solutions in nature as opposed to using science"* (Vacanti Mouse Cue, diary).
	Despite our special abilities, humans are still subject to the laws of nature.	Strongly agree	

	Humans will eventually learn enough about how nature works to be able to control it	Strongly agree	
The Possibility of Eco-Crisis	Humans are seriously abusing the environment	Strongly agree	
	The so-called 'ecological-crisis' facing humankind has been greatly exaggerated	Strongly agree	
	If things continue on their present course, we will soon experience a major ecological catastrophe.	Strongly agree	

Through engagement in the module, FT4 became more committed to advocate for sustainability. During the interview, she repeatedly assured how much she enjoyed the module and particularly the Visual Cues. She emphasised that she *"would have researched [herself], prior to the course […] so [she] was fully kind of prepared to see things like that*" (ibid). She was stimulated to become action oriented for sustainability through the use of the Visual Cues and highlighted that her *"commitment to want to make more of a difference changed"* (ibid) and that "*next year is going to be [her] year where [she is] going to do a lot of voluntary work"* (ibid). During the follow-up interview she confirmed that during the last year she participated in "*protests about the environment, animal rights, human rights and the LGBT community".* She also noted her family is "*getting solar panels on the house"* and that the participation in this module motivated her to do a work placement in "*Youth Reach"* (follow up interview), a training and work experience programme for young people who are early school leavers.

The most memorable and most impactful Visual Cue on her feelings was "*the Baboon Cue just because it showed pure humanity, pure humanity, like humanity that [she] would hope and pray to see [herself*] *someday in person"* (ibid). The Elephant Cue impacted most on her way of thinking about sustainability as it motivated her to "*think a lot"* (ibid).

5.4.4 Participant PT1

PT1's NEP results confirmed that she had a full 'pro-ecological' view and was fully aware of the 'fragility of nature's balance', 'the rejection of exemptionalism' as well as the 'possibility of eco-crisis' prior to the module. Overall, she had a comprehensive perspective of the ecological paradigm. While, she did point out the "*need to manage our natural*

resources" (first entry – diary), she was not fully aware of the reality of the limits to growth' and some anthropocentric perspectives indicated some room for refinement. She associated sustainability (at the outset) with "*the environment as it stands today but keeping the future in mind"* (first entry – diary). She acknowledged that she was very *focused on the environment* as the central point of sustainability (last entry – diary), which was based on the fact that she "*taught a Sustainable Development Course"* (interview) in her community. Nevertheless, through the module, she recognised that she gained a more holistic perspective of sustainability, relating it to "*a broader context e.g., poverty, homelessness, human rights, health, society, culture, economy, bio - diversity, education and animal rights"* (last entry – diary). Her understanding of ESD was very similar in the first and last entry, but she realised that the process of learning about and for sustainability was critical – *"how we learn about sustainable development is more important as to what we learn"* (ibid).

Table 12: Changing Perspectives/ Dispositions of PT1

NEP Sub-Scale	NEP Statement	Results at Outset	Evidence of Change in Perspective or Development in Learning During Visual Cue Intervention
Reality of Limits to Growth	We are approaching the limit of the number of people the Earth can support	Slightly agree	*"We should share our natural resources, and be grateful for what resources we have"* (Baboon Cue, diary entry).
	The Earth has plenty of natural resources if we just learn how to develop them	Slightly agree	
	The Earth is like a spaceship with very limited room and resources	Slightly agree	
Anti-Anthropo-centrism	Humans have the right to modify the natural environment to suit their needs	Slightly agree	*"Humans are destroying the environment, this needs to change otherwise we could become extinct"* (Baboon Cue, diary). *"We all have rights humans and animals"* (Leopard Cue, diary).
	Plants and animals have as much right as humans to exist	Strongly agree	
	Humans were meant to rule over the rest of nature	Slightly disagree	
The Fragility of Nature's Balance	When humans interfere with nature it often produces disastrous consequences	Strongly agree	
	The balance of nature is strong enough to cope with the impacts of modern industrial nations	Slightly disagree	

	The balance of nature is very delicate and easily upset	Slightly agree	
Rejection of Exemptiona -lism	Human ingenuity will insure that we do not make the Earth unliveable	Slightly disagree	
	Despite our special abilities, humans are still subject to the laws of nature.	Slightly agree	
	Humans will eventually learn enough about how nature works to be able to control it	Slightly disagree	
The Possibility of Eco-Crisis	Humans are seriously abusing the environment	Slightly agree	*"We make a big imprint on the environment causing the mess that our world is in"* (Elephant Cue, diary).
	The so-called 'ecological-crisis' facing humankind has been greatly exaggerated	Slightly disagree	
	If things continue on their present course, we will soon experience a major ecological catastrophe.	Slightly agree	

PT1 adapted a more ethical minded consumer behaviour, advocated for sustainability and internalised a more critical/holistic outlook for sustainability. She recognised that the Visual Cues made her *"think about some clothing that [she]'d wear* (interview). She stopped "*buying tin foil altogether"* and she "*bought [her] own cup"* to avoid the use of disposable cups (ibid). She also raised her voice for sustainability, by "*showing the Visual Cues to friends and family"* (ibid). In addition, she made her son more conscious about the homeless crisis in Ireland, as she felt more aware of the human rights as a result of the Visual Cues. By the time of the interview she "*planned to use the Visual Cues in [her] teaching".* Six month later, she told me via email that she "*just used a Visual Cue"*, that she designed "*about a cow to raise awareness of [the impact of] methane gas"* (email conversation 4th October, 2016)

The Homeless Man Cue and the Leopard Cue were her most memorable Visual Cues. The homeless Man Cue reminded her on a homeless experience in her childhood and the Leopard Cue made her re-consider to buy cloths with animal prints, more aware of animal testing and the need for "*environmentally friendly"* products. The Boy Cue influenced most her feelings,

as she related to the scenario as a parent, and the Elephant Cue enabled her to *"consider animal rights"* when thinking about sustainability.

5.4.5 Participant PT2

PT2's initial perspective on sustainable development was based on an environmental perspective that emphasised re-usage and recycling of resources to sustain natural resources. He understood ESD as the practice of ethical consumption of products and highlighted the potential "*damage it [unethical products] could cause"* (first diary entry). PT2 had some previous environmental perspectives that were also evident in his NEP results. Before entering the module, he showed a good understanding of humans being part of nature. During the interview, when we revisited his NEP results, he seemed surprised that he had anti-anthropocentric worldviews. In contrast, after completion of the module, he actually understood sustainability *"in a different light and knew that [sustainability related issues were] connected to"* one another (ibid). He became aware of the "*interlink"* between societal, economic and environmental aspects of sustainability and he understood ESD as the inclusion of sustainable development issues "*in all curriculums"* to enable "*learners to change their behaviour and take action to implement it"* (last entry). In his last diary entry, he confirmed that he "*learned a lot"* since his first diary entry.

Table 13: Changing Perspectives/ Dispositions of PT2

NEP Sub-Scale	NEP Statement	Results at Outset	Evidence of Change in Perspective or Development in Learning During Visual Cue Intervention
Reality of Limits to Growth	We are approaching the limit of the number of people the Earth can support	Unsure	*"I don't agree anymore that the Earth has plenty of natural resources* as *humans just use and abuse the environment"* (interview).
	The Earth has plenty of natural resources if we just learn how to develop them	Slightly disagree	
	The Earth is like a spaceship with very limited room and resources	Slightly agree	
Anti-Anthropo-centrism	Humans have the right to modify the natural environment to suit their needs	Slightly disagree	*"This course has made me consider the environment as one whole and we all play a part in it"* (Leopard Cue, diary).
	Plants and animals have as much right as humans to exist	Slightly agree	

	Humans were meant to rule over the rest of nature	Strongly disagree	
The Fragility of Nature's Balance	When humans interfere with nature it often produces disastrous consequences	Slightly agree	*"What I consume today has consequences for everything in nature"* (Leopard Cue, diary).
	The balance of nature is strong enough to cope with the impacts of modern industrial nations	Unsure	
	The balance of nature is very delicate and easily upset	Strongly agree	
Rejection of Exemptiona -lism	Human ingenuity will insure that we do not make the Earth unliveable	Unsure	
	Despite our special abilities, humans are still subject to the laws of nature.	Slightly agree	
	Humans will eventually learn enough about how nature works to be able to control it	Unsure	
The Possibility of Eco-Crisis	Humans are seriously abusing the environment	Slightly agree	*"We're not going to be able to lower the heat of the planet and we're going to be in trouble in the next couple of years"* (interview).
	The so-called 'ecological-crisis' facing humankind has been greatly exaggerated	Unsure	
	If things continue on their present course, we will soon experience a major ecological catastrophe.	Unsure	

PT2 engaged in the wider community through a variety of actions for sustainability as a result of the Visual Cue interventions. He used *"the Leopard Cue in [his own] class"* (interview) of disenfranchised and marginalized prisoners. He became also motivated to "*help out with the Zoo"* and he got *"involved with the 'Zoowardship' a project where [his students] adopted a little leopard in Dublin Zoo"* which gave them a sense that "*they'd done something' good for the community"* (ibid). One year later he pointed out that his class still get updates on the leopard's well-being, and he also signed up for *"Zoowardships for a couple of zebras this year"* (follow-up interview) as Christmas presents. He emphasised that it was "*the Leopard Cue [that] has inspired [him] to do all that"* (interview). Moreover, he got involved in the Re-education of jailed poachers in cooperation with the African Wildlife

Centre "*to show them the effects of what they've done […] damaging the planet"* (interview), and he began to voluntarily deliver soup to homeless people in Dublin for a Homeless trust, which he was still doing "*every second week on a Saturday night"* (follow up interview) one year later. During the follow-up interview, he noted that that the module "*has really changed everything".* In the past year, he also "*joined the Wetlands of Ireland Society and helps to clean up the wetlands" (*follow up interview). He "*changed all the bulbs",* and he got an "*energy meter to try and make [his] footprint smaller"* (follow up interview). In addition, he "*is selling the house [as he is] looking now for a greener house"* (follow up interview).

For PT2 the Leopard Cue and the Homeless Man Cue have "*stuck in [his] head"* and were the most memorable Visual Cues. The Homeless Man Cue was also most impactful on his feelings, as it "*changed [his] whole opinion of homeless men"* (ibid). Before the module, he would have only "*given them [homeless people] money",* after the module he stopped and "*asked him [a homeless man] if he's ok. Did he need a hand?"* (ibid). His increased sense of responsibility and care might have also been influenced by the Baboon Cue, which was most influential on his way of thinking about sustainability. He felt inspired by "*the ethos of it […] you help someone, pass it, I help you - you help them"* (ibid). The Leopard Cue and the Homeless Cue resulted in his active engagement in the wider community. The Homeless Cue changed his perspective of homelessness and motivated his engagement in change agency for the homelessness in his community, delivering soup to homeless people. When being asked if any Visual Cue had a low or no impact, he responded that the Vacanti Mouse "*didn't have a good effect or a bad effect"* (ibid) as he felt not as interested in "*genetics"* (ibid). Nonetheless, his diary showed that he felt disrupted in the sense that he felt initial "*revulsion"* (Vacanti Mouse, diary) based on the image of a rodent. After the discussion, he connected the Visual Cue to the concept of

> […] health. Is not just how they look after their bodies. Our health is shaped by personal lifestyle choices, such as where and how they get to work, the food they eat, social connections, the community that they live in and their levels of physical activity. That we need to make sure that all people, not just the people who have money or access to education, be allowed to have food, clean water and the use of educational resources to be able to make themselves healthy (Vacanti Mouse, diary).

This example demonstrated that, while PT2 felt that the Vacanti Mouse didn't have a major impact on him, he still learned about sustainability. Similarly, the Boy Cue had a lasting impact on him, as he "*hadn't seen [the image] before"* (interview). His diary revealed that

through the Boy Cue he also learned about sustainability, as he became more aware of the refugee crisis, "*that this is not just a local idea, it is worldwide and people need to be made aware of the effects on everything else and everyone else no matter how small, similar to the much cited Butterfly effect"* (Boy Cue, diary).

5.4.6 Participant PT4

At the outset of the course, PT4 "*thought of sustainability as something that was capable of being sustained and kept going"* (first diary entry). In contrast, she recorded in her last entry a thorough understanding of sustainable development and ESD. She took into account "*the '4 pillars', [and] the need for respect for equality, ethnic identity, integration, language and how to be more thoughtful and reflective of interdependencies and complexities contained therein"* (last diary entry).

PT4's NEP scores revealed that she was aware of the possibilities of eco-crisis and that her worldview considered humans as part of nature at the outset of the module. However, she had very little awareness of the limitation of natural resources. Through, the Visual Cue interventsions, she realised "*the need for respect of the fundamental freedom for all without distinction as to race, sex, language or religion"* (last diary entry). Her diary entries indicated that the Visual Cues sparked her interest in sustainability related issues, showing evidence of her own engagement in research in this area. For example, she emphasised that she "*looked at the United Nations Conference on Climate Change [COP21 in Paris, Dec 2015]"* (Baboon Cue, diary), which suggested that she became more aware of the limitation of natural resources. She considered herself as "*a prime example of someone who knew little about Sustainability and ESD and now can't stop thinking about it in day to day living"* (last diary entry).

Table 14: Changing Perspectives/ Dispositions of PT4

NEP Sub-Scale	NEP Statement	Results at Outset	Evidence of Change in Perspective or Development in Learning During Visual Cue Intervention
Reality of Limits to Growth	We are approaching the limit of the number of people the Earth can support	Unsure	*"I was astounded to hear that the world's forestry coverage is shrinking by an areas equivalent to the 'size of Ireland' every year"* (last diary entry). *"Societies that continue to use resources unsustainably will collapse* "(last diary entry).
	The Earth has plenty of natural resources if we just learn how to develop them	Strongly agree	

	The Earth is like a spaceship with very limited room and resources	Unsure	
Anti-Anthropo-centrism	Humans have the right to modify the natural environment to suit their needs	Slightly disagree	*"The Visual Cues connected me more as a human with nature* as *humans and animals are part of the same world"* (Baboon Cue – diary).
	Plants and animals have as much right as humans to exist	Strongly agree	
	Humans were meant to rule over the rest of nature	Slightly agree	
The Fragility of Nature's Balance	When humans interfere with nature it often produces disastrous consequences	Slightly agree	*"Small things and choices we make every day* have *an impact on the elephant's environment"* (Elephant Cue – diary), and "*on other societies globall"y* (Baboon Cue – diary). *"The increasing awareness of the fragile physical environment"* (last diary entry).
	The balance of nature is strong enough to cope with the impacts of modern industrial nations	Slightly disagree	
	The balance of nature is very delicate and easily upset	Slightly disagree	
Rejection of Exemptiona-lism	Human ingenuity will insure that we do not make the Earth unliveable	Slightly disagree	*"I've reconsidered my place and responsibilities towards the environment"* (Baboon Cue, diary).
	Despite our special abilities, humans are still subject to the laws of nature.	Strongly agree	
	Humans will eventually learn enough about how nature works to be able to control it	Slightly agree	
The Possibility of Eco-Crisis	Humans are seriously abusing the environment	Slightly agree	
	The so-called 'ecological-crisis' facing humankind has been greatly exaggerated	Strongly disagree	
	If things continue on their present course, we will soon experience a major ecological catastrophe.	Strongly agree	

During the interview, she confirmed to have internalised a more holistic outlook as she became "*more aware of global issues"* related to sustainability, which further encouraged her to become more confident with her own perspective and to discuss sustainability related

topics. Prior to the model, she "*would have assumed"* that for example the migrant crisis had "*nothing to do with"* her (interview). PT4 adopted ethically minded consumer patterns such as "*recycling"* and questioned the origin of products as she began to consider "*the consequences of [her] own actions and consumer behaviour*" (ibid). In addition, PT4 recognised her responsibility for sustainability as an educator and integrated sustainability and the *"Visual Cues in [her] class as a way of encouraging learners to engage in a topic"* (ibid).

The Boy Cue was the most memorable Visual Cue and had the most impact on PT4's feelings and thinking of sustainability, reminding her of her own childhood when she once experienced homelessness, sleeping "*overnight on the pavement […] the coldness of that night"* (ibid). The Boy Cue made her consider how "*shocking"* it must be in such as situation such as the refugee crisis "*if you have got responsibilities such as kids"* (ibid). It was the Boy Cue that also made her realise that "*everything is connected"* (ibid) and she became interested in the situation of refugees near her home who were "*there over ten years waiting to become citizens […] and [she] only learned then that for instance they can't make their own food […] that all their rights are being denied"* (ibid). For her, the Homeless Man Cue had the least impact on her as she thought that it reminded her on similar scenarios that she had seen before especially in movies.

5.4.7 Participant PT5

PT5 had a prior pro-ecological outlook. Her understanding of sustainability was similar in her first and last entry, where she considered the "*impact on environment and humanity & attempting to change behaviours which cause damage to the planet"* (first diary entry). PT5 would have been years ago "*the recycler"* (interview). She pointed out that she did not *"have a huge amount of food waste because [she has] animals that eat it"* (ibid). Her high degree of environmental awareness was also mirrored in her NEP results, which illustrated a full pro-ecological worldview, including a full understanding 'anti-anthropocentrism', 'the fragility of nature's balance', and 'the possibility of eco crisis' prior to the module. However, there was room for development in some areas – such as understanding the reality of limits to growth and rejection of exemptionalism. Through the Visual Cue interventions, she critically realised that perhaps it was as misleading to rely on mother nature to solve crisis as it was to rely on humans, and that it is rather the balanced interplay of all elements on this planet that will contribute to the survival of all living (see NEP result – 'rejection of

exemptionalism'). Furthermore, the Visual Cue made her aware of the limitation of natural resources.

Table 15: Changing Perspectives/ Dispositions of PT5

NEP Sub-Scale	NEP Statement	Results at Outset	Evidence of Change in Perspective or Development in Learning During Visual Cue Intervention
Reality of Limits to Growth	We are approaching the limit of the number of people the Earth can support	Slightly agree	*"Natural resources are not infinite and care should be taken to ensure that humans are behaving responsibly and morally in our actions if we are not to critically endanger the delicate balance of the natural world"* (Vacanti Mouse, diary).
	The Earth has plenty of natural resources if we just learn how to develop them	Strongly agree	
	The Earth is like a spaceship with very limited room and resources	Slightly agree	
Anti-Anthropo-centrism	Humans have the right to modify the natural environment to suit their needs	Slightly disagree	
	Plants and animals have as much right as humans to exist	Strongly agree	
	Humans were meant to rule over the rest of nature	Strongly disagree	
The Fragility of Nature's Balance	When humans interfere with nature it often produces disastrous consequences	Strongly agree	
	The balance of nature is strong enough to cope with the impacts of modern industrial nations	Slightly disagree	
	The balance of nature is very delicate and easily upset	Slightly agree	
Rejection of Exemptiona-lism	Human ingenuity will insure that we do not make the Earth unliveable	Slightly disagree	*"Our belief that mother nature will repair whatever damage we inflict upon her is short-sighted, solving the climate crisis depends on the survival of each element, because the living world is about a fragile chain that links all together – the future of the planet depends on it"* (Baboon Cue – diary).
	Despite our special abilities, humans are still subject to the laws of nature.	Slightly agree	

	Humans will eventually learn enough about how nature works to be able to control it	unsure	*"Humans depend upon the Earth's ecosystem for survival. We are part of a global cross-species community and each integral element in this community is dependent in some way on the others for survival"* (last diary entry).
The Possibility of Eco-Crisis	Humans are seriously abusing the environment	Strongly agree	
	The so-called 'ecological-crisis' facing humankind has been greatly exaggerated	Strongly disagree	
	If things continue on their present course, we will soon experience a major ecological catastrophe.	Slightly agree	

PT5 has a comprehensive pro-ecological worldview at the outset. She highlighted that even though she would always be environmentally conscious, she would have never associated her actions with sustainability, which was a term she only got introduced to through this module. She internalised a more holistic and critical outlook for sustainability, connecting it to "*the whole human rights element of it"* (interview). As a result of the Visual Cues, she noted a change in how she thought about sustainability matters, in that she began to engage in deeper, more critical reflection before making judgements – "*to think things through a little more",* and it made her *"not judge things instinctively or not make an initial assessment of something"* (ibid). The Boy Cue, made her *"look at the coverage [of the refugee crisis] differently"* (ibid). Instead of making judgements based on *"instinctive and immediate reactions, [she] reads now more into current affairs and investigates what else [she] could find out about it"* (ibid) to gain an in-depth perspectives on current affairs such as the refugee crisis. During her youth, she "*joined Greenpeace […] and became a vegetarian"* (ibid) and she believed that it was wrong to impose her values on to others. She exemplified this through the way she "*brought [her] children up as meat eaters so they could make that decision themselves"* (ibid), i.e. whether they want to be vegetarian or not. PT5 highlighted that nowadays she "*was probably growing in confidence",* she became "*more comfortable with [her] own views [and she realised her] opinion was valid"* (ibid). Thus, following the Visual Cue interventions she became more comfortable with her pro-ecological mind-set and more confident to advocate sustainability. She mentioned during the interview that she encouraged classmates to become ethical consumers. She informed them about the rationale

of having chickens at home. In addition, while she "*hoped that [her] children learn by example* she was *pulling them up a little more on things"* (ibid) to grasp the far-reaching consequences of their own actions on the planet. PT5 was critical with her own lifestyle and perspectives. She was aware that her actions for sustainability *"could be better"* (ibid). Her criticality became also apparent through the realisation that "*perhaps it is wise to review and revise even our most firmly held beliefs from time to time"* (Vacanti Mouse Cue, diary).

For PT5, the most impactful Visual Cue on her thoughts was the Homeless Man Cue, which made her "*look at things a little differently",* especially as she had the opportunity to exchange perspectives with class mates who "*are working with former drug addicts and prisoners, [which] was actually very enlightening"* (interview). PT5's most memorable Visual Cue was the Boy Cue, which made her more aware of the refugee crisis and enabled her to look more critically at news and information on social media. Nonetheless, the Boy Cue had an impact on her, making her more aware of the *"human rights"* in the context of sustainability (ibid). It is arguable that the fact that PT5 was *"a vegetarian"* and her "*love of animals from childhood"* (ibid), influenced her experience of the Elephant Cue and the Leopard Cue as being the most impactful on the way she felt, noting that these two Visual Cues "*angered"* her (ibid). She recorded that "*a change in attitude towards a fairer and more equitable treatment of all living creatures will impact on how we treat each other"* (Leopard Cue, diary entry), suggesting that she critically reflected on equality of all living beings. In addition, the Baboon Cue was her least impactful Visual Cue. The Baboon Cue triggered a positive reaction and sympathy which may be due to her pro-ecological worldview prior to the module.

5.5 Chapter Summary

Having familiarised ourselves with each participant's learning journey, we move forward in the next chapter to situate their learning in the context of the emergent categories of learning of/for sustainability identified through the CGT analysis of datasets across phase two of the research.

Chapter 6: Learning of/for Sustainability in Research Phase Two

6.1 Introduction

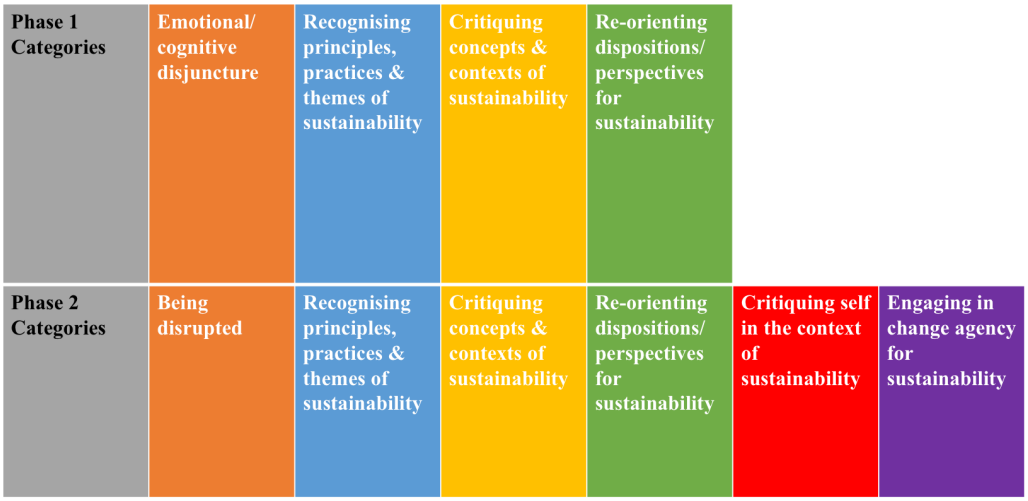
This chapter presents the evidence of learning of/for sustainability within the Visual Cues intervention captured in the second phase of the research, and contextualises the learning journey of each participant within the emergent framework of theoretical categories of sustainability learning. It begins by comparing and contrasting the six theoretical categories that emerged in phase 2 with those emergent from phase 1 of research. The discussion progresses to explore the evidence for disruption within the Visual Cue interventions, articulating the trigger/s for learning, and the stimulus for participant's re-orientation of self towards sustainability. This is followed by presentation of the evidence of the learning value of the Visual Cue interventions, through presentation and discussion of the six different theoretical categories aligning with different 'depths' or 'levels' of learning. This chapter concludes with an exploration of participants' perspectives on the Visual Cue design considerations that stimulated disruption.

6.2 Evidence of Learning in Visual Cue Intervention

In phase one of this research, the Constructivist Grounded Theory approach provided evidence of four categories contributing to sustainability learning; in phase 2 evidence has emerged supporting the addition of two new categories, as shown in Figure 15.

In Phase 1, the four categories identified were: 'emotional/ cognitive disjuncture', 'recognising principles, practices & themes of sustainability', 'critiquing concepts and contexts of sustainability', and 'reorienting dispositions/ perspectives for sustainability'. Figure 15 illustrates that the additional categories of phase 2 are 'critiquing self in the context of sustainability' and 'engaging in change agency for sustainability'.

Figure 15: Comparison of Categories from Phase 1 and Phase 2



The category 'being disrupted' replaced the category 'emotional/cognitive disjuncture' (which emerged in research phase 1), through the process of constant comparison of the data of both phases and memo writing about data-set of phase 2. This decision is based on two observations. The initial focus codes (such as disjuncture, dissonance, discomfort, disorientation, disconnection etc.) of phase one were all associated with a disruption in existing thoughts and emotions, which in its broadest sense are interruptions of frames of minds. Since the second data set provided a deeper insight into the initial reactions and the meaning of disruption of frames of minds, it became increasingly difficult to differentiate between the initial focus codes and to organise the utterance of the second research phase to the initial focus codes. Consequently, new focus codes emerged and the initial focus codes of the first phase were re-organised and allocated to the focus codes of the second research phase.

6.2.1 Phase 2 Summary of Categories and Focus Codes

In the analysis of datasets in phase two of the research, all focus codes of 'emotional/cognitive disjuncture' were replaced by the focus codes of the category 'being disrupted'. The utterances and initial codes of 'emotional/cognitive disjuncture' that were presented in the findings of phase 1, were re-organised in alignment with the findings of phase 2. The data of phase 2 gave a more detailed insight into the initial reactions of participants to the Visual Cue interventions, and upon comparison of the data of both

research phases, the utterances and initial codes of phase 1 had to be re-worked or removed accordingly, in keeping with the practice of Constructivist Grounded Theory. Figure 16 presents the categories of phase 2 and details the focus codes of each category.

The data of phase 2 enriched the evidence within the categories 'recognising principles, practices and themes of sustainability', 'critiquing concepts and contexts of sustainability' and 're-orienting dispositions/perspectives for sustainability'. The focus codes of these categories (which emerged in Phase 1) were maintained, with the exception of the category 're-orienting dispositions/perspectives for sustainability' where one additional focus code emerged from phase 2, namely 'Internalising a more critical/holistic outlook for sustainability'. The evidence for this focus code emerged mainly from the interviews.

Figure 16: Overview of Categories and Focus Codes from Phase 2

Phase 2 Categories	Being disrupted	Recognising principles, practices & themes of sustainability	Critiquing concepts and contexts of sustainability	Critiquing self in the context of sustainability	Re-orienting dispositions/ perspectives for sustainability	Engaging in change agency for sustainability
Focus Codes	• Being sympathetic • Disapproving scenario/practice • Discovering a new/unfamiliar idea/scenario/ practice • Experiencing discomfort • Experiencing Weltschmerz • Respecting scenario/practice • Acknowledging guilt/shame of lack of agency for sustainability	• Acknowledging lack of voice • Recognising interdependencies that exist in the world • Acknowledging human centrism/ superiority • Recognising different hierarchies that exist in the world	• Considering alternative contexts or perspectives • Questioning contexts/ perspectives • Striving to understand	• Being aware of critical self-examination • Recognising own role in transforming society • Questioning one self • Recognising own role in transforming self for sustainability • Acknowledging guilt/shame of lack of agency for sustainability • Building self-confidence in new roles and relationships	• Changing perspectives on sustainability • Changing dispositions of sustainability • Internalising a more critical/holistic outlook for sustainability	• Engaging in the wider community for sustainability • Adopting ethically minded consumer behaviour • Advocating for sustainability

The data generation through the interviews and the reflective diaries resulted in thicker description of the (lasting) impact of the Visual Cue interventions. The weaving together of these data sets resulted in two new categories, namely 'critiquing self in the context of sustainability' and 'engaging in change agency for sustainability'. These two categories demonstrate that participants deeply reflected on self in the context of sustainability, which in turn resulted in the motivation to engage in change agency in their community and personal contexts.

The focus code 'acknowledging shame/guilt of lack of agency for sustainability' is the only focus code that belongs to two categories 'being disrupted' and 'critiquing self in the context of sustainability'. Shame and guilt contains strong elements of feelings. The focus code was largely evident in participants' initial reactions and simultaneously it indicated that the individual reflected on self. Therefore, this focus belongs to the categories 'being disrupted' and 'critiquing self in the context of sustainability'.

It is evident from the data analysis process that Visual Cue interventions, inspired by a disorienting dilemma, initiated a disruption which motivated engagement in reflection and discussion, enabling deeper forms of learning that encompass higher order thinking and deep reflection skills, and ultimately in some cases resulted in engagement of change agency for sustainability. Figure 17 highlights that students who engaged in Visual Cue interventions used both lower order thinking skills and higher order thinking skills. Moreover, it demonstrates that the suite of theoretical categories suggest that learners engaged in not only higher order thinking but also deep reflection (of self), suggesting that Visual Cue interventions stimulate Deep Learning.

Figure 17: Categorical Evidence for Higher Order Thinking Skills and Deep Reflection

Categorical Evidence	Cognitive Skills	Reflective Continuum
Being disrupted – *Disorienting dilemma*	Remembering, Understanding, Applying, Analysing	Noticing
Recognising principles, practices & themes of sustainability	Remembering, Understanding	Making sense Making meaning
Critiquing concepts & contexts of sustainability	Applying, Analysing	Making meaning Working with meaning
Critiquing self in the context of sustainability	Analysing, Evaluating	Working with meaning
Re-orienting dispositions/perspectives for sustainability	Creating	Transformative learning
Engaging in change agency for sustainability - *Action*	Change agency	Transformative learning

The theoretical category 'being disrupted' – describes the dissonance within learners, forcing them to take-stock of their emotional/ cognitive states-of-mind, and lead them to a heightened awareness of, or even questioning of, their existing frames of reference, values,

or belief systems. Participants entered the Visual Cue interventions at different cognitive levels, depending on the associations they could make between the Visual Cue and their frames of mind. Therefore, when a participant felt familiar with the topics related to the presented Visual Cue, they began immediately to apply the scenario to different contexts or analysed the different meanings that could be associated with it. The initial disruption highlights that emotions encouraged students to 'notice' or perceive the topic as being interesting or important to them in some ways.

Students' 'recognition of principles, practices and themes of sustainability' demonstrates that students remembered relevant knowledge and began to understand the meaning of the scenario. They thought more about the details of the scenario, while connecting it with pre-existing ideas, concepts and knowledge to make sense and give meaning to the presented Visual Cue scenario.

The emergence of the theoretical category of 'critiquing concepts and contexts of sustainability', highlights how students applied and worked with the meaning by linking it to alternative ideas and contexts. They also analysed and broke down the scenario into its components to determine the relationship of the different aspects that can be associated with the scenario to ask questions that enabled them to make and work with meaning in order to evaluate and make judgements based on prior knowledge.

The emergence of the theoretical category of 're-orienting dispositions/perspectives for sustainability' shows that students began to combine and reorient their frames of mind to form a coherent new frame of reference. Hence, students have reached the point of Transformative Learning where they can formulate new ideas based on reoriented perspectives and dispositions.

The emergence of the category of 'engaging in change agency for sustainability', provides evidence that students acted upon their reoriented perspectives and dispositions

6.2.2 Evidence of Disruption and Learning within Visual Cues Experience

From the analysis of data, it was possible to provide an overview of the pedagogic processes deployed within the Visual Cue intervention that contributed to disruption of learners (in other words, challenged frame/s of reference of participant) and their resultant progression

to varying levels of learning. In this regard, the individual Visual Cue interventions for each of the seven participants (49 cases in total) are presented in figures 18-24. Each participant diagram clarifies the pedagogic process that resulted in disorientation for that participant, and furthermore, presents the different types of learning stimulated within the pedagogic processes of: viewing & reflection; and/ or discussion & reflection, of each Visual Cue intervention. The diagram also highlights which Visual Cue interventions were most impactful in motivating the participant to engage in change agency i.e. the impact of the Visual Cue intervention as a whole on motivating this learner towards action for sustainability, (green X).

Figure 18: Pedagogic Processes within Visual Cues Contributing to Disruption and Learning Levels for Participant FT1

FT1 – evidence of:	Visual Cues					
	Elephant Cue	Vacanti Mouse Cue	Baboon Cue	Homeless Cue	Boy Cue	Leopard Cue
Being disrupted	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting
Recognising principles, practices & themes of sustainability	X Discussion/ reflection	X Discussion/ reflection	X Discussion/ reflection	X Discussion/ reflection	X Discussion/ reflection	X Discussion/ reflection
Critiquing concepts & contexts of sustainability	X Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	
Critiquing self in the context of sustainability	X Discussion/ reflection	X Discussion/ reflection	X Discussion/ reflection	X Viewing/ reflecting	X Discussion/ reflection	X Discussion/ reflection
Re-orienting dispositions/perspectives for sustainability	X Viewing/ reflecting & Discussion/ reflection		X Discussion/ reflection	X Discussion/ reflection	X Discussion/ reflection	
Engaging in change agency for sustainability				X The entire intervention	X The entire intervention	

Figure 19: Pedagogic Processes within Visual Cues Contributing to Disruption and Learning Levels for Participant FT2

FT2 – Evidence of:	Visual Cues					
	Elephant Cue	Vacanti Mouse Cue	Baboon Cue	Homeless Cue	Boy Cue	Leopard Cue
Being disrupted	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting
Recognising principles, practices & themes of sustainability	X Discussion/ reflection	X Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection			X Viewing/ reflecting
Critiquing concepts & contexts of sustainability	X Viewing/ reflecting	X Viewing/ reflecting & Discussion/ reflection		X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting
Critiquing self in the context of sustainability	X Viewing/ reflecting	X Viewing/ reflecting	X Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting
Re-orienting dispositions/perspectives for sustainability	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting	X Discussion/ reflection	X Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection
Engaging in change agency for sustainability	X The entire intervention					X The entire intervention

Figure 20: Pedagogic Processes within Visual Cues Contributing to Disruption and Learning Levels for Participant FT4

FT4 – evidence of:	Visual Cues					
	Elephant Cue	Vacanti Mouse Cue	Baboon Cue	Homeless Cue	Boy Cue	Leopard Cue
Being disrupted	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting
Recognising principles, practices & themes of sustainability		X Discussion/ reflection	X Viewing/ reflecting			
Critiquing concepts & contexts of sustainability	X Discussion/ reflection	X Discussion/ reflection		X Discussion/ reflection	X Viewing/ reflecting	X Viewing/ reflecting
Critiquing self in the context of sustainability	X Discussion/ reflection			X Viewing/ reflecting		X Viewing/ reflecting
Re-orienting dispositions/perspectives for sustainability						
Engaging in change agency for sustainability	X The entire intervention		X The entire intervention			

Figure 21: Pedagogic Processes within Visual Cues Contributing to Disruption and Learning Levels for Participant PT1

PT1 – evidence of:	Visual Cues					
	Elephant Cue	Vacanti Mouse Cue	Baboon Cue	Homeless Cue	Boy Cue	Leopard Cue
Being disrupted		X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting
Recognising principles, practices & themes of sustainability	X Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Discussion/ reflection	X Discussion/ reflection	X Discussion/ reflection
Critiquing concepts & contexts of sustainability	X Viewing/ reflecting	X Viewing/ reflecting & Discussion/ reflection	X Discussion/ reflection	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting & Discussion/ reflection
Critiquing self in the context of sustainability	X Discussion/ reflection	X Discussion/ reflection	X Viewing/ reflecting	X Viewing/ reflecting		X Discussion/ reflection
Re-orienting dispositions/perspectives for sustainability	X Discussion/ reflection		X Viewing/ reflecting	X Viewing/ reflecting		X Discussion/ reflection
Engaging in change agency for sustainability					X The entire intervention	X The entire intervention

Figure 22: Pedagogic Processes within Visual Cues Contributing to Disruption and Learning Levels for Participant PT2

PT2 – evidence of:	Visual Cues					
	Elephant Cue	Vacanti Mouse Cue	Baboon Cue	Homeless Cue	Boy Cue	Leopard Cue
Being disrupted	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting
Recognising principles, practices & themes of sustainability	X Initial reaction/after discussion	X Discussion/ reflection	X Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection
Critiquing concepts & contexts of sustainability	X Discussion/ reflection	X Viewing/ reflecting	X Viewing/ reflecting			X Viewing/ reflecting & Discussion/ reflection
Critiquing self in the context of sustainability	X Discussion/ reflection		X Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Discussion/ reflection
Re-orienting dispositions/perspectives for sustainability	X Discussion/ reflection	X Discussion/ reflection	X Viewing/ reflecting		X Discussion/ reflection	X Discussion/ reflection
Engaging in change agency for sustainability			X The entire intervention	X The entire intervention		

Figure 23: Pedagogic Processes within Visual Cues Contributing to Disruption and Learning Levels for Participant PT4

PT4 – evidence of:	Visual Cues					
	Elephant Cue	Vacanti Mouse Cue	Baboon Cue	Homeless Cue	Boy Cue	Leopard Cue
Being disrupted	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting
Recognising principles, practices & themes of sustainability	X Discussion/ reflection	X Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting		
Critiquing concepts & contexts of sustainability	X Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection
Critiquing self in the context of sustainability	X Viewing/ reflecting & Discussion/ reflection		X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection
Re-orienting dispositions/perspectives for sustainability			X Viewing/ reflecting		X Discussion/ reflection	
Engaging in change agency for sustainability					X The entire intervention	

Figure 24: Pedagogic Processes within Visual Cues Contributing to Disruption and Learning Levels for Participant PT5

PT5 – evidence of:	Visual Cues					
	Elephant Cue	Vacanti Mouse Cue	Baboon Cue	Homeless Cue	Boy Cue	Leopard Cue
Being disrupted	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting	X Viewing/ reflecting
Recognising principles, practices & themes of sustainability	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Discussion/ reflection		
Critiquing concepts & contexts of sustainability	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting	X Viewing/ reflecting & Discussion/ reflection
Critiquing self in the context of sustainability	X Viewing/ reflecting & Discussion/ reflection	X Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting & Discussion/ reflection	X Viewing/ reflecting	
Re-orienting dispositions/perspectives for sustainability		X Discussion/ reflection		X Discussion/ reflection		
Engaging in change agency for sustainability	X The entire intervention			X The entire intervention		X The entire intervention

Participants were motivated through the Visual Cue interventions to engage in different levels of thinking, which culminated in the re-orientation of dispositions/perspectives for sustainability and engagement in change agency. One can see that the majority of Visual Cues (Elephant Cue, Baboon Cue, Boy Cue, Homeless Man Cue, and Leopard Cue) prompted participants to engage in the highest levels of thinking. It is significant that figures 18-24 depict that the category 'being disrupted' emerged only from the pedagogic processes of viewing and reflecting. The category 'being disrupted' provides insight into participants' initial reaction to the Visual Cues, and highlights that 'being disrupted' was central to progression of [re-]orientation of participants towards sustainability. It is apparent that the viewing of Visual Cues stimulated the process of disruption and evidently encouraged participants to engage in higher levels of thinking. Through a process of discussion and reflection, participants were further moved beyond recognising themes, principles and practices of sustainability, to critiquing sustainability issues and self in the context of sustainability as well as engaging in change agency. Overall, most diary entries contained evidence that the Visual Cues stimulated disruption.

However, PT1 (Figure 21) did not record any evidence of emotional or cognitive disruption for the Elephant Cue. Nevertheless, in post-intervention interview, she stated that it impacted most on her thinking about sustainability, as beforehand she "*wouldn't have thought much about animal rights and stuff like that".* The absence of disruption of the Elephant Cue for PT1 might be also related to the fact that she "*works in the sustainable development area"* (ibid) and that she entered the module with a pro-ecological worldview (see 5.4.4) – thus, she had already an in-built capacity to critically reflect and engage on sustainability-related matters, and her 'frames of references' were already primed for critical reflection. When being asked if any Visual Cue had a low or no impact, she emphasised that "*they all impacted her"* (interview). This example demonstrates that even participants with a prior pro-ecological worldview, who might not be necessarily disrupted by all Visual Cues, can still broaden their understanding of sustainability.

The interview responses (see green X) show that it was very subjective for each participant which Visual Cue was perceived as the most stimulative in terms of motivating engagement in change agency. The Visual Cue that participants stated to have motivated change agency were the Visual Cues they were personally connected with. The nature of change agency for sustainability depended on their own abilities, opportunities, context etc. Apart from the

category ‘being disrupted’, the evidence of the different levels of learning emerged from both pedagogic processes (viewing/reflecting and discussion/post-discussion reflection). As can be seen from the Figure 22 and 23 [PT4-Elephant Cue; PT5-Boy Cue; etc.], participants did not need to progress through these levels of learning to re-orient perspectives/dispositions and/or to engage in change agency.

FT1 (see Figure 18, and section 5.4.1) emotionally connected to the Boy Cue as a parent and it encouraged her to ask “*politicians what are they doing about refugees”* (interview). During the Leopard Cue, FT1 did not move through all levels of learning. Nevertheless, she re-oriented her disposition through the Leopard Cue as she noted that “*those that have no voice, be it a human voice or the inability of an animal to verbally fight their corner, were the ones that are most exploited and suffered from inequality”* (Leopard Cue, diary entry).

For FT2 (see Figure 19, and section 5.4.2) it was the Elephant Cue which impacted most on her emotions and triggered significant changes in her personal life, such as the initiation of a divorce. Albeit not moving through all levels of learning for example in the Baboon Cue, FT2 re-oriented her perspective when she “*realised that we are the ones who complicate our lives and that the simple choices could make such a difference to everyone”* (Baboon Cue, diary entry).

FT4 (see Figure 20, and section 5.4.3) did not move through all stages of learning in the Baboon Cue, but she connected emotionally to the Baboon Cue as her *“sister had travelled to parts of central Brazil herself and she’d seen the most amazing acts of humanity as well like that. And she doesn’t want to come home now because she wants to stay in that kind of environment and mindset”* (interview).

PT1 (see Figure 21, and section 5.4.4) did not move through all stages of learning in the Boy Cue, but she connected to the Boy Cue *as a parent* (interview) and it reminded her of “*a friend who had a child who passed away”* (interview).

PT2 (see Figure 22, and section 5.4.5) was emotionally impacted by the Homeless Man Cue and afterwards got involved in a Homeless Trust *“to deliver soup to homeless people”* (interview). Hence, The Homeless Man Cue motivated PT2 to engage in change agency for

sustainability besides having not moved through all stages of learning in the Homeless Man Cue.

PT4 (see Figure 23, and section 5.4.6) was also emotionally impacted by the Boy Cue as she related it to the active engagement of her daughter who "*did a trip out to Calais to see if she could help out"* (interview). PT4 did not move through all stages of learning within Boy Cue which made her investigate more about the conditions of refugees near her hometown.

PT5 (see Figure 24, and section 5.4.7) did not move through all stages of learning in the Elephant Cue or the Leopard Cue but she related personally to the both Visual Cues as she was reminded on her "*love of animals from childhood and that she would have been flying the flag from very early, bucking the trend at home becoming a vegetarian as a 16-year-old, and joining Greenpeace"* (interview).

The examples demonstrate the importance of emotions within sustainability education as motivators in change agency for sustainability. Moreover, the examples highlight the subjective impact of Visual Cues, how each participant personally related to it depending on their own life experiences and frames of mind and that it was not essential to move through all stages of learning to re-orient perspective/dispositions or engage in change agency.

6.3 Findings on Disruption and its Relevance to Learning

This section discusses the findings of the central theoretical category 'being disrupted', providing an insight into initial reactions to the Visual Cues and triggering the process of becoming sustainability [re-]oriented. This category is central to progression on the pathway of becoming sustainability [re-]oriented and details what constitutes disruption and its role in enabling higher order learning for sustainability.

The evidence of participants 'being disrupted' was only identified in the pedagogic processes of viewing and reflecting – this happened when the Visual Cue was initially presented and participants were encouraged to individually record what they thought or felt on initial viewing. This disruption in initial viewing of Visual Cues unsettled learners, by challenging existing frames of reference, and opening the pathway towards stimulation of higher order learning and re-orientation of frames of mind towards sustainability.

> My initial reaction was one of shock as it is such a strange image. When [X] explained the context of why the woman was feeding the baboon it did make sense, but still looked strange to me. I did then feel respect for this woman who acted selflessly to nurture an animal, who would have died if she hadn't nursed it (FT1, Baboon Cue, diary).

What is disruption? First, disruption is the realisation of a learner that there is a need for re-orientation of existing frame/s of reference towards sustainability. Second, 'disruption' indicates the genesis of a [re-]connection of the learner with the world. Participants began to realise their disconnection, such as from the far-reaching impact of their action, their natural habitat, other species or marginalised members within their society. Consequently, the initial viewing of the Visual Cues made individuals aware of the potential possibilities to [re-]connect with the world. Disruption within the initial reaction to a Visual Cue, very often had an emotional component that did not persist throughout the entire process. There is evidence to support that an emotional reaction resulted from a personal association with the scenario and the related content and knowledge.

> **PT4** (Vacanti Mouse Cue, diary):
> Being Disrupted: "*I was shocked. I'm terrified of mice and rats"* [viewing phase]

PT4 made an initial, personal association with her own fear of rats which influenced her initial reaction of being shocked. The research further showed that emotional reactions, whether positive or negative (such as evident in the focus codes 'experiencing discomfort' or 'disapproving scenario or practice'), were followed in all cases by movement towards deeper reflection or critique of scenarios, as PT4 and PT2 below illustrate:

> **PT4** (Vacanti Mouse Cue, diary):
> Being Disrupted: "*I was shocked. I'm terrified of mice and rats"* [viewing phase]
> Critiquing concepts and contexts of sustainability: "*Am I involved in any way? Seems crass. What we do in the name of beauty/medicine? Altering something natural. Would I allow a pig's heart to be implanted in a human to save their life?"* [post-discussion phase]

PT2 (Baboon Cue, diary):

Being disrupted: "*Just makes me feel uncomfortable / Was confused thought it was a gimmick / Yes made me feel a bit repulsed"* [viewing phase]

Reorienting perspectives/dispositions: *"It changed my outlook on breastfeeding the baboon as a sign of respect for nature, in a way its sustainability in action"* [post-discussion phase]

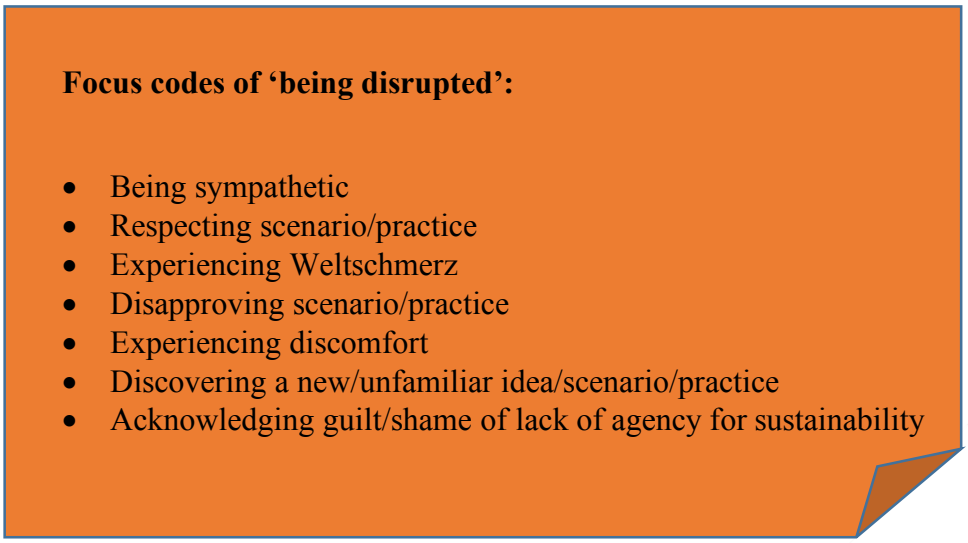
Critiquing self in the context of sustainability: *"Makes me feel like I should do more to help more"* [post-discussion phase]

The examples above exemplify that initial disruption with a negative emotional component, did not represent a barrier for higher order learning, as engagement with self in the context of sustainability was evident. PT4 questioned her own responsibility for the use of animals in science and questioned her stance on alternative scenarios, besides having a negative emotional component in her initial reaction. PT2 felt initially uncomfortable, repulsed and confused when viewing the Baboon Cue, and nevertheless changed his disposition and recognised his role in transforming self for sustainability.

These participants' reactions contained expression and examination of emotions, suggesting that the Visual Cue was effective as a trigger in challenging existing frames of reference. Consequently, participants' 'being disrupted' is indicative of an experience that did not meet their expectations/ frames of reference, or did not immediately make sense. As a result, participants had to reorient their existing frame of mind in order to attribute meaning to the presented scenario.

The process of disruption initiates the process of becoming sustainability [re-]oriented. The remainder of this section will detail the findings of each focus code of the theoretical category 'being disrupted', as illustrated in Figure 25.

Figure 25: Focus Codes of Being Disrupted



The focus code 'being sympathetic' relates to feelings and thoughts that signal the participant understood the circumstances of another being, or could sympathise with the predicament of an animal and/or human in the Visual Cue scenario. Participants connected to the experience of other beings through their compassion for them. The evidence of disruption emerged from data-sets of both research phases. Six participants of phase 2 showed evidence of being sympathetic to predicaments of others across their six diary entries. FT4 was sympathetic and felt *"compassion, love and faith in humanity"* (Baboon Cue, diary), when realising that the woman saved the life of the baboon. With the exception of the Baboon Cue, participants recorded sadness when considering the contexts of the other Visual Cues, particularly in the context of marginalised individuals or abused animals. For example, sympathy was stimulated by the exposure to "*the cruelty to animals"* (PT1, Vacanti Mouse Cue, diary), when recognising that "*the leopard is in a cage alone with no stimulus"* (PT2, Leopard Cue, diary), or when noting that "*the elephant looked sad, lonely and violated by the graffiti"* (FT1, Elephant Cue, diary entry). "*Sadness and grief"* (FT1, Boy Cue, diary) were also recorded for the Boy Cue, as it triggered "*sympathy for the family but also for the human race"* (FT2, Boy Cue, diary). The Boy Cue evoked "*extreme sadness especially in those who are parents"* (PT5, Boy Cue diary). The Homeless Man Cue stimulated sympathy expressed by "*sadness at the way the Veteran was tossed aside and forgotten"* (PT2, Homeless Man Cue, diary).

The focus code of 'respecting scenario/practice' implies that the participant 'has respect' or 'shows respect' for the scenario or practice presented. Showing respect suggests that the

individual accepts differences or tolerates rights, beliefs or practices of others. It has an emotional component evident through the realisation of the good qualities of someone else. When respecting a scenario or practice, individuals connect with the epitome, as one might decide to pursue such good qualities or they are reminded on their own good qualities, which might not be considered as high as in the example presented. For this reason, 'being disrupted' also stimulates the initiation for 'goodness', or the will to re-orient self towards sustainability by relating to the scenario and taking it as a leading example that one admires or looks up to. Five participants showed evidence of 'respecting scenario/practice' in their diaries. FT1 recognised respect for the bond of the Yanomami's woman and nature, when expressing "*respect for this woman who acted selflessly to nature and animal"* (Baboon Cue, diary). PT1 was initially challenged by the thought to breastfeed a monkey, but showed respect when noting that she had *"no issue with a human doing this, if that is a culture norm for them"* (Baboon Cue, diary). PT2 acknowledged *"the lack of respect for the Veteran"* (Homeless Man Cue, diary) in the Homeless Cue, and FT2 had "*admiration for the old man who not only shared his food but also demonstrated respect for the young man's dignity and treated him as an individual by engaging him in conversation"* (Homeless Man Cue, diary). Similarly, PT5 was "*very moved by the generosity of the gesture of the older man in sharing his food"* (Homeless Man Cue, diary).

The focus code of 'Weltschmerz' indicates 'world-pain' and refers to the feeling of sadness experienced when the world as it is does not reflect what one thought it should be. The Oxford dictionary defines Weltschmerz as "*a feeling of melancholy and world-weariness*" (Oxford University Press, 2016). The feeling of sadness connects individuals with the suffering of the world, that is taking place in the world and can be associated with dominating lifestyles, such as a tendency to priorities appearance or vanity, while disregarding potential negative consequences for another species or the planet itself. The focus code 'experiencing Weltschmerz' emerged only from the data of research phase 2. FT2 informed this focus code when acknowledging the "*sadness that we place so much emphasis on how we look"* (FT2, Vacanti Mouse Cue, diary).

The focus code 'disapproving scenario/practice' relates to initial responses such as disliking or being against a presented scenario as it was deemed unacceptable, such as cruelty to animals. Evidence for this emerged mainly from the research phase 1 and there were just two occasions when this focused code was recorded in Phase 2. Depending on the Visual

Cue, the 'disapproving of a scenario' may indicate that individuals had a pro-ecological perspective (so, may refer to a positive quality), such as PT5 who initially "*objects an animal being used in this way"* as in the Vacanti Mouse (PT5, diary). Or it captured an initial negative reaction, as PT1 reflected on her premature judgement of "*not being willing to breast feed a baboon",* but simultaneously made the reservation that she "*would offer help and nourish the animal"* (PT1, Baboon Cue, diary). Once students began engagement with the scenario they critically reflected on their initial perspective and realised the potential to make connections with the world, such as considering to help another species to survive in unconventional ways, if the context would require it.

The focus code 'experiencing discomfort' relates to initial emotional reactions to the Visual Cues such as embarrassment, being upset, uncomfortable or distressed. These initial experiences of discomfort did not prevail throughout the interventions and were only initial responses to something surprising or even shocking, as the scenario was of unexpected nature. In a way, individuals were initially challenged with the confrontation of the consequences of humans' disconnection with the world. Evidence of discomfort emerged from both research phases. All seven participants from research phase 2 recorded in their diary the initial experience of discomfort. The Homeless Man Cue appeared initially to be "*very difficult to watch and was upsetting to watch"* (FT1, diary). The Boy Cue triggered "*anger for the reasons it happened"* (PT2, diary) and the image gave PT1 "*the shivers"* (diary). In terms of the Elephant Cue, FT4 noted that it "*sickens to see any creature treated in such a barbaric way"* (Elephant Cue, diary). The emotions of "*anger, upset, disgust and hate"* (FT4, diary) were recorded when viewing the Leopard Cue, especially when considering "*humans creating a cage for animals"* (PT5, diary). The Baboon Cue made FT2 initially "*uncomfortable"* (diary), and the Vacanti Mouse Cue resulted in "*uneasiness"* as it was considered "*awful to use animals for experiments"* (FT4, diary), or because participants were "*terrified of mice and rats"* (PT4, diary).

The focus code of 'discovering a new/unfamiliar idea/practice/scenario' appeared in both research phases. Participants were being confronted with something for the first time when 'discovering a new/unfamiliar idea/practice/scenario' – something that was outside their normal frame of reference (from a cognitive perspective). In Phase 2, five out of seven participants recorded evidence of this focus code in their diary. Participants self-recorded that they discovered something for the first time, when they defined the presented scenario

as different, odd, strange, weird, abnormal or funny. Participants also recorded that initially they were surprised, shocked, confused or perplexed and not sure of the meaning that should be attributed to the presented Visual Cue scenario, or how they should react to it. In other words, participants discovered the possibility of a new connection with the world. FT1 confirmed that the Baboon Cue was not a concept she has *"ever come across before"* (Baboon Cue, diary). FT2 felt "*surprised and shocked – it took [her] a few seconds to realise what [she] was looking at, [and she experienced] confusion [as she] could not at first decipher the image [of the Elephant Cue]*" (diary). The Baboon Cue made PT2 "*confused [as he] thought it was a gimmick"* (diary). PT4 was "*shocked"* (Vacanti Mouse Cue, diary) by the Vacanti Mouse Cue as she "*is terrified of mice and rats"* (PT4, Vacanti Mouse Cue, diary). And PT1 was "*shocked"* by the Homeless Man Cue, when she took into account "*the amount of food thrown out each day"* (PT1, Homeless Man Cue, diary).

Six participants acknowledged the 'feeling of guilt or shame of their lack of agency for sustainability' in their diaries. While this focus code provides insight into the nature of participants' disruption that was triggered by the Visual Cues, it also indicated that the individual reflected on self. Ergo, the focus code 'feeling of guilt or shame' relates to the category 'being disrupted' and 'critiquing self in the context of sustainability', and illustrates the close ties between these two categories, highlighting that disruption encourages individuals to engage in higher order thinking. The feeling of shame suggests that one feels as if he or she did something wrong but is not sure what. The feeling of guilt relates to the feeling that one has when one did something wrong and is aware of it. PT2 noted that he experienced a "*few different states of emotion, but the most powerful one was guilt mainly for the race as a whole"* (Homeless Man Cue, diary). FT1 felt both, "*shame and guilt because of [her] lack of action"* (FT1, Boy Cue, diary; PT4, Boy Cue, diary), and PT5 felt "*ashamed that [she was] not doing more to voice her opinion"* of the refugee crisis (PT5, Boy Cue, diary entry). Similarly, PT4 "*felt somehow guilty in that [she] knew this [refugee crisis] was happening from previous TV and radio broadcasts, but hadn't the 'time' to do something"* (Boy Cue, diary entry). FT2 felt both, "*shame"* that harm was being done to elephants, and the recognition that she was *"guilty of this"* (Elephant Cue, diary). FT4 felt "*guilt"* when she thought about the "*homeless community"* and that she did "*not give those people enough of her time"* (Homeless Man Cue, diary). Visual Cues triggered critical reflection of self in the context of sustainability and the potential to make connections with the world, such as raising their voice or supporting marginalised individuals.

6.4 Evidence of Learning Value of Visual Cues

This section will present the evidence of the learning value of Visual Cues. The categories that emerged from the Constructivist Grounded Theory research approach demonstrate that Visual Cues can foster basic recall of themes and principles or indeed lead to higher order forms of thinking, where participants demonstrate interrelationships of thematic areas; examine frames of mind; compare and/or contrast own frames of mind with other perspectives; and create relationships with the world and self.

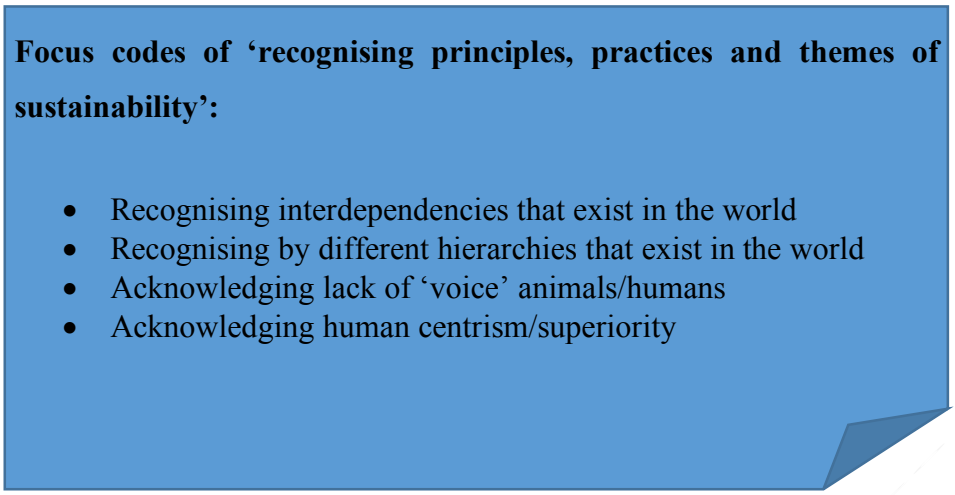
6.4.1 Theoretical Category - Recognising Principles, Practices and Themes of Sustainability

> I think it's important to be reminded that we as humans are not capable of creating a more sustainable world for ourselves unless we have a greater understanding of the need to respect and understand the limits of all nature, all resources, all life to have any chance of creating a sustainable future (FT1, Vacanti Mouse Cue, diary)

> Animals are seen as a resource or commodity which can be used by humans in whatever way we choose. Our treatment of other creatures should reflect how we would hope to be treated as humans. A change in attitude towards a fairer and more equitable treatment of all living creatures will impact on how we treat each other (PT5, Baboon Cue, diary)

This category originated from research phase 1 and the data of research phase 2 further enhanced the existing focus codes. Therefore, the additional Visual Cues of phase 2 enriched the evidence for the category of 'recognising principles, practices, issues and/ or themes of sustainability', as illustrated in Figure 26. All participants of phase 2 contributed to this category. It highlights the recognition of different hierarchies and interdependencies that exist in the world; issues of human centrism/superiority, and/ or a lack of 'voice' of animals as well as humans, in both, the pedagogic processes of viewing/reflecting and discussing.

Figure 26: Focus Codes of Recognising Principles, Practices and Themes of Sustainability



Six participants informed the focus code 'recognising interdependencies that exist in the world'. Participants recognised the interdependencies of the cornerstones, such as FT1, who "*had seen it [sustainability] as more representative of an environmental issue, but then could see it could also represent culture and society and a lack of respect for those elements"* (Elephant Cue, diary). PT4 recognised the interdependence of different parts of the world when she realised the far-reaching consequences of our actions impacting "*on other societies globally"* (Baboon Cue, diary). FT1 pointed out the interdependence of the southern and northern hemisphere, as "*it was mainly the excess of those in the developed world that are negatively impacting on our global environment and yet it is those in the developing world who are suffering the consequences of these changes"* (FT1, Boy Cue, diary). PT5 acknowledged the interdependence between nature and human, as "*the balance of the natural world depends on the survival of each element and the living world is about a fragile chain that links all together"* (Baboon Cue, diary). The Visual Cues also enabled the recognition of the interdependencies of all life, when considering *"the environment as one whole and we all play part in it"* (PT2, Leopard Cue, diary). Humans were considered as being part of nature as "*for a balance to exist and sustainability to be achieved we must become more open to a dependence on all of nature"* (FT2, Vacanti Mouse Cue, diary). The Leopard Cue exemplified the realisation that "*humans are the problem to sustainability"* (PT1, Leopard Cue, diary entry) and that humans and animals coexist in interdependence, as PT1 became "*more aware that we all have rights humans and animals"* (Leopard Cue, diary). Participants also started to identify the linkages between unsustainable problems when being optimistic *"that we can address a lot by linking solutions for example food waste, poverty and homelessness"* (PT2, Homeless Man Cue, diary). The reflective diaries

showed a constant broadening of the understanding of the interdependencies of sustainability related issues, such as

> global warming bringing drought or flooding and affecting the food sources, shelter and livelihoods of those neediest. With rising tensions from the uncertainty of their [refugees] situation and displacement from their homes and families, peace and security are not a human right that they are being afforded (FT1, Boy Cue, diary).

All seven participants 'recognised different hierarchies that exist in the world' between, humans/ animals, humans/ nature and humans/ humans. Within the context of the Baboon Cue, PT5 comprehended that different ecosystems in the world have different or no hierarchies between humans and animals as well as humans and nature. PT5 noted that "*the jungle is a delicate balance of plants and animals. To survive in that environment humans, need to have a respect for the living world around them and to be part of the community of species that protects their natural home"* (PT5, diary entry). The different hierarchies between humans and animals in each society have been pointed out by FT4, when she recognised the "*pure love of all creatures is a very rare act we do not see in our society, and it is beyond sad"* (Baboon Cue, diary entry). FT2 highlighted the need for equal rights for all life forms as exemplified by the Baboon Cue, a "*selfless act of doing all in your power to keep another life alive"* (Baboon Cue, diary entry). PT2 recognised that Western societies struggled "*to consider human rights as the same as animal rights"* (PT2, Elephant Cue, diary), and PT1 related it to the fact that "*animals are used as a commodity"* (PT1, Leopard Cue, diary). Both, PT2 and PT1 compared Tribal societies with Western societies and noted that the latter was rather disconnected from nature and animals. PT4 realised the effects of hierarchies between humans, such as rich vs poor, and noted that there "*is so much abundance in the world and yet not enough to go around"* (PT4, Homeless Man Cue, diary). FT1 also recognised the widening gap between the rich and the poor when considering that "*the more developed we have become it seems the greedier we have become and the more we want"* (FT1, Vacanti Mouse Cue). She also noted the differences between the southern and northern hemispheres when she recorded her thoughts "*about the lack of balance between developing and developed nations and indeed within developed nations"* (Homeless Man Cue, diary). Moreover, she identified also differences between those who have a voice and those who are voiceless in Western society, as "*those that have no voice, be it a human voice or an animal* voice, *were the ones that are most exploited and suffered from inequality"* (FT1, Leopard Cue, diary).

Six participants acknowledged the 'lack of 'voice' of animals and children'. PT1 came to understand how human rights are still often disregarded. "*Across the world children are denied their human rights"* (PT1, Boy Cue, diary), as exemplified through the European refugee crisis. FT1 noted that "*we only had human opinions that the animal was not being harmed"* (Vacanti Mouse Cue, diary). PT2 realised that when animals are used for human benefit "*the rights of the animal were totally removed"* (PT2, Leopard Cue, diary). Furthermore, participants recognised that the "*animal had no voice"* (PT5, Vacanti Mouse Cue, diary entry; PT4, Elephant Cue, diary entry) and that "*it was not fair to put an animal under so much stress and torture"* (FT4, Vacanti Mouse Cue, diary entry).

The 'acknowledgement of human centrism/superiority' was observable in diaries of four participants. This focus code relates to humans assumed superiority over other life forms such as animals, nature and even over other humans. FT1 recognised that "*while we are predominately a nation of animal lovers, the majority would hesitate to make the same sacrifices for animals that they would for another human. We still perceive ourselves as the dominant species"* (FT1, Vacanti Mouse Cue, diary entry). Participants became increasingly aware of "*the need to move beyond human centric views of the world"* (FT2, Baboon Cue, diary entry), as "*we treat animals as our products and we use them as we want"* (PT2, Leopard Cue, diary entry). It was also noticeable that participants acknowledged humans assumed superiority "*of the natural world and the damage that mankind does to it both intentionally and unintentionally"* (PT5, Elephant Cue, diary entry). Consequently, PT5 became hopeful that "*a change in attitude towards a fairer and more equitable treatment of all living creatures will impact on how we treat each other"* (PT5, Baboon Cue, diary entry).

The category 'recognising principles, practices and themes of sustainability' presents evidence that participants identified and comprehended the major thematic areas and principals presented through the Visual Cues and understood the interrelationship of thematic areas of sustainability. This required a sense of interpretation, judgment and caution of one's own ideas and knowledge, which also demanded some ability to go beyond mere rephrasing of contributions during the discussion to determine the underlying principles of sustainability. Therefore, by recognising principles, practices and themes of sustainability, participants began to consider the roots of the disconnection of Western societies with the world.

6.4.2 Theoretical Category - Critiquing Concepts and Contexts of Sustainability

> How complicated our lives have become. The simple life – has civilisation made us less civilised? Finding it difficult to grasp how disconnected we have become. I think about the things we worry about – not having enough money for our wants (FT2, Boy Cue, diary)

This category originated from research phase 1 and the data of research phase 2 further enhanced the existing focus codes. All participants of phase 2 contributed to this category. All diaries of phase 2 informed the category of 'critiquing concepts and contexts of sustainability', encompassing the critical engagement of students with the subject matter presented in the respective Visual Cues. Participants questioned and considered (alternative) contexts or perspectives, questioned the presented scenario or various perspectives and strove to understand the underlying message of the Visual Cues. The focus codes of 'critiquing concepts and contexts of sustainability' are presented in Figure 27.

Figure 27: Focus Codes of Critiquing Concepts and Contexts of Sustainability

Focus codes of 'critiquing concepts and contexts of sustainability':

- Questioning Context/ Perspective
- [Re]considering alternative contexts or perspectives
- Striving to understand

Six participants 'questioned the context or different perspectives'. Visual Cue scenarios provoked the questioning of existing norms and attitudes within society, whether we were "*raising a society that has the 'it's not my problem' mentality?"* (FT1, Homeless Man Cue, diary) or whether *"civilisation made us less civilised?"* (FT2, Boy Cue, diary). Participants also sympathetically questioned the Visual Cue scenarios, such as PT5 who *"wondered if the older man would have felt better if the food had been bought for him as opposed to being told that it was going to go to waste"* (PT5, Homeless Man Cue, diary). PT1 questioned if "*the animal preferred to be a coat rather than live in the room with no natural light and a dead tree"* (PT1, Leopard Cue, diary). In addition, the questioning entailed critique of

humans' anthropocentric worldviews, as FT4 noted that "*people do not wear each other's skin so what right do we have to skin an animal for selfish reasons"* (Leopard Cue, diary). Queries were also addressed to oneself when asking "*am I involved in any way?"* (PT4, Vacanti Mouse Cue, diary).

All participants 'considered alternative contexts or perspectives'. Within the context of the Baboon Cue, participants repeatedly considered breastfeeding practices in Western societies where "*it is not even seen as dignified or acceptable to feed our own human children in public"* (FT1, Baboon Cue, diary) as "*breastfeeding in this country [Ireland] still has negative connotations"* (PT5, Baboon Cue, diary). Nevertheless, FT2 also noted an alternative context within a Western society such as the Western Trust Milk Bank in Ireland that *"distributes"* donated breast milk *"to babies who need it"* (FT2, Baboon Cue, diary). PT5 considered the context of a recent killing of a male lion called Cecil in a National Park of Zimbabwe, when she critically questioned if "*society would have been so enraged by the killing of an animal if he had not had a human name attached to him?"* (PT5, Leopard Cue, diary). Through the Homeless Man Cue, participants took into account the "*homeless crisis which is a huge problem in this country"* (FT4, diary) and considered that "*access to housing* as *one of the most basic human rights"* (PT1, Homeless Man Cue, diary). In addition, PT4 recognised "*other aspects of urban poverty which included government agencies accountability regarding adequate shelter and housing, inadequate infrastructure and provision of services, access to education and lawlessness, [as the example of the] recent London Riots demonstrated during the lecture"* (PT4, Homeless Man Cue, diary). The Elephant Cue stimulated the acknowledgement of "*our consumption habits and how we dispose waste, the chemicals in products and the impact of medication when it leaves your body"* (PT4, diary), and that "*it [Elephant Cue] can be looked at from as many different ways and interpreted in as many ways as you can think of"* (PT2, Elephant Cue, diary). FT1 was reminded on the fairy-tale the "*Beauty and the Beast"* (diary entry) when engaged with the Vacanti Mouse Cue and considered as an alternative "*the use of 3D medical printers* as *a more ethical approach [to bio-engineering] in the future"* (FT1, Vacanti Mouse Cue, diary).

Six participants recorded evidence of the focus code 'striving to understand' in their diaries. Participants explained the meaning they associated with the Visual Cues, made critical or reflective evaluations of the presented scenario or dominating lifestyles in Western societies,

and indicated more anti-anthropocentric or pro-ecological perspectives. FT1 concluded from the Homeless Man Cue that "*it's a worrying trend that the more we seem to have the less we seem to want to share and help others"* (diary entry). FT1 also critically reflected on the meaning of the sand in the Boy Cue, noting that "*sand only shifts, it does not go anywhere and sand on one beach will eventually land on another. Issues must be addressed"* (FT2, Boy Cue, diary) because "*the next big news story* will *'wash away' the news of this child's death"* (FT1, Boy Cue, diary entry). Consequently, FT2 points out that "*it is everyone's responsibility to keep the refugee crisis in Europe to the fore front"* (Boy Cue, diary). PT4 recognised that the refugee crisis also required "*a community drive",* where local communities need to become aware of *"practical things that people can do to help"* (Boy Cue, diary). PT2 concluded from the Leopard Cue that "*we waste a lot of animals and lots of useful parts we just dump* and *that we need to find a way to make animals survive without putting them in Zoos"* (diary entry). PT5 noted that the "*tyre lying against the wall is a reminder of past life/pleasure* and *that animals need to live in their natural environment to thrive and we cannot learn anything from them in this setting"* (PT5, Leopard Cue, diary entry). PT1 understood the far reaching impact of our actions when she interpreted the graffiti on the Elephant as a representation of humans that "*are the mess and the need to take action towards a more sustainable lifestyle, the water reflects, water pollution and climate change"* (diary entry).

The category 'critiquing concepts and contexts of sustainability' demonstrated that participants transferred the situations to their personal or other societal contexts. Hence, participants engaged in higher order thinking as they critically reflected and abstracted the presented scenarios of the Visual Cues.

6.4.3 Theoretical Category - Critiquing Self in the Context of Sustainability

> I could and should have a more genuine approach to influencing others through my actions. As a mother, sibling, daughter, tutor and member of the community I need to lead by example, the example of my actions (FT2, Elephant Cue, diary)

This theoretical category originated only from phase 2. Evidence emerged from the diaries as well as partially from the interviews. It provides an insight into participants' progression to critically review the self in the context of sustainability as participants recorded intentions of becoming sustainability [re-]oriented. For this category, there needed to be evidence of participants questioning oneself; building self-confidence in new roles and relationships;

being aware of critical self-examination in the context of sustainability; recognising own role in transforming self or society for sustainability; or acknowledging guilt/shame of lack of agency for sustainability. This category included participants' deliberations on non-human centric views and/ or non-centric views over the course of the Visual Cue interventions. Evidence for it has been found in all seven diaries and emerged within the pedagogic process of viewing and reflecting as well as within the pedagogic process of discussing. The focus codes of critiquing self in the context of sustainability are presented in Figure 28.

Figure 28: Focus Codes of Critiquing Self in the Context of Sustainability

Focus codes of 'critiquing self in the context of sustainability':

- Questioning oneself;
- Building self-confidence in new roles and relationships
- Being aware of critical self-examination in the context of sustainability;
- Recognising own role in transforming self for sustainability
- Recognising own role in transforming society for sustainability.
- Acknowledging guilt/shame of lack of agency for sustainability

Six participants informed the focus code of 'questioning self within the context of sustainability'. FT1 considered herself being a refugee and questioned whether this "*could ever happen to [her]? What type of support would [she] hope for from others if it did?"* (Boy Cue, diary entry). The Vacanti Mouse Cue made FT2 *"question why [she gave] into so many of society's norms when [she did] not really believe in them"* (diary entry). PT2 recorded that "*it's hard to say we care for animals when we* ate *them",* and he recognised that there is "*space for self-reflecting on [his] relation to animals*" (Leopard Cue, diary entry). FT4 reflected on how her own prejudice influenced her attitude to homelessness, when she questioned "*how [she] really treated the homeless"* (Homeless Man Cue, diary entry). PT4 was concerned if she "*possessed anything that resembles animal print [as she felt she was] perpetuating even though it was not a real fur/skin"* (Leopard Cue, diary entry). PT5 raised doubts about her "*attachment to the natural world and whether [she made] a positive impact on the planet or a negative one"* (PT5, Baboon Cue, diary entry).

Four participants confirmed to have 'built more self-confidence' through the Visual Cue interventions. Participants learned not only about sustainability but also about self. Participants realised aspect of self, such as lack of own voice or discovered their own creativity. FT2 noted that she was *"quite a creative person and [she] didn't know [she] was*" (interview). PT4 realised through the discussion of the Visual Cues that she "*just didn't have a loud voice"* (ibid). The focus code of 'building self-confidence in new roles and relationships' shows that as a result of the Visual Cue interventions participants valued more their own perspective and were becoming more comfortable with their own perspective, as FT1 realised that she actually "*has something to say, has an opinion or learned something"* (ibid). Similarly, PT5 acknowledged that the Visual Cues made her "*a little more comfortable with her own views"* (ibid).

Six participants were 'aware of critical self-examination in the context of sustainability'. FT1 became "*more aware of the far-reaching consequences of [her] actions on a global scale"* (Elephant Cue, diary entry). Similarly, FT2 realised the need to pay closer attention to her actions as she did "*a considerable number of everyday things without any great thought of the impact [her] actions may/will have on the environment"* (FT2, Elephant Cue, diary entry). PT2 acknowledged that he judged "*images and media in [his] own little universe and we need to make it bigger"* (PT2, Homeless Man Cue, diary entry). PT1 *realised* that she was "*very distant from animals and nature"* (PT1, Baboon Cue, diary entry). PT4 began to examine her "*learning style"* as she recognised that she "*conjured up other images, memories which seem to have a deeper meaning"* for her when she looked at the Visual Cues (PT4, Elephant Cue, diary entry). PT5 conceded that perhaps her "*own beliefs had a naïve and idealistic perspective"* (Vacanti Mouse Cue, diary entry) and that she "*allowed the course of [her] life to stay away from that original resolve, mostly because we all get distracted by day-to-day dilemmas and our social conscience gets kicked to the side, [but she] hoped to re-examine that conscience"* (PT5, Baboon Cue, diary entry).

All participants 'became conscious of their own role in transforming self for sustainability'. Participants realised that they can become more pro-active, evident in their recorded intention and willingness to do so. FT1 emphasised a need "*to be more pro-active and not wait for someone else to do something"* (Boy Cue, diary entry). FT2 highlighted that she" *could and should have a more genuine approach to influencing others through* her *actions. As a mother, sibling, daughter, tutor and member of the community [she] needs to lead by*

example, the example of [her] actions" (FT2, Elephant Cue, diary entry). Furthermore, she became more aware of her "*responsibility to keep important issues alive"* (FT2, Boy Cue, diary entry) and noted that she felt "*encouraged to search beyond the obvious"* (FT2, Vacanti Mouse Cue, diary entry). PT2 expressed that he "*should do more to help more"* (PT2, Baboon Cue, diary entry). PT1 intended to "*review all the products [she] purchases and look at the small writing to double check have these been tested on animals"* (PT1, Vacanti Mouse Cue, diary entry). FT4 acknowledged that she did *"not give vulnerable people enough of [her] time"* (FT4, Homeless Man Cue, diary entry). PT4 highlighted that the Visual Cues "*connected [her] more as a human with nature"* (Baboon Cue, diary entry). She also pointed out that she should have "*more compassion for refugees*" and that she wanted to "*become more informed of the most recent Syrian refugee crisis"* (Boy Cue, diary entry). PT5 felt "*ashamed that [she is] not doing more to voice [her] opinion"* (Boy Cue, diary entry). The Elephant Cue also "*reminded [PT5] that [her] voice can be effective"* (diary entry) and that her "*interactions with others, particularly those who are vulnerable, can be kinder"* (Homeless Man Cue, diary entry).

Five participants 'recognised their role in transforming society'. FT1 confirmed that she "*never thought much about lobbying local government but it is something that [she] needed to find out more about [in order to become] more pro-active and not wait for someone else to do something"* (FT1, Boy Cue, diary entry). FT2 emphasised her responsibility of being a role model to the future generations, as she wanted *"to educate [her] children to realise that there are consequences to all our actions". [She] "grieved for the lost years when [she] did not know about SD and [her] neglect to enlighten [her] children to their dependence on nature"* (FT2, Baboon Cue, diary entry). PT2 related the Elephant Cue to his role as an educator and emphasised the importance "*to figure out how to get this message across to all people of the world"* (diary entry), while he felt optimistic about "*the way [he] could use Visual Cues to help others learn, to see the use of life everyday events to influence our students"* (Homeless Man Cue, diary entry). Similarly, PT4 also considered to "*incorporate sustainability into the modules [she] delivers, including Visual Cues, instead of our usual content"* (PT4, Elephant Cue, diary entry). PT1 assured she "*could do more"* regarding the homeless crisis in Ireland (Homeless Man Cue, diary entry) and that the Leopard Cue "*is a video [she] will remember and show others"* (PT1, Leopard Cue, diary entry).

Five participants 'acknowledged the feeling of guilt or shame' in their diaries. It should be pointed out that the majority of evidence for this focus code emerged from the pedagogic process of viewing and reflecting and as it has an emotional component it had been discussed as well earlier in the theoretical category 'Being disrupted'. Shame suggests that one felt as if he or she did something wrong but is not sure what. Guilt relates to the feeling that one has when one did something wrong and is aware of it. The feelings of guilt and shame indicate that the individual reflected on self. PT2 noted that he experienced a "*few different states of emotion, but the most powerful one was guilt mainly for the race as a whole"* (Homeless Man Cue, diary). FT1 felt both, "*shame and guilt [because of her] lack of action"* (FT1, Boy Cue, diary; PT4, Boy Cue, diary) and PT5 felt "*ashamed that [she was] not doing more to voice [her] opinion"* of the refugee crisis (PT5, Boy Cue, diary entry). Similarly, FT2 felt also both, "*shame"* that harm was being done to elephants, and the recognition that she was *"guilty of this"* (Elephant Cue, diary). FT4 felt "*guilt"* when she thought about the "*homeless community"* and that she did "*not give those people enough of [her] time"* (Homeless Man Cue, diary).

The findings of the category 'critiquing self in the context of sustainability' are indicative that participants were more aware of the potential [re-]connections with the world. The category demonstrates higher order thinking as participants related the scenario to themselves, they morally analysed and questioned self in the context of the Visual Cues and draw conclusions through the display of a variety of intentions of how participants considered to become change agents for sustainability.

6.4.4 Theoretical Category - Re-orienting Dispositions/Perspectives for Sustainability

> I am starting to think differently about everything (FT2, Vacanti Mouse Cue, diary)

This category originated from research phase 1 and the data of research phase 2 further enhanced the existing focus codes and resulted in one additional focus code ('internalizing a more critical/holistic outlook for sustainability'). It contains evidence of changing dispositions (attitudes, beliefs, values) of, or perspectives on, sustainability. For this category, there needed to be evidence of participants re-orienting perspectives to include non-human centric views and/ or non-centric views over the course of each intervention. Evidence for the focus codes 'changing disposition of sustainability' or 'changing perspectives on sustainability' were found in all seven diaries, and emerged within the

pedagogic process of viewing and reflecting as well as within the pedagogic process of discussing. Some participants confirmed that they gained a more critical and holistic outlook. Evidence for the focus code 'internalizing a more critical/holistic outlook for sustainability' emerged from the diaries and the interviews. The focus codes of re-orienting dispositions/perspectives for sustainability are presented in Figure 29.

Figure 29: Focus Codes of Re-Orienting Dispositions/Perspectives for Sustainability

Focus codes of 're-orienting dispositions/perspectives for sustainability':

- Changing dispositions (attitudes, beliefs, values) of sustainability
- Changing perspectives on sustainability
- Internalising a more critical/holistic outlook for sustainability

Five participants recorded 'changing dispositions' as a result of the Visual Cue discussions. The presented examples of reoriented dispositions showed that emotions contributed to the reorientation for sustainability related disposition. FT1 noted that she became more concerned with the world we leave behind for our future generations as her "*feelings did change more to ones of worry and concern for our children's futures if this is the type of society we are living in now, it doesn't bode well for them"* (FT1, Homeless Man Cue, diary). FT2 *"was surprised by how sad [she] became [and consequently] felt embarrassed and quite the hypocrite"* (FT2, Elephant Cue, diary). PT2, who initially felt uncomfortable when viewing the Baboon Cue, recorded after the discussion that he *"changed [his] outlook on breastfeeding the baboon. It is as a sign of respect for nature, in a way its sustainability in action. They feed the monkeys help nature and keep a species alive"* (PT2, Baboon Cue, diary). The Elephant Cue made PT1 more concerned for the well-being of animals, as she developed *"more emotions for the elephant and animals"* (PT1, Elephant Cue, diary). PT4 became more environmental conscious, emphasising that "*because of this course [she] reconsidered [her] place and responsibilities towards the environment"* (PT4, Baboon Cue, diary). PT1 became "*more aware of the homeless crisis in Dublin"* (Homeless Man Cue, diary).

Six participants recorded that they 'broadened their perspective on sustainability related aspects' and became more aware of the interconnectedness of sustainability dimensions. Participants broadened their perspectives when realising that "*sustainability was about the interrelationship between the four pillars"* (FT2, Elephant Cue, diary). FT2 "*saw the [Vacanti Mouse Cue] through the eyes of many and realized that there is so much more to the interdependency between man and nature than [she] had previously thought"* (FT2, diary). PT1 gained "*a better understanding around climate change, climate impact and greenhouse effect"* (PT1, Elephant Cue, diary), and FT1 realised that sustainability has more to it than environmental concern as she had seen the Elephant Cue *"as more representative of an environmental issue but then could see that it could also represent culture and society and a lack of respect for those elements"* (FT1, diary). PT2 recorded his recognition "*that sustainability is not related to one aspect of our lives but it involves human rights, animal rights, and the protection of all plants and resources that are integral to us as a race, while continuing to flourish and survive"* (PT2, Elephant Cue, diary). In addition, the Visual Cue interventions resulted in the recognition that we are living in a fast-changing world where "*everything changes and we have to learn how to adapt in a respectful and sustainable way"* (PT4, Boy Cue, diary). PT5 concluded that "*examining our actions or inactions is a vital part of sustainable development. How we interact with our fellow human beings can be a real indicator of our awareness of the rights of all people"* (PT5, Homeless Man Cue, diary). Six participants provided examples in the interviews that they 'internalised a more holistic and critical outlook for sustainability'. This focus code indicates that participants thought differently about the future and the need to make more conscious decisions when they realised the far-reaching impacts of their actions. Such as FT2 who became *"very conscious of how her actions have a lasting effect not just for ourselves but for the world"* (interview) or FT4 who confirmed that her *"commitment to want to make more of a difference changed"* (ibid). PT1 felt "*more aware of human rights"* (ibid) and PT4 became more interested in "*sustainability related topics globally and locally"* (ibid). FT1 began more to critically question sustainability related news stories by considering "*more the background"* (ibid). Similarly, PT5 highlighted that the Visual Cue*s* made her *"look at things differently and perhaps question [her] interpretation of things"* (ibid).

The awareness of the alteration of own perspectives, dispositions and outlooks, and the identification of biases or inconsistency of prior frame of minds with gained information and/or other perspectives, demonstrated that the category 're-orienting

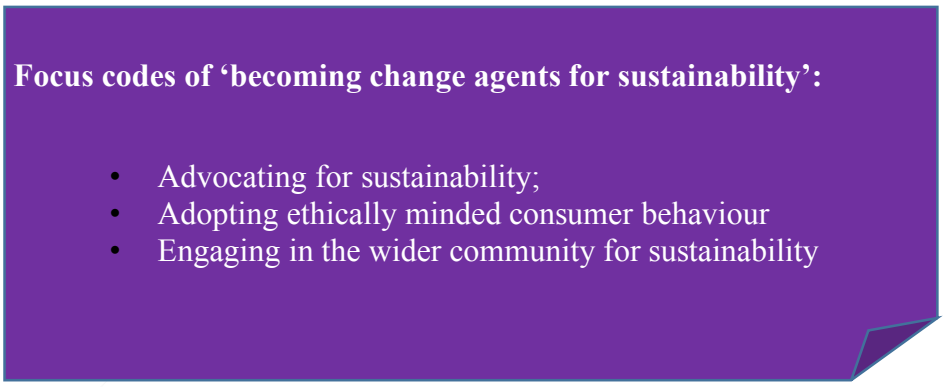
dispositions/perspectives for sustainability' is evident of higher order thinking. Participants thought about their own thought processes and critical considered their own perspective or disposition of the Visual Cue scenarios.

6.4.5 Theoretical Category – Engaging in Change Agency for Sustainability

> It changed the way I shop, it changed the way I think about the future, about how I make decisions, that I actually think beyond now and I don't know if I had ever actually done that before (FT2, interview)

This theoretical category emerged only from the interviews of the second research phase (see interview guide Appendix G and I). The interviews provided evidence of engagement in change agency for sustainability. This category (as shown in Figure 30) contained three focus codes that detail the nature of change agency: Advocating for sustainability; adopting ethically minded consumer behaviour; and engaging in the wider community for sustainability.

Figure 30: Focus Codes of Becoming Change Agents for Sustainability



Six participants 'advocated sustainability' as a result of participating in this module. This focus code captured participants' active engagement in making family and friends more conscious of the far-reaching impact of own action by advocating ethical consumer behaviour and encouraging others to become as well ethical consumers. FT2 encouraged her family and friends to follow her example and reminded them to "*think of the impact before acting*" (interview). FT1 also made her friends and kids "*conscious of the reasons"* (ibid) of the need for change agency. PT5 reminded her kids that "*this is your planet, this is your future, you have to safeguard it, nobody else is going to do it for you"* (ibid). PT4 highlighted how she became more interested and confident to discuss sustainability related topics that

emerge in the media within her personal context "*whereas [she] would never have even entered the discussion before [the module]"* (ibid). In addition, FT4 "*would go home and would tell family about the lecture content"* (ibid), and PT1 "*showed the Visual Cues to friends and family"* (ibid).

Four participants acted for sustainability after completion of this module. The focus code 'adopting ethically minded consumer behaviour' showed evidence of participants ethical and conscious consumer choices based on environmental and social concerns rather than on taste, colour, design etc. PT1 emphasised that the Visual Cues made her "*think about even some clothing that [she]'d wear"* (ibid). Ethically minded behaviour encompassed "*recycling"* (PT4, ibid), making "*compost at home"* (FT1, ibid), avoiding generation of waste by "*reusing paper bags"* (PT1, ibid), refusing to buy certain products such as "*tin foil"* (PT1, ibid), and using disposable coffee/tea cups (FT2, ibid and PT1, ibid) due to their impact on the environment. FT2 summarised all her examples when she highlighted that the Visual Cues "*changed the way [she] shops, it changed the way [she] thinks about the future, about how [she] makes decisions, that [she] actually thinks beyond now and [she] doesn't know if [she] had ever actually done that before"* (ibid).

Four participants 'engaged in the wider community for sustainability' based on the participation in this module. This focus code covers individuals' active involvement in the wider community and contains examples of how participants acted upon their gained understanding of inclusion, equality and solidarity for all living members of their community. Through acknowledging, respecting and engaging with disadvantaged members of the community (PT2, ibid and FT2, ibid), "*volunteering"* (PT2, ibid and PT1, ibid), or using "*the Visual Cues in [their] classes"* (PT4, ibid and FT2, ibid), participants showed that they reached out to the wider community.

The act of change agency is representative of creativity in action. Participants found unique patterns to become change agents within their personal context. This is representative for higher order thinking because it required the process of analysing, synthesising and evaluating to develop a way to apply change agency suitable for their lives. Thus, depending on their creativity and context participants incorporated change agency by doing things in a different way or they adapted an additional or new way of connecting with the world.

6.5 Participants Experiences of Disruptive Pedagogic Interventions

This section presents the experience of the Visual Cues from the participants' perspective. It details the impact of the pedagogic processes of viewing/reflecting and discussion and the use of the pedagogic tools of facilitation and reflective diaries. This section concludes with an exploration of participants' perspectives on the Visual Cue design considerations to stimulate disruption. The reader may like to review Figure 14 as a reminder of the difference phases in the pedagogic processes of Visual Cue interventions.

6.5.1 Pedagogic Processes of Viewing and Reflecting

During the interviews, only PT1 felt that the viewing had the biggest contribution to her learning, while she also confirmed that the discussions were not irrelevant as *"it's great to listen to everybody's opinion, and we always learn from each other. But I think the viewing of the Visual Cue had the most impact"* (PT1, interview). Although only one participant explicitly referred to the initial phase of viewing and reflecting, when being asked about the biggest contribution to learning, the evidence of the theoretical category 'being disrupted' (see section 6.3), which emerged only from the initial phase of viewing and reflecting, demonstrated its significance within the Disruptive Learning process of the Visual Cues. FT2 emphasised that "*the Visual Cues had a major impact on [her] personal life"* (interview). FT1 highlighted (follow up interview) "*that if something does have an emotional impact on you, you'll remember it as well as the thoughts, […] it made the Visual Cues more personal"*. PT4 noted that you "*needed the viewing and then you needed the discussion"* (ibid).

Overall, participants "*liked the way we had personal time to reflect on the image* as *having the time and the silence in the room made [her] think deeper about the image"* (PT1, Boy Cue). The pedagogic process of reflection prior to the group discussion was essential for participants to contemplate on own perspectives and to mitigate the effects of the disruption. During the process of critical reflection participants began to make sense and countered feelings of disruption as the example below exemplifies:

PT4(Baboon Cue, diary):

> *"I was surprised at my reaction as I breastfed my children but I still couldn't imagine breastfeeding an animal"* (6b-viewing)
>
> *"I felt once I reflected on how I felt made me realise that sometimes I judge too quickly. I learnt a lot from today's Visual Cue in that I need to think more deeply before forming my opinion"* (6d-reflecting)

PT4's initial reaction of surprise was indicative of the disruption stimulated by the Visual Cue. This initial reaction was only a short lasting emotional reaction. Once she reflected, she realised that she was pre-judgemental, suggesting that the pedagogical process of individual viewing and reflecting before the group discussion was essential for the learning experience.

In addition, students noted the act of writing about those thoughts and emotions triggered when viewing the Visual Cue was critical within the overall learning experience. PT5 recalled that "*actually writing down your thoughts, at the time, was what triggered emotions",* it was more influential "*because you never look at these images and think 'What am I feeling here?' You never ask yourself these questions"* (follow-up interview). She noted that the discussions would have not been the same "*without being asked to write down your thoughts and emotions"* before the discussion*, "it allowed people to speak a bit more freely and speak about their emotions"* (PT5, follow-up interview).

6.5.2 Pedagogic Process of Discussion

Five out of seven participants confirmed that the discussion had made the biggest contribution to their learning. Participants "*enjoyed listening to the class"* (PT1, Homeless Man, diary), felt *"lucky to be part of this learning and to be exposed to the views of such a variety of young adults"* (FT2, Vacanti Mouse Cue, diary), and felt "*more empowered through discussion"* (PT4, Boy Cue diary). These positive experiences were mainly stimulated through the exchange of perspectives, when participants were introduced to unexpected viewpoints that had not been taken into consideration beforehand or when they realised that other participants had similar perspectives. PT2 felt that the discussions "*reinforced [his] existing views"* (PT2, Homeless Man Cue, diary), it assured him that he was *"not alone in the feelings"* (PT2, Boy Cue, diary). Similarly, PT4 felt "*empowered through the discussion because [she] realised others feel the same way"* (Boy Cue, diary). FT2 highlighted that she "*felt humbled by the emotions and feeling expressed by others. I*

felt challenged by the younger members of the group and the thoughtful manner by which they expressed themselves" (Elephant Cue, diary). Furthermore, some participants noted that hearing different perspectives encouraged them "*to think a bit differently about the Visual Cues"* (FT4, Elephant Cue, diary). Participants also compared Visual Cue scenarios, such as relating "*back to an earlier Cue"* (FT1, Homeless Man Cue, diary), or noted that an "*idea was also discussed"* (FT1, Mouse Cue, diary) in another Visual Cue discussion, yet from a different angle. Thus, a gradual exposure to differing scenarios, each of which would in theory, prompt learners to critically reflect on their own perspectives in the context of sustainability, perhaps intensified the experience of students. PT5 noted

> […] the discussion informed you on how other people think, so I think that was probably the biggest learning for me, because my own views initially, when I was reflecting, were mine, and they are already there, your image might have provoked me to think about them but they are still there and they are set but I had probably the biggest change in those views because of the discussion (interview).

Overall, most participants confirmed that the discussions and the exchange of perspectives contributed to their learning.

6.5.3 Facilitation of Visual Cue Scenarios

Another dimension in the pedagogic process that warrants mentioning was the facilitator approach. Taking a facilitator approach provides a safe and trusting space for participants to be open to other viewpoints and to engage in discussions. Facilitators should be sympathetic and compassionate in their approach, while providing support for learners during the process. FT4 highlighted that the facilitation made her *"respect teachers so much more […] as the main sort of lasting impact, was you guys",* as it was the facilitation that she *"loved"* (FT4, interview). In the same vain, PT4 recorded that "*it was more the facilitation of the group than anything else that [she] really enjoyed"* (PT4, interview). During the follow up interview, PT5 emphasised that "*there was a lovely warm environment. I trusted the environment, and that's a key to getting people to talk, given that we didn't really know each other"* (follow-up interview). She also pointed out the fact that the facilitator reminded the group that *what was said in the room stayed in the room* influenced that "*they were able to be open with each other"* (follow-up interview).

6.6 Participant's Views on Delivery Mode and Impact of Visual Cues

In the second research phase, the Visual Cue interventions were situated within a structured programme of study, and participants engaged in a lecture-type session, before interacting with the Visual Cue activity. When participants were asked whether the lectures, the Visual Cues, or both, were most impactful on their learning experience, five participants answered that it was both and two participants experienced the Visual Cues as most impactful. The interview responses suggested that the Visual Cues were beneficial for learning of self in the context of sustainability, whereas the lectures provided the essential content and fostered a better understanding of sustainability.

For FT1 it was the combination of the Visual Cues and the lectures that were most beneficial to her learning experience, "*because the lectures were connected to the Visual Cue, and it just kept everything real as well"* (interview). FT2 also highlighted the combination of both the lectures and the Visual Cues, that contributed to her learning experience. She emphasised that "*the Visual Cues had a major impact on [her] personal life and on her attitude* as *it helps* to *learn from yourself because an image will evoke memories and thoughts and makes you think slightly differently, whereas the lectures had a huge impact on* her *knowledge"* (ibid). FT2 summarised that the Visual Cues are "*in your face, and you are drawn to them and you* are *not only learning from each other but you learn from yourself. It makes you think in a different way"* (ibid). FT4 noted that "*definitely both",* the Visual Cues and the lectures, contributed to her learning experience as "*the material and the content itself was fantastic and obviously the Visual Cues really did have a lasting effect"* (ibid). PT4 pointed out that "*both"* the lectures and Visual Cues were needed to be able to "*write down what you thought"* about the content when reflecting on the Visual Cues (ibid). PT5's learning experience was also shaped by "*both"* the lecture and the Visual Cues. She emphasised that "*there were some elements of the lectures that completely threw [her] and have stayed with [her]* (ibid), such as the map demonstrating the impacts of climate change on the world (with each degree of increase in temperature), "*made a huge impact on me"* (ibid). In the beginning of the module "*she wasn't comfortable with the Visual Cues, but [she] got into it over time and really enjoyed it"* (ibid). Overall, she felt that "*both elements actually had a big impact on her. Maybe the Visual Cues [impacted more], because it made [her] think about how [she] thought about things"* (ibid). PT1 emphasised that the *Visual Cues had the most impact* on her learning experience (ibid). Similarly, PT2 highlighted that the Visual Cues

contributed most to his learning experience "*because of the Leopard Visual Cue"* (interview). Nevertheless, he pointed out that "*the lectures were good and the assignment was brilliant because it made you research and find out about it, but the Visual Cues"* (ibid) were overall more impactful than the lectures. Overall, participants exemplified that relating the lecture with the Visual Cues was useful for the learning process. The Visual Cues provided a space for learners to connect personally with the content and critically reflect on their own perspectives about it. In other words, integrating Visual Cues into modules by relating them to the content is useful because the Visual Cues enable learners to internalise the content by connecting personally with the scenario that is related to the knowledge presented during the lecture.

Figure 31 summarises the interview responses of the most memorable Visual Cue, the most impactful Visual Cue on feelings and on thinking, and the Visual Cues with low or no impact on participants' thoughts or feelings.

Figure 31: Most Memorable and Impactful Visual Cues

Participants	Most memorable Visual Cue	Most impactful Visual Cue on feelings	Most impactful Visual Cue on thinking	Visual Cues with low or no impact on thinking and feeling
FT1	Elephant Cue Boy Cue	Boy Cue	Homeless Cue	None
FT2	Elephant Cue	Elephant Cue	Leopard Cue	Vacanti Mouse Cue
FT4	Baboon Cue	Baboon Cue	Elephant Cue	Model Cue/ Vacanti Mouse Cue
PT1	Homeless Cue Leopard Cue	Boy Cue	Leopard Elephant Cue	None
PT2	Homeless Cue Leopard Cue	Homeless Cue	Baboon Cue	Vacanti Mouse Cue
PT4	Leopard Cue	Boy Cue	Boy Cue	Homeless Man Cue
PT5	Boy cue	Elephant Cue Leopard Cue	Homeless Cue	Baboon Cue

All Visual Cues, except the Vacanti Mouse Cue, were mentioned when participants were asked about the most memorable or most impactful Visual Cue on their thinking about sustainability as well as on their emotions. Two participants experienced all Visual Cues as impactful and could not identify one that was least impactful. The Vacanti Mouse was declared as least impactful by three out of seven participants. Visual Cues scenarios created

very subjective experience for each individual and only in comparison to the impact of the other Visual Cues, the Vacanti Mouse Cue was the least impactful. Overall, the six Visual Cues were deemed as appropriate by all seven participants (see table 16 below).

Table 16: Interview Responses to Question 'Were Any of the Visual Cues Inappropriate for Use within Class?'

Participant	Interview Responses
FT2	*"Oh no, no I thought they were very appropriate. I thought they worked very well and I liked the way you built them up"*
FT1	*"No, no, nothing, because they were all connected to it, they were all very thought-provoking. No there was nothing that I felt was inappropriate"*
FT4	*"I didn't have any problem or issue or anything like that with any of them, I was like no, deadly, yes"*
PT1	*"I don't think it was inappropriate – I don't think anyone in the class did think it was inappropriate"*
PT2	*"No, no we're all adults. I didn't think there was anything inappropriate, no"*
PT4	*"No, I'm pretty open minded when it comes to that".*
PT5	*"No. I don't think there could have been a Visual Cue that would be inappropriate. Because even when some people might feel it is inappropriate, it spurs conversation and I think that is probably the motivation behind it in the first place. Even if you don't like what you see, you don't always like what you see anyway, so you should be able to talk about it"*

The second research phase showed that the majority of participants described the presented scenarios initially as different, odd, strange, weird, abnormal or funny. Participants were surprised, shocked, confused or perplexed and not sure of the meaning that should be attributed to the presented Visual Cue scenario or how they should react to it. The focus code 'discovering a new/unfamiliar idea/scenario/practice' suggested that participants existing frames of mind were disrupted. Therefore, Visual Cues should present a scenario that is less likely to be known to participants and is unfamiliar to daily life events or practices.

The findings from the research study indicated that Visual Cues must be designed using real life and unfamiliar scenarios. Responses to the Horse Cue in phase one pointed out the need for realistic scenarios, as it appeared "*too unrealistic"* (1.6, Horse Cue). In phase two, the Elephant Cue also raised questions as to whether "*the picture is genuine or photo shopped"*

(PT5, Elephant Cue, diary). Based on its more realistic appearance and its connection to the lecture content about "*the interlinking elements of sustainable development"* (FT1, Elephant Cue, diary), participants critically considered the presented scenario and abstracted its meaning "*of the far reaching consequences of my actions on a global scale"* (FT1, Elephant Cue, diary). Nevertheless, the Boy Cue is a reminder that if a Visual Cue deals with a sensitive issue, such as the death of a child within the European refugee crisis, it is advisable to consider artistic representations to avoid emotional disturbances, but stimulate critical consideration and reflection of the scenario. Participants thought that "*the image was a good representation of the original image"* (PT5, Boy Cue, diary) when inquiring the appropriateness of the Boy Cue. While, many participants were aware of the European refugee crisis, they acknowledged that the Visual Cue motivated them to "*become more informed of the most recent Syrian refugee crisis"* (PT4, Boy Cue, diary). Using current affairs can encourage individuals to form an opinion, be more critical and to discuss current events as they tended not to "*voice their opinion"* (PT5, Boy Cue, diary). As a result, Visual Cues must appear realistic but simultaneously should have a component of unfamiliarity. The observational notes showed that selecting Visual Cues that stimulated controversy and were related to different sustainability issues supported a rich exchange of various perspectives and enhanced the understanding of the "*connectiveness* […] *that everything is connected"*, as PT4 pointed out that the Visual Cues allowed participants *"to tie in so many things into the same cue"* (interview).

As mentioned above, the results of the second research phase have shown that the integration of the Visual Cues in a sustainability module is an effective tool for sustainability education. The observational notes showed that during the discussions, for example of the Boy Cue, "*not one of them mentioned Human Rights"* (observational notes, Boy Cue), or during the discussion of the Homeless Man Cue "*no participant mentioned the 1st half of lecture"* (observational notes, Homeless Man Cue) which was about urban poverty. Whereas this may be an argument that Visual Cues had a disruptive nature, it should be pointed out that this did not mean that participants did not relate the Visual Cue scenarios to the lecture content. Within the reflective diaries participants connected the Visual Cues to the lecture content. FT1 emphasised that "*having discussed in lectures the interlinking elements of sustainable development made* her *more aware of the far-reaching consequences of [her] actions on a global scale"* (Elephant Cue, diary). Participants linked the Boy Cue to the lecture discussion "*about Human Rights"* (FT1, Boy Cue, diary) and noted that is "*an integral part*

of sustainability" (PT5, Boy Cue, diary). On this account, careful decisions about the sequencing of Visual Cues and matching them to the lecture content were beneficial to the learning experience for sustainability.

The second research phase contained a 'trial' Visual Cue, which was used during the first session of the module, introducing participants to the pedagogic process and the template of the reflective diary. It aimed to make sure participants understood what was expected from them, provided space for any questions and to practice the process before we used the first 'real' Visual Cue, the Elephant Cue. The Model Cue was designed with the pure purpose of introducing participants to Visual Cue scenarios and it was not part of the assessment. The Model Cue portrayed two images of similar nature (Cordaid People in Need Campaign: https://www.cordaid.org/en/news/story-behind-little-money-big-difference/). Both images showed a tribal woman in Africa posing in the Savannah with luxury goods. The first image displays her with sunglasses with the tagline: 'sunglasses €24 – access to water €8'. The second image shows her with a handbag with the tagline 'handbag €32 – food for a week €4'. Below the images, I included the critical question: what can you do to help rebalance human needs and wants? From seven participants, only FT4 remembered the Model Cue and referred to it when being asked if there was a Visual Cue that had no impact:

> I think the one, with the African person with the handbags and the sunglasses and stuff like that. Because, not that it didn't have a…it just didn't have as much of an impact as the others did because I grew up in a world where this has just always happened and not that I agree with it because I don't. But it is just something that you are like, yes, it is just a thing, we live in that world and that is just what happens on a day to day basis and it is not fair, it's ridiculous but yes, it is not something that shocked me or made me think much further into the meaning behind it to be honest (interview).

Based on FT4's description and the fact that no other participant remembered the Model Cue, it is arguable that it was not disruptive. The consideration of the differences between the Model Cue and the other Visual Cues offered insights into how Visual Cues should be designed in order to disrupt. The context of the Model Cue was not unfamiliar; whereas the tagline demonstrates reality, it was less likely that a tribal woman in her real life context would be desiring a luxury handbag; most participants did not remember the Model Cue and FT4 indirectly noted that it did not disrupt; it was not disrespectful to any member within the target group; the researchers' reflective diary recorded that the Model Cue resulted in

low engagement, even though it was designed to ensure that it related to the lecture content and related to self through the inclusion of the critical question.

6.7 Summary of Research Phase Two

The impact of Visual Cues on participants' frames of mind (thoughts and/ or feelings) has been illuminated through the findings presented. The analysis, using Constructivist Grounded Theory, provided evidence that participants moved from basic recalling of sustainability themes, practices and principles to higher order thinking such as critical thinking of these sustainability themes or of self in the context of sustainability, re-orientation of existing frames of minds and change agency for sustainability. Disruption was necessary to initiate higher order learning, by supporting the personal connection with the scenario and as such marked the genesis of the re-orientation process. Stimulated by initial disruption, participants entered the process of re-orienting self towards becoming sustainability [re-]oriented. This process guided individuals towards enactment of recognised connections with the world and engagement in change agency for sustainability, which was subjective and unique to every individual. The correlation of the NEP scores with the diaries and the interviews in chapter five, provided further evidence that participants gained a more holistic and critical outlook, and that the Visual Cue acted as a stimulus or trigger in enabling this. All seven participants recalled their initial worldviews, as confirmed by the NEP Scale, when being asked about it during the interview. In addition, all participants confirmed that they "*would have scored differently"* (FT2, interview) at the time of the interview – in other words, they recognised that their worldview had changed as a result of engagement in Visual Cue interventions. All seven participants learned that sustainability means more than care for the environment and became more aware of the human rights element of sustainability. The individual learning journeys in chapter five, demonstrated that students have different previous knowledge, and life experience *inter alia* that are used to make sense of the Visual Cues and to engage in change agency for sustainability suitable to their individual context. The second research phase reconfirmed that both pedagogic processes (viewing/reflecting and discussing) impacted on participants' frames of mind. The initial viewing stimulated the disruption, which was representative for the experience of a disorienting dilemma in a classroom and required critical reflection and a rational discourse to give meaning to the Visual Cue. The pedagogic tools of facilitation of the Visual Cues and the use of reflective diaries were important elements of the Visual

Cue interventions. In the final chapter, the findings from the overall research will be encapsulated in the articulation of a Theory of Disruptive Learning, and the pedagogic processes that activate this type of learning.

Chapter 7: Disruptive Learning Theory, Conclusions & Recommendations

7.1 Introduction

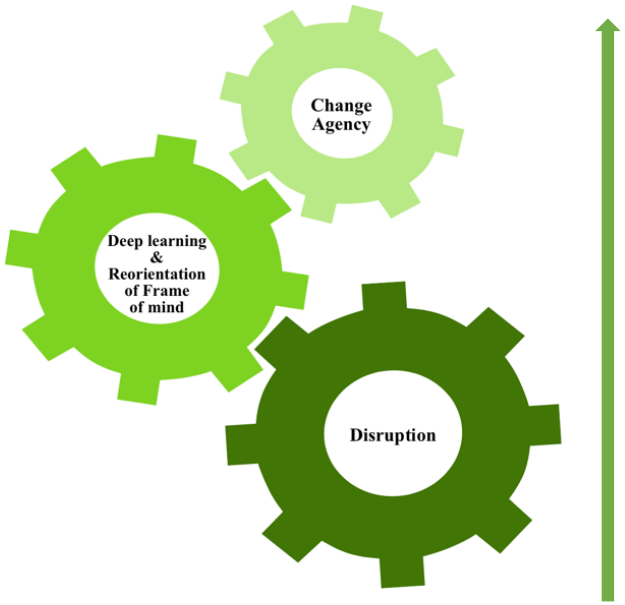
This final chapter opens with an explanation of the Disruptive Learning Theory that has emerged from this research, and what this constitutes within the context of education for sustainability. It moves forward to summarise the nature of, and findings from, the Visual Cue interventions that enabled processes of Disruptive Learning within this study. This is followed by researcher reflections on the process of utilising Constructivist Grounded Theory (CGT) to explore Disruptive Learning processes. Finally, conclusions are drawn from this exploration of the activation of Disruptive Learning within education for sustainability, and recommendations for future studies in this area.

7.2 Disruptive Learning Theory

The Constructivist Grounded Theory approach adopted in this research has resulted in the articulation of the theory of, and processes within, Disruptive Learning. The Disruptive Learning Theory, postulates that if learners' frames of mind or frames of reference can be disrupted (in other words, challenged), then learners' mind-sets can be re-oriented towards sustainability and indeed learners can be motivated to engage in change agency for sustainability. Disruptive Learning is fully activated through pedagogic processes that offer opportunities for deep consideration and sharing of perspectives, values, and worldviews. According to Mezirow (2009, p.92), Transformative Learning enables transformation of "*problematic frames of references – sets of assumption and expectation – to make them more inclusive, open, reflective and emotionally able to change*". This study has shown that Disruptive Learning interventions can activate these transformations *in self* and *of self*, particularly re-orientation of mind-sets towards sustainability, with a view to enabling change agency for sustainability. Disruptive Learning has its roots in Transformative Learning (Mezirow 2009) and in the concept of Re-education (Lewin 1948), as it is concerned with effecting change, in terms of re-orienting learners' frames of mind and promoting action for sustainability in the context of this research. Lewin (1999) describes the process of change in three stages: *unfreezing*, the moment when people experience the

need for change; *moving*, when people internalise new perceptions, values and behaviours; and *refreezing*, when the changes are incorporated and become 'normal' behaviour. This study has clearly shown that the processes of Disruptive Learning (disruption, followed by individual reflection and critical discourse) enable at least two (and arguably three) of these three stages of change. Hence, engagement in Disruptive Learning interventions contributes to a form of Deep Learning, which motivates re-orientations of learners' frames of mind and inspires change agency for sustainability, as illustrated in Figure 32.

Figure 32: Disruptive Learning



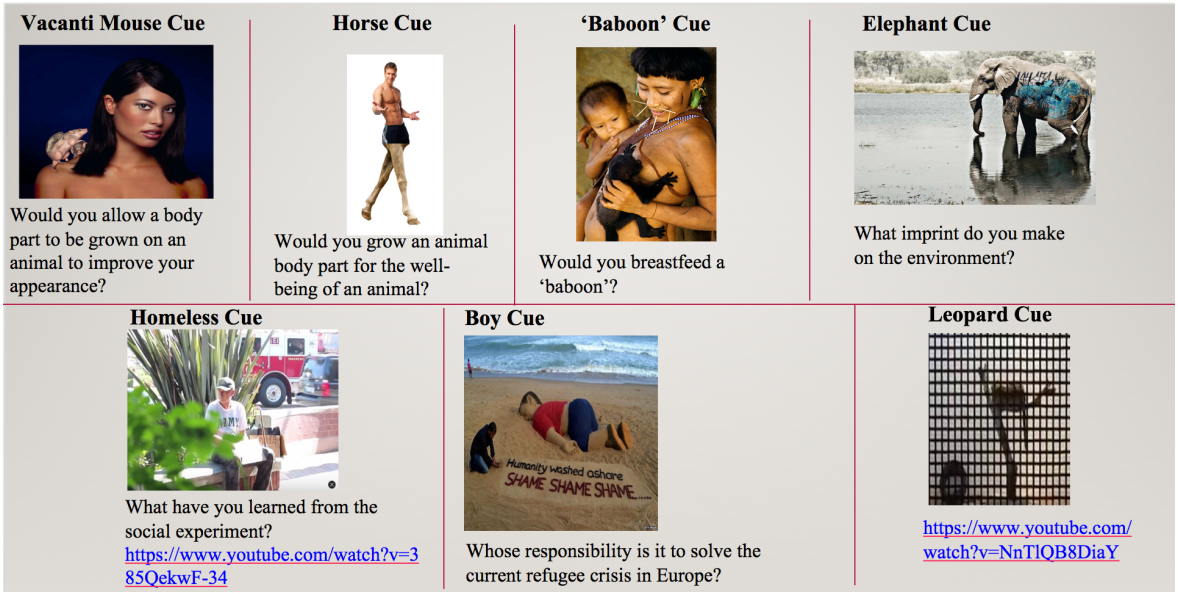
The pedagogic processes that activate and enable Disruptive Learning include the integration of disorienting dilemmas, followed by opportunities for individual reflection and group discourse. This study has shown that these processes result in: (1) disruption – unsettling of learners' existing frames of reference vis-à-vis sustainability; followed by (2) Deep Learning, to critique and strategise for sustainability, **and** reorientation of frames of mind towards becoming more sustainability oriented; and/ or, (3) change agency, to conduct sustainability actions.

7.2.1 Disruption

The first process in Disruptive Learning is the facilitation of disruption – in other words, creating experiences that cause dissonance within learners, forcing them to take-stock of

their emotional/ cognitive states-of-mind, and lead them to a heighted awareness of, or even questioning of, their existing frames of reference, values, or belief systems. In the context of this study, these disruptive experiences were facilitated through the use of Visual Cues, presenting disorienting dilemmas that in the first instance were designed to elicit or cause emotional reactions and/ or cognitive disjuncture within learners, by challenging or unsettling their existing mind-sets/ frame of reference. For this reason, the Visual Cues were designed to cause learners to question their reaction/mind-sets and seek out pathways to find 'equilibrium/ stability' – thus, to critically reflect on and share their own perspectives, opinions or values, and then re-consider their outlook/ worldviews with respect to sustainability. Figure 33 provides an overview of the Visual Cues employed to facilitate disruption in this study.

Figure 33: Overview of Visual Cues



7.2.2 Deep Learning & Reorientation of Frames of Mind

The second process within Disruptive Learning is the facilitation of opportunities for Deep Learning and re-orientation of frames of reference/ mind-sets. Sterling (2001) highlights that sustainability education needs a "*transformative paradigm that values, sustains and realises human potential in relation to the need to attain and sustain social, economic and ecological wellbeing, recognising that they are deeply interdependent*" (p.22). Within Disruptive Learning interventions, the pedagogic processes of individual reflection and group discourse that follow the process of enabling disruption, are used to foster processes that result in critical review of eco-systems, explore interdependencies within our world, and promote

deeper understanding of the role of self and society in fostering sustainable futures for all. Hence, Disruptive Learning facilitates a form of Deep Learning that can be used to cultivate what Bonnett (1999) calls sustainability as a frame of mind, and furthermore activate action for sustainability. Disruptive Learning can be considered as a form of higher order learning that leads to the examination or re-orientation of values and beliefs, including awareness of alternative perspectives, dispositions and actions.

Sterling (2004) further states that Transformative Learning involves the whole person, engaging in and affecting deep changes of values and belief. Mezirow (1997) perceives it as a social process which "*involves transforming frames of reference through critical reflection of assumptions, validating contested beliefs through discourse, taking action on one's reflective insight, and critically assessing it*" (p.11). These transformative forms of learning are fostered within Disruptive Learning through the engagement of a facilitator in processes involving deep reflection and critical discourse. The facilitator approach is required to support learners to become more aware and critical of their own and others' perspectives (Mezirow 1997). Taylor (2006) describes Transformative Learning as teaching for change, including a transformative educator, a transformative environment and transformative material to make students open minded for change. Therefore, a key agent in activating this second level within Disruptive Learning, is the pedagogue who acts as a facilitator in motivating learners to think critically about the thematic area under consideration.

7.2.3 Change Agency

The third process within Disruptive Learning is motivating action for sustainability – this process is often the by-product of the second process, in that when learners reorient their frame/s of reference or mind-sets, they want to change their behaviour and in the case of the participants in this study, did so without prompting. Therefore, Disruptive Learning can lead to change agency for sustainability. For Lewin change agency is a key aspect to "*rational action and democratic values*" (Caldwell 2006, p.14), and the change agent is a rational actor who facilitates the implementation of change (Lewin 1948). Sustainability educators need to be change agents to support learners to become sustainability change agents themselves (UNESCO 2014a). Sustainability learning is about building the capacity to become change agents (Pittman 2004). The motivation to be a change agent results from a value system and self-concept that is in favour of change agency (Svanström et al. 2008). Agency refers to human wellbeing and empowers individuals to be able to live their life in accordance to their

own values (Lozano et al. 2012). Therefore, education aims to stimulate people's agency that empowers them to be the "*authors of their own lives*" (Lozano 2012, p.134). Participant FT2 is only one example of this research, demonstrating how she became empowered to make a life-changing decision in order to live a happier and more honest life that meets the responsibility of being a role model for her children. Within "*ESD/EfS it is essential to personalize the learning experience in the context of a developing interest and a sense of responsibility toward the environment and society, producing a capacity for enacting change*" (Thomas 2009, p.254).

Disruptive Learning enabled participants of this research to develop an interest in current affairs and to engage in change agency for sustainability which was evident through several examples, such as PT2 who began working voluntarily in a homeless trust and supporting the clean-up of the Irish wetlands. Disruptive Learning facilitates capacity building to become change agents, but as there is no blueprint, individuals need to find their own way of sustainability change agency that is in accordance to their own values and personal context.

7.3 Process of Disruptive Learning: Visual Cue Interventions

Within this study, Disruptive Learning was facilitated though Visual Cue interventions, which activated processes that resulted in learners critiquing their own frames of references. Visual Cue interventions integrate a stimulus activity and are loosely modelled on Mezirow's concept of Transformative Learning (1991; 2009). Thus, each Visual Cue intervention in effect acts as a disorienting dilemma, and is facilitated with opportunities for critical reflection and rational discourse. First, learners are given time to individually view the Visual Cue and engage in a form of Expressive Writing, before they engage in a group discussion, which is followed by reflection, taking place in class and outside the classroom. A diary template accompanies the Expressive Writing during the viewing of Visual Cues and the reflection after discussion. Visual Cue interventions can be integrated into an existing sustainability module, where students are weekly introduced to a Visual Cue, or one or more Visual Cues can be facilitated as a stand-alone activity. The duration of engagement with a Visual Cue intervention can vary depending on time allocated for the discussion phase.

7.3.1 Visual Cue

The Visual Cue is a visual stimulus, designed to disrupt or challenge mind-sets of participants, that may take the form of image or video and may be combined with a critical question (as was mainly the case in this study), to stimulate reflection and discussion. Visual Cues aim to draw attention to non-sustainable behaviour, inviting students to deeply question their current norms, perspectives and dispositions that have resulted in non-sustainable Western livelihoods. Visual Cues are open to individual interpretations and aim to engage students with their state of mind. The Visual Cues for this study were designed with the aim to deepen thinking about assumptions, expectations, values and beliefs that influence dominant ways of thinking, feeling and acting in contemporary Western societies. The underpinning assumption is that Western societies are estranged from the wider global community and are to greater extents unaware of the causes or effects of anti-social/environmental behaviours (Cook et al. 2010). Therefore, Visual Cues directed the attention of students to sustainability issues, values-bases, and worldviews, and, in doing so, enabled students to question their own values and worldviews.

Based on the aspiration of becoming an 'artistic rebel teacher' who challenges individualistic anthropocentrism (Blenkinsop and Morse 2017), some of the visual content for this study was sourced from various parts of the public domain, such as art found in social media which have been designed to raise public awareness (Kilaru et al. 2014). For example, the visual content of the Elephant Cue was based on 'awareness advertisements' of a charity organisations, the Leopard Cue was based on artwork of street artist Banksy and the Homeless Man Cue entailed a social experiment presented in form of a video clip that was sourced from YouTube.

7.3.2 Pedagogic Process of Viewing & Reflecting

The pedagogic process of using Visual Cue interventions in Disruptive Learning, will be now explained in more depth. A disorienting dilemma is an external or internal individual crisis that cause a disruption where the individual seeks something that he or she lacks in their lives (Mezirow 1978; Taylor 1998; Roberts 2006). It provokes conceivable emotions in students that drives critical reflection and the questioning of deeply held personal values (Taylor 2000). Therefore, a disorienting dilemma is a trigger that directs self-examination where one begins to re-orient perspectives and to understand the world in a different way (Cranton 2006). At the beginning of each intervention, students were presented with a Visual

Cue. The facilitator provided a brief overview of the main ideas or backstories of the presented scenario, if it was required (e.g. Baboon Cue or Vacanti Mouse Cue). The students were then asked to write about their thoughts and feelings stimulated by the Visual Cue using a diary template. In the context of this study, asking students why particular emotions or thoughts were triggered, resulted in students further investigating the thoughts and emotions triggered by the Visual Cue in the context of their own selves. The combination of the viewing of the Visual Cue and responding to the diary questions represented a disorienting dilemma, resulting in disruption of existing frames of mind for many participants by encouraging deeper exploration of emotions and thoughts triggered by the Visual Cue.

The Visual Cue interventions differed in their application of certain aspects of Expressive Writing, that would be considered critical within other Expressive Writing activities. In its normal application, Expressive Writing tends to take place only in class. For the purpose of the Visual Cue interventions, students were also allowed to continuously write about their reflection after the group discussion of the Visual Cue, in the class and at home. This provided also space for the students to reflect across the different Visual Cues, and to reflect on their own learning process. Furthermore, in its traditional use, Expressive Writing should be only evaluated by the writer (Foulk and Hoover 1996). However, in the context of the Visual Cue intervention, the reflections were shared and considered within whole-group discussion, which further informed the post-intervention reflections of students.

7.3.3 Pedagogic Process of Facilitating Discourse

A whole class discussion (facilitated by the educator for approximately 15-30 minutes) was initiated on completion of individual reflection of Visual Cues. During the discussion, the facilitator posed ‘freestyle’ trigger questions that provoked further questioning and discussing by the students. The facilitator avoided any suggestion of prescription or promotion of worldviews, values or actions. Instead, the facilitator approach was inspired by the Classic Socratic method (Maxwell 2014) to encourage the students to get a sense of their own non-sustainability perspectives and dispositions. According to Chesters (2012), the use of a Socratic inspired facilitation has the potential that students learn the skills and dispositions required for a democratic living as it aims to stimulate reason about existing beliefs.

The discussion of Visual Cues usually opened with the facilitator posing the critical question of the Visual Cue or more broadly asked the students 'what emotions and/or thoughts were triggered? And why?' Sharing the personal experience with the class is a core step of Socratic Dialogues (Chesters 2012). Having one student sharing their initial feelings and thoughts further ensured that students related to the scenario. Usually, the initial contributions during the discussions were examples of how the scenario was or could become reality in their life. Consequently, the other students either agreed or disagreed with the initial shared reactions or perspectives. The facilitator's aim was to continuously prompt them with questions about their ideas or examples to ensure that students move away from judgement of each other, and instead towards an examination of their attitudes, beliefs and values in the context of sustainability. Therefore, the facilitator posed open-ended questions that were useful to guide the discussion around specific learning outcomes. Additionally, the facilitator had to actively-listen to the students' contributions and needed to remain flexible to raise open-ended questions that could have been not prepared in advance, but were essential to signal to students that there is no single right answer. Facilitators of Disruptive Learning should consider themselves as learners too, as Wals and Jickling (2002) point out, there is no 'expert' who can say what a sustainable life is.

7.3.4 Pedagogic Process of Post-Discussion Reflection

The post-discussion phase was initiated by students reflecting after engagement in a whole-class discussion. Here students were asked to write down what now comes to mind when viewing a Visual Cue; whether their emotional state remained the same or changed during the process; what they learned about sustainability; and to reflect on their own process of learning through the Visual Cue intervention. The reflection after the discussion was particularly beneficial when considering that "*the dissonance created by exposing learner to a wide range of perspectives is what triggers reflection and meaningful learning*" (Jickling and Wals 2008, p.12). The exchanges of perspective during the discussions stimulated deep reflection which enabled students to consider differencing viewpoints, which either empowered their perspectives or challenged them to re-orient existing perspectives and/or dispositions.

7.4 Sustainability Frames of Mind

The participation in the Visual Cue interventions built capacities in participants' sustainability frames of mind. Capacities are not just necessary for critical thinking of sustainability but also for sustainability action. From Figure 34, it is clear that after frames of mind were unsettled (from disruption caused by Visual Cue), participants moved onwards to recognise concepts, contexts and issues within sustainability; critique sustainability contexts and self; re-orient their perspectives/worldviews with respect to sustainability; and engage in change agency for sustainability.

Figure 34: Reorientation Towards Sustainability

The following section explains in a holistic manner how within the pedagogic pathways of re-orientation, whole-system thinking, ethical-values thinking and critical thinking resulted and contributed to sustainability frames of mind.

7.4.1 Whole-System Thinking

> Whole systems thinking [is] a synergy between the body of holistic thought inspired by an ecological view of the world, and the methodology of systems thinking: essentially a coming together of ecologism and systemisism, of critical thought and a sense of connectedness, yielding what might be termed 'systems as worldview (Sterling 2003, p.38).

Whole-systems thinking goes beyond exploration of dominating forms of Western worldviews (Sterling 1996). The combination of systems thinking and ecological thought enables the development of connective and holistic views of ethics, culture, ecology, spirituality, technology, economy, society, politics, *inter alia* (Sterling 2001). This study provided evidence that, through the Visual Cue interventions, students recognised

interdependencies of different parts of the world and realised the far-reaching impact of their actions. They recognised the tensions between the connections of humans/ animals, humans' nature and humans/ humans. In addition, students became more aware of the holistic nature of sustainability and how its thematic areas are interrelated. Students built the capacity to explore the dialectic between tradition and innovation (Tilbury 2013) through whole-system thinking, ethics and value thinking and critical thinking. The exploration of the dialectic between tradition and innovation describes the necessity to examine "*cultural values and traditions in a way which respect diversity, protect traditional knowledge and if necessary challenge exploitative practice*" (Tilbury 2011, p.38). The Baboon Cue exemplified how students engaged in recognition of required change on the one hand and the protection of traditions on the other hand. Students became aware of the need to protect indigenous knowledge and explored the potential learning from it. Simultaneously, they referred to the need to challenge exploitative actions that not only harm indigenous communities but ultimately the entire world. Similarly, the Vacanti Mouse Cue, invited students to explore what it means to make 'appropriately' use of technologies in the light of sustainability. Students were confronted with the paradoxes of the 21st century or what Delors (2013) calls tensions "*within mankind as a whole, between singular and the universal, tension between tradition and modernity, and tension between the spiritual and the worldly*" (p.326). Students began to think critically about the whole-system, ethics and values, and, in doing so, began to build capacities to re-orient thoughts and actions towards sustainable ways of being and doing.

7.4.2 Ethics and Values Thinking

Jickling (2009, p.215) argues that education should be about ethics that is "*concerned with using the questions posed as prompts for exploring controversy, dissonance and unconventional ideas, and imagining new possibilities*." The exploration of ethics/ values bases within sustainability education has the potential to build an individual capacity to make future decisions through a consideration of the consequences on the interconnected challenges of sustainability for future human and non-human generations (Kopnina 2012; Biedenweg et al. 2013). As Disruptive Learning does not focus on the pre-identification of particular sustainability actions or values, the Visual Cue interventions encouraged students to clarify and question their own values in the context of sustainability. They began to recognise the interconnectedness of sustainability challenges and consequently reoriented non-sustainable values and worldviews, envisioned alternative values, or began to prioritise

existing values differently. Students questioned their compliance with dominating norms and lifestyles, their relation to nature and other species and began to reflect on their underlying values that inform many of their daily actions.

Unlike Jickling (2009), who highlights the importance of general ethics, Kopnina (2012) argues that environmental ethics are most relevant in sustainability education. Environmental ethics can be understood through Taylor (1986) who notes that

> […] our duties toward the Earth's non-human forms of life are grounded on their status as entities possessing inherent worth. They have a kind of value that belongs to them by their very nature, and it is this value that makes it wrong to treat them as if they existed as mere means to human ends. It is for their [and humans] sake that their good should be promoted or protected. Just as humans should be treated with respect, so should they (p.13).

However, a focus on environmental ethics might still be too narrow for sustainability education. Ultimately, every individual has their own perception of reality and, therefore, has also a unique ontological understanding of reality. The rhizome can be an inspiration for alternative ways of perceiving, being, thinking, knowing, teaching and learning (Tillmanns et al. 2014; Le Grange 2011; Le Grange 2017). By thinking rhizomatically, learners may be stimulated towards an active and open-minded approach of becoming by exploring multiple interconnections and coincidences through which new horizons, possibilities and connections emerge. In other words, it requires a capacity to self-organise spontaneously relationships and form interactions. Furthermore, there is an on-going controversy about ethics, whether it can or should be taught, and how ethics can be defined (Trevino and Nelson 2011). Ethics relates to moral principles and values which are differently prioritised by every individual (Trevino and Nelson 2011). Values theories tend to agree that values influence and shape actions and lifestyles and that individuals can prioritise values that may result in responsible sustainability actions (Murray et al. 2014). Consequently, it is crucial to have an ethical basis when making decisions or decide for future actions or before considering practical solutions or actions to tackle unsustainability (Biedenweg et al. 2013).

7.4.3 Critical Thinking

Critical thinking has a central role in education (Moon 2008) and it is fundamental to sustainability education (Thomas 2009). According to Ennis (2011), "*critical thinking is reasonable, reflective thinking that is aimed at deciding what to believe or what to do*" (p.5). Similarly, Brookfield (2005; 1987) understands critical thinking as an emancipatory process that involves reflection and results in the reorientation of assumptions; awareness of contextual influences on thoughts and actions; and the emergence of alternatives ways of thinking and living. Critical thinking within sustainability education should provide the opportunity for students to learn how to think instead of what to think (Thomas 2009). The Visual Cue interventions encouraged students to critically think, challenge or question the status quo and own dominating unsustainable worldviews or perspectives. Thus, students engaged in critical questioning of the contexts and own as well as other perspectives. They also questioned oneself in the context of sustainability, such as re-considering their consumption habits. This resulted in the re-orientation of existing perspectives or dispositions and change agency for sustainability. As Moon (2008, p.9) notes that critical thinking is not only about cognition, but also includes "*expression and action and the various capacities that become relevant*."

Deep critical thinking is similar to deep reflection (Moon 2008). Albeit deep critical thinking focuses more on making a judgement than making meaning, both should be understood as an endless process that moves from surface to deeper learning (Moon 2008). Reflection and critical thinking play a crucial role in the deeper approaches to learning (Moon 1999). This research has demonstrated that Visual Cue interventions enable students to engage in critical reflection on own values base, which is a form of Deep Learning.

7.5 Premises Underpinning Processes of Change within Disruptive Learning

Disruptive Learning has already been framed in terms of a theory, and a set of processes, but what are the premises underpinning the processes of change (leading to reorientation of mind-sets and/ or change agency for sustainability) activated within Disruptive Learning interventions? Kurt Lewin's (1948) ten observations on processes of Re-education are now used to frame premises underpinning processes of change enabled within Disruptive Learning. Before we begin, it is important to note that for Lewin (1948) these ten observations of Re-education are not separate from one another and are closely interrelated. It is only for the purposes of explanation of the context of Disruptive Learning that they are explained one at a time.

(1)"The processes governing the acquisition of the normal and abnormal are fundamental alike" (Lewin 1948, p.57). Individual behaviour depends on the interaction of individuals and their environment in which they live or their belongingness to societal groups. Lewin (1948) argues that the processes of an individual either becoming a criminal or an honest person are identical and depend on individuals' perception, creating either an inadequate image (illusion) or an adequate image (reality). Thus, for Disruptive Learning interventions to lead to re-orientation of frames of mind it is essential to recognise that the processes that make some believe that sustainability is a fad or fiction (illusion) are the same processes that makes others belief sustainability is an essential balancing act (reality). How an individual perceives for example sustainability depends on what is socially accepted and involves also group pressures of a group to which one belongs. Lewin (1948) points out that individuals are affected by group pressures "*in all areas – political, religious, social – including our beliefs of what is true or false, good or bad, right or wrong, real or unreal*" (p.58).

(2) The re-educative process has to fulfil a task which is essentially equivalent to a change in culture (Lewin 1948, p.59). Culture should be understood analogical, referring to shared beliefs and assumptions of a group that an individual cannot have alone (Coghlan and Jacobs 2005). It requires a culture of a group to enable an individual to incorporate new values and perceptions into daily life (Lewin 1948). Lewin proposes that when the processes, resulting either in 'illusions' or 'realistic' perceptions are identical, then Re-education should be a process that functions as a change in culture (Lewin 1948). For example, the Re-education of a carpenter to become a watchmaker requires a set of new skills and the acquisition of

new routines, standards and values which characterise a watchmaker (Lewin 1948). Disruptive Learning focuses on a re-orientation of frames of mind towards sustainability that requires the acquisition of new system of values, habits and standards. The challenge of Disruptive Learning is that there is no 'right' sustainable way of living, there is no blueprint of values or habits that every individual ought to acquire. Therefore, Disruptive Learning recognises that individuals and their life contexts are unique and that individuals need to build capacities to adapt to the ongoing threats of increasing uncertainty and risk of disasters. Disruptive Learning aligns with Sterling's perspective (2010) that sustainability needs to be approached in a broad and open direction where individuals explore alternative worldviews and ways of life. It is important to keep in mind that these "*changes of knowledge and beliefs, changes of values and standards, changes of emotional attachments and needs, and changes of everyday conduct occur not piecemeal and independently of each other, but within the framework of the individual's total life in the group*" (Lewin 1948, p.58).

(3)"Even extensive first-hand experience does not automatically create correct concepts" (Lewin 1948, p.60). Lewin notes that changing perceptions and behaviour does not happen only through experiences (Lewin 1948; Coghlan and Jacobs 2005). There is a tendency in sustainability education, which originated from environmental education, to promote pedagogic approaches that are primarily based on dialogue and experience to foster a reorientation of perspectives and/or dispositions to encourage behavioural change (Scott and Gough 2003; Cotton and Winter 2010; Thomas 2014; Wals 2014; Tilbury 2011). Whereas the literature of pedagogies in higher education does not disregard reflective pedagogies, Disruptive Learning emphasises connecting with the affective domain and encouraging reflection as critical aspects of re-orienting frames of mind and behavioural change, connecting perceptions, experiences and future actions.

(4) Social action no less than physical action is steered by perception (Lewin 1948, p.61). Re-education aims to change individual social perception, because it is only through a change of social perception that an individual's social action will change (Lewin 1948). Therefore, Disruptive Learning focuses on challenging perceptions of sustainability with a view to re-orienting frames of mind and to stimulate sustainability action. Disruptive Learning interventions aims to stimulate awareness of the individual's own perceptions and different perceptions of sustainability within a group context. In the context of the Visual Cue interventions, where there is no dissent from the group-perspective, the facilitator may

act as devil's advocate and pose counter-arguments or counter-questions that require individuals to think outside the 'group', or a Visual Cue may be presented that challenges social 'norms' (such as in the case of the Baboon Cue).

(5) As a rule, the possession of correct knowledge does not suffice to rectify false perception (Lewin 1948, p.61). Disruptive Learning acknowledges that even extensive experience and knowledge of sustainability do not necessarily result in the 'correct' perception of sustainability. Everyone is a learner in the context of sustainability education. In addition, Lewin (1948) highlights that this rule will equip one to be less surprised during encounters of resistance and inadequate illustrations or prejudices.

(6) Incorrect stereotypes (prejudices) are functionally equivalent to wrong concepts (theories)" (Lewin 1948, p.62). The experience of inadequate stereotyping will not change an individuals' understanding of the world (Coghlan and Jacobs 2005). Individuals need to be engaged in self-examination of their own and alternative perspectives and perceptions of the world in order to move away from stereotyping (Lewin 1948; Coghlan and Jacobs 2005). Disruptive Learning interventions increase individuals' personal awareness, engage them in reflection of own worldviews, and establish a non-judgemental exchange of perspectives and perceptions. The Baboon cue exemplifies that if this cue is introduced without adequate context setting about tribal customs and practices, it could lead to re-enforcement of stereotyping of tribal women rather than challenging Western dualisms.

(7) Changes in sentiments do not necessarily follow changes in cognitive structures (Lewin 1948, p.62). Lewin uses the example of an alcoholic who is aware that drinking alcohol is bad and does not want to keep drinking alcohol, to illustrate that individual changes depend less on knowledge as emotional reactions can contrast with what one knows (Lewin 1948). He points out that there is a danger to intensify the gap between how one should feel and the way one really feels, which will not result in changes but in a bad individual conscience (Lewin 1948). In Re-education "*the individual's real and total involvement in the change process is a significant factor*" (Coghlan and Jacobs 2005, p.449). This is also true for the dominant understanding of sustainability. For Disruptive Learning to re-orient frames of mind towards sustainability it is important to foster active involvement that includes affective, attitudinal, cognitive and behavioural aspects of the learner. Disruptive Learning interventions should be implemented within safe spaces, where students can exchange

perspectives, explore their feelings and thoughts even if they disagree with the dominant values system of their social group. Importantly, it should move the learner beyond 'disruption' of their existing frames of references, towards deep reflection and reorientation of mind-sets with respect to sustainability.

(8) A change in action-ideology, a real acceptance of a change set of facts and values, a change in the perceived social world – all three are but different expressions of the same process" (Lewin 1948, p.64). Re-education will only result in permanent change if all three processes are sufficiently changed (Lewin 1948). Lewin (1948) refers action-ideology to perception that guides all action. Consequently, behavioural change requires that new facts and values are perceived and that one begins to act in accordance to these values (Lewin 1948). It is also essential that the individual voluntarily engages in Re-education based on freedom and acceptance, which creates an atmosphere of comfort, freedom to express own perspectives and disagreement, emotional security and avoidance of pressure (Lewin 1948). This safe space for the exploration of own and different perspectives in a non-judgemental way is essential for Disruptive Learning. Within Disruptive Learning interventions, learners need to have opportunities to reflect and discourse on self and society, and how actions have implications in the present and for the future, to effect change in action-ideology.

(9) Acceptance of the new set of values and beliefs cannot usually be brought about item by item" (Lewin 1948, p.66). Values and beliefs are systems with its own integrity, and for individuals to maintain their identity this integrity must be respected (Coghlan and Jacobs 2005). Thus, Re-education aims to foster gradual change from defensiveness to open-mindedness towards a whole new values system instead of a conversation about one 'point' at a time (Lewin 1948; Coghlan and Jacobs 2005). Disruptive Learning takes a system perspective and aims to understand the bigger picture of the interconnectedness of sustainability instead of focusing on the details and nature of the cornerstones of sustainability. In addition, Disruptive Learning does not flag specific values that are associated with sustainability. Instead it supports individuals to build the capacity to identify and question their own values.

(10) The individual accepts the new system of values and beliefs by accepting belongingness to a group" (Lewin 1948, p.67). Re-education aims to establish an 'in-group' in which members identify with the group. Members feel that they belong to the group, and a strong

'we-feeling' is created (Lewin 1948). Group belonging supports the engagement of members in the discovery and ownership of facts and values which might have been previously rejected (Lewin 1948). The ownership is the belief that one discovered these facts, which is the same belief that the individual has in the group (Lewin 1948). This fact and value finding process for the group and by the group is important in Re-education. Lewin points out that "*the teacher and the student have to feel as members of one group in matters involving sense of values*" (Lewin 1948, p.67). The success or otherwise of Disruptive Learning interventions depends on careful planning of the facilitator who should create a safe space in which students feel that the facilitator is neutral, non-judgemental and an in-group member of their sustainability learning group.

From this discussion of the premises underpinning Disruptive Learning, it is clear that culture, values, social perception and the need to belong to a particular social-group play important roles in enabling change within education for sustainability.

7.6 Differentiating Disruptive Learning from Pedagogy of Discomfort

Disruptive Learning shares with the Pedagogy of Discomfort the underpinning assumption that the affective domain is important in challenging and transforming dominant values, norms or habits. However, these two theories have some significant differences, which will now be discussed. The following table summarises the main criteria of differences that summarise the underpinning processes of change, defining disruption and the purpose and handling of affections within Disruptive Learning and the Pedagogy of Discomfort.

Table 17: Criteria Differentiating Disruptive Learning from Pedagogy of Discomfort

Criteria	Pedagogy of Discomfort	Disruptive Learning
Underpinning assumption	The affective domain is important to challenge existing frames of mind to create possibilities for transformation.	
Aim	Intentional creation of discomfort that takes participants out of their 'comfort zone' and leaves them in a state of 'disturbance' after interventions.	Intentional disruption that focuses on initial unsettlement. Conscious avoidance of disturbance where participants are not left alone with discomforting feelings, and are guided to move beyond initial disruption towards deep reflection.
Place of educator	The privileged position and power of the teacher is being used to put participants in a state of discomfort. Teacher assumes a non-neutral/ judgmental position.	Facilitator is part of the sustainability learning group. Facilitator is neutral and non-judgmental.
Place of learner	Participants may be forced to experience inequality by establishing a context where some participants are in a disadvantaged place.	Participants voluntary engage in discourse based on freedom and acceptance.
Safe space	'Relatively' safe learning environment. 'Democratic principle's' are imposed on participants, which may result in the creation of a form of ethical violence.	It is fundamental to create a safe space with an atmosphere of comfort, freedom of expression and emotional security. There is no pressure to build the capacity to identify and question own values, perspectives and understanding. Conscious avoidance of ethical violence.
Learning context	Social inequality, race, difference	Focuses on re-orienting frames of mind with respect to sustainability – thus, enabling learners to critically engage with issues and challenges in sustainability, and to engage in action for sustainability. In the process learners will be enabled to reveal/ uncover the interconnectedness of sustainability challenges.

The aim of Pedagogy of Discomfort is to take the learner and the teacher out of their 'comfort zones' (Boler 1999). A study conducted by Felman (1992) demonstrates that students were left in a state of trauma which lasted for months after the intervention. The studies presented in the literature review have shown that there were always some participants condemning the experiences facilitated through Pedagogy of Discomfort (Zembylas and Papamicheal 2017; Zembylas and McGlynn 2012). In contrast, Disruptive Learning aims to initially unsettle (but not disturb) participants and it consciously strives to avoid participants being left in a state of disruption. Moreover, the premises underpinning Disruptive Learning would counsel against engagement in any activity that has even a low risk of causing mental or emotional disturbance to learners.

The educator assumes a privileged position of power in the Pedagogy of Discomfort which is used for example to *force* some students into a disadvantaged position (Zembylas and McGlynn 2012). Zembylas and Papamichael (2017) further reveal that the teacher can assume a non-neutral and judgmental position, presumably to heighten the impact (and supposed learning value) of discomforting scenarios. Conversely, within Disruptive Learning, the facilitator and the participants are part of the same group that engages in sustainability learning. The facilitator remains neutral and non-judgmental to establish an exchange of perspectives that enables an exploration of feelings, thoughts and similar or contrasting perspectives.

The Pedagogy of Discomfort may force the learner to experience discrimination or inequality, for example through first hand experiences (Zembylas and McGlynn 2012) or through a lived experience (Felman 1992). On the contrary, Disruptive Learning focuses on the free choice of the participants to engage in the discourse. Equality between all participants including the facilitator increases individuals' personal awareness and motivates to deeply reflect on own worldviews, through which participants can become one's own teacher.

The Pedagogy of Discomfort imposes 'democratic principles' onto the learner, creating a form of ethical violence (Zymbylas 2015) and making it challenging to establish a safe space for learning. According to Zembylas and Papamichael (2017), Pedagogy of Discomfort has a 'relatively' safe learning environment where it "*is not always clear what 'safe space'*

entails" (p.15). In the context of Disruptive Learning a safe learning space is fundamental. This space should be based on freedom of expression, emotional security and in the absence of judgement and pressure. This space is essential to build the capacity to identify and question own values, perspectives and understandings. Disruptive Learning does not rely on a 'blueprint' and does not suggest a 'right' set of values or a 'right' way of sustainable living. Instead, participants are guided out of the initial disruption through the exposure of various perspectives and understandings. Participants will only act, and transform, in accordance to new values, perspectives, and understandings if they perceive them. To be perceptive participants must feel safe and comfortable.

The learning focus of Pedagogy of Discomfort is social justice or inequality and it has been used for themes such as racism or multiculturalism. Disruptive Learning focuses on the re-orientations of learners' frames of mind, with a view to enabling deeper consideration of interconnectedness of ecological, social, economic, political, intergenerational justice *inter alia*, and also to enable change agency for sustainability. In doing so, it aims to enable the learners to critically reflect on their own values bases, and the implications of that in their responses to the complexity and multiplicity of sustainability challenges.

This comparison of Pedagogy of Discomfort and Disruptive Learning suggests that the two theories are substantially different on all but one of the identified criteria, namely, that promoting disruption within the affective domain can be used to provide an initial stimulus for learning in both theories.

7.7 Researcher Reflections

> From the vantage point of the colonized, a position from which I write, and choose to privilege, the term 'research' is inextricably linked to European imperialism and colonialism. The word itself, 'research' is probably one of the dirtiest words in the indigenous world's vocabulary (Smith 1999, apud Denzin, 2005, p.933).

This research, from early design stages through to the latter stages of the research process, has been a process of reflecting on and asking questions about research, teaching and learning, and the journey is still on-going. It was a rich learning experience that was also intensified by different challenges.

This journey significantly contributed to my professional development as a researcher and as an educator. The research process enhanced my analytical and writing skills. The analysis of the lived experience of the Visual Cue interventions, also enabled me to deeply reflect on my performance as a facilitator/ researcher, based on participants' feedback/insight and my personal impressions. Before conducting this study, I had little prior knowledge of learning theories. The data analysis improved my understanding of learning processes based on issues which were emerging from the data without preconceptions.

Being a reflective and reflexive researcher has been a priority throughout this entire research process. While I am confident of having made the greatest effort to be reflexive at every stage of this research, it is essential to acknowledge the possibility of having been blinded by biases regarding the researchers own value system. The values and beliefs of a research form the axiological assumptions, which have fundamental implications on every study. My values and beliefs influenced this research in several ways. To name one example, this research is based on the belief that anthropocentric viewpoints are the roots of unsustainable challenges and crisis we are experiencing.

Throughout this study, I assumed a dual capacity of being the facilitator and researcher. From a social constructivist standpoint, the insider's perspectives are the core of the research and being the facilitator allowed me to be close to my participants. From an outsider perspective, the researcher should remain open to the participants' perceptions, should avoid premature judgements or the reliance on prior assumptions. Throughout this research, I was open minded and interested to learn from the participants. However, I cannot eliminate that my perceptions and interpretations of the impact of the Visual Cue interventions were influenced by my role as a facilitator. I managed the dual capacity of being the facilitator and the researcher through the use of different methods, capturing descriptive accounts of the participants and my reflective diaries in an effort to 'tell the story' of how participants experienced the Visual Cue interventions.

The identification of strategies to overcame challenges during the analysis process has been a significant learning experience. The rigorous structure of the analysis process hindered me at times to explore lines of thoughts that emerged at a fast pace in my mind, but could not flourish and were only recorded in diaries. Here, the researcher dairies supported me to deal

with the long and laborious process of coding and the writing of memos solved my challenge to abstract codes to another level.

Moreover, this research was conducted in my second language. The writing process trained me to pay attention to the details by constantly checking back and revising written accounts. English as my second language became occasionally a challenge within the analysis process when I was unsure if I interpreted the meaning accurately. However, the codes constantly improved through repeated examination of all statements, clarification with participants of statements and constant refinement recorded in the memos. Constructivist Grounded Theory is a flexible approach and there are no standard rules to follow for the identification of categories (Charmaz 2006). It was the reflexive process, through detailed memo writing about constant comparisons within the data set, that resulted in the generation of the theory of Disruptive Learning. Thus, following Charmaz (2006), the theory was not discovered, but emerged from both, the reflection of the researcher and the participants' reflections on the lived experience of the Visual Cue interventions.

Charmaz (2006) suggests member checking, a technique where the researcher returns to participants, asking them to validate the final version of the researchers' interpretations. She emphasises that "*although member-checking generally refers to taking ideas back to research participants for their confirmation, you can use return visits to gather material to elaborate your categories*" (Charmaz 2006, p.111). In this research, member-checking took place indirectly through follow up interviews to enhance the theoretical categories. During the follow up interviews in the second research phase, participants reconfirmed critical elements, such as their initial disruption, and their (continuous) engagement in change agency for sustainability.

Constructivist Grounded Theory can be understood as 'epistemologically subjective' and 'ontologically relativist' (Mills et al. 2006, p.6), where meaning is constructed through interpretations of the data that assume a relativist and reflexive approach to the data (Charmaz 2006). However, any interpretations of a social construction will remain incomplete and, as a researcher, it is important to leave room for alternative interpretations as it is "*not that our understanding is poor, rather, it is that social realities are so extraordinarily rich*" (Alvesson & Kärreman 2000, p.147). For this resason, the value of

Constructivist Grounded Theory is that it constructs a theory that will have different meanings to different people and that is open to alterations and new data.

7.8 Recommendations

This section lays out recommendations for future research on theory of, or pedagogic processes within, Disruptive Learning.

This research study articulated the process of enabling disruption and Deep Learning for sustainability using Visual Cue interventions, which is one way of how Disruptive Learning can be facilitated. It is important to recognise that there may be other pedagogic strategies, processes and/ or techniques that can also enable disruptive forms of learning. Further research might identify alternative interventions that can facilitate Disruptive Learning in higher education or other levels or areas of education. Here, Actor Network Theory (ANT) might provide additional insights into the learning process and could be beneficial to the design of Disruptive Learning interventions and Visual Cues. ANT is a philosophical tool that dialogues with the rhizome (Deleuze and Guattari 1987) and perceives human and non-human actors in accordance to the principle of symmetry (Latour 2005). It is based on non-anthropocentric perspectives and has the potential to rethink pedagogy by disregarding humans and their attributes as the only actors of the learning process (Ferrante and Sartory 2016). In terms of future research, it has the potential to explore the significance of non-human actors in sustainability education, specifically their role in (dis) enabling learning within Disruptive Learning interventions. In addition, future research could also explore possibilities of connecting Disruptive Learning to Murray's Sustainable Self Model, which could be beneficial to design alternative interventions.

This study relied on materials that were in the public domain for the design of Visual Cues, such as public art or works developed to raise public awareness of sustainability. While some of the key considerations in the selection of Visual Cues have been articulated within this research study, further research will be required to define key design criteria for Visual Cue artefacts. Furthermore, the impact of the Visual Cue interventions was analysed only through written and oral accounts within this research study. Technological development in neuro-imaging could provide additional data in future studies in this domain, informing Visual Cue design factors, the impact of Visual Cue interventions or alternative interventions of

Disruptive Learning. For example: Functional Magnetic Resonance Imaging is a specialised MRI scan for brain imaging. Through the recording of blood flow, which can be analysed on a screen, researchers could be able to detect the specific areas of the brain, which are activated when being engaged in Disruptive Learning. Ultimately, it is this kind of research that will contribute fundamentally to the understanding of emotions and cognitions. In addition, eye tracking could be also useful to record what students pay attention to when viewing the Visual Cues, and inform the design of Visual Cues. Some eye tracking devises can be used to measure emotions, for example through facial expressions, which could be also of benefit for future research of Disruptive Learning in terms of better understanding reactions of participants.

This research study drew participants solely from the disciplinary area of education, within the context of initial teacher education, in a higher education setting. Future research could further contribute to Disruptive Learning by engaging participants within other disciplinary areas in higher education, from other educational contexts, and from partner networks. In line with this, the role of the educator in facilitating Disruptive Learning initiatives requires further exploration. Disruptive Learning necessitates a form of facilitation that maintains the 'thin line' between discomfort and disruption. Further research into the facilitator approach of Disruptive Learning would be also beneficial to the articulation of training for educators, wishing to integrate Disruptive Learning in their practice.

A further recommendation is the promotion of Disruptive Learning in initiatives aiming to foster ESD within teacher education in particular, as the framework has been shown very effective within that domain. To help facilitate this, the materials created for the Visual Cue intervention will be compiled into a toolkit, which educators can adapt or use within their own teaching and learning in EfS/ESD. The toolkit will include a Lesson Plan, explaining how the Visual Cue intervention works, some sample Visual Cues, and advice for facilitators.

7.9 Conclusions

Sustainability challenges are complex and fluid, and demand non-human centric thinking in constructing viable solutions. Higher education students need to be engaged in pedagogic interventions that enable them to critique dominant human-centric worldviews and to grasp

the multiplicity and interconnectedness of sustainability challenges. This research set out to explore pedagogic processes that could do this within a higher education institution in Ireland within an undergraduate degree of teacher education. Kathy Charmaz Constructivist Grounded Theory (CGT) approach, was applied to explore (pedagogic) processes that enable [re] orientations of higher education students' mind-sets towards sustainability, and promote change agency for sustainability. This research study has identified an overarching theory: Disruptive Learning, and articulated a pedagogic strategy employing Visual Cues, that can be used to re-orient frames of mind of higher education students towards sustainability. Therefore, the contribution of this research is both, a theory and strategy to the field of sustainability education that have the potential to bring about transformations of self (learner) and society.

This study was guided by three research questions, resulting in the following contributions to knowledge:

What impact do Visual Cue pedagogic interventions have on participants' frames of reference (thoughts and/ or feelings)? The findings have demonstrated that Visual Cue interventions disrupt frames of reference. The findings include the articulation of the theory of, and processes within, Disruptive Learning. Disruptive Learning rests on the premise that if learners' *frames of mind* or *frames of reference* can be disrupted (in other words, challenged), then learners' mind-sets can be re-oriented towards sustainability and indeed learners can be motivated to engage in change agency for sustainability. Disruptive Learning in the context of sustainability education activates the perception of sustainability as a frame of mind, which recognises humanness and/or sustainability through 'betweeness'. It enables learners to reflect on their own values bases, with a view to critically reviewing and re-orienting anthropocentric (human-centric) perspectives on sustainability, and engaging in change agency for sustainability.

Which elements of Visual Cue interventions impact participants' frames of reference, and to what extent? The combination of the pedagogic tools and processes employed within Visual Cue interventions activated Disruptive Learning and offered opportunities for deep consideration and sharing of perspectives, values, and worldviews. The processes included introduction of a disorienting dilemmas (Visual Cue), followed by opportunities for individual reflection and group discourse. The combination of the viewing of the Visual Cue

and responding to the diary questions, inspired by Expressive Writing, contributed to disruption of existing frames of mind for many participants. The facilitation of the group discussions was inspired by the Classic Socratic Method, encouraging students to get a sense of their own non-sustainability perspectives and dispositions. The post-discussion reflection supported deeper exploration of emotions and thoughts triggered by the Visual Cue intervention. Overall, this study has shown that the combination of the chosen pedagogic processes result in: (1) disruption – unsettling of learners' existing frames of reference vis-à-vis sustainability; followed by (2) Deep Learning, to critique and strategise for sustainability, **and** reorientation of frames of mind towards becoming more sustainability oriented; and/ or, (3) change agency, to conduct sustainability actions.

To what extent do Visual Cue interventions enable participants to critically review the self in the context of sustainability? This study exemplified that Disruptive Learning can activate transformations *in self* and *of self*, particularly re-orientation of mind-sets towards sustainability, and enable change agency for sustainability. The evidence shows that learners moved into deeper levels of critique, and engaged in change agency, but to differing degrees.

At the outset of this research study, it was evident that while the need for sustainability education was recognised by many, there was limited evidence of pedagogic strategies that could stimulate changes in learners' frames of mind and/ or enhance change agency for sustainability. The findings from this research study present one such pedagogic strategy (Visual Cue intervention) that could be used by educators to activate re-orientations of mind-sets of higher education students towards sustainability. It also offers a theory of Disruptive Learning for discussion to scholars and researchers in the field of sustainability education and other disciplines. This research will hopefully not only contribute to on-going debates on processes and practices necessary for the broader infusion of sustainability in higher education within and beyond Ireland, but also stimulate visions to remake education in the light of multi-dimensional challenges posed by today's world. This research might be interesting to foster discussions on how educators can stimulate learners to critically review and deeply consider the idea that the wellbeing of this planet requires respect for the interdependencies among all its entities; including non-living and living things. Human beings have never been, and will never be, by themselves.

Reference List

Adami, V. 2013. Culture, language and environmental rights: the anthropocentrism of English. *Pólemos Journal of Law, Literature and Culture,* 7(2), pp.335-355.

Adams, K. 2014. *Expressive writing: classroom and community.* United Kingdom: Rowman & Littlefield.

Ahmed, S. 2004. *The cultural politics of emotion.* Edinburgh: Edinburgh University Press.

Alvesson, M. 2003. Beyond neopositivists, romantics, and localists: a reflexive approach to interviews in organizational research. *Academy of Management Review,* 28(1), pp.13–33.

Alvesson, M. & Kärreman, D. 2000. Taking the linguistic turn in organizational research: challenges, responses, consequences. *The Journal of Applied Behavioral Science*, 36(2), pp.136-178.

Alvesson, M. and Sköldberg, K. 2009. *Reflexive methodology*. London: Sage.

Armstrong, C.M. 2011. Implementing education for sustainable development: the potential use of time-honoured pedagogical practice from the progressive era of education. *Journal of Sustainability Education*, Vol. 2 [Online]. Available from: http://www.jsedimensions.org/wordpress/wp-content/uploads/2011/03/Armstrong2011.pdf [Accessed 2 May 2017].

Avolos, B. and Winslade, J. 2010. Education as a 'line of flight'. *Explorations: An E-journal of Narrative Practice.* 1, pp.70-77.

Barber, B. and Rousseau, L. 2013. The living home: building it into the curriculum. *IN:* Johnston, L.F. (ed.) *Higher education for sustainability: cases, challenges, and opportunities from across the curriculum.* New York: Routledge, pp.169-182.

Bauman, Z. 1991. *Modernity and ambivalence.* Cambridge: Polity Press.

Beck, U. 1992. *Risk society: towards a new modernity*. London: Sage Publications.

Beck, U. 1999. *World risk society*. Oxford: Blackwell Publishers Ltd.

Bell, L. 1998. Public and private meanings in diaries: researching family and childcare. *IN:* Ribbens, J. and Edwards, R. (eds.) *Feminist Dilemmas in Qualitative Research.* London: Sage, pp.72-86.

Biedenweg, K., Monroe, M.C. and Oxarart, A. 2013. The importance of teaching ethics of sustainability. *International Journal of Sustainability in Higher Education.* 14(1), pp.6-14.

Bielefeldt, A.R. 2013. Pedagogies to achieve sustainability learning outcomes in civil and environmental engineering students. *Sustainability,* 5, pp.4479-4501.

Birdsall, S. 2013. Measuring student teachers' understandings and self-awareness of sustainability. *Environmental Education Research,* pp.1-22.

Blenkinsop, S. and Morse, M. 2017. Saying yes to life: the search for the rebel teacher. *IN:* Jickling, B. and Sterling, S. (eds.) *Post-sustainability and environmental education: remaking education for the future.* Cham, Switzerland: Palgrave Macmillan, pp.49-61.

Boler, M. 1999. *Feeling power: emotions and education*. New York: Routledge.

Bolton, H. 2001. Managers develop moral accountability: the impact of Socratic Dialogue. *Philosophy of Management,* 1(3), pp.21-34.

Bonnett, M. 1999. Education for sustainable development: a coherent philosophy for environmental education? *Cambridge Journal of Education*, 29(3), pp.313-324.

Bonnett, M. 2013. Sustainable development, environmental education, and the significance of being in place. *The Curriculum Journal,* 24(2), pp.250-271.

Bradbear, N. 2009. *Bees and their role in forest livelihoods: a guide to the services provided by bees and the sustainable harvesting, processing and marketing of their products* [Online]. Available from: ftp://ftp.fao.org/docrep/fao/012/i0842e/i0842e.pdf [Accessed 27 March 2017].

Bratton, J. 2010. *Work & organizational behaviour.* UK: Palgrave Macmillan.

Breidlid, A. 2013. *Education, indigenous knowledges, and development in the global south.* New York: Routledge.

Breiting, S. 2009. Issues for environmental education and ESD research development: looking ahead from WEEC 2007 in Durban. *Environmental Education Research,* 15(2), pp.199–207.

Brockbank, A. and McGill, I. 1998. *Facilitating reflective learning in higher education.* Milton Keynes: SRHE/ Open University Press.

Brookfield, S.D. 1987. *Developing critical thinkers.* San Francisco: Jossey-Bass.

Brookfield, S.D. 2012. *Teaching for critical thinking: tools and techniques to help students question their assumptions.* San Francisco, CA: Jossey-Bass.

Brookfield, S.D. 2005. *The power of critical theory for adult learning and teaching*. Maidenhead, UK: Open University Press.

Brookfield, S.D. 2000. Transformative learning as ideology critique. *IN:* Mezirow, J. and Associates (eds). *Learning as transformation: critical perspectives on a theory in progress.* San Francisco, CA: Jossey-Bass, pp.125-148.

Brown, S.C., Stevenson, R.A., Troiano, P.F. and Schneider, M.K. 2002. Exploring complex phenomena: grounded theory in student affairs research. *Journal of College Student Development,* 43(2), pp.173-183.

Bruskotter, J.T., Hitzhusen, G.E., Wilson, R.S. and Zwhickle, A. 2013. Understanding student environmental interests when designing multidisciplinary curricula. *IN*: Johnston, L.F. (ed.) *Higher education for sustainability: cases, challenges, and opportunities from across the curriculum.* New York: Routledge, pp.29-44.

Bryant, A. and Charmaz, K. 2007. Introduction: grounded theory research methods and practices. *IN:* Bryant, A. and Charmaz, K. (eds.) *The Sage handbook of grounded theory,* Thousand Oaks, CA: SAGE, pp.1-28.

Caldwell, R. 2006. *Agency and change: rethinking change agency in organizations*. New York: Routledge.

Carlowitz, H.C. von. 1713. *Sylvicultura oeconomica oder Anweisung zur wilden Baum-Zucht.* Leipzig.

Carp, R.M. 2013. Toward a resilient academy. *IN:* Johnston, L.F. (ed.) *Higher education for sustainability: cases, challenges, and opportunities from across the curriculum.* New York: Routledge, pp.223-237.

César Manrique Foundation 2014. *Biography* [Online]. Available from: http://www.cesarmanrique.com/biografia_i.htm [Accessed 27 March 2017].

Chandra, D.V. 2014. Re-examining the importance of indigenous perspectives in the western environmental education for sustainability: 'from tribal to mainstream education'. *Journal of Teacher Education for Sustainability,* 16(1), pp.117-127.

Charmaz, K. 2006. *Constructing grounded theory: a practical guide through qualitative analysis.* Los Angeles: SAGE.

Charmaz, K. 1995. Grounded theory. *IN:* Smith, J.A., Harre, R. and Van Langenhove, L. (eds.) *Rethinking methods in psychology.* London: Sage, pp.27-49.

Charmaz, K. 2015. *Grounded theory a constructivist approach.* Workshop presented at the 8th Qualitative Research Summer School 2015, Dublin City University, 5th-6th of May.

Charmaz, K. 2005. Grounded Theory in the 21st Century: applications for advancing social justice studies. *IN:* Denzin, N.K. and Lincoln, Y.S. (eds.) *Handbook of qualitative research,* 2nd Edition, Thousand Oaks, CA: SAGE, pp.507-536.

Charmaz, K. 2000. Grounded theory – objectivist versus constructivist grounded theory. *IN:* Denzin, N.K. and Lincoln, Y.S. (eds.) *Handbook of qualitative research,* 2nd Edition, Thousand Oaks, CA: SAGE, pp.509-535.

Chesters, S.D. 2012. *The Socratic classroom: reflective thinking through collaborative inquiry.* Rotterdam, Netherlands: Sense Publishers.

Cilliers, P. 2005. Complexity, deconstruction and relativism. *Theory, Culture & Society,* 22(5), pp.255-267.

Clair, R. 2015. *Creating courses for adults: design for learning.* San Francisco, CA: Jossey-Bass.

Clarke, A.E. 2003. Situational analyses: grounded theory mapping after the postmodern turn. *Symbolic Interaction,* 26, pp.553-576.

Clarke, P. 2012. *Education for sustainability: Becoming naturally smart*. New York: Routledge.

Coghlan, D. and Jacobs, C. 2005. Kurt Lewin on Reeducation: foundations for action research. *The Journal of Applied Behavioural Science,* 41(4), pp.444-457.

Cook, R., Cutting, R. and Summers, D. 2010. If sustainability needs new values, whose values? Initial teacher training and the transition to sustainability. *IN:* Jones, P., Selby, D. and Sterling, S. (eds.) *Sustainability education: perspectives and practices across higher education*. London: Earthscan, pp.313-327.

Corcoran, B.P. 2010. Forward. *IN:* Jones, P., Selby, D. and Sterling, S. (eds.) *Sustainability education: perspective and practice across higher education.* UK: Earthscan, pp.xiii-xv.

Cotton, D.R.E. and Winter, J. 2010. It's not just bits of paper and light bulbs: a review of sustainability pedagogies and their potential for use in higher education. *IN:* Jones, P., Selby, D. and Sterling, S. (eds.) *Sustainability education: perspectives and practices across higher education*. London: Earthscan, pp.39-54.

Couch, R. 1991. Five minutes to monitor progress. *The Teaching Professor,* 5(9), pp.1-2.

Cowen, V.S., Kaufman, D. and Schönherr, L. 2016. A review of creative and expressive writing as a pedagogical tool in medical education. *Medical Education,* 50, pp.311-319.

Cranton, P. 2006. *Understanding and promoting transformative learning: a guide for educators of adults*. San Francisco, CA: Jossey-Bass.

Creswell, J.W. 2007. *Qualitative inquiry and research design: choosing among five approaches*. Thousand Oaks, CA: Sage.

Davis, K. 2014. *Creative interviewing in qualitative research.* Workshop presented at the 7th Qualitative Research Summer School 2014, Dublin City University, 24th of April.

Dawson, A. 2013. Introduction to focus: apocalypse now. *American Book Review,* 34(2), pp.3.

DeLanda, M. 2006. *A new philosophy of society: assemblage theory and social complexity.* London: Bloomsbury.

Deleuze, G. and Guattari, F. 1987. *A thousand plateaus: capitalism and schizophrenia*. Minneapolis, MN: The University of Minnesota Press.

Delors, J. 1996. *Learning: the treasure within. Report to UNESCO of the international commission on education for the twenty-first century.* Paris, UNESCO.

Delors, J. 2013. The treasure within: Learning to know, learning to do, learning to live together and learning to be. What is the value of that treasure 15 years after its publication? *International Review of Education,* 59, pp.319-330.

Denzin, N.K. 2005. Emancipatory discourses and the ethics and politics of interpretation. *IN:* Denzin, N.K. and Lincoln, Y.S. (eds.) *Handbook of qualitative research,* 2nd Edition, CA: Sage Thousand Oaks, pp.933-958.

Denzin, N.K. and Lincoln, Y.S. 2005. Introduction: the discipline and practice of qualitative research. *IN:* Denzin, N.K. and Lincoln, Y.S. (eds.) *Handbook of qualitative research,* 2nd Edition, CA: Sage Thousand Oaks, pp.1-32.

Department of Education and Skills. 2014. *'Education for sustainability': the national strategy on education for sustainable development in Ireland, 2014-2020* [Online]. Available from: https://www.education.ie/en/Publications/Policy-Reports/National-Strategy-on-Education-for-Sustainable-Development-in-Ireland-2014-2020.pdf [Accessed 3 May 2017].

Desai, D. and Darts, D. 2016. Interrupting everyday life: public interventionist art as critical public pedagogic. *The International Journal of Art and Design Education,* 35(2), pp.183-195.

De Sousa, R. 1987. *The rationality of emotion*. Cambridge, MA: MIT Press.

Deuchar, R. 2006. Not only this, but also that! Translating the social and political motivations underpinning enterprise and citizenship education into Scottish schools. *Cambridge Journal of Education,* 36(4), pp.533-547.

Deuchars, R. 2011. Creating lines of flight and activating resistance: Deleuze and Guattari's war machine. *AntePodium,* Vistoria University Wellington [Online]. Available from: http://www.victoria.ac.nz/atp/articles/pdf/Deuchars-2011.pdf [Accessed 27 March 2017].

Dirkx, J.M. 2008. The meaning and roles of emotions in adult learning. *New Directions for Adult and Continuing Education,* 2008(120), pp.7-18.

Dobson, H.E. and Bland Tomkinson, C. 2012. Creating sustainable development change agents through problem-based learning. *International Journal of Sustainability in Higher Education.* 13(3), pp.263-278.

Dunlap, R.E. 2008. The new environmental paradigm scale: from marginality to worldwide use. *The Journal of Environmental Education,* 40(1), pp.3-18.

Dunlap, R.E. & Van Liere, K.D. 1978. The new environmental paradigm: a proposed measuring instrument and preliminary results. *Journal of Environmental Education,* 9(4), pp.10-19.

Easterly, W. 2015. The SDGs should stand for senseless, dreamy, garbled. *Foreign Policy* [Online], 28 September. Available from: http://foreignpolicy.com/2015/09/28/the-sdgs-are-utopian-and-worthless-mdgs-development-rise-of-the-rest/ [Accessed 2 May 2017].

Eaton, M., Davies, K., Gillespie, M., Harding, K. and Daloz Parks, S. 2013. Living the questions: contemplative and reflective practices in sustainability education. *IN:* Barlett, P.F. and Chase, G.W. (eds.) *Sustainability in higher education.* USA: MIT Press.

Eernstman, N. and Wals, A.E.J. 2013. Locative meaning-making: an arts-based approach to learning for sustainable development. *Sustainability,* 5, pp.1645-1660.

Eilam, E., and Trop, T. 2010. ESD pedagogy: a guide for the perplexed. *The Journal of Environmental Education,* 42(1), pp.43–64.

Ennis, R. 2011. Critical thinking: reflection and perspective part II. *Inquiry: Critical Thinking Across the Disciplines.* 26(2), pp.5-19.

Escrigas, C., Granados Sanchez, J., Hall, B. and Tandon, R. 2014. Editors' introduction: knowledge, engagement and higher education contributing to social change. *IN:* Global University Network for Innovation (ed.). *Higher education in the world: knowledge, engagement and higher education: contributing to social change,* Basingstoke: Palgrave, MacMillan, pp.xxxi-xxxix.

Evans, J.F. 2014. Preface. *IN:* Adams, K. (ed.). *Expressive writing: classroom and community.* United Kingdom: Rowman & Littlefield.

Fadnes, I. 2016. Brazil's Fundao dam collapse: the silence after the mud. *Aljazeera* [Online], 14 June. Available from: http://www.aljazeera.com/amp/indepth/features/2016/05/brazil-fundao-dam-collapse-silence-mud-160510065442136.html [Accessed 28 February 2017].

Farrell, J.J. 2013. The moral ecology of everyday life. *IN:* Johnston, L.F. (ed.), *Higher education for sustainability: cases, challenges, and opportunities from across the curriculum*. New York: Routledge, pp.154-168.

Faure, E., Herrera, F., Kaddoura, A.R., Lopes, H., Petrovsky, A.V., Rahnema, M. and Ward, F.C. 1972. *Learning to be: the world education today and tomorrow*. Paris: UNESCO.

Feinstein, B.C. 2004. Learning and transformation in the context of Hawaiian traditional ecological knowledge. *Adult Education Quarterly,* 54, pp.105-120.

Felman, S. 1992. Education and crisis, or the vicissitudes of teaching. *IN:* Felman, S. (ed.) *Testimony: crises of witnessing in literature, psychoanalysis, and history.* New York: Routledge, pp.1-56.

Fernandes, G.W., Goulart, F.F., Ranieri, B.D., Coelho, M.S., Dales, K., Boesche, N., Bustamante, M., Carvalho, F.A., Carvalho, D.C., Dirzo, R., Fernandes, S., Galetti, Jr.P.M., Garcia Millan, V.E., Mielke, C., Ramirez, J.L., Neves, A., Rogass, C., Ribeiro, S.P., Scariot, A. and Soares-Filho, B. 2016. Deep into the mud: ecological and socio-economic impacts of the dam breach in Mariana, Brazil. *Natureza & Conservação,* 14, pp.35-45.

Ferrante, A. and Sartori, D. 2016. From anthropocentrism to post-humanism in the educational debate. *Relations,* 4.2, November, pp.175-194.

Fien, J. and Tilbury, D. 2002. Chapter 1: The global challenge of sustainability. *IN:* Tilbury, D., Stevenson, R.B., Fien, J. and Schreuder D. (eds.), *Education and sustainability: responding to the global challenge*. Gland, Switzerland: IUCN, Commission on Education and Communication, pp.1-12.

Foulk, D. and Hoover, E. 1996. Incorporating expressive writing into the classroom. *Technical Report Series,* number 16.

Freire, P. 1974. *Education for critical consciousness*. New York: Continuum International.

Gergen, K.J. 1985. The social constructionist movement in modern psychology. *American Psychologist*, 40(3), pp.266-275.

Glaser, B.G. 2012. Constructivist grounded theory? *The Grounded Theory Review,* 11(1), pp.28-39.

Glaser, B.G. and Strauss, A.L. 1965. *Awareness of dying.* Chicago: Aldine.

Glaser, B.G. and Strauss, A.L. 1967. *The discovery of grounded theory*. Chicago: Aldine.

Goleman, D. 1998. *Working with emotional intelligence*. New York: Bantam.

González-Gaudiano, E.J. and Gutiérrez-Pérez, J. 2017. Resilient education: confronting perplexity and uncertainty. *IN:* Jickling, B. and Sterling, S. (eds.) *Post-sustainability and environmental education: remaking education for the future.* Cham, Switzerland: Palgrave Macmillan, pp.125-138.

Grauerholz, L. 2001. Teaching holistically to achieve deep learning. *College Teaching,* 44, pp.44-51.

Grober, U. 2010. *Die Entdeckung der Nachhaltigkeit: Kulturgeschichte eines Begriffs.* Deutschland: Kunstmann.

Guattari, F. 1989. The three ecologies. *New Formations*, 8, pp.131-147.

Guba, E.G. and Lincoln, Y.S. 2005. Paradigmatic controversies, contradictions, and emerging confluences. *IN*: Denzin, N.K. and Lincoln, Y.S. (eds.) *Handbook of qualitative research,* 2nd Edition, Thousand Oaks, CA: Sage, pp.191-216.

Hay, R. 2005. Becoming ecosynchronous, part 1. The root cause of our unsustainable way of life. *Sustainable Development,* 13, pp.311-325.

Helgeson, J., Van der Linden, S. and Chabay, I. 2012. The role of knowledge, learning and mental models in public perceptions of climate change related risks. *IN:* Wals, A.E.J. and Corcoran P.B. (eds.) *Learning for sustainability in times of accelerating change*. Wageningen, NL: Wageningen Academic Publishers, pp.329-346.

Henn-Memmesheimer, B., Bahlo, C., Eggers, E. and Mkhitaryan, S. 2012. Zur Dynamik eines Sprachbildes: Nachhaltig. *IN:* Hansen-Kokorus, Henn-Memmesheimer and Seybert (eds.) *Sprachbilder und kulturelle Kontexte.* Mannheimer Studien zur Literatur-und Kulturwissenschaft Bd 50: Ingbert, pp.159-186.

Herron, E.C. 2009. Feeling, art, and sustainable civil society. *Jung Journal: Culture and Psyche,* 3(4), pp.112-122.

Higginbottom, G. and Lauridsen E.I. 2014. The roots and development of constructivist grounded theory. *Nurse Researcher,* 21(5), pp.8-13.

Homer-Dixon, T. 2006. *The upside of down: catastrophe, creativity and the renewal of civilisation.* London: Souvenir Press.

Horne, R., Fien, J., Beza, B.B. and Nelson, A. 2016. *Sustainability citizenship in cities: theory and practice.* UK: Routledge.

Howie, P. and Bagnall, R. 2015. A critical comparison of transformation and deep approach theories of learning. *International Journal of Lifelong Education,* 34(3), pp.348-365.

Huckle, J. 2006. *Education for sustainable development: a briefing paper for the training and development agency for schools* [Online]. Available from: https://huckleorguk.files.wordpress.com/2016/10/huckle2006.pdf [Accessed 20 April 2017].

Huckle, J. 1996. Realizing sustainability in changing times. *IN*: Huckle, J. and Sterling, S. (eds.) *Education for sustainability.* London: Earthscan Publications, pp.3-17.

Huckle, J. and Sterling, S. 1996. *Education for sustainability.* London: Earthscan Publications.

Huckle, J. and Wals, A.E.J. 2015. The UN Decade of Education for Sustainable Development: business as usual in the end. *Environmental Education Research,* 21(3), pp.491-505.

Iliško, D. 2007. Teachers as agents of societal change. *Journal of Teacher Education for Sustainability,* 7, pp.14-26.

Jarvis, P., Holford, J. and Griffin, C. 2003. *Theory and practice of learning.* London: Routledge.

Jickling, B. 2017. Education revisited: creating educational experiences that are held, felt, and disruptive. *IN:* Jickling, B. and Sterling, S. (eds.) *Post-sustainability and environmental education: remaking education for the future.* Cham, Switzerland: Palgrave Macmillan, pp.15-30.

Jickling, B. 2009. Environmental education research: to what ends? *Environmental Education Research,* 15(2), pp.209-216.

Jickling, B. 2013. Normalizing catastrophe: an educational response. *Environmental Education Research,* 19(2), pp.161-176.

Jickling, B. 1992. Why I don't want my children to be educated for sustainable development. *Journal of Environmental Education,* 23(4), pp.5-8.

Jickling, B. and Sterling, S. 2017. Post-sustainability and environmental education: framing issues. *IN:* Jickling, B. and Sterling, S. (eds.) *Post-sustainability and environmental education: remaking education for the future.* Cham, Switzerland: Palgrave Macmillan, pp.1-14.

Jickling, B. and Wals, A.E.J. 2008. Globalization and environmental education: looking beyond sustainable development. *Journal of Curriculum Studies,* 40(1), pp.1-21.

Jonassen, D. 1991. Objectivism vs. constructivism. *Educational Technology Research and Development,* 39(3), pp.5-14.

Jones, P., Selby, D. and Sterling S. 2010. Introduction. *IN:* Jones, P., Selby, D. and Sterling S. (eds.) *Sustainability education: perspective and practice across higher education.* UK: Earthscan, pp.1-16.

Kállay, É. 2015. Physical and psychological benefits of written emotional expression: review of meta-analysis and recommendations. *European Psychologist,* 20(4), pp.242-251.

Kiernan, P. 2016. Samarco warned of problems at dam, engineer says. *The Wall Street Journal* [Online] 17 January. Available from: https://www.wsj.com/articles/samarco-warned-of-problems-at-dam-engineer-says-1453093025 [Accessed 10 April 2017].

Kilaru, A.S., Asch, D.A., Sellers, A. and Merchant, R.M. 2014. Promoting public health through public art in the digital age. *American Journal of Public Health,* 104(9), pp.1633 -1635.

Kincheloe, L.L. and McLaren, P. 2005. Rethinking critical theory and qualitative research. *IN:* Denzin, N.K. and Lincoln, Y.S. (eds.) *Handbook of qualitative research,* 2nd Edition. CA: Sage, Thousand Oaks, pp.303-342.

Kopnina, H. 2012. Education for sustainable development (ESD): the turn away from environment in environment education? *Environment Education Research,* 18(5), pp.699-717.

Kopnina, H. 2013. Evaluating education for sustainable development (ESD): using ecocentric and anthropocentric attitudes toward the sustainable development (EAATSD) scale. *Journal of Environment, Development and Sustainability*, 15(3), pp.607-623.

Kopnina, H. 2015. The victims of unsustainability: a challenge to sustainable development goals. *International Journal of Sustainable Development and World Ecology*, 23(2), pp.113-121.

Kopnina, H. and Meijers, F. 2014. Education for sustainable development (ESD): exploring theoretical and practical challenges. *International Journal of Sustainability in Higher Education,* 12(2), pp.188-207.

Kurian, P.A. and Bartlett, R. 2009. Ethics and justice needs for sustainable development. *IN*: Elliot, R.C (ed.) *Institutional issues involving ethics and justice* (Vol. II). Paris, France: UNESCO, Eolss Publishers [Online]. Available at: http://www.eolss.net/sample-chapters/c14/E1-37-04.pdf [Accessed 7 March 2016].

Kvale, S. and Brinkman, S. 2009. *InterViews: learning the craft of qualitative research interviewing.* London: Sage.

Kvale, S. 2007. *Doing interviews.* London: Sage publications.

Ladson-Billings, G. and Donnor, J. 2005. The moral activist role of critical race theory scholarship. *IN:* Denzin, N.K. and Lincoln, Y.S. (eds.) *Handbook of qualitative research,* 2nd Edition. CA: Sage, Thousand Oaks, pp.933-958.

Latour, B. 2005. *Reassembling the social: an introduction to Actor-Network Theory.* New York: Oxford University Press.

Leal Filho, W. 2000. Dealing with misconceptions on the concept of sustainability. *International Journal of Sustainability in Higher Education,* 1(1), pp.9-19.

Leal Filho, W. 2014. The United Nations decade of education for sustainable development: lessons learnt and needs to be met. *International Journal of Sustainability in Higher Education,* 1(2), pp.1-2.

Leal Filho, W., Manolas, E. and Pace, P. 2015. The future we want. *International Journal of Sustainability in Higher Education,* 16(1), pp.112-129.

Le Grange, L.L.L. 2017. Environmental education after sustainability. *IN:* Jickling, B. and Sterling, S. (eds.) *Post-sustainability and environmental education: remaking education for the future.* Cham, Switzerland: Palgrave Macmillan, pp.93-110.

Le Grange, L.L.L. 2011. Sustainability and higher education: from arborescent to rhizomatic thinking. *Educational Philosophy and Theory,* 4(7), pp.742-754.

Lewin, K. 1999. Group decision and social change. *IN:* Gold, M. (ed.) *The complete social scientist: a Kurt Lewin reader.* New York: American Psychological Society Press, pp.265-284.

Lewin, K. 1948. *Resolving social conflicts: selected papers on group dynamics.* Washington, DC: Harper & Brothers.

Lotz-Sisitka, H., Wals, A.E.J., Kronlid, D. and McGarry, D. 2015. Transformative, transgressive social learning: rethinking higher education pedagogy in times of systemic global dysfunction. *Current Opinion in Environmental Sustainability.* 16, pp.73-80.

Lozano, J., Boni, A., Peris, J. and Hueso, A. 2012. Competencies in higher education: a critical analysis from the capabilities approach. *Journal of Philosophy in Education,* 46(1), pp.132-147.

Margola, D., Faccin, F., Molgora, S. and Revenson, T.A. 2010. Cognitive and emotional processing through writing among adolescents who experienced the death of a classmate. *Psychological Trauma: Theory, Research, Practice, and Policy.* 2(3), pp.250-260.

Maxwell, M. 2014. *Introduction to the Socratic method and its effect on critical thinking* [Online]. Available from: http://socraticmethod.net/ [Accessed 26 April 2017].

Maxwell, M. and Melete 2014. *The fundamentals of education: a Socratic perspective on the cultivation of humanity* [Online]. Available from: http://www.socraticmethod.net/how_to_use_the_socratic_method/page1.html [Accessed 26 April 2017].

McCarthy, E. 2010. *Ethics embodied: rethinking selfhood through continental, Japanese, and feminist philosophies.* Plymouth, UK: Lexington Books.

McShane, K. 2008. Convergence, nonintrumental value and the semantics of 'love': reply to Norton. *Environmental Values*, 17(1), pp.15-22.

Meads, C., Lyons, A. and Carrol, D. 2003. *The impact of the emotional disclosure intervention on physical and psychological health – a systematic review.* Birmingham, UK: West Midlands Health Technology Assessment Collaboration.

Medel-Añonuevo, C., Ohsako, T. and Mauch, W. 2001. *Revisiting lifelong learning for the 21st Century*. Hamburg: UNESCO Institute of Education.

Merriam, S.B. 2004. *The new update of adult learning theory. New directions of adult and continuing education.* San Francisco: Jossey-Bass.

Mezirow, J. 1985. A critical theory of self-directed learning. *IN*: Brookfield, S. (ed.) *Self-directived learning: from theory to practice. New directions for continuing education.* San Francisco: Jossey-Bass.

Mezirow, J. 2009. An overview on transformative learning. *IN:* Illeris, K. (ed.) *Contemporary theories of learning.* London: Routledge, pp.90-105.

Mezirow, J. 2000. *Learning as transformation: critical perspectives on a theory in progress*. San Francisco, CA: Jossey-Bass.

Mezirow, J. 1991. *Transformative dimensions of adult learning.* San Francisco, CA: Jossey-Bass.

Mezirow, J. 2003. Transformative learning as discourse. *Journal of Transformative Education*, 1(1), pp.58-63.

Mezirow, J. 1997. Transformative learning: theory to practice. *New Directions for Adult and Continuing Education.* 74, pp.5-12.

Mills J., Bonner, A. and Francis, K. 2006. The development of constructivist grounded theory. *International Journal of Qualitative methods,* 5(1), pp.1-10.

Mintz, K. and Tal, T. 2014. Sustainability in higher education courses: multiple learning outcomes. *Studies in Educational Evaluation,* 41, pp.113-123.

Mochizuki, Y. and Fadeeva, Z. 2008. Regional centres of expertise on education for sustainable development (RCEs): an overview. *International Journal of Sustainability in higher education,* 9(4), pp.369-381.

Moon, J. 2004. *A handbook of reflective and experiential learning.* London: Routledge Falmer.

Moon, J. 2008. *Critical thinking: an exploration of theory and practice.* London: Routledge.

Moon, J. 1999. *Reflection in learning and professional development.* London: Routledge Falmer.

Moore, J. 2005. Is higher education ready for transformative learning? A question explored in the study of sustainability. *Journal of Transformative Education,* 3(1), pp.76-91.

Morowitz, H. and Smith, E. 2006. *SFI working paper: 2006-08-029* [Online]. Available from: http://samoa.santafe.edu/media/workingpapers/06-08-029.pdf [Accessed 5 May 2017].

Murphy, E. 2002. Constructivism: from personal beliefs to theoretical principles. *Morning Watch: Educational and Social Analysis,* 30 (1). Memorial University of Newfoundland [Online]. Available from: http://www.mun.ca/educ/faculty/mwatch/fall02/Murphy.htm [Accessed 2 May 2017].

Murray, P., Douglas-Dunbar, A. and Murray, S. 2014. Evaluating values-centred pedagogies in education for sustainable development. *International Journal of Sustainability in Higher Education,* 15(3), pp.314-329.

Murray, P., Goodhew, J. and Murray, S. 2014. The heart of ESD: personally engaging learners with sustainability. *Environmental Education Research,* 20(5), pp.718-734.

Murray, P. 2011. *The sustainable self: a personal approach to sustainability education*. New York: Earthscan.

Naghettini, A.L. and Lopes, G. 2015. Tailing dam breach – 'the assassination of Brazil's fifth largest river basin'. *Ecologist* [Online], 19 November. Available from: http://www.theecologist.org/News/news_analysis/2986322/tailings_dam_breach_the_assassination_of_brazils_fifth_largest_river_basin.html [Accessed 2 March 2017].

National Geographic 2012. *Alien deep with Bob Ballard,* season 1, episode 3 [Online]. Available from: http://channel.nationalgeographic.com/alien-deep/ [Accessed 5 May 2017].

Nelson Laird, T.F., Shoup, R. and Kuh, G.D. 2005. Measuring deep approaches to learning using the national survey of student engagement. *IN: The Annual Meeting of the Association for Institutional Research 14-18 May 2005 Chicago, IL* [Online]. Available from: http://nsse.indiana.edu/pdf/conference_presentations/2006/air2006deeplearningfinal.pdf [Accessed 7 March 2017].

Nicholl, H. 2010. Diaries as a method of data collection in research. *Paediatric Nursing,* 22(7), pp.16-20.

Nikolopoulou, A., Abraham, T. and Mirbagheri, F. 2010. *Education for sustainable development: challenges, strategies and practices in a globalizing world*. New Delhi: SAGE Publications India Pvt Ltd.

Norton, B.G. 2008. Convergence, nonintrumental value and the semantics of 'love': Comment on McShane. *Environmental Values,* 17(171), pp.5-14.

Nussbaum, M.C. 2010. *Not for profit: why democracy needs the humanities*. Oliverio: Princeton University Press.

O'Brien, W. and Sarkis, J. 2015. U.S. and international community-based sustainability projects for deep learning. *IN:* Davim, J.P. (ed.) *Sustainability in Higher Education.* Cambridge: Woodhead, [Online]. Available from: https://web.wpi.edu/Images/CMS/Business/WP12014_Sustainability_Projects_for_Deep_Learning.pdf [Accessed 3 March 2017].

O'Sullivan, E., Morrell, A. and O'Connor, M. 2002. *Expanding the boundaries of transformative learning: essays on theory and praxis.* New York: Palgrave.

Oulton, C., Dillon, J. and Grace, M. 2004. Reconceptualizing the teaching of controversial issues. *International Journal of Science Education.* 26(4), pp.411-423.

Parris, C.L. and Hegtvedt, K.A. 2014. Justice for all? Factors affecting perceptions of environmental and ecological injustice. *Social Justice Research*, 27(1), pp.67–98.

Pekrun, R. and Stephens, E.J. 2012. Academic emotions. *IN:* Harris, K., Graham, S., Urdan, T., Graham, S., Royer, J. and Zeidner, M. (eds.). *Individual differences and cultural and contextual factors. APA educational psychology handbook.* Washington: American Psychological Association.

Pennebaker, J.W. and Beall, S.K. 1986. Confronting a traumatic event: toward an understanding of inhibition and disease. J*ournal of Abnormal Psychology*, 95(3), pp.274-281.

Pennebaker, J.W. and Chung, C.K. 2011. Expressive writing: connections to physical and mental health. *IN*: Friedman, H.S. (ed.) *The Oxford handbook of health psychology.* UK: Oxford University Press.

Pennebaker, J.W. 2013. Foreword. *IN:* Adams, K.L. (ed.). *Expressive writing: foundations of practice.* MD: R&L Education.

Pennebaker, J.W. and Smyth, J.M. 2016. *Opening up by writing it down: how expressive writing improves health and eases emotional pain.* New York: The Guilford Press.

Pennebaker, J.W. 1997. Writing about emotional experiences as a therapeutic process. *Psychological Science,* 8(3), pp.162-166.

Pepper, D. 1996. *Modern environmentalism: an introduction.* London: Routledge.

Pereira, L. 1996. Stepping out with the constructivist. *Australian Science Teachers Journal,* 42(2), pp.26-28.

Pessoa, L. 2008. On the relationship between emotion and cognition. *Nature,* 9(2), pp.148--158.

Pigem, J. 2007. Faith-based organizations and education for sustainability [Online]. Available from: http://www.arcworld.org/downloads/ARC-Faith-based-ESD-toolkit.pdf [Accessed 25 July 2014].

Pipere, A., Veisson, M. and Salīte, I. 2015. Developing research in teacher education for sustainability: UN DESD via Journal of Teacher Education for Sustainability. *Journal of Teacher Education for Sustainability,* 17(2), pp.11-26.

Pittman, J. 2004. Living Sustainably through higher education: a whole systems design approach to organizational change. *IN:* Corcoran, P.B. and Wals, A.E.J. (eds.). *Higher education and the challenge of sustainability: problematics, promise, and practice*. Dordrecht, Netherlands: Kluwer Academic Publishers, pp.199-212.

Postel, S. 2012. A river in New Zealand gets a legal voice. *National Geographic* [Online], 4 September. Available from: http://voices.nationalgeographic.com/2012/09/04/a-river-in-new-zealand-gets-a-legal-voice/ [Accessed 12 April 2017].

Rachels, J. and Rachels, S. 2012. *The elements of moral philosophy.* 7th edition. New York: McGraw-Hill.

Reason, P. and Tobert, W.R. 2001. The action turn: toward a transformational social science. *Concepts and Transformation,* 6(1), pp.1-32.

Redman, C.L. and Wiek, A. 2013. Sustainability as a transformation in education. *IN:* Johnston, L.F. (ed.) *Higher education for sustainability.* New York: Routledge, pp.214-222.

Roberts, N. 2006. Disorienting dilemmas: their effects on learners, impact on performance, and implications for adult educators. *IN:* Plakhotnik, M.S. & Nielsen, S.M. (eds.) *Proceedings of the Fifth Annual College of Education Research Conference: urban and international education section*. Miami: Florida International University [Online]. Available from: http://digitalcommons.fiu.edu/cgi/viewcontent.cgi?article=1249&context=sferc [Accessed 7 May 2017], pp.100-105.

Robert, S. 2006. Deictic space in Wolof: Discourse, syntax and the importance of absence. *IN:* Hickmann, M. and Robert. S. (eds.) *Space in languages: Linguistic systems and cognitive categories.* Amsterdam, NL: John Benjamins Publishing Co, pp.155-174.

Robinson, H. 2016. Dualism. *IN:* Zalta, E. N (ed.) *The Stanford Encyclopaedia of Philosophy* [Online]. Available from: https://plato.stanford.edu/entries/dualism/ [Accessed 29April2017].

Robinson, J. 2005. *Deeper than reason: emotion and its role in literature, music, and art*. Oxford: Oxford University Press.

Ryan, A. and Tilbury, D. 2013. Unchartered waters: voyages for education for sustainable development in the higher education curriculum. *The Curriculum Journal,* 24(2), pp.272-294.

Saleem, H.A. 2015. Who should we blame for the brazil mining dam disaster? *The Conversation* [Online], 12 November. Available from: http://theconversation.com/who-should-we-blame-for-the-brazil-mining-dam-disaster-5052 [Accessed 20 February 2017].

Savageau, A.E. 2013. Let's get personal: making sustainability tangible to students. *International Journal of Sustainability in Higher Education*, 14(1), pp.15-24.

Schreiber, R.S. and Macdonald, M. 2001. *Using grounded theory in nursing.* New York: Springer.

Schwab, J.J. 1969. The practical: a language for curriculum. *The School Review,* 78(1), pp.1-23.

Scott, W. and Gough, S. 2003. *Sustainable development and learning: framing the issues.* London: Routledge.

Seghezzo, L. 2009. The five dimensions of sustainability. *Environmental Politics,* 18(4), pp.539-556.

Senge, P. 1999. *The fifth discipline fieldbook: strategies and tools for building a learning organization*. London: Nicholas Brealey Publishing.

Shephard, K. 2015. *Higher education for sustainable development.* United Kingdom: Palgrave Macmillan.

Sipos, Y., Battisti, B. and Grimm, K. 2008. Achieving transformative sustainability learning: engaging head, hands and heart. *International Journal of Sustainability in Higher Education,* 9(1), pp.68-86.

Smith, L.T. 1999. *Decolonizing methodologies: research and indigenous peoples.* London: Zed Books.

Song, Y.I.K. 2012. Crossroads of public art, nature and environmental education. *Environmental Education Research,* 18(6), pp.797-813.

Springett, D. 2010. Education for sustainability in the business studies curriculum: ideological struggle. *IN:* Jones, P., Selby, D. and Sterling, S. (eds.) *Sustainability education: perspectives and practices across higher education*. London: Earthscan.

Stables, A.W.G. 2004. Who drew the sky? Conflicting assumptions in environmental education. *IN:* Scott, W. and Gough, S. (eds.) *Key issues in sustainable development and learning: a critical review.* London: Routledge Falmer, pp.41-44.

Stables, A. and Scott, W. 2002. The quest for holism in education for sustainable development. *Environmental Education Research,* 8(1), pp.53-60.

Stacey, R.D. 2001. *Complex responsive processes in organizations*. London: Routledge.

Sterling, S. 2017. Assuming the future: repurposing education in a volatile age. *IN:* Jickling, B. and Sterling, S. (eds.) *Post-sustainability and environmental education: Remaking education for the future.* Cham, Switzerland: Palgrave Macmillan, pp.31-48.

Sterling, S. 1996. Education in Change. *IN:* Huckle, J. and Sterling, S. (eds.) *Education for Sustainability.* London: Earthscan Publications, pp.18-39.

Sterling, S. 2004. Higher education, sustainability, and the role of systemic learning. *IN:* Corcoran, P.B. and Wals, A.E.J. (eds.) *Higher education and the challenge of sustainability.* Dordrecht: Kluwer, pp.49-70.

Sterling, S. and Jickling, B. 2017. An afterword. *IN:* Jickling, B. and Sterling, S. (eds.) *Post-sustainability and environmental education: remaking education for the future.* Cham, Switzerland: Palgrave Macmillan, pp.139-146.

Sterling, S. 2001. *Sustainable education: re-visioning learning and change.* Dartington, United Kingdom: Green Books Ltd, Schumacher Society Briefing no.6.

Sterling, S. and Thomas, I. 2006. Education for sustainability: the role of capabilities in guiding university curricula, *International Journal of Innovation and Sustainable Development,* 1(4), pp.349-370.

Sterling, S. 2010. Transformative learning and sustainability: Sketching the conceptual ground. *Learning and Teaching in Higher Education,* 5, pp.17-33.

Sterling, S. 2003. *Whole systems thinking as a basis for paradigm change in education: explorations in the context of sustainability.* PhD diss., Centre for Research in Education and the Environment, University of Bath [Online]. Available from: www.bath.ac.uk/cree/sterling/sterlingthesis.pdf [Accessed 26 March 2017].

Stevenson, R.B. 2002. Conclusion. Education and sustainable development: perspectives and possibilities. *IN:* Tilbury, D., Stevenson, R.B., Fien, J. and Schreuder, D. (eds.) *Education and sustainability: responding to the global challenge*. Gland, Switzerland: IUCN, Commission on Education and Communication, pp.187-196.

Stevenson, R. 2007. Schooling and environmental/sustainability education: from discourses of policy and practice to discourses of professional learning. *The Journal of Environmental Education*, 13(2), pp.265- 285.

Strauss, A. and Cobin, J. 1990. *Basics of qualitative research grounded theory procedures and techniques.* London: Sage Publications.

Svanström, M., Lozano-García, F.J. and Rowe, D. 2008. Learning outcomes for sustainable development in higher education. *International Journal of Sustainability in Higher Education,* 9(3), pp.271–282.

Tan, C. 2008. *Teaching without indoctrination: implications for values education*. Rotterdam: Sense Publishers.

Tarrant, S.P. and Thiele, L.P. 2016. Practice makes pedagogy – John Dewey and skills-based sustainability education. *International Journal of Sustainability in Higher Education.* 17(1), pp.54-67.

Taylor, E.W. 2000. Analyzing research on transformative learning theory. *IN:* Mezirow, J. (ed.) *Learning as transformation: critical perspectives on a theory in progress*. San Francisco: Jossey-Bass, pp.285-328.

Taylor, E.W. 2006. The challenge of teaching for change. *New Directions for Adult and Continuing Education.* 109, pp.91-95.

Taylor E.W. 1998. *The theory and practice of transformative learning: a critical review.* Columbus, OH: ERIC Clearinghouse on Adult, Career, and Vocational Education.

Taylor, P.W. 1986. *Respect for nature: a theory of environmental ethics.* New Jersey: Princeton University Press.

The Earth Charter Commission 2000. *The Earth Charter,* The Hague.

Thomas, I. 2009. Critical thinking, transformative learning, sustainable education, and problem-based learning in universities. *Journal of Transformative Education.* 7(3), pp.245-264.

Thomas, I. 2014. Special issue – pedagogy for education for sustainability in higher education. *Sustainability*, 6, pp.1705-1708.

Tilbury, D. 2011. *Education for sustainable development: an expert review of processes and learning,* Paris: UNESCO.

Tilbury, D. 2004. Environmental education for sustainability: a force for change in higher education. *IN:* Corcoran, P.B. and Wals, A.E.J. (eds.*). Higher education and the challenge of sustainability: problematics, promise, and practice*. Dordrecht, Netherlands: Kluwer Academic Publishers, pp.97-112.

Tilbury, D. and Wortman, D. 2008. Education for Sustainability in further and higher education. *Planning for Higher Education,* 36(4), pp.5-17.

Tillmanns, T. and Holland, C. 2017. Crafting pedagogical pathways that disrupt and transform anthropocentric mindsets of higher education students. *IN:* Leal Filho, W., Brandli, L., Castro, P. and Newman J. (eds.) *Handbook of theory and practice of sustainable development in higher education.* Cham, Switzerland: Springer, pp.297-312.

Tillmanns, T., Holland, C., Lorenzi, F. and McDonagh, P. 2014. Interplay of rhizome and education for sustainable development. *Journal of Teacher Education for Sustainability,* 16(2), pp.5-17.

Trevino, L.K. and Nelson, K.A. 2011. *Managing business ethics: straight talk about how to do it right.* USA: John Wiley & Sons, Inc.

UN 2015. Transforming our world: The 2030 Agenda for Sustainable development, 21 October [Online]. Available from: http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E [Accessed 25 May 2017].

UNEP 1972. Declaration of the United Nations Conference on the Human Environment, 16 June [Online]. Available from: http://www.un-documents.net/unchedec.htm [Accessed 25 March 2017].

UNESCO 2016. *Framework for the UNDESD International Implementation Scheme,* France [Online]. Available from: http://unesdoc.unesco.org/images/0014/001486/148650E.pdf [Accessed 2 November 2016].

UNESCO 2014a. *Roadmap for implementing the global action programme on Education for Sustainable Development,* France [Online]. Available from: http://unesdoc.unesco.org/images/0023/002305/230514e.pdf [Accessed 5 November 2016].

UNESCO 2014b. *Shaping the future we want – UN Decade of Education for Sustainable Development (2005-2014) Final Report.* France [Online]. Available from: http://unesdoc.unesco.org/images/0023/002303/230302e.pdf [Accessed 6 November 2016].

Van Boeckel, J. 2013. *At the heart of art and earth: an exploration of practices in arts based environment education.* Helsinki: Aalto University publication series.

Van den Akker, J. 2014. Art-based learning: painting the journey of self-realisation. *Reflective Practice: International and Multidisciplinary Perspectives,* 16(6), pp.751-765.

Van de Kelft, D. and Venselaar, J. 2013. A Socratic approach to teaching sustainability. *Sixth International Conference on Engineering Education for Sustainable Development. 2013: Rethinking the Engineer*, Cambridge, UK 22-25 September 2013.

Vidich, A.J. and Lyman, S.M. 2000. Qualitative methods: their history in sociology and anthropology. *IN:* Denzin, N.K. and Lincoln, Y.S. (eds.) *Handbook of qualitative research,* 2nd Edition, Thousand Oaks, CA: Sage, pp.37-84.

Vining, J., Merrick, M.S. and Price, E.A. 2008. The distinction between humans and nature: human perceptions and connectedness to nature and elements of the natural and unnatural. *Research in Human Ecology*, 15(1), p.1-11.

Vitali, S., Glattfelder, J.B., and Battiston, S. 2011. The network of global corporate control. *Plos ONE*, 6(10), p.1-6.

Walker, J. and Palacios, C. 2016. A pedagogy of emotion in teaching about social movement learning. *Teaching in Higher Education,* 21(2), pp.175-190.

Wals, A.E.J. and Blewitt, J. 2010. Third-wave sustainability in higher education: Some (inter) national trends and developments. *IN:* Jones, P., Selby, D. and Sterling, S. (eds.) *Sustainability education: perspectives and practices across higher education.* London: Earthscan, pp.55-74.

Wals, A.E.J. and Jickling, B. 2002. "Sustainability" in higher education: from doublethink and newspeak to critical thinking and meaningful learning. *International Journal of Sustainability in Higher Education,* 3(2), pp.221-232.

Wals, A.E.J. 2012. *Shaping the education of tomorrow: 2012 full-length report on the UN decade of Education for Sustainable Development* [Online]. Available from: http://unesdoc.unesco.org/images/0021/002166/216606e.pdf [Accessed 5 August 2014].

Wals, A.E.J. 2014. Sustainability in higher education in the context of the UNDESD: a review of learning and instutionalization processes. *Journal of Cleaner Production,* 62, pp.8-15.

Warburton, K. 2013. Deep learning and education for sustainability. *International Journal of Sustainability in Higher Education,* 4(1), pp.44-56.

Wasserman, J.A., Clair, J.M. and Wilson, K.L. 2009. Problematics of grounded theory: innovations for developing an increasingly rigorous qualitative method. *Qualitative Research,* 9(3), pp.355-381.

Waters, C.N., Zalasiewicz, J., Summerhayes, C., Barnosky, A.D., Poirier, C., Galuska, A., Cearreta, A., Edgeworth, M., Ellis, E.C., Ellis, M., Jeandel, C., Leinfelder, R., McNeill, J.R., Richter, D., Steffen, W., Syvitski, J., Vidas, D., Wagreich, M., Williams, M., Zhisheng, A., Grinevald, J., Odada, E., Oreskes, N. and Wolfe, A.P. 2016. The Anthropocene is functionally and stratigraphically distinct from the Holocene. *Science,* 351 (6269) [Online]. Available from: http://science.sciencemag.org/content/351/6269/aad2622 [Accessed 3 May 2017].

WCED 1987. *Our common future – The Brundtland Report* [Online]. Available from: http://www.un-documents.net/our-common-future.pdf [Accessed 2 March 2017].

Wei-Haas, M. 2016. Life and rocks may have co-evolved on earth. *Smithsonian* [Online]. Available from: http://www.smithsonianmag.com/science-nature/life-and-rocks-may-have-co-evolved-on-earth-180957807/ [Accessed 5 May 2017].

Wiek, A., Whithycombe, L. and Redman, C.L. 2011. Key competencies in sustainability: a reference framework for academic program development. *Sustainability Science,* 6, pp.203-218.

Wright, A. 2010. Backpack-wearing cockroaches to detect radiation. *National Defense*, 94(676), pp.17.

Yeomans, J. and Bowater, D. 2016. One year on, Brazil battles to rebuild after the Samarco mining disaster. *The Telegraph* [Online], 15 October. Available from: http://www.telegraph.co.uk/business/2016/10/15/one-year-on-brazil-battles-to-rebuild-after-the-samarco-mining-d/ [Accessed 3 March 2017].

Zeegers, Y. and Clark, I.F. 2014. Students' perception of education for sustainable development. *International Journal of Sustainability in Higher Education,* 15(2), pp.242-253.

Zembylas, M. and McGlynn, C. 2012. Discomforting pedagogies: emotional tensions, ethical dilemmas and transformative possibilities. *British Educational Research Journal,* 38(1), pp.41-59.

Zembylas, M. and Papamichael, E. 2017. Pedagogies of discomfort and empathy in multicultural teacher education. *Intercultural Education,* 28(1), pp.1-19.

Zembylas, M. 2015. 'Pedagogy of discomfort' and its ethical implications: the tensions of ethical violence in social justice education. *Ethics and Education,* 10(2), pp.163-174.

Zoller, U. 2015. Research-based transformative science/STEM/STES/STESEP education for "sustainability thinking": from teaching to "know" to learning to "think". *Sustainability,* 7, pp.4474-4491.

Bibliography

Barlett, P.F. and Chase, G.W. 2013. *Sustainability in higher education: stories and strategies for transformation.* USA: MIT Press.

Bauman, Z. 2007. *Consuming life.* Cambridge: Polity Press.

Beighton, C. 2013. Assessing the mess: challenges to assemblage theory and teacher education. *International Journal of Qualitative Studies in Education,* 26(10), pp.1293-1308.

Bonnett, M. 2002. Sustainability as a frame of mind and how to develop it. *The Trumpeter Journal of Ecosophy,* 18(1), [Online]. Available from: http://trumpeter.athabascau.ca/index.php/trumpet/article/view/115/120 [Accessed 20 May 2017].

Chaves, M., Macintyre, T., Verschoor, G. and Wals, A.E.J. 2017. Towards transgressive learning through ontological politics: answering the "call of the mountain" in a Columbian network of sustainability. *Sustainability,* 9(21), pp.1-19.

Clarke, P. 2012. *Education for sustainability: becoming naturally smart.* New York: Routledge.

Das, G. 2009. *The difficulty of being good.* New York: Oxford University Press.

Deleuze, G. 1968. *Difference and repetition.* New York: Columbia University Press.

Engle Richland, L. and Simms, N. 2015. Analogy, higher order thinking, and education. *WIREs Cognitive Science,* 6(2), pp.177-192.

Fahy, F. and Rau, H. 2013. *Methods of sustainability research in the social sciences.* London: SAGE publications.

Ferraro, E. and Reid, L. 2013. On sustainability and materiality. Homo faber, a new approach. *Ecological Economics,* 96, pp.125-131.

Freire, P. 2013. *Education for critical consciousness.* UK: Bloomsbury Academic.

Freire, P. 2005. *Teachers as cultural workers: letters to those who dare teach.* Colorado, USA: Westview Press.

Hardt, M. and Negri, A. 2012. *Declaration.* New York: Argo Navis Author Services.

Horton, M. and Freire, P. 1990. *We make the road by walking: conversations on education and social change.* Philadelphia: Temple University Press.

Kalland, A. 2002. Holism and sustainability: lessons from Japan. *Worldviews,* 6(2), pp. 145-158.

Lather, P. 1993. Fertile obsessions: validity after poststructuralism. *The Sociological Quarterly,* 34(4), pp.673-693.

Latour, B. 2011. Waiting for Gaia. Composing the common world through arts and politics. *A lecture at the French Institute, London* [Online]. Available from: http://www.bruno-latour.fr/sites/default/files/124-GAIA-LONDON-SPEAP_0.pdf [Accessed 29 May 2017].

Lizot, J. 1985. *Tales of the Yanomami: daily life in the Venezuelan forest.* New York: Cambridge University Press.

Meadows, D., Booth Sweeney, L. and Mehers, G.M. 2016. *The Climate Change Playbook.* USA: Chelsea Green Publishing.

Mlodinow, L. 2015. *The upright thinkers.* New York: Vintage Books.

Morgan, G. 2006. *Images of organization.* London: SAGE Publications.

Naess, A. 1989. *Ecology, community and lifestyle: outline of an ecosophy.* Cambridge, UK: Cambridge University Press.

O'Shea, A. and O'Brien, M. 2011. *Pedagogy, oppression and transformation in a 'post-critical' climate: the return of Freirean thinking.* London: Continuum.

Parr, A. 2009. *Hijacking sustainability*. USA: MIT Press.

Scott, W. and Gough, S. 2004. *Key issues in sustainable development and learning: a critical review.* London: Routledge Falmer.

Sharma, S., Starik, M. and Husted, B. 2007. *Organizations and the sustainability mosaic.* USA: Edward Elgar Publishing, Inc.

Singer, P. 2016. *Ethics in the real world: 82 brief essays on things that matter.* UK: Princeton University Press.

Taylor, E.W. and Cranton, P. 2012. *The handbook of transformative learning: theory, research, and practice.* San Francisco, CA: Jossey-Bass.

Tomasello, M. 2009. *Why we cooperate.* USA: MIT Press.

White Jr.L. 1967. The historical roots of our ecologic crisis. *Science,* 155(3767), pp.1203-1207.

Appendix A: Ethical Approval

Ollscoil Chathair Bhaile Átha Cliath
Dublin City University

DCU

Ms Tanja Tillmanns
School of Education Studies

13th June 2014

REC Reference: **DCUREC/2014/112**

Proposal Title: **Sustainable Futures: Identity formation within education for sustainability in higher**

Applicants: **Ms Tanja Tillmanns, Dr Charlotte Holland**

Dear Tanja,

This research proposal qualifies under our Notification Procedure, as a low risk social research project. Therefore, the DCU Research Ethics Committee approves this research proposal. Materials used to recruit participants should state that ethical approval for this project has been obtained from the Dublin City University Research Ethics Committee. Should substantial modifications to the research protocol be required at a later stage, a further submission should be made to the REC.

Yours sincerely,

DCU
Research & Innovation

Dónal O'Mathúna

Dr. Donal O'Mathuna
Chairperson
DCU Research Ethics Committee

Taighde & Nuálaíocht Tacaíocht
Ollscoil Chathair Bhaile Átha Cliath,
Baile Átha Cliath, Éire

Research & Innovation Support
Dublin City University,
Dublin 9, Ireland

T +353 1 700 8000
F +353 1 700 8002
E research@dcu.ie
www.dcu.ie

Appendix B: Informed Consent Form

Informed Consent Form

Research Study: Sustainable Futures: Exploring innovative pedagogies within education for sustainability in higher education.

Tanja Tillmanns, Tillmanns.Tanja@gmail.com
Dr. Charlotte Holland, charlotte.holland@dcu.ie
School of Education Studies, Dublin City University.

Sustainability education is recognised globally by bodies, such as UNESCO in Agenda 21 (1993), as a lynchpin to reorienting dispositions, attitudes and behaviours of individuals towards sustainability, and thus the enablement of just, fairer and sustainable futures for all. Individuals need to be activated as 'agents of change' within educational interventions that promote sustainability. The key to such activation involves the development of new approaches to teaching and learning that promote high levels of critical thinking and discourse on sustainability. This study will examine how learners' dispositions, cognition and/ or behaviours are impacted within sustainability education. The study will involve your engagement in workshops that deploy innovative teaching tools (such as creative visual cues) to stimulate critical discussion about sustainability. Participation in this study will give you the opportunity to have a say in identifying and developing ideas for the integration of education for sustainable development in higher education.

Participant – please complete the following (Circle Yes or No for each question)

I have read or had read to me the Plain Language Statement?	Yes/No
I understand the information provided?	Yes/No
I have had an opportunity to ask questions and discuss this study?	Yes/No
I received satisfactory answers to all your questions?	Yes/No
I am aware that I will be interviewed & will complete surveys during the course of this research?	Yes/No
I am aware that my interview will be audio-taped?	Yes/No
I am aware that I may need to keep a reflective diary?	Yes/No
I am aware that my responses to interviews/ surveys, may be anonymously quoted in Research-based papers?	Yes/No
I am aware that I may withdraw from this study at any time?	Yes/No

Confirmation that involvement in the Research Study is voluntary:

Your involvement in this Research Study is entirely voluntary. You may withdraw from this research study at any point. There will be no penalty for withdrawing before all stages of the Research have been completed.

Confidentiality of data, subject to legal limitations:
Data will be securely held within the School of Education Studies, at Dublin City University, for two years after research is completed and accessed only by the named researchers within this study. The data will be securely disposed of after this. Confidentiality of participants in this research is assured. Confidentiality of information is subject to legal limitations. Should an extract from your response to interviews/ survey be used for research purposes, any information that would identify you will be removed.

Signature:

I have read and understood the information in this form. My questions and concerns have been answered by the researchers, and I have a copy of this consent form. Therefore, I consent to take part in this research project

Participants Signature: _____

Name in Block Capitals: _____

Witness: _____

Date: _____

Appendix C: Plain Language Statement

Plain Language Statement

Research Study: Sustainable Futures: Exploring innovative pedagogies within education for sustainability in higher education.

Tanja Tillmanns, tillmanns.Tanja@gmail.com
Dr. Charlotte Holland, charlotte.holland@dcu.ie
School of Education Studies, Dublin City University.

Sustainability education is recognised globally by bodies, such as UNESCO in Agenda 21 (1993), as a lynchpin to reorienting dispositions, attitudes and behaviours of individuals towards sustainability, and thus the enablement of just, fairer and sustainable futures for all. Individuals need to be activated as 'agents of change' within educational interventions that promote sustainability. The key to such activation involves the development of new approaches to teaching and learning that promote high levels of critical thinking and discourse on sustainability. This study will examine how learners' dispositions, cognition and/ or behaviours are impacted within sustainability education. The study will involve your engagement in workshops that deploy innovative teaching tools (such as creative visual cues) to stimulate critical discussion about sustainability. Participation in this study will give you the opportunity to have a say in identifying and developing ideas for the integration of education for sustainable development in higher education.

Please note that involvement in this research project will require the completion of surveys and interviews. The research is classified as low-risk as there is a very remote risk of possibly creating minor 'discomfort' for some students reflecting on the visual cues. [In the event of discomfort, you will be able to access additional support from student counselling services.] For those participants who are current students in DCU or partner universities, please note that involvement in this research project will not affect ongoing assessment/grades/management in your programme of study. Also involvement in this research study is completely voluntary and no direct or indirect financial benefits will be given. You will benefit directly through the acquisition of information and awareness on some issues related to education for sustainable development and participation will give you a 'voice' in matters concerning the integration of 'Education for Sustainable Development' principles and practices within the Dublin City University community. The research will take-place over a three years period from September 2014 to September 2017. You may withdraw from this research study at any point.

Data will be securely held within the School of Education Studies, at Dublin City University for two years after the conclusion of the study and accessed only by the named researchers within the study. The data will be securely disposed after this period. Confidentiality of participants in this research is assured.

If participants have concerns about this study and wish to contact an independent person, please contact:
The Secretary, Dublin City University Research Ethics Committee, c/o Office of the Vice-President for Research, Dublin City University, Dublin 9. Tel 01-7008000

Appendix D: Survey Type Tool (Phase 1)

TOOL 1

Student Name: _____ Course: _____
Please tick whether this activity has challenged your frame of mind or emotional state, and explain what is different?

	Frame of Mind (Did this impact the way you think? Explain)	Emotional State (Feelings) (Did this impact on how you feel (emotionally)? Explain)
A. First Instant of Viewing image (rat with human ear)	Yes [] No [] Explanation:	Yes [] No [] Explanation:
B. Individual Reflection on the image	Yes [] No [] Explanation:	Yes [] No [] Explanation:
C. Paired discussion	Yes [] No [] Explanation:	Yes [] No [] Explanation:
D. Class discussion	Yes [] No [] Explanation:	Yes [] No [] Explanation:
E. Other: Was there anything else in this activity that challenged you – please explain.	Yes [] No [] Explanation:	Yes [] No [] Explanation:

TOOL 2

Student Name:_____ Course: _____

On a scale of 1 to 5, where 1 is not disruptive and 5 is the most disruptive, please rate the extent to which each activity disrupted your frame of mind, and emotional state, when compared with overall activities.

4A) **Frame of Mind**	**1 (Not Disruptive)**	**2(Mildly Disruptive)**	**3 (Moderately Disruptive)**	**4 (Highly Disruptive)**	**5 (Most Disruptive)**
Activity 1: Rat with human ear					
Activity 2:Man with Horse legs					
Activity 3: Baboon Breastfeed					

4B) Emotional State	**1 (Not Disruptive)**	**2(Mildly Disruptive)**	**3 (Moderately Disruptive)**	**4 (Highly Disruptive)**	**5 (Most Disruptive)**
Activity 1: Rat with human ear					
Activity 2:Man with Horse legs					
Activity 3: Baboon Breastfeed					

TOOL 3

Student Name:_____ Course: _____

What is going through your mind right now?

What have you learned about sustainability today?

Thank You.

Appendix E: Follow-up Questions (Phase 1)

1. Has engagement in this module had any lasting effect on you? Explain.
2. You used the word or phrase _____ [shocking/ disturbing, etc.] to describe your reaction to Visual Cue _____. Can you explain what this phrase means?
3. Any other comments

Appendix F: Reflective Diary Template – Visual Cues (Phase 2)

VISUAL CUE (Framework for Diary Entry)

Diary Entry Number: _____

Student Name: _____

Visual Cue Title:_____

To be completed BEFORE group discussion:

1. Write down thoughts and/ or emotions triggered on the first viewing of this visual cue. [just use key words or phrases]

2. Explain why YOU think these thoughts or emotions were triggered within you?

To be completed AFTER group discussion:

3. Write down what now comes to mind when viewing this visual cue. [just use key words or phrases]

4. Did your emotional state remain the same or change during this process? Please explain.

5. What have you learned today about Sustainability?

6. This section is asking you to reflect on the process of learning using visual cues:

	Question	YES	NO	Please Explain
a.	Did first viewing of the visual cue impact the way you think?			
b.	Did first viewing of the visual cue impact the way you feel?			

c.	Did individually reflecting on the visual cue impact the way you think?			
d.	Did individually reflecting on the visual cue impact the way you feel?			
e.	Did group discussion about the visual cue impact the way you think?			
f.	Did group discussion about the visual cue impact the way you feel?			

Reflective diary template – first and last entry

Name: _____
Please indicate the Diary Entry: FIRST [] LAST[]
Date:

1. What do you understand as Sustainability/ Sustainable Development?

2. What do you think Education for Sustainable Development is?

Appendix G: Semi-structured Interview Guide (Phase 2)

1. Has engagement in this module had any lasting effect on you? Explain.
2. In terms of learning from the module;
    a. Has your level of awareness of sustainability issues changed since you engaged in the module on Education for Sustainable Development? Explain. Which elements had the most impact on this: Lectures [] Visual Cues [] Both [] Other []? Explain.
    b. Have you taken any actions for sustainability since the completion of the module? Explain. Which elements had the most impact on this: Lectures [] Visual Cues [] Both [] Other []? Explain.
    c. Have you spoken out or advocated for rights of marginalised or disenfranchised groups since the completion of the module? Explain. Which elements had the most impact on this: Lectures [] Visual Cues [] Both [] Other []? Explain.
3. Which visual cue is the most memorable when you reflect on those presented to your group last semester? Explain why?
4. Which visual cue comes to mind as being the most impactful on the way you felt? Explain why?
5. Which visual cue comes to mind as being the most impactful on the way you thought about sustainability? Explain why?
6. In your opinion, were any of the visual cues inappropriate for use within class? Explain.
7. Which visual cues had low or no impact on the way you thought or felt? Explain why you think this is the case.
8. You used the word or phrase _____ [shocking/ disturbing, etc.] to describe your reaction to Visual Cue _____. Can you explain what this word or phrase means? *Discussion or clarification of key quotes from diary [perhaps relating to transformation or reorientation of perspectives during particular visual cues]*
9. Which process or processes of the visual cue activity (viewing, individual reflection OR discussion) contributed the most to your learning? Explain.
10. What was your experience of using the reflective diary as a form of assessment? Did it contribute to your learning in any way? Explain.
11. What role, if any, did the results from the NEP have on your learning within this module?

Ask the student would it be okay to call them if another question pops up: Trigger/ Influences

Appendix H: New Ecological Paradigm Scale (Phase 2)

Table 1. Revised NEP Statements

1.	We are approaching the limit of the number of people the Earth can support.
2.	Humans have the right to modify the natural environment to suit their needs.
3.	When humans interfere with nature it often produces disastrous consequences.
4.	Human ingenuity will insure that we do not make the Earth unlivable.
5.	Humans are seriously abusing the environment.
6.	The Earth has plenty of natural resources if we just learn how to develop them.
7.	Plants and animals have as much right as humans to exist.
8.	The balance of nature is strong enough to cope with the impacts of modern industrial nations.
9.	Despite our special abilities, humans are still subject to the laws of nature.
10.	The so-called "ecological crisis" facing humankind has been greatly exaggerated.
11.	The Earth is like a spaceship with very limited room and resources.
12.	Humans were meant to rule over the rest of nature.
13.	The balance of nature is very delicate and easily upset.
14.	Humans will eventually learn enough about how nature works to be able to control it.
15.	If things continue on their present course, we will soon experience a major ecological catastrophe.

Source: Dunlap et al. (2000).

The seven even numbered items, if agreed to by a respondent, are meant to represent statements endorsed by the dominant social paradigm (DSP). The eight odd items, if agreed to by a respondent, are meant to reflect endorsement of the new environmental paradigm (NEP).

Appendix I: Follow-up Interview Guide (Phase 2)

1. In terms of learning from the module:
    a. Do you still advocate sustainability as you described in our last interview? Explain
    b. Do you still consider sustainability in your decision making processes? Explain
    c. Is there a Visual Cue that remains the most impactful when you recall those presented to you during the module? Why?
2. Has engagement in this module had any further lasting effect on you? Explain
    a. Has your interest for sustainability issues changed since our last interview? Explain.
    b. Have you taken any further actions for sustainability since our last interview? Explain.
    c. Have you (continuously) spoken out or advocated for rights of marginalised or disenfranchised groups since our last interview? Explain.
3. What was your experience of the process of facilitating the Visual Cues?
4. Do you think it was useful to record your thoughts and emotions before the group discussion?
5. Do you think the discussions would have been the same without recording your thoughts and emotions before>
6. How would you describe the facilitation of the Visual Cue interventions?

I will read out five themes – please share with me your thoughts or emotions triggered by these themes
How would you describe your degree of understanding of …..

Reality of limits to growth – the degree to which people understand the limits of earth's resources
Anti-anthropocentrism – the degree to which people understand the need to move beyond human centric views of the world
Fragility of nature's balance – the degree to which people understand the fragility of nature
Rejection of Exemptionalism – the degree to which people understand the dangers of relying on humans to solve crisis
Possibility of Eco crisis – the degree to which people understand that we are facing an ecological crisis

7. Is there anything else you would like to add?

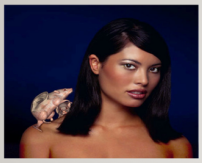
Appendix J: Examples of Coding Process

The column to the right provides an example of the participants' statements, either taken from the reflective diaries or the interview transcripts.

Utterance	Open Code	Focus Code	Category	Theory
It's not a concept I have ever come across before (Baboon Cue, FT1)	Seeing scenario of breastfeeding a baboon for the first time	Discovering a new/unfamiliar/idea/scenario/practice	Being disrupted	Disruptive Learning
It makes me think about how we as humans feel we are superior (Baboon Cue, 2.14)	Critically reflecting on humans assumed superiority over other living beings	Acknowledging human centrism/superiority	Recognising principles, practices and themes of sustainability	
Do we consider our species as a dominant force over nature overall? (Vacanti Mouse Cue, FT1)	Critically questioning if humans do perceive themselves superior over other life forms	Questioning context/perspective	Critiquing concepts and contexts of sustainability	
It made me think how myself really treat the homeless (Homeless Man Cue, FT4)	Critically question own attitude towards homeless people	Questioning oneself	Critiquing self in the context of sustainability	
When we found out the whole story it changed me / Made me feel a little bit less superior then the animal (Baboon Cue, 2.1)	Augmenting perspective - Recognising the role of the story behind image in enabling to feel a little bit less superior to the animal	Internalising a more critical/holistic outlook for sustainability	Reorienting dispositions/perspectives for sustainability	
I used to do a big shop, and then you'd get to the end of the week and the salad would be gone limp or something and I have changed that. Like I buy food that's needed and then if I need more I buy more.	Purchasing grocery on demand, reducing stock of food to reduce waste	Adopting ethically minded consumer behaviour	Becoming change agents for sustainability	

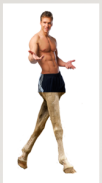
Appendix K: Overview of Visual Cues

Vacanti Mouse Cue



Would you allow a body part to be grown on an animal to improve your appearance?

Horse Cue



Would you grow an animal body part for the well-being of an animal?

'Baboon' Cue

Would you breastfeed a 'baboon'?

Elephant Cue

What imprint do you make on the environment?

Homeless Cue

What have you learned from the social experiment? https://www.youtube.com/watch?v=385QekwF-34

Boy Cue

Whose responsibility is it to solve the current refugee crisis in Europe?

Leopard Cue

https://www.youtube.com/watch?v=NnTlQB8DiaY