Sveriges lantbruksuniversitet
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Department of Economics

Creating Spaces for Sustainability Transformation at Universities

Conditions and practices at a transdisciplinary, student-driven center for sustainability in Uppsala, Sweden

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Creating Spaces for Sustainability Transformation at Universities: Conditions and practices at a transdisciplinary, student-driven center for sustainability in Uppsala, Sweden

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Summary

Universities are systemically implicated in local and global sustainability problems. They, like many other institutions, face the challenging task of transforming themselves towards sustainability across their domains of education, research, outreach, collaboration and campus operations. Yet still little is known about how they do or should carry this out. This study explains conditions and practices at a sustainability-focused university center (CEMUS) which implements a unique student-led model and functions as an inter- and transdisciplinary meeting point for two large Swedish research universities (Uppsala University and Swedish University of Agricultural Sciences). Since 1992 CEMUS has developed and nurtured ways of operating that offer insights into new ways of organising university activities for sustainable development.

Analysing innovative social practices for implementing sustainability in higher education, and institutional contexts for enabling such practices, this study explains the creation of a 'shadow space' for social learning, semi-detached from institutional context, in which some innovative capacities for meeting the challenges of implementing sustainable development at universities has built up and been nurtured over time. The findings explain how an innovation in practice has led to new social arrangements and structures within the university environment that are relevant for efforts at sustainability transformation. This is evident in its 1) creating new types of student-faculty relationships, 2) working across and between disciplines as a matter of practice, 3) re-purposing courses as a way to form knowledge bases for learning and action sustainability problems and 4) creating a community of practice semi-detached from institutional context, in which innovative capacity for meeting the challenges of implementing sustainable development at universities has built up and been nurtured over time.

In this case we see on the one hand a well-established sustainability-focused center for education, research and outreach and on the other a student-driven, student-faculty partnership model – a combination that has so far not been explored in literature on sustainability in higher education. The findings and questions raised by this exploratory study may be valuable for 1) those interested in locating innovations relevant for transformation towards sustainability at universities and learning from them 2) decision makers at universities who are interested in the challenges of transitioning towards sustainability and embedding it across operations, enacting new types of student engagement, and finding ways to create interdisciplinary education for sustainability; 3) students and teachers who seek to develop teaching and learning environments in which students are empowered contributors to a community rather than only receivers of knowledge or consumers of education, particularly in sustainability education. Ways forward for further research are suggested.

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CEMUS	Center for Environment and Development Studies
CEFO	CEMUS Research Forum
CCL	Climate Change Leadership: Power Politics and Culture course at CEMUS
CCLIP	Climate Change Leadership in Practice course at CEMUS
ESD	Education for sustainable development
HEI	Higher education institutions
MOOC	Massive open online course
MLP	Multi-Level perspective on socio-technical transitions towards sustainability
PO	Participant observation
SD	Sustainable development
SLU	Swedish University of Agricultural Sciences
SPT	Social Practice Theory
UN-DESD	United Nations Decade of Education for Sustainable Development
UU	Uppsala University

Forward

"The truth is that many things on which our future health and prosperity depend are in dire jeopardy: climate stability, the resilience and productivity of natural systems, the beauty of the natural world, and biological diversity. It is worth noting that this is not the work of ignorant people. Rather, it results from the work by people with BAs, BSs, LLBs, MBAs, and PhDs."

David Orr (2010, pp. 237–238)

"New ideas are essential if learning is to take place… ideas are the trigger for organizational improvement. But they cannot by themselves create a learning organization. Without accompanying changes in the way that work gets done, only the potential for improvement exists."

- David A. Garvin (1993, n.p.)

"Transdisciplinarity concerns that which is at once between the disciplines, across the different disciplines, and beyond all disciplines. Its goal is the understanding of the present world, of which one of the imperatives is the unity of knowledge."

- Basarab Nicolescu (2010, p. 22)

"We combine somehow, all together, even though probably in another context we would never meet, here you have this space where we meet."

- Interview with a Course Coordinator at CEMUS, Uppsala, Sweden, 2016

The need to realise our place on the earth has never been greater. Universities are places where adults learn foundational parts of their worldview that will stay with them for the rest of their lives, and produce that which seems in short supply today – trusted knowledge. It is imperative that universities do not, as Arjen Wals has argued, 'teach people to destroy the world'. Speaking in such dramatic terms about universities may seem hyperbolic. In fact it is important to continually state, in the context of so-called higher learning, a widespread failure to meet the growing ecological crisis in a way that is adequate to facing certain truths. That we exist within and through the natural world; that our human-made systems are ways of organising nature, and that future generations live *with* our decisions and *in* the conditions left for them. Across the Earth, some groups of humans taught ourselves to be tremendously successful in ways that, in a tragic turn, are no longer successful. And we are not dealing with it well. Referring to technology, William Gibson once wrote that the future is already here, it's just not evenly distributed yet. The next century looks dark, and some of it is indeed arriving now, but distributed in places most people who will read this don't see. Much can be done, however. We can transform towards more sustainable ways of living and relating to the natural world. We can also continue struggling to learn how transformation is possible, and in practice. Universities can be places where this transformation happens in powerful ways, both *within* them as institutions and *through* them as they are change agents in the world. This thesis hopes to contribute in a small way to this hopeful future.

Uppsala, 2017

1. Introduction

Achieving sustainability in a just way across complex, interlinked social-ecological systems is an existential challenge facing human societies and the way in which it is met has consequences for much of the rest of the living world (Boulding 1966; Brundtland, 1982; Meadows *et al*. 2004; Rockström *et al*., 2009; Raworth, 2012). We may have entered a dark century in which we see previously taken for granted Earth systems altered irreparably, stimulating the rise of unprecedented social problems. In order to shift towards another future, an immensely complex and radical transformation needs to happen across multiple sectors of society: institutions, systems, lifestyles and worldviews. And in some cases it needs also to be rapid, for example reaching a low carbon future to avoid disastrous levels of climate change Adams *et al*., 2014). Deep and intentional change in human societies is needed to address unsustainable futures head on and avoid disastrous changes in the earth system (Adams et al., 2014; IPCC, 2014). We will also need institutions that can, somehow, guide the work of (re)connecting and (re)awakening people and social systems to the web of life in which they remain (Capra, 1997; Moore, 2015) and never left, despite the predominance of modernist ideas about humans controlling and transcending their environment (Latour, 1993).

These challenges arguably can be addressed through human creativity and management that is science-based, and knowledge-driven – through action, policy, practice and creativity that institutions such as universities have a hand in shaping. As Donella Meadows (Meadows, 1998) argues, a change in culture (mindsets) is the most powerful leverage point in achieving change in complex systems. To achieve sustainable future, cultural change is required of many of our institutions, which still operate on the basis of ideas about consumption, economic growth and lifestyles that have persisted since the industrial revolution and are now unfit for meeting the challenges of sustainable development (Costanza et al., 2007).

1.1 Problem background

As Jared Diamond has shown, one reason societies collapse is that elites become – intentionally or otherwise – blind to the consequences of their actions and ways of life (Diamond, 2005). As the oldest of the European institutions alive today in a form near to its original, the university has spread globally while also gradually shedding some of its elitism (Rüegg, 1992). However, myriad unsustainable lifestyles, practices and systems have been brought into being, perpetuated and sometimes defended by people with bachelor, master and doctoral degrees (and many without them). This is by no means entirely the responsibility of universities. But it is especially problematic in richer countries, in which most of what are considered the 'best' universities are located (Times Higher Education, 2016). These institutions educate a wealthy global elite who bear a large amount of the responsibility for global sustainability problems. For example, being responsible for massively disproportionate amounts of carbon production causing human-made climate change: the top 10% of income earners globally produce about 45% of global emissions, while the bottom 50% create just 13% of emissions (Piketty and Chancel, 2015). In short, universities and those attending them are at once integrated in and insulated from the unsustainable consequences of their various actions and inertias. This is a problem, or set of problems, in which the university itself can intervene. By seeking new ways to integrate sustainable development in its research, education, collaboration and outreach, it can begin address this combination of implication and insulation head-on.

As arbiters of knowledge, drivers of knowledge production, and centres of higher learning, universities hold tremendous capacity for contributing to wide scale societal transformations

towards sustainability (Rammel et al., 2015; Stephens et al., 2008). Universities have unique potentials to, for example, foster experimentation and innovation for sustainable ways of living (Cortese, 2003), allow space for rethinking fundamental assumptions about the growth trajectory of economies (Raworth, 2012), place the intergenerational justice of sustainable development at the core of education, and influence deeply the imaginaries (Taylor, 2003) of generations of humans born over the coming century, expanding their conception of the possible when it comes to fundamentally different sustainable ways of life.

Universities can engage with transformation towards a sustainable world on at least two fronts: they are organisations that need to learn how to transform their own goals, structure and practices, but are also social change agents themselves and are involved in wider societal transformation (Stephens *et al*., 2008). When it comes to sustainable development (**SD**), universities as organisations are implicated in the very same problems they research and educate for (Wooltorton *et al*., 2015). Just as the rest of society they contribute to, and in some cases are locked into, unsustainable behaviours and pathways while at the same time possessing agency to change.

The proliferation and interdisciplinary nature of sustainability problems challenges traditional disciplinary structures and barriers within research, education, and outreach, and campus operations within universities (Barth, 2014; Lozano, 2006; Sterling, 2004). Effort has been made to implement sustainability. For example greening campuses' own management and operations, creating new interdisciplinary educational offerings and programs focused on sustainability, or building new research initiatives around the multitude of problems from climate to migration to consumer lifestyles. From 2005-2015 the United Nations Decade of Education for Sustainable Development (**UN-DESD**) lead to many universities taking up broad goals of working differently for a sustainable future, and implementing new modes of learning and teaching and while substantial progress has been made towards Education for Sustainable Development (**ESD**), much work lies ahead (Wals, 2014). Overall universities have implemented changes towards SD in education and reporting, but are still in early stages of integrating SD across all their activities and making it an integral part of their purpose (Lozano *et al*., 2013a). And as of 2011, out of 14,000 universities worldwide, only 15 had published full sustainability reports (Lozano, 2011). At the same time, a large number of universities have signed onto international agreements for implementing sustainable development, and have formed strategies and visions of their own (Lozano *et al*., 2013b), indicating interest and willingness to act.

Against this background, a body of research on *sustainability in higher education* has grown over the last decade. Many studies have been published in recent years that investigate the implementation of sustainability or sustainable development initiatives at universities, as evidenced in leading journals such as the *International Journal for Sustainability in Higher Education* and *Journal of Cleaner Production*. As a key function of universities, education has of course been a focal point for research in this area. The UN-DESD also helped set up new research agendas for educational research, university policy recommendations, directions for practice and experimentation in learning and teaching with corresponding reports and materials for teachers.

More recently, *transition management* has been put forward as a theoretical underpinning for researching sustainability in higher education (Stephens and Graham, 2010), both for understanding and forming strategy around how universities transition themselves, and also how they do act and should act as transformative change agents in the world for a sustainable future (Stephens *et al*., 2008). This perspective emphasises (but is not limited to) learning and innovation–and spaces and contexts in which these can happen–as key parts of transition. Societies', institutions' and organisations' ability to enable and provide such spaces is key in efforts at transformation and transition towards sustainability (Grin *et al*., 2011). The degree to which universities can and do foster the kinds of learning and innovation needed for both

influencing societal transformation towards sustainability and for transforming themselves is furthermore a key question for researchers on sustainability in higher education (Albrecht et al., 2007; Stephens and Graham, 2010; Wooltorton et al., 2015). They need spaces and contexts for learning and experimentation dedicated towards innovating in the way they work for sustainable development.

1.2 Problem

Universities have struggled to implement sustainable development in innovative ways (Lozano, 2006). Not much is known about how this implementation happens, can happen and should happen in the higher education sector. Research on wide-scale social and technical transition and transformation towards sustainability has shown that locating and tapping spaces, networks and communities that stimulate social learning and nurture social and technical innovations developed under non-mainstream goals and incentive structures is a crucial part of efforts at transforming regimes and systems locked into unsustainable pathways (Westley *et al*., 2011). From these spaces, new practices that engage people, materials, skills and meanings in new ways can emerge (Shove et al., 2012; Wenger, 1999). However, little is yet known about such spaces in the higher education sector (Stephens and Graham, 2010). Studying the contours of specific communities or networks located in universities that are working semi-informally, outside the culture, and incentive/reward system, of the institutional context, and in which innovative ways of organising social learning *for* and *about* sustainability, could be a good avenue for generating knowledge about how universities can do the same (explained further in Chapter 2).

At the same time, when it comes to ESD implementation in higher education, peer reviewed research publications overall have focused projects or initiatives that make marginal changes and improve existing activities of the organisation, rather than radical change or disruptive or novel innovations that diverge from institutional norms (Karatzoglou, 2013). The implication here being that a narrative of substantial achievement is created around ESD efforts that are actually marginal and do not threaten the status quo.

In addition, much research on how universities embed sustainable development aims at informing university-wide frameworks, or programs and strategies developed and/or implemented by the university at higher-level managerial levels (Ferrer-Ballas *et al*, 2004; Ferrer-Ballas *et al*, 2008; Holmberg *et al*, 2012), or developing rubrics or lenses for diagnosing and strategizing the whole university (Baker-Shelley et al., 2017), rather than grasping the characteristics and potentials in the how and why of new practices emerging 'from below'. Even when pressure for change is seen as initiated at 'grassroots' level, the focus can remain on how university management can implement change towards sustainability through policy interventions (for example Krizek et al., 2012). A good reason for this may be that a goal of many researchers in the field of sustainability in higher education is to develop new knowledge and inform policy approaches for how to achieve whole-system change at universities, especially as progress there remains slim overall.

There is thus a need for empirical research that develops new knowledge about novel ways of implementing sustainability in higher education that not only teach new curriculum or focus on new research areas using existing institutional arrangements, but also entail operating in new ways that move against some of the norms and culture of the institution itself. Studying such cases also requires a research approach that is able to capture action at the micro level, sensitive to the situated nature of practice, and able to link it to theory about wider scale transformation.

1.3 Aim and Research Questions

The broad aim of this research project is to explore how universities can enable the types of learning and innovation needed for their own organisational transformation towards embedding sustainable development in their core purpose. Specifically, the research project aims to explain conditions and practices at a transdisciplinary university center that operates under and unconventional, student-driven, transdisciplinary model for organising its education and outreach. The research questions are:

- *What is the relevance of student driven, transdisciplinary centres of learning and teaching for the challenge of embedding sustainability at universities?*

- *What kinds of institutional contexts can foster learning and innovation towards meeting the challenge of sustainability transformation of universities?*

1.4 Value of the Research

The combination in practice of trans-disciplinary sustainability education, research and outreach with a student-driven, student-faculty partnership model has so far not been explored in literature on sustainable development in higher education. This is an empirical study of a community that developed around an innovation in practice, forming a specific type of institutional context to meet the challenge of implementing sustainability in higher education. The findings and questions raised by this study may be valuable for 1) those interested in locating innovations in practice relevant for transformation towards sustainability at universities and learning from them 2) decision makers at universities who are interested in the challenges of transitioning towards sustainability and embedding it; 3) students and teachers who seek to develop teaching and learning environments in which students are empowered contributors to a community rather than only receivers of knowledge or consumers of education, particularly in sustainability education and promoting sustainability across HE.

2. Literature Review and Theoretical Frame

*In this chapter the theoretical approach and conceptual frame for this study is elaborated. First I cover relevant concepts in sustainability in higher education and transforming universities towards sustainability. I then outline theoretical perspectives from literature that focus on how social and technical transformation and transition of societies towards sustainability happens. Finally, social practice theory (**SPT**) is outlined, with a focus on its potential in changing practices towards addressing sustainability challenges such as climate change.*

2.1 Transforming Universities Towards Sustainability

Many concepts are relevant to sustainability in higher education, and to transforming universities as organisations, as institutions, towards embedding sustainability as part of their purpose and practice. Next, some of these relevant to this study are presented and discussed.

2.1.1 The Sustainable University?

The proliferation and interdisciplinary nature of sustainability problems challenges traditional disciplinary structures and barriers within research, education, and outreach, and campus operations within universities (Barth, 2013; Cortese, 2003; Sterling, 2004). Full system integration of sustainability across universities may be needed if they are to meet their commitments and potentials (Cortese, 2003; Mcmillin and Dyball, 2009). Wooltorton *et al*. (2015) contextualise universities as being woven into the fabric of an unsustainable world. They both contribute to and work against unsustainable societies. Universities are organised around fundamental Western assumptions about the world, which are at least in part behind the unsustainable state of modern lifestyles (Orr, 2002). Modern institutions have taken on key assumptions of the early industrial revolution, for example that the main barrier to better lives was lack of access to infrastructure and consumer goods (Costanza et al., 2010). Such assumptions have little to offer in the face of challenges that were not conceived of at the time such as climate change, decline in essential ecosystem services, or the interweaving of relationships between social-ecological systems and the rise of consumer lifestyles across the planet. Universities thus need to be institutions that can begin to aid in the shift towards new assumptions about human wellbeing.

Many definitions of 'the sustainable university' can be found in the literature. According to (Velazquez *et al*., 2006), a sustainable university is

> *''A higher educational institution, as a whole or as a part, that addresses, involves and promotes, on a regional or a global level, the minimization of negative environmental, economic, societal, and health effects generated in the use of their resources in order to fulfil its functions of teaching, research, outreach and partnership, and stewardship in ways to help society make the transition to sustainable lifestyles.'' (Velazquez et al., 2006, p. 812)*

This is a fairly acceptable definition, positioning sustainability as a concern for all functions of the university and inserting a 'three pillars of sustainability' frame (economics, environment, society). It is all too easy to criticise definitions of 'what sustainability is' because it is a fundamentally ambiguous and complex concept that transcends disciplines. Nevertheless it is worth noting what this definition does not include but could. Other aspects to include are the 'how' of transitioning towards achieving this, and the 'ongoing journey' of sustainable development (AtKisson, 2010) in which one makes moves in a changing landscape (Grin *et al*., 2011) and that thus defies attempts at deciding a clear 'end state'. In addition, expanding the scope of agency beyond minimisation of negative impact and instead positioning the university as a change agent in a positive sense, which in fact may be a more accurate reflection of what a university does (Pielke, 2007) and what a sustainable university might be (Stephens *et al*., 2008).

David Orr (Orr, 2010b) argues that universities are needed that create an 'ecologically literate citizenry' while also meet the very real "possibility of growing despair and nihilism among young people" (Orr, 2010b, p. 82) as news about the planet gets worse and more prevalent and social and economic problems rise.

2.1.2 Drivers and Barriers to Transformation

There is wide agreement in the literature that universities need to integrate sustainable development across their complex organisational contexts and functions in order to achieve sustainability (Baker-Shelley *et al*., 2017). The way in which this happens and ideas about how it should happen remain open and contested questions. Many authors have identified drivers and barriers to transformation, at the level of the individual, project, institution and wider society, some of which are elaborated below.

Ferrer-Balas *et al*. (2008) say that a main internal drivers for university transformation are the presence of 'connectors': networks or people that can bridge gaps across disciplines, help in developing shared language for interdisciplinary work, and incentivise interaction across departments. They also pointed to the importance of 'sustainability champions': innovators who can be helped or hindered by institutional support or lack thereof. Furthermore, they identify external drivers, such as pressure from peers – other organisations and institutions as examples or competitors, and funding sources and the priorities of those that control them.

Ferrer-Balas *et al*. (2008) also identified barriers, including the freedom of individual faculty members meaning coordination at the faculty level is hard, incentive structures that don't reward sustainability work, and a lack of desire to change, particularly as building quality routines and practices takes years and effort. Velazquez *et al*., (2005) also elaborate many barriers, including lack of funding, and a lack of support from university administrators. They also discuss a lack of incentive to change due to inertia and established routine. Smaller universities also have the ability to change faster, and universities of more than around 10 000 students make rapid change harder (Ferrer-Balas *et al*., 2008).

2.1.3 Universities as Learning Organisations

Unsurprisingly, *learning* plays a role in much of the research on sustainability in higher education. The ways in which organisations, networks, groups and individuals learn, and how this learning can lead to changes in structure and behaviour are key areas of knowledge for those engaged in a research field that, overall, is action-oriented and seeks to produce research with transformational potential (Corcoran *et al*., 2004; Stephens *et al*., 2008). The degree to which universities can and do foster the kinds of learning and innovation needed for both influencing societal transformation towards sustainability and for transforming themselves is a key question for researchers on sustainability in higher education (Stephens and Graham, 2010; Wooltorton *et al*., 2015), especially considering universities' powerful social position as institutions. Universities, as other institutions need spaces for learning and experimentation in order to innovate in the way they work for any transition to sustainable development.

Organisational learning has been linked to sustainability at universities (Tilbury, 2007). It has been shown that initiating concrete sustainability projects can stimulate organisational learning for sustainability across disciplines and other institutional and organisational boundaries, not only as a result of the outcomes of the projects, but because of the new and possibly unusual ways in which actors, practices and structures interact in the planning and implementation of the projects themselves leading to organisational learning for sustainability (Albrecht *et al*., 2007). Insights from this linking have led to some authors suggesting ways forward for universities that implement organisational learning as part of general efforts at incorporating sustainability. For

example, collective action research (**CAR**) has been proposed as a conceptual and practical approach for universities in developing their sustainability courses and programs, bringing various actors together in a collaborative effort to integrate knowledge, learn and develop something new together while simultaneously producing collective learning among academics and students (Wooltorton *et al*., 2015). The *way in which universities organise themselves* to plan, create and carry out their research and education is important to the outcomes, and can result in more or less learning that moves the organisation towards sustainability.

2.1.4 Transdisciplinarity

The difference between multi-, inter- and trans-disciplinary approaches can be hard to grasp. Nicolescu (2010) provides a clear delineation. Multidisciplinary entails working across the boundaries of disciplines, bringing something additional in order to enhance disciplinary research. Interdisciplinarity transfers methods from one discipline to another in order again to benefit disciplinary research. Transdisciplinarity "concerns that which is at once between the disciplines, across the different disciplines, and beyond all disciplines. Its goal is the understanding of the present world, of which one of the imperatives is the unity of knowledge." (Nicolescu, 2010, p. 22) Taking a transdisciplinary approach to for example research or education requires including actors and perspectives in from outside the disciplinary structures and traditions of research or education at universities (Nicolescu, 2010).

Transdisciplinary approaches have been shown to be productive and necessary when dealing with complexity of sustainability problems (Mauser *et al*., 2013), which are also often 'wicked problems' (Rittel, 1972). Because of the complexity of working to overcome sustainability problems, and the scale of change needed in human societies, transdisciplinary approaches are prescribed for processes that seek to bring about such transformation (O'Brien, 2012). Transdisciplinary approaches to teaching and learning have been shown to be effective ways of working on concrete sustainability challenges because of the way they integrate knowledge, people and learning in science-society interfaces (Biberhofer and Rammel, 2017).

2.1.5 Education for Sustainable Development

Education for Sustainable Development (**ESD**) has seen increased uptake by universities over the last decade (Wals, 2012). A key part of ESD is inter- and trans-disciplinary approaches to education. In addition, as fully implementing ESD entails a deep, multi-level change at the university (Corcoran and Wals, 2006), this implies to some extent, integrating an inter- and trans-disciplinary approaches in research and outreach also. 'Collaborative and participative' forms of learning are a key ingredient in implementing Education for Sustainable Development in HEI (Wals, 2012). ESD emphasises constructivist approaches to learning, in which learners construct meaning together in learning situations.

Key competencies for learners in ESD are now well elaborated and form a comprehensive and powerful set of orienting principles for learning and teaching in higher education, not only for students but for situations in which even experienced researchers need to learn new competencies for sustainability work. Wiek *et al*. (2011) identify *systems thinking competence* to understand and analyse systems and systemic problems, *anticipatory competence* to analyse, evaluate and craft pictures of the future for sustainability, *normative competence* allowing for navigation of values, principles, goals and targets that characterise sustainability work, *strategic competence* allowing for the ability to "design and implement interventions, transitions, and transformative governance strategies towards sustainability" (*ibid*, p. 210), and *interpersonal competence* comprising skills such as negotiation, facilitation, dialogue, etc. needed to work with sustainability research and problem solving.

Numerous and varied examples of ESD in higher education have emerged over the UN decade for ESD are now found in abundant case studies and materials designed for pedagogic settings (Wals, 2012, p. 28). The materials available to teachers, researchers and institutions have grown dramatically. What remains is for ESD to be implemented at greater scale (Wals, 2012, p. 28) a considerable challenge for universities, and education sectors globally.

2.1.6 Student-Faculty Partnerships in Higher Education

Who initiates and runs change initiatives and projects for sustainability is important, and how power relations play out among them. Bottom-up initiatives driven fully or in part by students and/or non-faculty actors can have significant capacity to drive change in valuable ways that are not addressed, or can't be addressed, by the structures and routines of the institution itself. They can challenge norms of power over knowledge and visions of the future within HEI (Healey *et al*., 2014). Thus embedding sustainability in universities may require students engaging in not only in initiatives and projects which focus on greening campuses, but in other areas of university operations – for example education and research (Barth, 2014). Davison *et al*. (2013) present case studies of four universities in Australia in which a 'distributed leadership' model was used, highlighting student-faculty cooperation and student led model for developing climate change education. This is an example of what has not often been tried in practice sustainability contexts: student-faculty partnership in which students are involved in areas traditionally off limits to students across research, education, outreach, and other university operations.

A relatively small but growing research field studies such *student faculty partnerships in higher education* (e.g. Bovil and Bully; Cook-Sather, 2011) the presence of which is expanding in Europe and internationally (Healey *et al*., 2014). Recent research on student-faculty partnership in teaching and learning reveals cases and ways forward for students being involved in forming education and research agendas and projects at universities. The cases and arguments presented by the authors show a far greater involvement and sharing of responsibility, and accompanying risk and uncertainty for both groups (faculty & students), than has traditionally been in place at universities. Healey *et al*. (2014) provide a conceptual framework (**Figure 1**) for Partnership in Learning and Teaching (PLT) and argue for this leading to a range of positive outcomes for teaching and learning, and for the modern university environment.

It covers areas often off-limits to significant influence by students: 1) being co-producers and designers of learning, teaching and assessment, 2) curriculum design and pedagogic consultancy, 3) subject based research and enquiry, and 4) the scholarship of teaching and learning, research on education itself.

There has been little (if any) research on how these types of partnership models are implemented in the context of sustainability in higher education. Nor how they might play out in implementing ESD, or what role they may play in transformation towards sustainability which universities need to be engaged in. This may mean a significant avenue for exploration, as such models have been shown to lead to organisational learning processes and challenging norms:

> *"In its difference to other, perhaps more traditional, forms of learning and working in the academy, partnership raises awareness of implicit assumptions, encourages critical reflection and opens up new ways of thinking, learning and working in contemporary higher education"* (Healey et al., 2014, p. 7)

Healey *et al*. (2014) warn that partnership may come with a certain amount of cognitive dissonance, but can lead to learning and innovation:

> *"A partnership approach may be directly at odds with principles embodied in key drivers and mechanisms which have a strong influence on behaviour and attitudes among staff and students[...]These place an emphasis on the importance of quantifiable information and the achievement of specific outcomes*

and impacts, whereas a partnership approach places value on a creative process that may result in unexpected outcomes." (Healey et al., 2014. p. 10)

Furthermore, the best functioning examples of such models of learning, which cross into research also, develop over time in communities of practice in which social learning occurs.

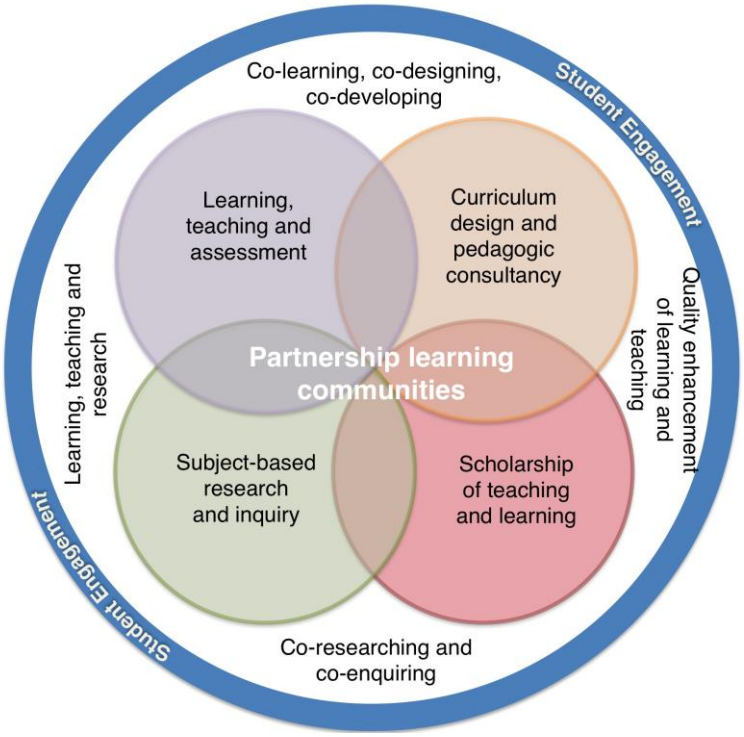

Figure 1. An overview of engagement through partnership: students as partners in learning and teaching in higher education. Often located in Partnership Learning Communities. Adapted from Healey *et al* (2015)

2.2 Spaces for Transformation Towards Sustainability

This thesis thus takes as a point of departure the assumption that universities can be seen as undergoing or facing at least some pressure to both undergo and be part of large scale social and technical transformation towards sustainability, which will require more or less drastic technical, social and cultural changes – some of which will emerge through learning and innovation processes. Some researchers (Baker-Shelley et al., 2017; Stephens and Graham, 2010) have started to conceptualise transformation towards sustainability at universities which make use of theoretical perspectives from the literature on socio-technical transitions. The multi-level perspective (**MLP**) on such transitions (Geels, 2002; Geels, 2008; Grin *et al*., 2011) allows for analysis of key barriers and dynamics for sustainability transition across micro, macro and meso scales. It posits 'niches' as places from which radical innovations can arise and change at regime (meso) and landscape (macro) levels. Niches can form in meso scale as well as micro, and patterns and changes in meso and macro scales provide conditions for activity in niches. Research on transition and transformation towards sustainability emphasises *social learning* and spaces and places in which this happens as a crucial part of transitions (Grin *et al*., 2011). These spaces can form at either micro level or meso level. Such niches are crucial for transitions towards sustainability. They are places out of which social and technical innovations emerge, and may or may not be taken up in a wider transition to effect wider regimes, or social realities. Caniëls and Romijn (2008) describe niche formation as

"the creation of socio-technical experiments in which the various innovation stakeholders are encouraged to collaborate and exchange information, knowledge and experience, thus embarking on an

interactive learning process that will facilitate the incubation of the new technology[…]in a protected space called a niche, a specific application domain for the new technology" (p. 246)

Empowering niches is one of the key actions that can be taken by those aiming to in manage transition towards sustainable development (Grin *et al*., 2011). These niches are spaces in which social learning processes occur and can lead to social and technical innovations. Social learning is situated in communities and groups collected around common interest and practice in which actors are able to innovate new practices, technologies, etc. over time (Wenger *et al*., 2002). This suggests better understanding of how institutional transformation might be enacted may benefit from a look at the niches – groups, networks, spaces, communities etc. where innovative practice may have developed over time.

However, actors can be constrained by institutional or organisational context, especially when attempting to work with adaptation or mitigation of difficult sustainability problems and challenges. Aiming to "unpack patterns of individual and collective action within organisations" (Pelling *et al*., 2008, p. 867) that restrict or enhance organisational capacity in the face of climate change, Pelling *et al*., (2008) show that 'adaptive capacity' for change towards sustainability, in particular in dealing with climate change, can be developed and maintained over time in 'shadow spaces for social learning'. These too are groups or networks in which innovative conditions and practices develop over time through social learning processes. But these are particular types of niches, often employing informal (non-canonical) practices and structures, while still connected to and interacting with formal (canonical) institutional practices and structures. They have the potential to develop unique approaches for dealing with problems as they are less constrained by institutional context other actors face. Basically they have found 'workarounds' to the formal system (Brown and Duguid, 1991), in part because they manage to find time and space to work outside of it and develop a culture in doing so.

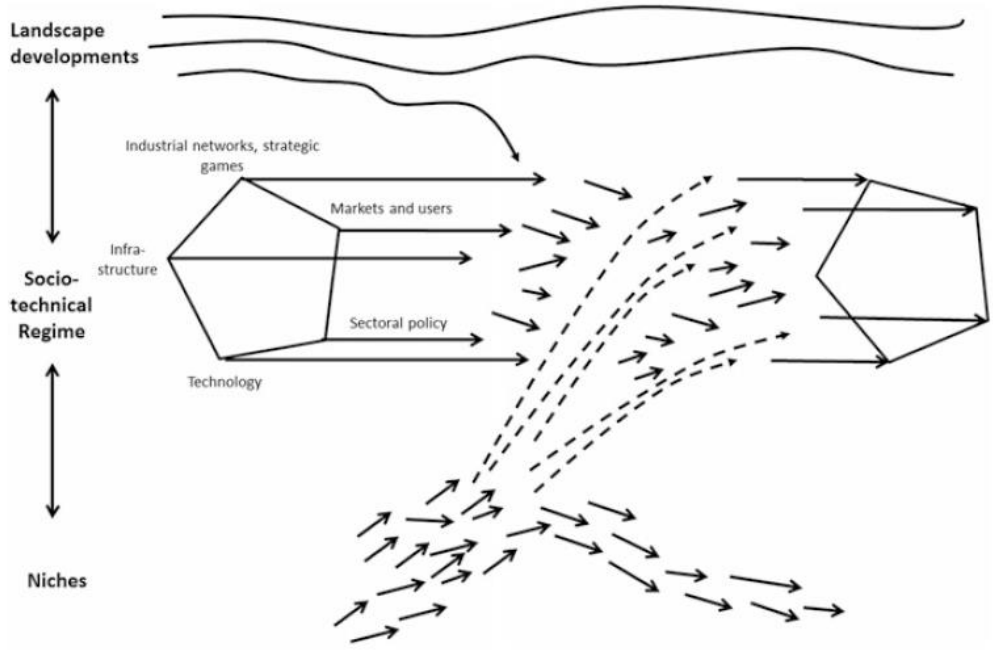

Figure 2. The Multi-level Perspective on Socio-Technical Transitions (MLP), Adapted from Geels (2002, p. 1263). The multi-level perspective is a heuristic analytical frame to understand large-scale sociotechnical transitions

Here Pelling *et al.* (2008) provide an approach not yet applied to the higher education sector, yet one that may be productive in locating, and building knowledge about, innovative, alternative,

non-mainstream capacities and practices that may have value for efforts in meeting problems of sustainability and implementing sustainable development. While the authors focus on adaptive capacity for climate change in particular, this approach is not limited to understanding the where and how of developing capacities for climate adaptation, as I will argue. Rather it can also be productive in locating and understanding spaces for social learning in which capacities, practices, new ways of operating that offer potential for transformation/transition of institutions (like universities) towards sustainability develop over time. The authors build their theoretical approach by synthesising the literatures on 1) social learning, in particular on communities of practice (**CoP**) (Wenger, 1999)**,** and 2) the institutional aspects of multi-level environmental governance (Pelling et al., 2008, p. 867) grounding their work in some empirical examples. Furthermore, they argue that

"too often, the literature reduces the individual to a rational economic actor – and approach which enables aggregate assessments of vulnerability to particular climate scenarios, but closes off research on the underlying sociopsychological determinants of adaptive action"(*ibid*, p. 868).

In other words, this focus on the individual obscures crucial parts of the how and why of people taking action within and upon institutional contexts.

In this thesis I take a similar approach, focusing on practices developed in such CoP that constitutes such a shadow space for social learning. Actors have been working within an informal space, and a formal space of institutional context to develop an innovative model for implementing sustainable development structurally, and in teaching and learning that may offer an adaptive solution to the challenge of implementing transdisciplinary work modes at universities, and embedding sustainability in universities as organisations.

This is in line with Westley *et al*. (2011) who argue that large scale social and technical transitions towards sustainability will require looking for novelty in non mainstream places and 'tapping into' it. They argue that "dominant pathways can often obscure or even overrun alternatives, the less-travelled "byways", "shadow tracks", or innovation regimes that define and respond to different sets of goals, values, and forms of knowledge" (Westley *et al*., 2011, pp. 772-773) Furthermore, locating and empowering local entrepreneurs and innovation networks that nurture innovative alternatives is key in social and technical transformation towards sustainability across sectors and scales. These actors can chip away at existing regimes, seeking opportunities to build their innovation niches into innovation regimes (Westley *et al*, 2011, p 771) that can replace or integrate with existing regimes. They "nurture innovative alternatives through sense making, building and brokering partnerships between unusual suspects, selling innovations to secure resources, and creating disturbances in existing regimes and landscapes" (Westley *et al* 2011, p. 771). So far, little research has located and analysed such spaces for learning and innovation in universities and the innovations they may nurture that have potential to influence sustainability transition of universities themselves from the perspective of transformation towards sustainable development.

Locating, analysing and explaining conditions and practices within such local innovation spaces at universities could thus yield important new knowledge about ways forward for university transition, and inform policy makers and policy changers at universities about niches that could be supported, empowered, or brought together with other niche actors who seek to work towards transition. Furthermore, the degree to which universities are set up to support, encourage or otherwise interact in beneficial ways with such social learning and innovation is key in linking knowledge and practice at multiple levels within the university as an organisation, so that the university itself can learn as an organisation.

2.3 Social Practice Theory

The link between on the one hand innovations in practice developed in spaces, communities or networks over time, and on the other hand wider scale and radical (radical in scale, not necessarily speed, see Grin *et al*., 2011) social and technical transition is thus a central part of theory about long-term transitions to sustainability for human societies and technologies. If changing practices can change the world towards sustainability then we need knowledge about how shifts in practice happen, and do so based on a robust theory of practices and how they change and move through the social world. One way to do this may be to use social practice theory.

If current understandings for transitions and transformation are correct, then it also stands to reason that actors and institutions that explicitly research, educate, collaborate and otherwise act for achieving sustainable development may benefit from considering not only practice in general but *their own* practices as they relate to this theoretical understanding.

2.3.1 Practices

Social practice theory (**SPT**) takes all activity in the social world to be made up of practices, which are enacted, carried on and die when links between elements are made or broken. As Trowler (2014, p. 20) argues, Reckwitz' (2002) definition of practices is possibly the most commonly used, although in itself it "omits the social, relational, character of practice" Trowler, (2014, p. 20):

> *"…a routinized type of behaviour which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge"* (Reckwitz, 2002, p. 249)

More recently Shove, *et al*, (2012) have elaborated an elegant yet still comprehensive framework for SPT. According to the authors the social world is made up of elements grouped into three are three categories, competences, meanings, and materials, which are integrated in various combinations in practice. Practices can only be enacted by integrating elements in various combinations, and elements shape each other, changing and influencing each other over time. This approach sees elements as "somehow 'out there' in the world, waiting to be linked together" (Shove *et al*., 2012, p. 24). This also means that for practices to remain and persist

> *"connections between defining elements have to renewed time and time again. This suggests stability and routinisation are not end points of linear processes of normalisation. Rather they should be understood as ongoing accomplishments in which similar elements are repeatedly linked together in similar ways" (Shove et al., 2012, p. 24)*

According to (Schatzki, 2002) what people do has a history and setting, and 'doings are future oriented'. These past and future moments become one through practice (Shove *et al*, 2012, p. 23). Furthermore, in Shove *et al.*'s (*ibid*) model, they collapse meanings and emotional states into an element of practice – rather than saying these are a motivating force for practices standing outside them, as Schatzki does (Shove *et al* 2012, p. 23). Perhaps not surprisingly, 'meanings' are the element of practice that the authors treat with the most flexibility, allowing for much interpretation. However, in order to understand the life of elements of meaning and how they travel, the authors suggest looking at situations where interpretations and symbolic association is relatively uncontested (Shove *et al*., 2012, p. 53)

Shove *et al* give the example of Driving in the USA, showing how practice can be understood through the integration of elements. *Meaning*, such as signifying adventure; *materials*, such as engines; and *competences*, such as mechanical expertise and maintenance (**Figure 3**).

2.3.2 Practices are Situated, Elements Travel

Innovation in practice can make elements travel in new ways. Elements are 'out there' in the wild, waiting to be integrated in practice (Shove *et al*., 2012). Because practices take shape depending on the elements they integrate, they are on the one hand 'home-grown', each instance being different to others over time and from place to place, while at the same time standardised to some degree, sharing characteristics across locations. In other words, while practices are necessarily situated and localised, elements travel (Shove *et al*., 2012, pp. 38). While each practice is shaped by the elements of which it is made, standardisation is helped along by the fact that all kinds of institutions, from manufacturers to governments to schools, create and circulate elements, contributing to the standardisation of practice as it is produced in different locations. Institutions play a role in the circulation of elements, but they are rarely able to control their use in practice (Shove *et al*., 2012).

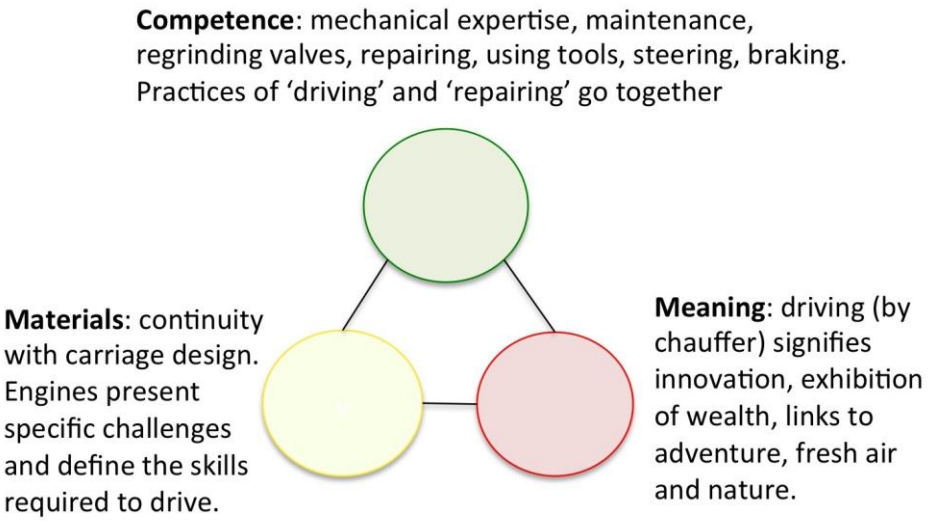

Figure 3. Example of Social Practice theory used to explain driving in the US in the early 20th century, adapted from Shove *et al* (2012, p. 29)

2.3.3 Why Practices Persist or Die

In order to understand why practices persist, it is productive to examine those that 'die'. Shove give three possible explanations for why the fad of Hula-Hooping, a briefly hugely-popular sport or game which involves spinning a plastic ring around the hips (still used in some gymnastics sports), failed to persist over generations of carriers or even within one; why it was that users 'defected' from the practice:

1. Lack of Internal Rewards – the experience of Hula hooping was not rewarding enough for the 100 million people who ordered a hula-hoop in the 1950s, to sustain their commitment. "Practices are, perhaps ironically, better able to retain commitment when they afford scope for innovation" (*ibid*, p. 75). Practices last if they offer rewards of personal investment and development, if they can be innovated upon, or even be replaced with another version.

2. No Symbolic or Normative Anchoring. "Hula hooping was not strongly associated with good or bad behaviour, with the reproduction of distinctions, or with fulfilling injunctions and obligations." (*ibid*, p. 75). And "Since fads like swinging a ring around the hips are of no wider significance, defection is easy" (*ibid*, p. 75).

3. Connection to and Dependence on Other Practices. "Hula Hooping was not obviously connected to and not obviously dependent on any other practice. It came into being, existed briefly, and died alone". (*ibid*, p. 75).

So then, practices are more likely to persist (or said another way, defection is not easy) if the practice is internally rewarding and affords innovation, has symbolic or normative anchoring, and is connected to other practices.

2.3.4 Social Practice Theory and 'Pro-Sustainability' Policy

In the theoretical frame elaborated so far, it is theorised that 'shadow spaces' for social learning can be identified and understood in order to support the emergent and potentially transformative practices (innovations, adaptations) that can develop within them to solve problems of, or influence change towards, achieving sustainability. This happens as a result of social learning occurring within and through the networks and communities that constitute these spaces (Pelling *et al*., 2008; Westley *et al*., 2011). Social Practice Theory (**SPT**) may offer a lens to explain and analyse 'what goes on in the shadows'; what happens in these apparently hidden or often overlooked places in which transformative alternatives develop. And as explained below, this lens may be particularly suited to informing policy for transformation towards sustainability.

Practice Theory has recently been positioned as possible way forward for research that seeks to inform policy and decision-making aimed at changing human behaviour towards more 'sustainable' practices. For example in the areas of climate change policy (Shove *et al*., 2012; Strengers and Maller, 2015) and the field of sustainable design (Kuijer, 2014). One argument for this is that a practice approach shifts focus from the individual as the unit of analysis, allowing us to include more elements of the world in our analysis (Schatzki, 2002; Shove *et al*., 2012). Trowler's (2014) explanation is particularly clear:

> *"A practice perspective re-centres and re-focuses our attention away from the individual actor on the one hand and impersonal social structures on the other, focusing instead on situated practices which are extra-individual in a number of senses." (Trowler, 2014, p. 20)*

Much policy aimed at behaviour change towards 'pro-environmental' or 'more sustainable' behaviours takes as its theoretical base a view of behaviour change which sees the individual as rational economic actors and each decision they take a matter of choice in which attitudes and beliefs are paramount. This leads to policy that takes an Attitude –Behaviour – Change (**ABC**) approach (Shove *et al*, 2010). This can be problematic for several reasons. As Shove (2010, p. 1247) argues "the ABC is a political and not just a theoretical position in that it obscures the extent to which governments sustain unsustainable economic institutions and ways of life, and the extent to which they have a hand in structuring options and possibilities." In other words, this approach obscures the constraining institutional and cultural context[1]. This has led to what Shove (2010) has labelled a "yawning gulf between the potential contribution of the social sciences and the typically restricted models and concepts of social change embedded in contemporary environmental policy" (Shove, 2010, p. 1273).

A practice approach, rather than taking individuals as primary units of analysis, focuses on the creation and careers of practices as the unit of inquiry (Shove *et al*., 2012, p. 139). As Michie *et al*. put it in a submission to the UK house of Lords on behaviour change policy, (Michie *et al*.,

[1] In addition, it is not clear to me why governments are the chief target in Shove's critique – the private sector certainly forms and implements policies. While one may argue broadly that the government is charged with the public interest and the private sector is not, the considerable increase in CSR work for sustainability in recent years means increasingly that businesses and other non-state organisations, both in rhetoric and in action (to varying degress), are forming policy for sustainability aimed at public benefit. It follows that these policies can just as badly miss the mark if based solely on ABC models of change. And so the value of using a practice approach should not be restricted to situations in which the state is a signifcant actor.

n.d.)a practice approach can allow policy makers to see problems of behaviour as problems of "collective convention" and to take an approach of "intervening at the level of shared practice". This means an approach that allows for mobilisation of various actors and symbols in ways that existing ABC approaches simply may not allow for. A focus on practices takes into account tacit knowledge and skills (competences), objects and physical systems (materials), and symbols, models and ways of knowing (meanings) at once.

This shift is important when considering approaches to research on transformation towards sustainability because, as elaborated earlier, much of the literature on transformation sees the social learning and innovation happening in communities and through pluralistic networks of actors, sometimes spread across sectors and other demographics, and in constant relation to institutional context, as a crucial to transition and transformation towards sustainability. A focus on the individual may thus be insufficient to inform policy that aims at transformative change. There is thus a disconnect here between what is known about how, where and why transformation towards sustainability happens, and the way in which behaviour change policy that seeks to make it happen is commonly conceived and designed. This suggests that insight from social practice theory applied in empirical studies may thus be able to inform policy in new ways when it comes to how transformations and transitions (of institutions, for example) can happen.

A second reason for a shift of focus towards SPT is that it allows for a reframing of policy questions about how to get change to happen. Instead of asking which social forms or networks would best "enhance the circulation and adoption of more sustainable practices" (Shove *et al*., 2012, p. 160) SPT allows us to reverse the question and ask what types of new links, bonds, networks, social forms etc. could emerge from the enactment of new practices (*ibid*). In this view, the doing of specific social practices *are in themselves* a way through which new networks, links and bonds are formed. This, they argue, does not mean we should not give up on the individual, or on policies that impose structures and relationships altogether. But that "*policy makers would do better to study the changing contours of specific communities of practice*"(*ibid,* p. 161, emphasis added) if they want new ways of seeing that allow for addressing more of the social world, and employ a more robust theoretical base for understanding why people do things the way they do.

2.3.5 Communities of Practice, Practices, and (Social) Innovation

CoP have appeared in educational and organisational research literature for some decades, a key text being Wenger's (1991) highly influential publication of *Communities of Practice: Learning Meaning and Identity*. According to (Wegner *et al.*, 2002; Wegner, 1998), CoP are constituted by 3 parts, a domain, a community and a practice (Wenger *et al*., 2002) A domain of knowledge creates common ground, inspires members to participate, guides their learning and gives meaning to their actions. The notion of a community creates the social fabric for that learning. A strong community fosters interactions and encourages a willingness to share ideas. While the domain provides the general area of interest for the community, the practice is the specific focus around which the community develops, shares and maintains its core of knowledge.

COP have been shown to be particularly conducive to learning, knowledge management and innovation (Brown and Duguid, 1991; Wenger *et al*., 2002). However CoP are often hard to create and do not match up with institutional structures. This presents a problem for managers and policy makers who want to find ways to generate such communities (Wenger *et al*., 2002), especially in bureaucratic institutions (Harvey *et al*., 2013). However, as we have seen so far, these communities can harbour knowledge, adaptations, solutions, novelties, and innovations, and are crucial in theories of wide-scale transition and transformation towards sustainable development.

2.3.1 Social Practice Theory in Relation to the Multi Level Perspective

These two perspectives have significantly different (but not necessarily opposing) ways of understanding innovation and change, in particular how social/technical innovations are taken up, selected, and fit into social reality. Broadly, perspectives in transitions to sustainability that integrate the MLP see competition followed by replacement of rivals (Geels, 2002; Grin et al., 2011) whereas practice theory sees them as becoming a co-dependent part of existing arrangements (Shove et al., 2012). The former understands social and technological innovations as edging out competitors and experiencing radical breakthroughs to become dominant, or taken up by the wider regime, at the expense of previous regimes or projects. The latter understands new practices/innovations coming into use through not only competing with others but through links to existing practices and situations, which they then becomes a co-dependent part of and may even strengthen or enhance, rather than replace.

The two perspectives have somewhat different ontologies, but have many similarities; their theoretical notions about change map onto each other well (see Geels, 2011 for a discussion of this). One thing theorists taking these approaches agree on is that policy interventions to promote new practices and behaviours do not "work as abstract measures but as specific historical moves in a landscape of possibilities that is, in any case, always in transition" (Shove et al., 2012, p. 145) and this requires fundamentally different understandings of social change on addressing entrenched sustainability problems. Much policy still sees behaviour as largely a matter of individual choice alone, thus precluding that interventions address for example climate change should focus on individuals and their attitudes, arguably a flawed approach in theory and practice (Shove, 2010). **Figure 4** positions the theoretical approach of the study, showing the location or 'level' at which the relevant concepts and theory, and the phenomena under focus (see chapter 4) are found.

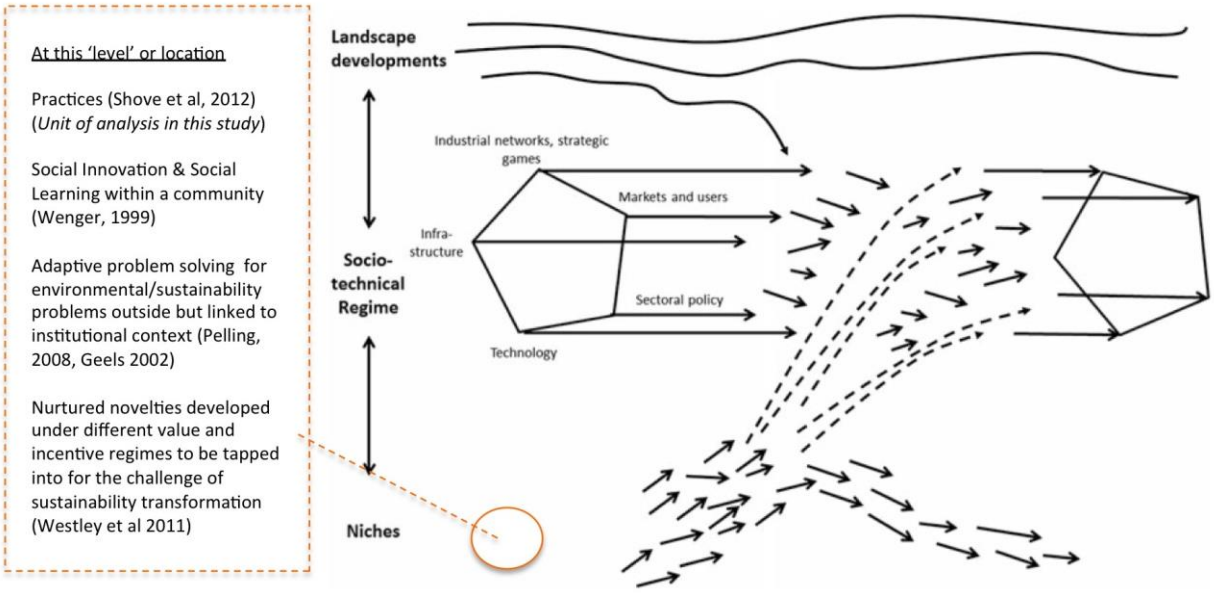

Figure 4. Positioning theory and the case itself in relation to wider scale transition/transformation as theorised in literature on transitions to sustainability utilising the MLP.

2.3.1 Critique of Social Practice Theory

As an analytic approach, SPT has its drawbacks. Practice theory may be more suited to analysing routine behaviours and habits (Shove 2013), however as Strengers and Maller (2015) show, the theoretical approach has explanatory power that offers value well beyond narrow behaviour change interventions and into large scale sustainability programs, or developing new knowledge

about the effects of technical innovations such as smart grids. SPT also has a complex ontology when compared to other perspectives on social and technical change such as transition management theory and the MLP (see section 2.2) meaning that it may be more challenging to trace the dynamics of transitions towards sustainability using SPT (Geels, 2011). However, in this study I rather use it to analyse and explain practices in a case in which actors explicitly aim for sustainability transition, placing these findings in relation to what transition theory tells us about change dynamics in order to find indications of transformative potential in the practices under focus. At the end of the study I make the argument for combining a practice approach and transformation theory in studying transformative practices and appropriate institutional contexts from which they can emerge.

3. Methods

In this chapter all methodological choices are presented and discussed in relation to the aim and research questions. The thesis makes use of multiple sources of evidence, including participant observation, personal interviews, literature review and secondary data.

3.1 Research Design

This research focuses on universities as organisations and practices that go on within them, or influence them. To a large extent, these phenomena are social in nature. That is, they are comprised of social relations and interactions. They are phenomena that are largely 'products' of social realities. Universities of course inhabit the built environment, and practices integrate materials when they are enacted – but these physical spaces and objects are (in part) social in nature as well; from some theoretical perspectives even having their own agency (Latour, 2007). However, from an interdisciplinary perspective that recognises the inter-linkages between the social and the ecological, the phenomena under focus in this study are also inescapably ecological. Social systems are ways of organising nature (Capra, 1997). More than that, higher education institutions are nexus points for science and policy, for specialised disciplinary knowledge and education across all fields. They are thus embedded in the ecological and are also locations from which any pathways to sustainable futures will likely draw upon. In particular, the centres, networks, departments, groups etc. within universities that produce, teach and manage knowledge and competences geared towards social-ecological problem solving and understanding are linked to the management/survival capacity of human societies under increasing pressure from sustainability problems (O'Brien, 2012).

Nevertheless, in this study the phenomena under question are largely 'social' and lie in the realm of the social sciences. The relative lack of knowledge about them, and the selection of one case for study, mean that it may be difficult to approach them with a 'ready made' set of tools for understanding it. An inductive approach is taken; as there is a need for *theory building* rather than *theory testing* (Thomas, 2011) about the case, and to answer the research questions. The approach is *qualitative,* explaining variables not readily quantifiable in order to answer the research questions. The empirical work in this study comprises data collection through multiple techniques and relies on multiple sources of data.

3.2 Use of Data Sources

The following tables, **Table 1** and **Table 2**, show which empirical material is presented in which part of Chapter 4, in which the study's empirical material is presented.

Table 1. Empirical data sources

Primary sources	**Specifics**
1. Interviews with coordinators	x 12
2. Interviews with long-term staff and associates	x 4
3. Participant observation notes	Nov2016-Apr2017
Secondary sources	
4. *Transcending Boundaries* book (Hald, 2011) including reflective and analytical articles and accounts by practitioners and associates of the organisation under focus in the case.	Ch. 4, 5, 8 ,13
5. CEMUS annual reporting documents	4 years, 2013 - 2016
6. Climate Change Leadership course reports	Year 2014, 2015

Table 1 shows primary and secondary sources used in the study, giving specific details about the quantity or quality, depending on the source. Table 2 then shows which parts of the empirical background and results draw on which data sources. The tables are presented with the aim of explaining how primary and secondary data is used in the study, in order to further clarify the

research design. The numbers in Table 2 correspond to the numbered Empirical Data Sources in Table 1.

Table 2. How empirical data sources are used in this chapter

Section	Content	Primary (from Table 1)	Secondary (from Table 1)
CEMUS Background	Descriptive and quantitative data	2, 3	4, 5
CEMUS Model	Description and diagrams of process & practice, course creation	1, 2, 3	
Course example: Climate Change Leadership: Power, Politics and Culture	Description, expansion to Prof., MOOC, CCLIP	1, 5, 6 1, 2	5 5
Practice: "student-led coordination of transdisciplinary sustainability learning & teaching"	Themes emerging from interview data and participant observation notes	1, 3	

3.3 Case Study

Case Study is a research approach in which the researcher looks at a situation or set of situations as the unit of research. This method allows the researcher to "retain the holistic and meaningful characteristics of real-life events-such as individual life cycles, small group behaviour, organizational and managerial processes, neighbourhood change, school performance, international relations, and the maturation of industries" (Yin, 2008, p.5), capturing the complexity of such situations. In case study research, propositions are first made about why a particular *case* (the subject) is a *case of something* (the object), and this relationship is constantly revised as the research progresses (Thomas, 2011). Through the lens of the case the researcher moves towards developing *analytical generalisations* (Yin, 2008) which relate to the wider phenomena this is argued to be a case of.

The case study as a *research approach* has been criticised as being insufficiently defined for rigorous scientific research. Despite the available literature elaborating case study typologies and methodologies (albeit with arguable rigour), case study can still be labelled as imprecise or vague, leading to poor scientific rigour (Scholz and Tietje, 2002), a claim which Yin (2008) rejects as a matter of course, given the well-established methodological possibilities and successful applications of case study. Case studies are used often in teaching and learning and are an excellent tool for establishing an often rough-and-ready framework to generate space for discussion and analysis in pedagogic settings. To some extent I argue they have a analogous pedagogical function for the reader in the literature on sustainability in higher education (which this study is positioned within), given the action-oriented, policy-informing orientation of many of the case studies and other empirical research published. Case study implemented in research, however, needs to carefully present evidence and process – the reader must be able to fully see the steps of the research process and sources of data, if not repeat it exactly. Yin (2008:8) describes three conditions which determine whether it's appropriate to use a case study as a research method: (a) the type of research question posed, (b) the extent of control an investigator has over actual behavioural events, (c) the degree of focus on contemporary as opposed to historical events. Case studies, Yin continues, are appropriate when the research is characterised by (1) 'How?' and/or 'why?' research questions where the aim is to achieve an "extensive and in-depth understanding of some social phenomenon" (2) No need for researcher to have control over behavioural events, (3) a focus on contemporary events.

Case studies may be *exploratory*, *descriptive*, or *explanatory*. If the goal is to be *predictive* of outcomes, perhaps a survey is a better method. Case study research is especially relevant when the boundaries between the social phenomena under study and its context are not clearly definable (*ibid*:18). This is then part of the reason to study it at all, and the question of how to find these boundaries will therefore also form part of the researcher's decisions on data collection and analysis methods.

When choosing case study as an approach, the choice of case(s) is important to address. Thomas (2011), case studies always involve a *subject* and *object*; the *case* and *that which it is meant to be a case of*. He argues that "the validity of the case study cannot derive from its representativeness since it can never legitimately be claimed to form a representative sample from a larger set. The essence of selection *must rest in the dynamic of the relation between subject and object*. It cannot rest in typicality." (*ibid,* p.514, emphasis added). He adds that a case can be selected through three different routes, each of which point to this dynamic relation between subject and object. First, a case can be selected because of the researchers' familiarity with it: a *local knowledge case*. Second, because of its inherent interest – that it is a *key case* of the phenomena. Third, because of the case's *outlier* status – that it deviates significantly from current understandings of a phenomena. However, it should be noted that, as Thomas argues (*ibid*) whether or not this is an outlier case, or even a local knowledge case, depends on the relationship between the object and subject. This is a dynamic relationship that can change over time as the case is studied, because the researcher continues to ask "what is this a case of?".

Whether findings in a study are generalizable of course depends first on the research design and topic. But a deep study of an isolated case will tend to produce more particular results that constitute less generalizable findings, as opposed to a broad comparative study of multiple cases (assuming that the quality of the research is equal). However, a case study must *always* generalise to some extent because any case presented must include consideration of other cases in order to describe what it is that is being studied and why. As (Gerring, 2006) argues, case studies thus are always both particular and generalizable to a greater or lesser extent:

> *"No case study (so-called) denies the importance of the case under special focus, and no case study foreswears the generalizing impulse altogether. So the particularizing/ generalizing distinction is rightly understood as a continuum, not a dichotomy. Case studies typically partake of both worlds. They are studies of both something particular and of something more general"* (Gerring, 2006: 76)

Such a 'continuum' understanding of the generalizability of case studies is in line with Thomas' (2011) previously mentioned relationship between object and subject. Thus for case studies to offer valuable and productive scientific possibilities for the researcher, she or he must establish a clear relationship - or at least the researchers' informed view of the relationship –throughout the study between *what* is under study and *what it is meant to be a case of*. This is essential in order for generalizability of findings to be elaborated and gauged.

Finally, apart from the more common ethical duty to report the process and outcomes of scientific research honestly, case studies are particularly ethically charged because interview subjects are often involved. Furthermore, case studies look at contemporary events, rather than e.g. biological systems or historical narratives. This means the events are often still unfolding, and people's lives can be affected by the research, and this puts a burden of ethical behaviour on the researcher throughout the research and after its publication.

3.3.1 This Case Study and Unit of Analysis

This empirical study in this research project is an *exploratory case study*. It approaches a phenomenon that is not well explored and attempts to make sense of it. However, it is also *explanatory*, in that it explains conditions and practices, asking and answering *why* questions about the phenomenon in question. Thomas (2011, p. 514) observes that "the theoretical enterprise of case study is not about testing probabilistically stated theories. Rather it is about discovering or testing tools of explanation", and this reasoning forms a basis for the way this study proceeds.

The case was selected in part because of its double-interest as a case study: the author's first-hand experience with it making it a local knowledge case (Thomas, 2011) and because the case can be seen as an 'outlier' (*ibid*) to current understandings of sustainable development implementation at universities. These two aspects make the case a compelling focus for case study research. Other reasons for the choice are the organisation's explicit aim to drive the sustainable development agenda, 'transform educational paradigms" and "change how we teach, meet and learn' in higher education" (Hald ed., 2011). In seeking to transform societies as well as higher education itself in enacts a sort of 'double loop' aim which in theory aims to change universities themselves (Sterling, 2004), and has been working under these values and vision for 25 years. Furthermore, the organisations' 'bottom up' approach to driving change was a prerequisite in selecting it as a case. Finally, the choice of taking a practice theory approach had consequences for what could be studied – the unit of analysis is of course linked to this analytical approach. What this meant was that entities like individuals and institutional structures are de-centered from the focus of the case study. However, this does not mean they are excluded, and certainly data was gathered related to context as well, the turn specifically towards a focus directly on practice only being more relevant if the practice is *situated* as clearly as possible.

The unit of analysis in this research project is a practice, what I label *student-led coordination of learning and teaching for sustainability*. This practice is shown to be situated within a higher education institution/organisation and carried by members of a community situated there. The context of this case is further outlined in Chapter 4. In order to present the practice at a greater level of resolution, it is also discussed in light of its enactment in an interdisciplinary course that has been run since 2010. The course functions as a sub-unit in the case study that helps in explaining the practice.

3.3.2 Participant observation

Participant observation involves being immersed in a situation as an active participant. It is traditionally used "at the exploratory stages of the research on a new topic, culture, venue, or behaviour[…]Spending time working, playing, or living with people will produce data that would require dozens of interviews or focus groups to uncover." (Guest *et al*., 2013, p. 82). Guest *et al* (*ibid*) discuss several benefits of participant observation, drawing on Bernard (2006) in their text. Participant observation can open up new areas for investigation in order to collect a wider range of data, allowing for an 'insider's view' on what's important to collect data about. It also can give researchers insight that helps them form the right questions and do so in terms that are understandable to the 'natives' of the place. The method also helps in developing intuitive understanding about the meaning and significance of data, reducing the potential for misunderstanding of something obvious to insiders – a common validity error with qualitative research. Furthermore, participant observation allows the researcher to ask research questions that may be inaccessible through other data collecting techniques. According to Guest *et al* (2013, p. 81.)

Table 3 shows specific moments when, and activity about which, participant observation notes were taken. In addition, the author draws on four reflective and evaluative documents about practice during the time of being a course coordinator, written periodically since 2013 and reflecting my own interpretations of what is important in planning and implementation of specific courses at CEMUS. The author of this study has for several years been a part of the community and employed by the organisation (CEMUS) it is situated with. The author has participated in many facets of the community and the university, and has engaged in some of the transformative strategies under study.

Table 3. List of Recorded Participant Observations (PO)

Event: Description	Focus	Date	PO#
Actors & Strategies for Change Course: interactive dialogue on climate change with IPCC guest over Skype and Prof. Kevin Anderson in person	CCs behaviour, students behaviour, lecturers behaviour	20.05.2017	PO 1
CEMUS MSD Alumni Event: meeting and dinner for former and current Master in Sustainable Development students and other CEMUS students including panel discussants now working professionally	Story Told by Founder of CEMUS to the group. Behaviour of students and course coordinators	18.03.2017	PO 2
Start-Up Meeting for New Coordinators: New employees/CCs introduced to the job on day 1	How CEMUS is described. Behaviour of new coordinators	03.04.2017	PO 3
Climate Change Leadership Course: Sitting in on classes, discussing the course with three students	How students experience being a student in a CEMUS course and also the behaviour of new coordinators in their first 6 months	18.03.2017	PO 4

3.3.3 Semi-structured interviews

Kvale and Brinkmann (2008, p. 105) delineate ways in which the purpose of the study link to the purpose of the interviews. Interviews may be conducted to "obtain empirical knowledge of subjects' typical experiences of a topic", or they may "seek knowledge of a social situation" – the latter presumably does not depend only or at all in the subjects experiences of it. As the interviewer/researcher (me) had extensive (although partial) knowledge of the goings on in the organisation, the interviews tended to focus on the experience and impressions of interview subjects rather than data about the social situation in which they live (although the boundary between these two is not always clear). If the researcher had been external to the organisation – i.e. not having been embedded and part of the community – interviews may have sought to establish more about social relations and structures than those carried out in this study.

Twelve interviews are conducted with those who have a Course Coordinator role at the organisation and who are members of the community, b) 4 long-term participants in the organisation who are members of the 'Core Team' (see Table 4). Data from these interviews aim to better explain conditions and practices around a way of organising for sustainable development in a higher education system. *Thematic analysis* was carried on interview data in order to find common themes that arise among interviewees, with themes emerging from the interview data. The interviews were transcribed and then coded using TAMS Analyser software (Weinstein, 2012). An exploratory coding method was used in which provisional codes were developed by the researcher. Provisional coding 'begins with a "start list" of researcher-generated codes based on what preparatory investigation suggests might appear in the data before they are analysed' (Saldaña 2009, p.118). Codes were modified as the coding progressed to allow themes to emerge from the interview data and remove others that were no longer relevant. The resulting major themes form the headings for section 4.3, in which interview data is presented. These are 1. Learning the practice, 2. Taking on an ambiguous role, 3. The importance of being (non-) expert, 4. Making Connections Within Transdisciplinary Frames – Inviting Guests, Weaving a Thread, and Creating a Space, People, 5. Materials and infrastructure, 6. Perceived influence and impacts on university.

Table 4 provides the position of the interviewee, the date of the interview and its validation. All interviews were validated via sending a full transcript to the interviewee asking them to validate its contents and raise any issues of accuracy or otherwise they may have found or were concerned about. In choosing interviewees, I aimed for a mixture of new, experienced and very long-term members of the community and organisation, and who at some stage had been practitioners, actively involved in CEMUS education, research, and/or outreach. This was done in order in an attempt to get a better snapshot of conditions and practices in the case as staff turnover is high

and therefore the practice itself is characterised by a mixture of newer and older practitioners. As is evidenced in the gaps between interviews in 2016 and 2017, the research project was started, then paused, and then returned to. Interviewees accounts of their experience remains valid to the research questions regardless of this gap, however given the shifting nature of practices and organisational culture and many other factors the same interviewees may have given different accounts if interviewed one year on. However, given the mature nature of the organisation (25 years old) and the subsequent routines, norms, values and culture built up within it, we may assume that much of what the interviewees express remains valid to the research questions and to the experience of practice.

Table 4. List of interviews

Name	Position	Years at CEMUS	Interview	Validation
Erica Zinders	Course Coordinator	>1	Jan 2016	Mar 2016
May, Frederike 1	Course Coordinator	1.5	Jan 2016	Mar 2016
Sophia Ekbom	Course Coordinator	2.5	Jan 2016	Mar 2016
Ernest Aigner	Course Coordinator	>1	Jan 2016	Mar 2016
Morag Ramsey	Course Coordinator	>1	Jan 2016	Mar 2016
Ben Owen	Course Coordinator	3.5	Jan 2016	Mar 2016
Jesse Schrage 1	Course Coordinator	1	Jan 2016	Mar 2016
Isak Stoddard 1	Course Coordinator	9	Jan 2016	Mar 2016
Alejandro Marcos Valls	Course Coordinator	1.5	Jan 2016	Mar 2016
Hannes Wilmer	Course Coordinator	5	Jan 2016	Mar 2016
Isak Stoddard 2	Educational Coordinator (Core Team)	9	Feb 2017	Mar 2017
Frderike May 2	Course Coordinator	1.5	Feb 2017	Mar 2017
Jesse Shrage 2	Course Coordinator	2	Feb 2017	Mar 2017
Jakob Grandin	Former Educational Coordinator (Core Team)	9	Feb 2017	Mar 2017
Sara Andersson	Educational Coordinator (Core Team)	9	May 2017	May 2017
Daniel Mossberg	Director of Studies (Core Team)	9	May 2017	May 2017

3.4 Case Study Research On and For Sustainability in Higher Education

Corazon *et al* (2004) critique the use of case studies in research on sustainability in higher education. Their article overall provided a stress test for my research design and in thinking about the thesis going into the research. The authors call for some specific requirements to ensure case studies are rigorous and have transformative potential. This potential is important for the researcher, given the nature of the phenomenon; its urgent and sometimes large-scale demands on well-established and powerful institutions. The authors say that some studies report 'good' results only, lack methodological discussion, do not explain where their data comes from. They also criticise a pattern they found to be common across published research of presenting some sustainability goals and using the case to show how these can be achieved; simply a means of reporting via case studies (Corcoran *et al*., 2004, p. 13). Furthermore, they found some studies where the author used a case to only make an argument already decided before the study began, an issue particularly pertinent to this study as I the author have been involved in the case personally. In this study I take measures to avoid these issues through the research design, and through asking questions that require going further than descriptive and 'reporting back' narratives, and into analysis and which opens up space for critique. The authors also argue that good case studies in this area should be challenging to both the author and the readers. "Dissonance and reframing should be both a part of the process of doing case-study research and a resulting outcome of the research when it is read by others." (Corcoran *et al*., 2004, p. 15). Because of the normative, change-oriented nature of the field,

> *A study is more transformative when it challenges the reader and/or sets challenges for the writer. The development of sustainability in higher education has both personal and shared elements to it. Social interaction allows one to relate or mirror his or her ideas, insights, experiences and feelings to those of others.* (Corcoran et al., 2004, pp. 14-15).

This ‘mirroring’ effect in the relation between the author and reader is particularly relevant in a field where action research and action learning are common ways of operating for readers and authors who it is assumed are likely acting as change agents and experimenting in their professional and personal contexts to some extent. Furthermore, the authors find that ‘cases as stories’ are a good way of reporting innovations, citing good examples in which the role of the author in the innovation is made clear (Corcoran *et al*., 2004, p. 14). I argue this thesis sheds light on some innovative and unusual practices worth reporting, and indeed this is one of the aims of the thesis and directly related to the research questions. And in this study I make my own role in the organisation clear.

3.5 Delimitations

The main focus for empirical the data gathering through interviews has been placed on CEMUS as an organisation, and the student coordinators who are or have been employed at CEMUS, and others employed at CEMUS who constitute the community. The interview data showing the lived experience of conditions and practices is a ‘snapshot’ of the organisation. This is filled out with secondary sources that speak to the history of the organisation. This means that developments and processes over time in the 25-year history of the case have largely been excluded. This was necessary due to the restrictions of the project, in order to have a hope of answering the research questions concisely. Furthermore, I rely heavily but not entirely on the perceptions of employees or those related to the organisation, who have been part of the community in one way or another. This is reasonable as interviews contribute to the part of the study that focuses most heavily on practices. Care was taken to also include critical viewpoints within this group. Students who attend the courses a part of CEMUS, but will not be included in the empirical part of this thesis, despite the deep curiosity of the author to know more about them and their relation to the case. This delimitation is put in place because of time restrictions, which I determined would not allow an effective exploration of the student body at CEMUS. The priority then was to explain phenomena in the case that centered more on an ‘internal’ community of practice linked to ‘students designing and implementing sustainability education’. In my suggestions for further research, I make the case for further research that includes more focus on other groups, for example students and lecturers, and their experience in this community.

Theoretical delimitations are also important to address. This has been discussed to some extent in section 3.1 of this chapter, however more can be said. I take a theoretical approach that seeks to build and test ‘tools of explanation’ (Thomas, 2011) for innovative social practices and how they relate to social and technical change, and specifically organisational and institutional aspects of this potential for change. This choice of theoretical approach limits the focus of the study. For example, the empirical study focuses on a center for education (among other things), but gives little time to analysing curriculum or outcomes for students. This is an intentional choice, as the research questions aim towards exploring or explaining change at universities as organisations and institutions, rather than for example questions directly about education for sustainable development and transformative learning.

4. Empirical Study

In this chapter, following some short to the case, empirical results of the research then presented. The case and its organisational context is presented then findings about the practice 'student-coordination of transdisciplinary sustainability learning and teaching' is presented, drawing on 14 semi-structured interviews with practitioners, and participant observation notes by the author between 2016-2017. It is made clear which sections of the chapter rely on which sources of evidence through referencing, and in section 3.2 of the thesis.

4.1 Empirical Background: Higher Education in Uppsala

Sweden is commonly seen as and measured to be a global leader in sustainable development, and has a long history of being a pioneer in this area (RebecoSAM, 2014), including in policy and fundamental national law. The Swedish Government has adopted sustainable development as a policy objective generally (Swedish Ministry of the Environment, 2003), and has sought to bring sustainable development into practice across many sectors, including education. For example, schools have been legally compelled to include sustainable development in their curriculum since 2004 *(Sverige* and *Kommittén för utbildning för hållbar utveckling*, 2004). Many of Sweden's universities have also adopted various vision and policies for sustainable development, and have introduced research and educational offerings that explicitly address this area. Swedish Universities are public institutions, and higher education is government supported and free to Swedish and EU citizens.

Uppsala is a Swedish city of approximately 200 000 residents located in the mid south east of the country, near Stockholm. It is home to two major universities, the Swedish University of Agricultural Sciences (**SLU**) and Uppsala University comprising together a student body of over 40 000, with Uppsala being significantly larger in scale. As such, Uppsala's university environment includes multiple faculties, departments and centres across a wide range of the arts and sciences. Uppsala University is one of the oldest higher education institutions in Europe, and the oldest university in the Nordic countries, being founded in 1477.

Both universities have sustainability strategies in place, and as with all large institutions the picture of how and where these are implemented is complex and beyond the scope of what is possible to say here. At the organisational level, however, both Uppsala University and SLU have adopted strategy documents that elaborate their intentions and policy directions for implementing SD. Uppsala University is in the early stages of doing this – in 2015 the university board adopted a Programme for SD (Uppsala University, 2015) and has recently appointed an officer focused directly on sustainable development. SLU can be said to be somewhat further ahead, having a longer history of working with sustainable development. Both universities refer to sustainable development in their communications about vision and purpose, Uppsala saying it researches and educates for a better world, with SD as one of its four strategic priorities (UU, 2017), and SLU using "science and education for sustainable life" as a university slogan and stating in its 'About' documents that that "SLU contributes to an ecologically, socially and financially sustainable development. Environmental thinking and environmental aspects are integrated in all decision-making and are part of all activities within SLU's organisational units"(Swedish University of Agricultural Sciences, 2017). The space available in this thesis does not allow further elaboration of the complex picture of SD in these two universities, however as Corcoran and Wals (2006) argue, case studies in higher education often have this problem – leaving little opportunity for the reader to understand the institutional context in which the case exists, and perhaps more importantly not adopting research designs that allow this to be incorporated. I have not overcome this issue, however in the conclusion I suggest future research that might.

4.2 Empirical Results

In this section empirical results of the study are presented, focusing on the case study that is introduced below. The background, origin story, model of practice and example of a university course are followed by a detailed results of a focus on the practice of student driven, transdisciplinary coordination of learning and teaching.

4.2.1 CEMUS background

The Centre for Environment and Development Studies (**CEMUS**) is a university center with a 25 year history of implementing sustainable development focused education, research and outreach. The organisation states its purpose as "student-led transdisciplinary education for sustainable development and a meeting point for researchers, experts, students and other actors around pressing sustainability questions and the future of humanity" (CEMUS, 2017). Starting as one course in 1992, it has grown into a university centre which employs ~30 people, runs ~22 undergraduate and master courses annually (see Table 7 in Appendix 2), and enacts numerous and varied outreach activities, with 52 events open to the public in 2016 alone (Center for Environment and Development Studies and Center for Sustainable Development, 2016). Between 500-800 students per year are enrolled (Center for Environment and Development Studies, 2014). CEMUS also has a research school CEMUS Research Forum **(CEFO)**, which carries out its own research projects, and to which researchers and PhD students can be affiliated. The center is physically located in Uppsala, Sweden at Uppsala University in the department of Earth Sciences (*Institutionen för geovetenskaper*), the center is administratively anchored at, at jointly supported by, both UU and the Swedish University of Agricultural Sciences. In 2015 the centre was awarded the Uppsala Peace Prize (*Uppsala Fredspris*) in the category of Sustainable Development, and in 2016 was nominated by Sweden to the UNESCO-Japan Prize in Education for Sustainable Development.

The organisation aims to drive the sustainable development in education, research and outreach while seeking to, 'transform educational paradigms" and "change how we teach, meet and learn' in higher education" (Hald ed., 2011). The center has transformational goals that extend beyond the classroom into the wider university and society, aiming to contribute through education, research and outreach to transform society, individuals, and higher education towards working for sustainable development. CEMUS has always been located outside of a disciplinary track (not formally overseen or managed by a specific scientific discipline within the university system) uses an unconventional student-led model to create education, is founded on an act of student activism - or entrepreneurship (or both) - that brought into being a new way of operating in practice for the university (examined and analysed in more depth in sections 4.3 of this chapter, and in Chapter 5), initiates and maintains numerous projects for society-university collaboration, and encourages active experimentation in educational practice from both students and teachers. As such it provides a unique case for exploring questions around sustainability in higher education.

4.2.2 Origins

Conditions and practices at CEMUS have grown from an idea (later in this thesis argued to have generated an *innovation in practice*) created in 1992 when two students were not satisfied with what the university offered, and took action to change this. This excerpt from a written account from Niclas Hällstrom, one of the founding students, recounts his thinking at the time:

"I found myself in an enormous, static machine[…]. Here, every year, thousands of students appeared to flow through the system without ever having been compelled to place their education in a broader context; without having been forced to challenge themselves and their educational and career choices in relation the major issues of global survival which should reasonably be of concern to everyone, regardless of discipline. Could it even be the case that I had ended up in a place that turned out to be a fundamental

part of the problem—the great environmental problems and the global injustices that troubled not only me, but also a growing part of the world (this was during the years between the Brundtland Commission and the Rio Conference)?" (Hällstrom, 2011, pp. 17)

The ensuing story of creating the initial course that started the CEMUS project still influences conditions and practices at CEMUS today, being retold often in meetings with either guests who come to CEMUS, and in internal meetings when someone more 'senior' in the organisation meets new recruits. The following recounting is based on my own participant observation notes, and a reading of Hald (2011): two students came to university and were disappointed to find that important conversations about the future of humanity and its place on the planet were completely missing from the 'static institution' they encountered. Having identified what they saw as a gap in what the university was offering and needed to offer, and inspired by visits to Uppsala by David Orr and other leading voices, they hatched an idea – a seminar series course called 'Man and Nature' which would bring the best scientists and thinkers from around Sweden together around this topic. With a lot of self-organisation, ideas and hard work, and the support of some key faculty members - professors Bengt Gustavsson and Hans Rosling among them, they were able to make the proposal to the university and get the course of the ground. There were 500 applicants to the first course, and the rooms they had could only hold 200. From the birth of this first course CEMUS continued to develop, expanding and becoming established as a center, now offering today around 21 courses for hundreds students per year.

The story is told differently by different people in the organisation, but the basic components of the story remain, placing student action at the core and including collaboration with faculty while implicating the university itself in the problems of development and environment, and envisioning and implementing a strategy for change.

4.2.3 The 'CEMUS model'

Throughout its activities, CEMUS implements in practice at a combination of

- Transdisciplinary approach to social-ecological issues and problems
- Student-driven education, outreach and research coordinated largely by students, but in collaboration with senior faculty and external experts
- Pedagogy that emphasises students taking responsibility for learning, and aims for transformative learning

A core part of CEMUS' operations is an unconventional *practice*, a way of organising learning and teaching that works within broad and challenging interdisciplinary frames and places students in an uncommonly empowered coordination position. An outline of its essential components are as follows, and can been seen in greater detail in Figure 5. The practice is also explored in more depth through interviews and participant observation later in this chapter.

- Two students are hired as course coordinators to design, plan and manage a course as a project over 9 months.
- Courses cover a wide range of themes, using broad interdisciplinary frames
- Course coordinators do not teach the courses, instead relying on a series of guest lecturers to teach on various themes, whom they invite during course planning
- Each course is supported by a 'Work Group' of 3-8 people; experienced teachers, researchers, and practitioners from business or civil society, 1-2 students from the previous iteration of the course, and 1-2 experienced CEMUS staff. The group supports course planning and development, acting as a sounding board, inspiration and legitimising partnership.

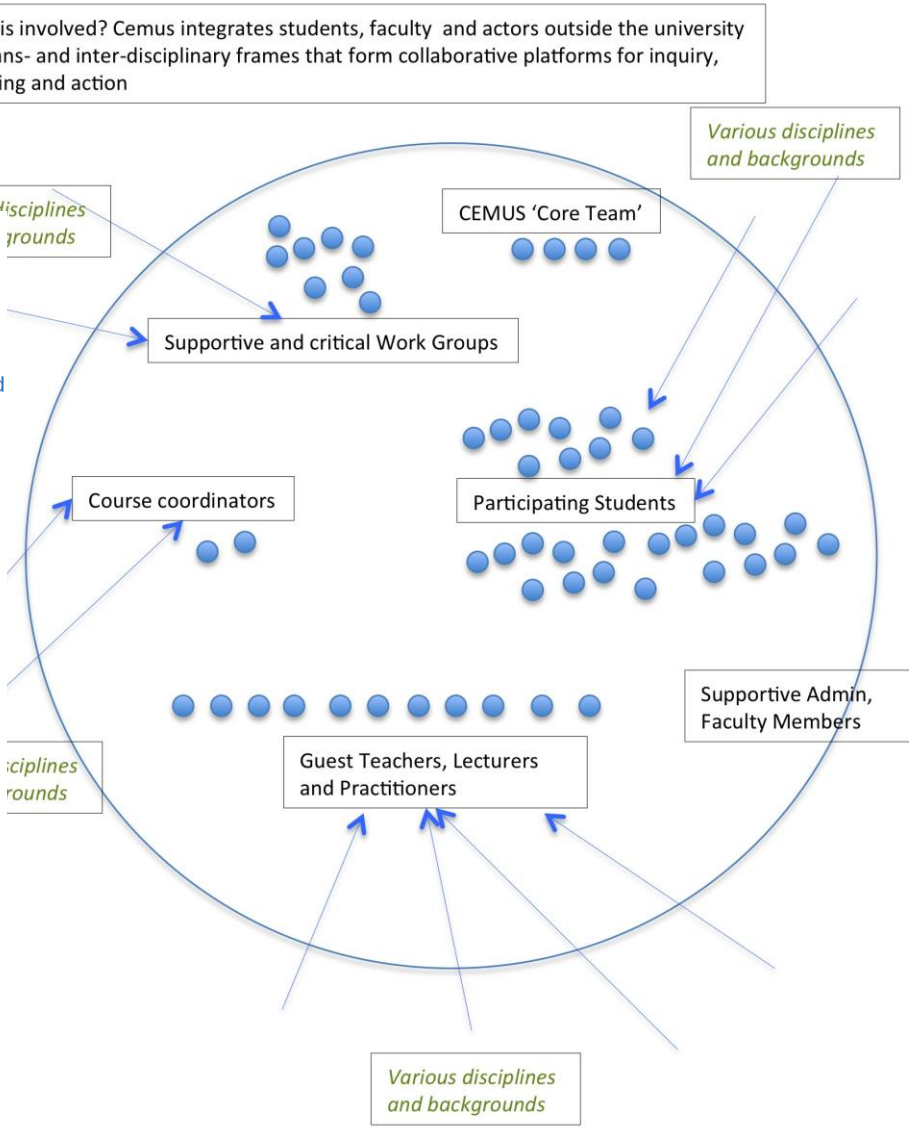

Figure 5. At CEMUS, planning and learning proccesses integrate students, teachers, learning settings, and subject matter as a collaborative action learning process led by students. Course creation invites far more actors to be involved in education than is common, including from outside disciplinary structures, to the table in inititiation and implementation of a course

CEMUS Core Team. Senior members of the organisation employed more long term. They provide support, administration, and drive internal and external initiatives along with CCs.

Supportive and Critical Work Groups. Cemus courses are supported by 'Work Groups' of ~4-8 people made up of 2-4 experienced university teachers & researchers, and/or practitioners from business or civil society; 1-2 students from the previous iteration of the course; and 1-2 experienced CEMUS staff from the Core Team. Some Work Groups have long standing relation to courses, others rotate members often.

Course Coordinators. Two students are hired as course coordinators to design, plan and manage a course as a project over 9 months. They are present in classes, and plan and run active workshops and seminars throughout the course. Typically they have previously taken the course themselves, or have taken other Cemus courses; an advantage in recruitment. Positions are advertised university wide and interviews conducted by small group of core team and CCs.

Participating Students in Courses and Outreach Projects. Students are from varied educational backgrounds across the social and natural sciences. Students are often given responsibility for organising parts of courses, e.g. discussions, activities, student-led challenges, varying course to course. They must attend 75% of all lectures; all other sessions are mandatory. Students enroll in bachelor level courses as elective parts of their enrolled study programs. Course sizes of around 10-30 for Swedish courses and 30-60 for English courses, which include international exchange students. CEMUS also runs 3 Master level course for the MSc. in Sustainable Development only open to students in that program. CEFO research school runs PhD courses for PhD researchers and researching Master students.

Guest Teachers, Lecturers and Practitioners. Drawn in to participate in courses, with paid teaching time (often 2-3 hour sessions) or pro bono in some cases. Invited either by CSc during course planning, core team for outreach events, and sometimes enrolled students who request a lecturer as part of the course. Coming from university (professors, researchers, other students), private sector, civil society, government agencies. With various specialties and backgrounds – depending on course or project need. Drawn from Uppsala/ Stockholm region, Sweden or international. Academics from 2 Uppsala universities UU and SLU, from other Swedish universities, from international universities via Skype or on visits. Some have long standing relationship to CEMUS and return often, are part of Work Groups, or supportive in other ways.

- With the support of the workgroup and regular internal meetings with other coordinators and senior CEMUS staff, coordinators develop examination and literature plans, working with a basis of previous iterations of the course (unless it is the first run).
- They also design and implement active workshops and seminars periodically throughout the course with the students. (These can take many forms and often utilise innovative group discussion methods, systems thinking, role play, strategic games, simulated political meetings like climate negotiations, and so on) This requires much creativity and willingness to try, experiment, and to possibly fail.
- During the course implementation, course coordinators manage the course, being present at all lectures and having a role that is ambiguous as both student, course leader, participant and more (this is shown in more depth in section 4.3 of this chapter)

While this practice is a way to create university courses specifically, it is a way of organising for sustainable development within the university more generally (also implemented in various outreach activities at CEMUS creating conferences such as the Climate Existence Conference and events such as the Uppsala Sustainability Festival) this will be examined in section 4.3 of this chapter, and explained and analysed in Chapter 5.

4.2.4 How a course idea is proposed and implemented

Ideas for CEMUS courses are proposed in open meetings, to which students, faculty and the public are invited, ideas are proposed before being developed planned and implemented. They must go through various administrative steps in order to be approved, which will not be described in detail here. A simplified outline of the process is included in Figure 8 (Appendix 3). This is relevant as the 'wide transdisciplinary framings' that move across and/or transcend disciplines comes under focus throughout this study and is a key part of conditions and practices at CEMUS.

4.2.5 An Anomaly in the University

CEMUS started as and remains an anomaly in the university system. The first course, Man and Nature, was funded directly by the vice chancellor, sitting outside of any faculty or department. This unusual administrative arrangement continued CEMUS remained a structurally 'freestanding' entity within the university, even when it was formed as a joint university center between the two universities in Uppsala, Uppsala University and Swedish University of Agricultural Science. Later, it was made part of another 'center', the Center for Sustainable Development (CSD Uppsala). CSD then became part of the Earth Sciences Department at Uppsala University. Throughout these changes CEMUS has remained structurally and culturally free of management or influence from any one disciplinary or departmental track

In addition, as is explained in more detail in coming sections, CEMUS is led by people who do not hold the official credentials and hence 'normal' institutional legitimacy formally required to lead a university center and organise education and research (in saying this its important to note that their work is supported in numerous ways by partnership and collaboration with those who do) CEMUS was, or at least was perceived to be by those working there, to be therefore isolated from the institutional context due to this cultural anomaly clashing with the norms of the university (Österberg and Kronlid, 2011). Over years CEMUS expanded, employing students to do a job they were 'not supposed to', and integrating disciplinary knowledge and actors in ways that did not fit norms and structures, often transgressing them intentionally (Österberg and Kronlid, 2011). New social and institutional arrangements were developed and built up around this practice of transdisciplinary student coordination. This was done under values, goals and incentives that were, or at least were perceived to be, often outside the coordinates and norms of institutional context (Hald, 2011).

4.2.6 Course example: Climate Change Leadership - Power Politics and Culture

Climate Change Leadership: Power, Politics and Culture (**CCL**) is a 15 ECTS student-coordinated interdisciplinary course at CEMUS, first run in 2011. As with other CEMUS courses, two people coordinate it each time it is run. As of 2015, seven people had been coordinators for course (May, 2015). The official syllabus course description is as follows:

"Climate change leadership is often mentioned in both news media and by politicians themselves, but what does it really entail? What kind of knowledge and skills define a climate change leader and how can they be learned? What kind of political, cultural and psychological resources are lacking in present initiatives?

This course discusses the fundamentals of an effective and functioning climate change leadership in a global perspective. Starting out from an analysis of how the climate has changed during the planet's long geological history and how it plays a central role in the life of the biosphere, the course looks at why there is such a comparatively few effective responses to the issues we are facing. Then the societal and cultural effects of climate change are discussed, looking at how the use of fossil fuel has transformed modern societies and cultures and taking into account broader perspectives such as ethics, justice or gender. With the knowledge gained during the first part of the course, a framework for a working climate change leadership is critically looked at from a political, power and societal perspective. The final part of the course is devoted to applying this framework in case studies, with the focus on both a global and local level, trying to identify different strategies for mitigation and adaptation in terms of a functioning climate change leadership" (Uppsala University, 2017, n.p.).

The course comprises active workshops, 'leadership labs', guest lectures, and group projects. According to numbers in 2013-2016 the number of students varies between 15-35, from and all come from multiple disciplinary backgrounds, from different departments around the university. Prerequisites for the course are that students have studied 60 credits (1 year of full time studies) in any discipline. In 2017's course, 28 guest lecturers visited the course for various types of meetings with students, from traditional lectures to practical workshops. These guests included teachers from 13 different university departments/units in Uppsala including both Uppsala University and Swedish University of Agricultural Sciences, 6 researchers from other Swedish/international universities, 2 from the business sector, 6 from civil society organisations, and one author/artist.

4.2.7 Expanding into the university – new social arrangements and structures

Between 2014-2017 CCL has also provided a basis for several new additions to CEMUS and Uppsala University that span research education and outreach. It has been turned into 1) a massive open online course (**MOOC)** of the same name, one of Uppsala University's first, 2) a second, applied 30 credit course, Climate Change Leadership in Practice (**CCLIP**), and 3) has recently formed the conceptual basis for a new and much publicised 10 year rotating professorship, The Zennström Visiting Professorship in Climate Change Leadership at Uppsala University, funded in 2015 by a donation from Zennström Philanthropies, the founder of which, Niclas Zennström, started the company Skype and is a UU alumni. The CCL course, the framing for which was developed by students in 2011 and iterated through the student coordination model over ensuing years, formed the basis of the application for the funding of the professorship. The visiting professorship runs for 10 years, with yearly rotating guest professors from around the world, whose is official goal is the

"development of an environment that will directly address some of the most challenging questions that climate change poses to humanity, develop novel solutions, and enable transformative change in the nexus of science, policy and innovation. The professors will in distinct but mutually reinforcing ways, inspire new research and education and catalyze the much needed action toward a more sustainable future" (CEMUS, 2016).

The professorship is currently in its third year, and has drawn in professors who are active outside the university as well as inside, being advocates for climate change issues. The wide

interdisciplinary framing crossing the social and natural sciences and being oriented towards social change was an important element of success in the professorship's selection at the application phase, and eventual awarding of funding, as it competed with several other international proposals. Its conceptual basis in the CCL course has influenced the selection of professors who have been vocal change advocates, and the trajectory of the professorship in general (Stoddard, 2017).

4.3 Zooming in on Practice

The practice developed and maintained at CEMUS, that of ***Student-led coordination of transdisciplinary sustainability learning and teaching*** as outlined so far, is complex, containing multiple stages and activities. Course coordinators usually have no formal training in education, face a steep learning curve, and are compelled to experiment, to try things out. They organise a course that integrates students, lecturers and knowledge from multiple disciplines and from inside or outside academia, building learning and teaching around a broad sustainability topic. Generations of coordinators design and coordinate courses, from planning to implementation to evaluation, maintaining throughout their status as 'non-experts' – not teachers or specialists. They also aim to implement pedagogic methods that place responsibility for learning on students and lead to transformative learning around inter and transdisciplinary sustainability questions. The practice is carried out as a challenge to some of the university's norms, goals and extant practices, while also working with and being also supported by the university.

4.3.1 Learning the practice

Recruitment of new coordinators happens twice yearly, in March and September. Turnover of coordinators happens often, with most coordinators staying for between 6 months and 3 years. Between mid 2013 and the time of writing in mid 2017, over 30 new course coordinators came into the organisation, and around as many moved on. This turnover means that coordinators' learning and knowledge sharing is important for the organisation to sustain its practice.

Coordinators learn how to coordinate in a number of ways. First, it is *common for new recruits to have been students in the course they will coordinate*. They are as such familiar with it from a student perspective and this is a valuable way of 'training' for being a course coordinator (pers.com Grandin, 2017; Hald, 2011). Not all have had this experience in the course they will coordinate, however almost all coordinators hired have been a student in a course at CEMUS previously (pers.com Stoddard, 2017).

Second, *CCs learn in practice from colleagues, and from the community at CEMUS*. Learning in the community at CEMUS, which includes faculty, students and course coordinators, happens in many formal and informal ways, many of which are beyond the scope of this thesis. However, some specific ways are able to be shown here. Important learning moments happen during planning phases of courses. During the 3 months before courses begin, coordinators meet in a 'Course Coordinator Series' in which they discuss their courses, their experiences as students, or as course coordinators, reflect on education and its purpose, and sustainable development issues, among other things. They also meet with workgroups of experienced teachers and practitioners, some of whom have been in the workgroup over several iterations of a course (see **Figure 5**, **Figure 8** in Appendix). In addition to the many ways CCs learn from the community, they in particular rely on their *partner coordinator*, initially to learn the basics (if one is more senior) and as a critical and creative partner in a journey often into unfamiliar territory, providing a partner and extra critical view for all work coordinators do.

Third, course coordination is *learnt by 'figuring it out' through trial and error* in the planning and implementation phases, in a parallel progression with others in the internal community at

CEMUS. Only *limited parts of the practice are codified*. When they begin at CEMUS, and then each time at the start of course planning, CCs receive the formal university course descriptions, the 'course report' including opinion and evaluation data from students and coordinators of the previous year, the course schedule from previous years, and they also write a short document outlining how they will work together and handle conflict. Everything else required for the practice to be performed is thus continually learned through experience by those who are involved in it (as faculty, students, coordinators, etc.) through its *repeated enactment in practice* in 9-month periods, and through communication of knowledge between members of the community during this time. Meeting the students at the course start and throughout then puts coordinators in a position where they need to figure out how, after planning and discussing for months, to perform the practice successfully. For example in this quote where the interviewee is discussing her first time coordinating a course and facing the challenge *of making practice live up to the way it had been talked about* in the 'community'

"...you tell people "we want you to be engaged and critical" but then you have 3 lecturers coming straight after, and they are like talking, talking, talking and students are writing, writing, writing, then people are like 'where's the student engagement here'? So the true challenge is…you tell them what we do [at CEMUS], but then to actually set up the space where that is actually happening" (pers.com May, 2017).

4.3.2 Taking on an ambiguous role

One theme that arose in interview data is that of roles, in particular a great ambiguity over the role of coordinators, and of CEMUS' position in the university. The practice of course coordination is *carried out by practitioners who are students and see themselves as non-experts*. They are not formally qualified to teach at universities and commonly do not perceive themselves to be formally part of a discipline or department. They experience inhabiting many roles (or categories) at the same time, while continuously seeking to define their own role. At the same time, practitioners actively avoid defining themselves, or being defined, as teachers or experts with answers.

All interviewees could outline their basic responsibilities, yet they *experience confusion and/or ambiguity about how to define their own role what is expected of them* as practitioners. Course coordinators describe themselves as 'facilitators', 'participants', 'responsible participants', 'meta-person', 'students', 'course leaders', 'administrators', 'the person who books the room and turns the lights on' and various combinations of these. They often described themselves in multiple different ways, sometimes in the same few sentences. Almost none of them identified themselves as teachers or experts, and those who did said they had been given a 'teacher' role or label against their will – it had been forced on them by the class, by a misunderstanding, or because of their own failure to work against it (pers.com Ramsey, 2017; pers.com May 2017; pers.com Aigner 2017; pers.com Valls 2017). One interviewee, who had taken pedagogical education and had experience in a teaching role prior to working at CEMUS, said that he constantly tried not to 'feel like a teacher' because that would not fit with goals of the course (Marcos Valls). Another interviewee who worked at CEMUS for over 3 years was still unsure how explain to people who did not know of CEMUS what a course coordinator does (pers.com Owen, 2017) and while still not comfortable with it, he saw this as a normal part of the job.

This *role confusion (or role plurality) appears to be a central part of the practice of course coordination* and was shared by all coordinators interviewed for this study, no matter whether they were in their first 6 months or had been at CEMUS over 3 years. Still seeking to understand one's own role and responsibilities constitutes part of the practice itself long after the first months of taking on the practice, as one might expect. Paradoxically, practitioners both accepted that they were inexperienced and worried that they did not really know how to do what they were doing, while also being convinced that what they were doing was necessary and valuable, that they were

successful at it, and that they did something that 'worked'. This is illustrated in an analogy made by a course coordinator to a story he was told by a guest lecturer in his course:

"..he just developed this system and now he is making money for this small village in Bangladesh. Yeah he's like a super interesting guy that comes from Stockholm and a really rough background, and he ended up creating this company with his dad and so on. And he said he never planned all of this, and he never knows what's happening either. But it kinda' works. And I want to kind of draw a parallel [to what we do]" (pers.com Shrage, 2016).

Another interviewee went as far as to say, when asked how he explained his role to students, that the role 'did not exist' but was defined only through ongoing practice

"I think it is very difficult. Because it doesn't exist, maybe […] *It is hard to communicate and make the students grasp what we are actually. That's the reason it is defined implicitly. Because it is not a clearly defined role. Because we have too much responsibility [to be] a student, and too little [to be] a teacher or professor. Or too little official knowledge to be a professor, or too little formal education to actually do what we are doing. And I think through that, it is unclear what we are actually. And that's why our role is defined through how we are dealing with people... This is an issue. At the same time this is the beauty that allows you to do whatever you want"* (pers.com Aigner, 2016).

The state of ambiguity, of being between roles and in a place which does not fit the coordinates of common categories was often associated with both feeling free and confused, legitimate and not legitimate, at the same time[2].

4.3.3 The importance of being (non-) expert

Despite this persistent confusion over how to define or categorise their practice within their intuitional context, coordinators believe their non-expert/student status is important in creating a successful learning experience. One important reason for this belief is the lack of answers on the overall questions dealt with at CEMUS (pers.com Grandin 2017; pers.com Marcos-Valls, 2016; pers.com May, 2017) and, according to interviewees, the resulting inability of specialists to alone facilitate the type of learning needed. Experts such as professors or researchers with PhDs can be seen as "tainted" by having a specialty, not suited to teaching the type of courses needed (while still playing essential parts), or to making the requisite connections the courses require. Being a professor or specialist did not mean you were qualified, in fact this may disqualify you. As one interviewee said *"just because we have a professor in Climate Change Leadership doesn't meant they should teach the Climate Change Leadership course…and that's because of the way the CEMUS course is built up*" (pers.com Stoddard, 2017). A second reason given is that explicitly acting as a non-expert and at the same time leading the course is seen as a way of getting students to learn, or to place responsibility on them to learn. Because it is clear that the one leading the course does not know the answers, responsibility for knowledge is shifted to students (pers.com Aigner, 2016; pers.com Ekbom, 2016; pers.com Grandin, 2017; pers.com Schrage, 2017).

Third**,** not *being an expert or specialist allows a 'freedom*' that is important for course coordinators to be successful in bringing together people and knowledge in the wide frames they work under; in practicing the type of 'making connections' required for course coordination already shown above (pers.com Aigner, 2016; pers.com Grandin, 2017; pers.com Schrage, 2017; Stoddard, 2017). This sense of freedom to experiment and try things is also motivating; being

[2] The anthropological concept of *liminality* goes some way to explaining the state of ambiguity coordinators feel, and could be useful in a further study. As Victor Turner in his (1967) book *Forest of Symbols: Aspects of Ndembu Ritual* develops through anthropological studies of tribal rituals in which people transition from one state to another–as in from childhood to adulthood, for example–, the concept of liminality describes a state of being between fixed categories. A state in which the person enters into a zone where they experience both the death of structural identity and the resulting birth of possibility, a realm that, once entered, can lead to new combinations of ideas and relations. In the case of CEMUS, we may see a *suspended state of liminality* as an essential part of practice. Also see (Cook-Sather and Alter, 2011) for a compelling application of the concept of liminality in a long term study of a partnership learning community (Healey *et al*, 2014) in higher education.

given freedom and responsibility that is unusually high for an inexperienced person and being trusted "not to fuck it up" (pers.com May, 2017) installs responsibility and motivates creative work. It has for some coordinators led to a 'start-up-like culture' that pushes you to experiment and create to see the role as that of an innovator (pers.com Grandin, 2017; PO3, 2017). This freedom and motivation is another way interviewees differentiated themselves from teachers and researchers at the university, as in this example:

"What value does the student coordinator have?....You are much more interested in making a good experience for the students than you would of you were doing it on the side 5%. You have your research funding and you spend as little time as possible. I think the real value is that [as a student coordinator] you care lot more about making a good course, regardless of what it takes from you." (pers.com May, 2017)

Furthermore, being someone who does not know and who has no clearly defined role also can bring its own legitimacy and "credibility". It allows for a "different kind of authority" (pers.com Grandin, 2017) that makes it OK that you don't have the answers (pers.com Grandin, 2017; pers.com May, 2017, pers.com 2016; pers.com Stoddard, 2017) while still allowing you to be responsible for the course. The authority of the course leader in practice at CEMUS is not in being an expert who knows, but rather in leading and 'not knowing', and in knowing about not knowing, and why it might be a good thing to 'not know'.

"[…]we have less authority and we can use that lack of authority, in a sense, to build another authority […] we don't have as much authority as experts in knowing the facts. So maybe we can use that to build an authority as a facilitator of processes where everyone would feel that they want to contribute, because that's what you're expected to do. So of course we always have these roles we adopt and these power relationships. But the power relationships we are able to build as course coordinators, when we are students, are quite facilitative to learning. (pers.com Grandin, 2017)

For the 13 interviewees that had worked for a year or more, *exhibiting and 'using' this non-expert status is a part of a successful performance of the practice*. This is also supported in published written accounts from experienced practitioners (Grandin, 2011; Hällstrom, 2011; Österberg and Kronlid, 2011). However, for newer recruits it can be a rather a confusing part of their work, leading to feelings of inadequacy and ill preparedness (pers.com Ramsey, 2016; pers.com Zinders, 2016).

4.3.4 Making connections within transdisciplinary frames – inviting guests, weaving a thread, and creating a space

The practice of course coordination at CEMUS involves the *bringing together of disparate knowledge, people and expertise in order to learn about big questions and problems that cut across social and ecological systems*. This activity is present in the origin story of the first course, and is an underlying goal of practice at CEMUS. Most projects and activities across education, research and outreach at CEMUS aim to make a journey through *broad transdisciplinary themes*. With titles such as *Climate Change Leadership: Power, Politics and Culture*, *Sustainable Design: Ecology, Culture and Human Built Worlds*, or *The Global Economy: Environment, Development and Globalisation*, they set a broad framework for integrating content, requiring integration of multiple disciplines, worldviews and discourses. This wide framings of the courses are important in enacting the practice of course coordination at CEMUS. They mean that practitioners must find ways of connecting a wide range of topics, knowledge, people, and expertise throughout the planning and implementation phases of their practice (pers.com Grandin, 2017; pers.com Stoddard, 2017, pers.com 2016). This continual 'finding ways to make connections' is also essential to successful practice (pers.com Aigner, 2016; pers.com May, 2017; Schrage, 2017, p. pers.com). This was particularly evident in the way interviewees talked about two activities that form part of the practice: inviting guests and making connections within courses. They also repeatedly referred to 'creating a space' for meeting and learning.

Inviting Guests

In planning courses, practitioners *build a lecture series* into the course around the course theme, inviting guest lecturers who could teach on topics that fit the course framing. With each course iteration new guests are invited while some guest lecturers also return, having lectured in the course previously. The wide frames of courses and lack of teachers 'in house' at CEMUS means that during course planning CCs *must* draw in guests from outside their center, coordinating learning and teaching based on "specific ideas we want to bring into courses, rather than people we have employed at our department" (pers.com Grandin, 2017). This means "mobilising the knowledge" produced in various departments across the two universities in Uppsala and elsewhere (pers.com Grandin, 2017).

Coordinators are free to *draw together actors who are not commonly teaching at universities* and often have few restrictions about who they can invite, apart from whether they fit with the course topic and other course components, and staying within course budgets. Guests are drawn from the several universities close to Uppsala, international universities, civil society, from the private sector, from government agencies, individuals with businesses or running other organisations, and so on, with the international guests sometimes connecting over Skype for dialogues with students.

The practice thus pulls together knowledge and people thematically (crossing departmental structures) and trans-disciplinarily (outside the disciplines of the academic institution). This constant turnover of guests is perceived as keeping CEMUS dynamic (pers.com Grandin, 2017; pers.com Stoddard, 2017). Furthermore, this freedom often allows quick and flexible integration of local and global actors and current issues that may otherwise be difficult to integrate into a university course. Although it is important to note that the majority of the lecturers at CEMUS courses are academics, researchers and teachers employed by universities, many are not.

Weaving a Thread through Teaching, Learning, Collaboration and Knowledge

CCs act as the connective tissue tying different knowledge and actors together, *acting as an 'in between'* for students, teachers and the course itself. They continuously try to generate ways to help students, lecturers, and themselves, make connections between the many different lecturers with many different specialities, and between the high numbers of topics covered in courses. This is a key part of coordinating (pers.com Aigner, 2016; pers.com Schrage, 2017; pers.com Willner, 2016). Several interviewees called this trying to "weave" a thread through the course, or help a "bigger picture" to come into being (pers.com Aigner, 2016; pers.com Ekbom, 2016; pers.com Marcos Valls, 2016; pers.com Zinders, 2016) during lectures and especially during workshops and seminars they are in charge of designing and running. They also need to do this 'making connections' activity in real time as the course happens because they invite so many new guests with lectures coordinators have not seen, and on topics they are not knowledgeable about, or are even completely new to the whole course themselves, as in this quote:

> *"during [a lecture], you just figure out how the lecture could be connected to the course: can you connect it to any future discussions in a literature seminar afterwards? How can you use what they have said to facilitate something else?"* (pers.com May, 2016)

And here CCs end up being in a similar position to students in the course, trying to construct a 'red thread' through the course content, while at the same time being far more cognisant of where the course is headed than the students are; being aware of what other literature, topics, lecturers and examination and assessment tasks are coming. If coordinators fail in being this 'connective tissue' and make these connections well then learning does not work; the course does not function; the practice is unsuccessful. This led to confusion for the students and even to feelings of embarrassment about their own performance, as one interviewee expresses here with irony about her own communication with students

"...just being like: last week you were looking at mining, and this week we're making you read four chapters about the colonial spirit in Scandinavia, and now we're all going to discuss it in a merry circle and you're all going to have all these thoughts..." (pers.com Ramsey, 2016)

When they believed they failed to perform this integrating activity successfully they felt as if they had not achieved what they were supposed to as someone who coordinates a course at CEMUS (pers.com Owen, 2016; pers.com Ramsey, 2016; pers.com Schrage, 2016; pers.com Zinders, 2016).

Creating a Space

Interviewees often referred to "creating a space" that students and lecturers are participants in (pers.com Aigner, 2016; pers.com Ekbom, 2016; pers.com Marcos Valls, 2016; pers.com Mossberg, 2017; pers.com Owen, 2016; pers.com Schrage, 2017; pers.com Stoddard, 2017). They locate this space both in the physical environment at CEMUS location the university or in individual classrooms, but is also an abstract space in which is brought into being through practicing course coordination. This 'space' is a term that encapsulates where all their planning comes together, where participants in the course engage with each other, where course content is synthesised, where meetings happen across disciplines and between different actors, and where the a platform for learning is constructed from which to explore challenging questions the course deals with. However, it is also a space which they want students 'to take', taking responsibility over the situation created.

4.3.5 People, materials and infrastructure

Interviewees expressed three main ways in which they integrated people, materials and infrastructure in practice. First**,** the relatively large a university environment with multiple disciplines and traditions, and the proximity to larger urban centres is important for the 'CEMUS model 'to function. Interviewees saw this as an important enabler for their practice (pers.com Grandin, 2017; pers.com Schrage 2017; pers.com Ekbom, 2016; pers.com Wilmer, 2016) as in this example:

"...we are definitely benefiting from being attached to a big monster like Uppsala University.... being in a university that has so many interesting guests and attracts so many interesting professors and has so much capacity. The pedagogical model, or lecture model, is based on these people coming in, so it will be a lot less successful if it was on [the island of] Gotland for example, or in the North of Sweden" (pers.com Schrage, 2017)

The integrative and widely framed collecting of people and knowledge course coordination includes thus relies on this diversity and location. Apart from guest teachers, this also includes other ongoing support and partnerships relied on throughout course coordination, in particular the Work Group of experienced teachers and practitioners (see **Figure 5**, in this chapter and **Figure 7** in Appendices) who come from diverse backgrounds and must be formed around the wide range of themes picked up by CEMUS courses and activities.

Second, the university's reputation and status plays a role in course coordination. The university's "trusting you" (pers.com Schrage, 2016) with course budgets and other resources was a motivating factor to work creatively and achieve a high standard (pers.com May, 2016; pers.com Aigner, 2016; pers.com Grandin, 2017). Being associated to the university's name when for example inviting guest lecturers lends legitimacy and status to the request (pers.com Owen, 2016; pers.com Shrage, 2016; pers.com Ekbom, 2016) and simply having a university employee email is allows coordinators to get the attention of lecturers.

Third, the practice also depends on using the physical environment of university buildings and classrooms, as one would expect any university center to do. CEMUS physical location has an open workspace for students and other guests, a small library and various shared offices for

course coordinators to work in. This multi-function physical location allows students and CEMUS staff to have a meeting place for the numerous activities and meetings throughout the year, and also to have classes use the space periodically for activities outside class time. Most courses happen in bookable classrooms within three university buildings, one of which houses CEMUS' work spaces, library and offices, the other buildings being within short walking distance of these.

4.3.6 Perceived influence and impacts on university

The majority of interviewees emphasised one main way they had seen their work effect the university as being through people who stay within the university environment after being involved in CEMUS' activities (pers.com Ekbom 2016; pers.com Grandin 2017; pers.com; Marcos 2016; Valls, pers.com Stoddard, 2017). These individuals are able take their experience with them and translate it into changes in behaviour elsewhere within the university. This includes both students and faculty.

Students are the main way through which CCs saw their work having impact on the wider university context. After studying at CEMUS, ideally they are "more critical towards how education is designed" (pers.com Grandin, 2017), have tacit experience of working collaboratively on complex sustainability problems requiring multiple worldviews and disciplinary focus (pers.com May, 2016; pers.com Schrage, 2017; pers.com Stoddard, 2017), ways of working that places more emphasis on students responsibility (pers.com Aigner, 2016; pers.com Grandin, 2011) and knowledge about course themes and sustainable development they could bring into their writing and studies. They take these with them into other classes into their program at Uppsala University or their home university. In addition many courses, such as 'Project Management and Communication for Sustainable Development' require students to implement projects outside the classroom, which often seek to change the university in small scale of larger scale ways and so they have experience of concrete projects.

Interviewees also gave examples of specific faculty members – lecturers, researchers, etc. – had been involved in support or teaching at CEMUS and then used this experience of student-led interdisciplinary practice in their own courses and programs (pers.com Owen, 2016; pers.com Ramsey, 2016; pers.com Willner, 2016). Long-term members of work groups in particular were highlighted as a way of transferring the effects of practice into the wider university (pers.com Stoddard, 2016). While the hundreds of guest lecturers invited to courses and to CEMUS outreach activities each year were an important part of the practice at CEMUS, interviewees said that they were involved to widely varying degrees. Some lecturers returned many times to CEMUS, building a relationship to particular courses (pers.com Grandin, 2017; pers.com May, 2016). Conversely, other guests showed up, 'did their 2 hours' and left without knowing much at all about the other components of the course, or the type of learning aimed for at CEMUS (pers.com May 2016; pers.com Owen 2016; pers.com Marcos Valls, 2016). However, guest lecturers experience of engaging with the interdisciplinary frames and the student-led collaborative model of courses are seen as a way in which the practice is related to changes in the wider university.

CEMUS also played an important role as a working alternative model. It allowed people in different university departments see that "a different way of doing things is possible" (Marcos Valls, 2016) functioning as a working example, and this is a big influence "even if it is not translated into structures" (pers.com Marcos Valls, 2016). At the same time, many interviewees said they knew little about how their work effected the wider university. CEMUS was a "small cog in a big machinery" (pers.com Wilmer, 2016), it was not clear how they should assess its influence on the wider university (pers.com Grandin, 2017; pers.com Ramsey, 2016; pers.com Stoddard, 2017; pers.com Zinders, 2016) and the spheres of influence coordinators refer to often are at the same time ambitious and ambiguous, ranging from 'the world' to 'individual students' (PO2, 2017; PO3, 2017).

5. Analysis and Discussion

This chapter is arranged in two parts. First, the practice of "student-led coordination of transdisciplinary learning and teaching for sustainability" is analysed through the conceptual frame of SPT. Second, I analyse and discuss how this practice and conditions around it, with consideration to institutional context, and explaining their relevance for transformation towards sustainability at universities in light of the research questions.

5.1 Analysing Practice: A social practice theory approach

The previous chapter presented empirical findings about the practice of *student-led coordination of transdisciplinary sustainability learning and teaching* and its conditions and context, carried out by people who are students (non-experts) who have responsibility for organising learning activities that integrate knowledge and people from multiple disciplines and cultural backgrounds, framed by problems and issues of sustainable development. While the practice under focus here is not short-term and repetitive in the same that might usually be imagined – take practices like 'showering' or 'sorting garbage' for example – it does follow specific and identifiable patterns and repetitive routines.

As discussed in Chapter 2, practices are made up of relational links between "bodily activities, forms of mental activities, things and their use, a background knowledge in the form of understanding, know how, states of emotion, and motivational knowledge" (Reckwitz, 2002, p. 249). When using Shove *et al.*'s (2012) framework as we do here, these phenomena are all collapsed into three categories of *elements*. They are *materials*, *meanings*, and *competences*. In explaining this practice, the following pages analyse and discuss the findings using this frame. Broadly, the focus is on 1) the location and characteristics of requisite people, places and items (*materials*), 2) the nature of the questions and issues the practice aims to integrate and address (*meanings*) and 3) practitioners ability to implement and/or facilitate learning processes within wide and messy transdisciplinary frames, and their own 'non-expert' status along with the expertise of others they rely on (*competences)*

Before continuing it is also important to note that separating a practice from other practices it is 'tightly bound up with' can be difficult (Shove *et al*., 2012). In the case of course coordination these are, for example, 'researching', 'creating a workshop' or 'giving a lecture'. However, some separation must be done in order to make any progress at all here. At the same time, other 'smaller' activities are also folded into the overall practice of course coordination, such as 'giving instructions', 'sending emails', 'creating a time plan'. However, practices often involve sequences of activities (Schatzki, 2002), and thus often can be therefore split into other constituent practices if one so chooses, depending on ones' aims. For example, the practice of Nordic Walking, a sport in which people walk using two poles, as studied by Shove and Pantzar (2005) can require wearing certain clothing or stopping for breaks, but in order to explain and analyse this practice it is not necessary to look at the practice of 'clothing wearing' or 'coffee breaks' necessarily.

Finally, it is worth noting that while the practice under focus obviously has consequences in the classroom – for example, its relation to sustainability education's often constructivist approach to forming knowledge in educational settings (Armstrong, 2011), or that 'placing students in charge' disrupts the dynamics of the didactic situation – this study is more concerned with asking if it has value in *changing the university itself* rather than say, a focus on students' learning. We are here interested in happens when, through this practice, competences, materials and meanings are integrated in new ways in a university environment. The following sections explain and discuss this, while the discussion returning often to answering the research questions. The following

sections, 5.1.1, 5.1.2, and 5.1.3 on Materials, Competences and Meanings respectively, are summarised in **Table 5**.

5.1.1 Materials

Materials encompass "objects, infrastructures, tools, hardware and the body itself " (Shove *et al*., 2012, 23). The materials integrated in the practice of course coordination are generic in that they can be found in many university environments all over the world.

The Physical Space. The headquarters the organisation and practitioners inhabit in the university is arranged as a 'meeting point' in which guests, teachers and students involved in courses and projects can meet. The space includes an open multifunction library/meeting space/work space, nearby offices for CEMUS staff, and visible and accessible courtyard spaces for outdoor meetings and activities. This space has been important for forming the ongoing community which facilitates knowledge sharing and learning processes over time and over concurrent generations of practitioners, which is important for communities to innovate, develop, and pass on practice to new practitioners (Wenger, 1999). It provides a core part of the 'situation' for this situated practice. Classrooms and teaching spaces are also important parts of the practice, as with most education that goes on within the university. Classrooms and other locations for lessons are also important physical infrastructures integrated in practice. Due to wide availability of rooms across several university buildings, the spaces used change often depending on the choices of the coordinators, and on the lesson itself. Often the flexibility of the room itself, whether furniture is able to be moved for example, is an important feature.

University/City Infrastructure. The large number of academic departments and lecturers to draw from within short travel distance, - 2 universities locally, and 3 more within 1 hour travel time - is important because the practice depends on participation from a range of disciplinary backgrounds. Proximity to urban centres and concentrated economic activity is also important for the selection of practitioners and people from outside the university in private and public sector.

People. This includes students, university lecturers, and external non-academic actors. The 500-800 students per year within all CEMUS courses come from a pool of around 40 000 in Uppsala itself. Several hundred lecturers are drawn into CEMUS per year. Shove *et al* (2012) show that when aiming to intervene for a change in behaviour, shifting practice can lead to the formation of new networks and social arrangements over time that in turn encourage change (p. 160). Because the practice at CEMUS requires bringing in a large number of guests to interact with students and the university, this ensures a steady flow of experts and people interested in the topics of sustainable development. It thus requires building a network and ongoing relationships with people inside and outside academia around sustainability themes across not only the 20+ courses now at the center, but other themes and outreach. Of course, this flow is in much more than materials, however I mention people here in this materials section to emphasise where they are situated in relation to the practice.

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When looking only at material elements, it is clear this practice shares much in common with other university centres and departments. While this does not mean that the practice under focus here therefore easily be transferred, as Shove *et al* point out, while practices are situated elements travel (Shove *et al*., 2012, p. 38) and so any transferability will depend on local characteristics and the availability of elements of skill and meaning also[3]. The availability of similar materials in

[3] Interestingly for this study, Shove *et* al. (2012) see codification of practice into best practice documentation as an attempt at the transfer of meaning and skills through materials, and I would argue often not a very effective one. This speaks to the inadequacy of some researchers' and conslutants' love of identifying 'best practices' as a way of providing value and making progress across

a wide number of university environments does invite the conclusion that successfully transferring and translating competences and meanings could lead to similar communities of practice elsewhere. The unusual integration of meanings and competences in practice at CEMUS is explained in the following sections.

5.1.2 Competences

Competences are know-how, background knowledge and understanding; 'practical knowledgability' (Shove *et al*., 2012, p. 23). The practice integrates existing competences in new ways. Analysing the way in which competences are integrated in practice here is important for explaining the innovative model at CEMUS, and in discussing its relevance for transforming the university towards embedding sustainability.

Coordinators make use of *wide trans- and inter-disciplinary framings* to create courses. This defines the frame for integration of other elements (meanings, materials) in new ways thus has important effects on the landscape of the university that can be valuable in transforming university towards sustainability. These effects include:

- *Creates connections and meeting points* between diverse actors around sustainability questions. As Grin *et al*. (2011) show, connective networks and meeting points are key in long-term transitions towards sustainability. Ferrer-Balas *et al*. (2008) identified 'connectors', networks or people that can bridge gaps across disciplines, help in developing shared language for interdisciplinary work, and incentivise interaction across departments.

- Brings together disciplinary knowledge from various domains of the university under the frame of a course for a *collective learning* process. Such processes have been shown to stimulate organisational learning for sustainability in HEI (Albrecht *et al*., 2007; Davison *et al*., 2013; Wooltorton *et al*., 2015)[4].

- *Defines new boundaries for who (materials; people) will visit and contribute to learning* at the university, when combined with the wide frames of courses. Actors within, across and beyond disciplinary boundaries become part of a process of inquiry and learning. This has been shown to work in tying the university to concrete sustainability problems (Biberhofer and Rammel, 2017) and is a key part of working transdisciplinary.

- Asks for generation of new *pedagogical ideas and methods* in a context with a lot of freedom to experiment and try out ideas.

In combination with their use of these frames, coordinators also integrate their own *'not knowing'* as a competence. They are forced into a position where they are uncertain of their role and do not have mastery of the topic, this 'competence' of being a 'non expert' student is an important element integrated in the practice of course coordination, as it *creates demand for new student faculty relationships and networks (i.e. new social arrangements/practices) are necessarily established through practice.*

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multiple locations. The transfer of practice depends on integration of local elements and so other policies and actions that are sensitive to the nature, life and death of practices are needed to give best practices a life beyond the page or the powerpoint slide.

[4] Although it is worth noting that the research design for this thesis does not include attention to key actors and their learning or experience, for example faculty members and administrators, inclusion of which could show a better picture of such learning. The authors referred to did to varying degrees include this, however they focused on time-limited projects, rather than established practices such as that at CEMUS. Further research on how sustainability in HEI stimulates collective and organsiational learning could do well to focus more on practice and institutional contexts that go beyond descreet projects.

Coordinator practitioners depend on knowledge and pedagogical experience of guest lecturers and workgroup members, requiring collaboration and continually making new relations in order to carry out the practice, relationships with different associated power/authority relations (new meanings). Working in partnership encourages trust, respect and engagement; raises awareness of implicit assumptions about the nature of learning and teaching; "enables a more authentic engagement with the very nature of learning itself, understood as an experiential process of reflection and transformation, in relation to oneself and with others" (Healey *et al*., 2014, p. 17). In addition Krizek *et al*., (2012) identify a weak culture of student faculty partnership as a major stumbling block to implementing sustainability in HEI.

Table 5. Elements of practice: materials, competences and meanings in framework based on Shove *et al*.'s (2012) elaboration of social practice theory

Elements of Practice. "Student-led coordination of transdisciplinary sustainability learning and teaching", analysis empirical data from interviews, participant observations and CEMUS book (Hald, 2011).	
Materials objects, infrastructure, tools and the body itself (Shove *et al,* 2012, p. 23)	-Students (with highly variable types of training and education) -Guest Lecturers (no particular disciplinary requirements, but should be interested in global environment/development issues) -'External' non-academic actors (practitioners) (invited to suggest new, and participate in, courses/learning/projects.) -Physical spaces -Lecture halls –Classrooms -CEMUS Office/workspace/center -Course Budget -Administrative staff and functions - Several universities and urban centres nearby, able to thus draw on varied knowledge & expertise -University's branding/logo, email account and website
Competences know-how, understanding, practical knowledgeability (Shove *et al,* 2012, p. 23)	<u>Working within Wide Transdisciplinary Frames</u> - Being a 'connector within the university across disciplines and hierarchies - Partnership or collaboration between (select) students and faculty, and with actors outside institution and disciplinary structures - Facilitating learning and exploration across disciplines; tying a inter- or trans-disciplinary course together <u>Faculty/expert</u> -Disciplinary knowledge of experts from multiple disciplines -Pedagogical experience/knowledge of faculty members -Senior Administrators and Faculty in formal support/management roles <u>Student/non expert</u> -Non expert, student 'experience' of university life -Non-adherence/naiveté to boundaries of disciplines and other institutional norms -Asking exploratory/naïve/idealistic questions -Coordinator as active participant/active learner/student who is facilitating learning while not having answers - Authority of 'expert' replaced with authority of 'not knowing', placing responsibility on students
Meanings (images) mental activities, emotion, motivational knowledge. "The social and symbolic significance of participation at any one moment" (Shove et al, 2012, p. 23).	<u>Discourse of Environment, Development, Sustainability and Interdisciplinarity</u> - Problems and questions in sustainability mean social change is needed -Problems of Human-Nature relationship are complex, expert knowledge needs integration -Exploring unanswerable/unanswered questions <u>Institutional Critique</u> -Students taking responsibility for learning vs. universities inviting 'passivity' -Disrupting expert/ non-expert, student/ non-student boundaries -University "needs to be challenged", "should be better", institutional critique and action to 'fix' it -Student's 'taking' power, activism through and toward the university -Disobedience towards the status quo/ Norm-breaking in education/university -Being independent and 'outside the system' -Challenge to the University's prestige/status through 'alternative' practice -Crossing Boundaries in: educational approach, disciplines, didactic authority <u>Personal development, and responsibility for education and the future</u>

Furthermore the direction of these relationships built through this practice does *not follow usual institutional barriers* again because of the non-expert, 'institutionally naïve' coordinators and the wide frames they move within. Coordinators thus bring competences to, and develop competence within, *a new type of role/practice* not existing in the university system, which integrates trans-/inter-disciplinary work modes and student faculty partnership aimed towards learning processes for sustainability. However this also means that *mobility of coordinators, and the practice itself, within the institutional context is limited* in some ways, working as they do in alternative ways to established norms and culture and locked in structures. They are trained in a situated practice maintained in a community, which means it does not necessarily map well onto institutional structures and can be hard to recreate (Shove *et al*., 2012, p. 89) and while elements travel, practices are situated (Shove *et al*., 2012). A question for university might be then how to learn from and capitalise on the development of this practice and those trained in it, in order to assist transition towards sustainability in meaningful ways.

5.1.3 Meanings

The practice under focus here is itself relatively complex and relates to many other practices within at various scales within the organisational context of a university. Alongside this, the practice involves coordinating learning and teaching on sustainable development, a complex study area. In addition, of the three types of elements outlined here in this chapter, it may be that *meanings* have shifted the most over time. The practice integrated discourses in environment and development, and the role and culture of the university itself in society that evolved over the decades since the early 90s.

Identifying meanings integrated in practices and how they travel in the social world is difficult without making simplifying moves and focusing on those that are not so contested in what they signify, and not paying too much attention to the fact that meaning is often situated and subjective (Shove *et al*., 2012, p. 53). This is rather difficult to do in examining this complex case. Nevertheless three areas of meaning integrated in the practice can be teased out for analysis here.

- The first stems from an *institutional critique*. The initiators of the practice did so in order to challenge the university, or rather fill a gap in what they saw as missing in the university (Hällstrom, 2011) and this part of the meaning of the practice today according to some of the more experienced practitioners interviewed (pers.com, Schrage, 2017; pers.com, Stoddard, 2017). This critique involved 1) students not being engaged by the university in questions and problems of environment and development, and 2) the need for urgent social change they, and others (Meadows *et al*., 2004; Orr, 1991; United Nations, 1987), believed these questions and problems raised at the time. This lead to a situation where, through planning and proposing a course we saw and still see happening through enactment of practice 1) students very concretely taking their responsibility for organising learning and 2) disruption of expert/ non-expert, student/ non-student boundaries, 3) new relationships and arrangements in the university forming around environment and development questions.

- The second relates broadly to the *discourse of sustainable development and sustainability* characterised by growing understanding of what it might take to address problems that cut across the complex interrelations of the social and ecological, like climate change or unsustainable energy systems. For example, one thing that has been increasingly advocated for and carried out is inter- and trans-disciplinary approaches, and another is transformative pedagogy. Practitioners see themselves as contributing to changing higher education, and changing society and the planet for the better – aiming for sustainable development. Their work is laden with this larger mission.

- The third relates to *personal development, and taking responsibility for education and the future*. Their wish for self-improvement and learning, to be personally challenged and to be employed by a status-holding university while doing it. The opportunity to make one's 'dream course' and to form courses as bases for action which analyse and point to solutions for environment and development issues (Gustavsson, 2011), and to have responsibility over organising such an important project is appealing (Grandin, 2011) and usually off limits to students at universities (Bovill and Bulley, 2011; Healey et al., 2014).

5.1.4 From the start, an innovation in practice

From the 1992 onwards, as interdisciplinary questions of environment and development became more prominent, structural barriers of siloed departments and faculties remained in place, making collaboration across these boundaries difficult. However, there was also emerging interdisciplinary problems for which no one expert existed, and this came alongside the need to develop the capacity and space in which to question expert knowledge in development and environment – which was increasingly seen to be flawed or at least insufficient to address growing problems. At the same time, experts with disciplinary focus (or those with doctorates) are those allowed to teach and thus those who organise education, research, and other activities at the university.

When the practice of student-led coordination began, many of the *elements* of creating a learning and teaching experience in the form of a university course remained in place – students, classrooms, teachers, offices, literature, the concept 'course', etc. In fact initially at least, the only change was that people with a different position in the university hierarchy were now in charge of a formal and fully 'legitimate' course, while not fitting the usual description of the one who is in charge because they were students, not specialists, not proven, lacking the usually requisite qualities (*competences*). Different 'know how' or competences were thus shown to be valued by the university in determining who then should lead this type of course, and who should determine the direction of inquiry, etc.

Accidentally or intentionally, the fact that the students with no officially legitimate academic expertise (*competences*) and who were not responsible to a particular discipline, or employed by a particular department, gave them freedom to draw on *materials* and *competences* including people (researchers and teachers, practitioners) and the disciplinary structure and integrate them for a purpose (*meaning*) that the university at the time was not engaged with. The dynamic relation of this new integration of elements in practice *reconstituted the meaning* (Shove *et al*., 2012, p. 31) of what it meant to create a course. It could be said that the course was now one way to address a blind spot the university was not addressing or could not address, to cross boundaries of disciplines, to address environment and development problems in new ways, and that this could be done through student planning and coordination of an inter- or trans-disciplinary learning and teaching experience made in partnership with faculty.

As Shove *et al*. (2012), Grin *et al*. (2011) and Geels (2002) show, managing change towards sustainability is a process which is unpredictable, and means making steps within an ever changing landscape. The shift in practice at CEMUS was an experiment, with no one predicting at the time it would lead to its growth, passing on through generations of practitioners, and building up of an organisation with routinized support functions and a community. It also allowed new directions for education, and suggested new practice for forming knowledge base for action on sustainability, and introduced a means of establishing partnership between faculty and students *as matters of practice*, rather than as strategic policies focused on behaviour change.

5.1.5 A rewarding and long-lived practice with scope for innovation

Shove *et al.* (2014) elaborate three reasons why practices persist or die that may offer some analytical value in explaining the strong community around and long career of this practice. First, the presence of internal rewards is important. Beyond the valuable opportunities for personal development, the scope for innovation is offers great value. Practices last if they offer rewards of personal investment and development, if they can be innovated upon, or even be replaced with another version. The practice at CEMUS encourages constant innovation, with courses being 'reinvented' often, and with practitioners, as we have seen, being inexperienced yet given great responsibility and freedom to innovate, to find new ways to meet, teach and learn in HE (Hald, 2011), even if many times courses are not changed dramatically and of course use some components in the same form for many years.

Second, the symbolic and normative anchoring of the practice is important for keeping people doing it, making it hard for them to defect, as Shove et al (*ibid*) showed in their example of the quick death of the fad of Hula-hooping. "Hula-hooping was not strongly associated with good or bad behaviour, with the reproduction of distinctions, or with fulfilling injunctions and obligations" (*ibid*, p. 75), and "[s]ince fads like swinging a ring around the hips are of no wider significance, defection is easy" (*ibid*, p. 75). In the case of CEMUS, the practice has had strong anchoring in many areas, for example development and environment questions linked to future and wellbeing of humans, the status of academia and higher education, and the narrative of student-activism. Over time the transdisciplinary and transformative education student led model has taken on new symbolic and normative anchorings within these discourses, allowing the practice to be seen as socially and even existentially significant for practitioners and others.

Third, Shove et al (*ibid*) list connection and dependence on other practices as key to persistence. To return to their example "Hula Hooping was not obviously connected to and not obviously dependent on any other practice. It came into being, existed briefly, and died alone". (*ibid*, p. 75). Obviously the formation of a university center institutionalised the practice to some extent, and this is one way to keep a practice persisting over time. However, as we have seen, practice at CEMUS is mostly not codified, still largely dependent on a functioning community for its 'passing on' from generation to generation, and is continually redefined in practice over time. This is true even to the extent that course coordinators feel that they cannot define the role properly except through practice, the point here being that even institutionalisation alone is not enough to say the practice will persist. The complexity of the practice and the relationships, materials, competences, people that it involves, connects it to many other practices.

The question of persistence is important to consider in asking how universities can shift practices and introduce new ones. While this practice has been successful in terms of longevity and has produced great value for many people over many years, it has not been so successful in terms of 'scaling up' or being taken up by many other actors in its local context or otherwise. This is not to say it *should* be, necessarily, but an important question to ask is how can we support and enable innovative practices which move us towards sustainability transformation even as we participate in structures and practices which block them from doing so. In the rest of this chapter this is reasoned through and elaborated upon further.

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Analysed using the lens of SPT (Shove *et al*., 2012) the practice of "student-coordinated interdisciplinary learning for sustainable development" integrates elements in a way that constitutes an innovation in practice. Certainly there are similarities to what we may see in the way other learning processes, courses, programs, etc. in higher education are formed, but in this

case we see materials, meanings and competences integrated in practice in ways that are significant to questions of sustainability in higher education.

5.2 Towards Sustainability Transformation / Transition

The empirical findings and analysis of practice so far have offered taken an in depth look at an unusual practice in the higher education sector, analysing it from the perspective of social practice theory in an attempt to unpack and explain how practice at CEMUS integrates skills, knowledge materials and meanings in new ways, and discussing it in light of research question one: *What is the relevance of student driven, transdisciplinary coordination of learning and teaching for the challenge of transforming universities towards sustainability?*

Taking a less fine grained approach but continuing along this line, the analysis and discussion below takes a wider view the context and conditions around the practice as it relates to the university environment in order to include focus on the second research question: *What kinds of institutional contexts can foster learning and innovation towards meeting the challenge of sustainability transformation of universities?*

5.2.1 A partnership learning community engaged in sustainability work

CEMUS combination of a student-faculty partnership arrangement (Healey *et al*., 2014) and inter- and trans-disciplinary sustainability learning and teaching is unusual in the higher education sector, and has grown from an innovation in practice into a community and institutional context in which this practice is situated, having developed over time. This combination in practice *requires* the development of new social arrangements for collaboration between students and faculty. This may be seen as desirable in and of itself, but importantly here these arrangements and relationships are built up around the effort to create learning around sustainable development questions in a ways that combine and move across disciplines. This is important for a number of reasons. For example, because a weak culture of crossing such boundaries is a stumbling block for university transition towards embedding sustainability (Krizek *et al*., 2012, p. 27) and efforts in implementing sustainability projects that involve 'bottom-up' student and staff driven initiatives are often met with resistance despite the fact that they can be highly successful (Barth, 2013; Krizek *et al*., 2012). Furthermore, university culture, structures and hierarchies can mean working across disciplines or whit questions that do not emerge from disciplinary arenas is hard to achieve or has not been well established in practice.

In the case of CEMUS, through the practice of course coordination, students are heavily involved in design of curriculum, pedagogic practice and organisational strategy of a university centre focused on transdisciplinary education, outreach and research across themes of sustainable development, and doing so with support and collaboration of faculty in multiple ways. During the research for this study, no case similar in scope (~22 courses, ~600 students) and duration (25 years) was found in peer reviewed literature or otherwise although there are example cases in which university students have been involved in curriculum design of education in for example climate change (see Davison *et al*., 2013). Working in partnership has also been shown to encourage trust, respect and engagement; raises awareness of implicit assumptions about the nature of learning and teaching and "enables a more authentic engagement with the very nature of learning itself, understood as an experiential process of reflection and transformation, in relation to oneself and with others" (Healey *et al*., 2014, p. 17).

However, the partnership arrangement at CEMUS gives unusual amount of responsibility and thus power to students. The creation of the 'course coordinator' role, that of a responsible participant who is not an expert, who functions as a connector rather than a leader, simply does not fit into institutional norms. Neither does the practice they enact, as we saw in section 5.2 in

the focused analysis of practice. As the community and institutional context of CEMUS built up around this practice, it necessarily remained semi-detached from the norms and culture of the university. However, the student-led or student-driven model, while perhaps interesting in and of itself,

5.2.2 Collective, transdisciplinary meeting and learning as a matter of practice

Transdisciplinary work modes have also been shown to be necessary for working towards sustainable development, but have been hard to implement in university structures not set up for inter- or trans-disciplinarity (Ferrer-Balas *et al*., 2008; Lozano, 2006), approaches which research education and outreach for sustainable development require working within. Yet they have become part of normal practice at CEMUS. Knowledge and competences of working within transdisciplinary frames are now embedded in practice, supported routines and structures. This suggests that the practice is conducive to developing and implementing transdisciplinary learning and collaboration, and contexts for doing so.

Again the creation of a new practice which places a non expert (thus 'non-disciplinary') student-coordinator, who is responsible to mobilise and connect disparate elements of meanings, knowledge, skill and materials in practice both in planning and implementing learning processes has led to new arrangements that allow for working fundamentally differently. Providing a basis for building a university center that can function in a truly inter- or trans-disciplinary fashion *within university structures* as Nicolescau (2010) defines transdisciplinary: as *complimentary* to disciplinary and interdisciplinary and multidisciplinary approaches, and being "*at once between the disciplines, across the different disciplines, and beyond all disciplines*" (*ibid,* p. 22).

This combination of a role that enables in practice working 'freely' across disciplines and departments within the university institution to create education, outreach and research, and a subject matter and scientific area (sustainable development) that also demands working within and beyond disciplines is a key dynamic in understanding the work carried out at CEMUS and the value of the practice for a transformation towards sustainability in higher education. This also requires working under a certain amount of ambiguity; not following disciplinary or hierarchical norms.

It may be that the non-expert role created through practice here is particularly suited to working transdisiplinarily, and supported in the right way, it has lead to outcomes hard to achieve without it – assuming a hierarchical and disciplinarily siloed university culture remains in place. This is one point at which we see the possible value of a meeting between on the one hand student-faculty partnership models and their heightened risk, engagement, and reflection on the meaning and norms of education, and on the other hand the challenge of working across, between and above disciplinary boundaries in HE environments in order to address complex and ambiguous sustainability questions.

5.2.3 A space for social learning, semi-detached from institutional context, harbouring innovative capacity for implementing sustainability in the higher education sector

Working 'outside of' and yet formally connected to institutions, and working to solve problems those institutions struggle with or don't even register is an attractive arrangement for working towards sustainability transitions. As Pelling *et al*. (2008) and Westley *et al*. (2011) show, such spaces from which social innovations can arise are crucial in achieving the large scale socio-technical transitions towards sustainability human societies require across many sectors in order to solve problems of sustainability. It is within these spaces that learning and innovation proceed under non-mainstream values and incentives and which actors work through trial and error and knowledge sharing in small communities or networks in order to solve, or create adaptations for,

entrenched sustainability problems within and across various sectors. **Figure 6** elaborates a similar analysis of the case under empirical study here.

CEMUS began working to inject environment and development questions and themes into the university environment in 1992, when few were doing so, especially in Uppsala at the time (Gustavsson, 2011). Much of it's work over the ensuing years, and its subsequent growth and development was done outside of the formal institutional norms and culture of a university, a department or a discipline, and carried out by people who had also not been trained in the 'right way' to do things as teacher or professor (Hald, 2011). A small group of dedicated people continued, reflexively developed, and expanded the application of a practice over time, integrating skills, meanings and materials into the way the university organised learning and teaching, in new or alternative ways, further explained below. This practice has continued to develop and change (for better and worse) over a stretch of 25 years, retaining its focus on environment, development and the future of human societies (this focus morphed along with global discourse into 'sustainable development' or 'sustainability'). It has also retained its focus on institutional paradigm change in higher education towards sustainability (Hald, 2011).

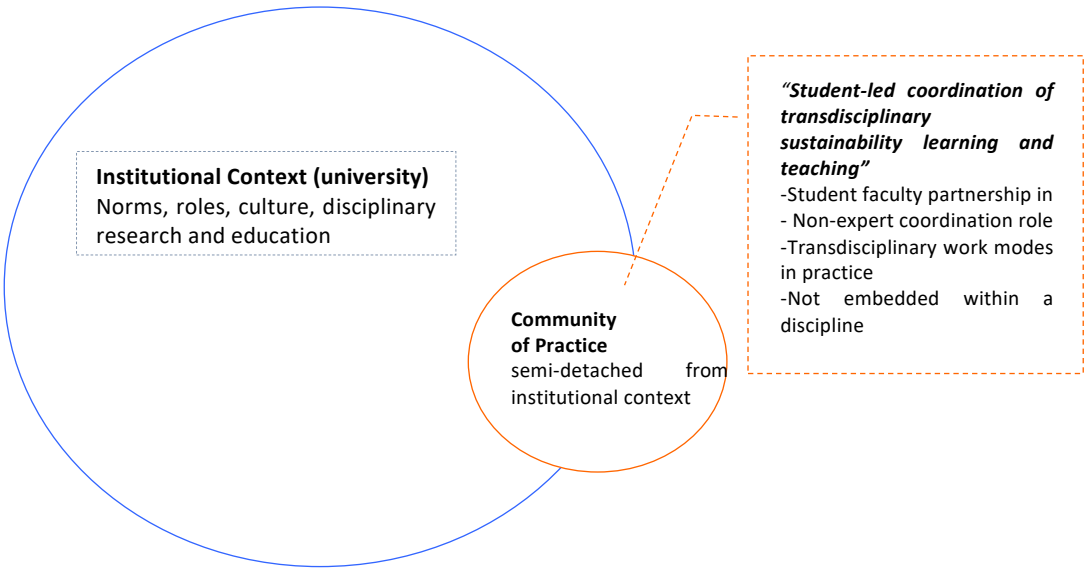

Figure 6. A Community of practice focused on implementing sustainability in higher education, semi-detached from institutional context and able to develop, experiment and innovate over 25 years

The practice developed and maintained in this space, and the space or community itself, constitute a social innovation in practice (for Shove *et al* (2012) *all* innovation is innovation in practice) geared towards injecting sustainability into the university in ways that overcome structural and cultural barriers to doing so. The social innovation here starts from two students ending up in charge of coordinating a course in 1992, and today includes the combination of an unusual partnership arrangement with faculty, the wide framing for tying together transdisciplinary teaching and learning with actors from outside academia, the uncertain formal identity and roles of coordinators as students, and the challenging of university norms through form and content. As (Wenger, 1999) argues and Shove *et al* (2012) support, communities and their practice constitute each other, so we can also include the community/space the practice is situated in as a key part of the picture here, the semi-detached nature of the practice and its context seen in Figure 6 being crucial to the practice itself. We thus see a rather innovative or novel entity within the university system with many characteristics (see Table 6). conducive to working towards, and creating the

institutional context for, finding ways to meet a larger, landscape-level challenge (Geels, 2002) faced by universities as a sector: implementing sustainable development (Lozano et al., 2013b).

It is important to note that, rather than the practice under focus here being *the* way to create such spaces, such institutional contexts, or implement sustainable development, I rather claim that it has been *one way*, with results that can be seen as successful in many ways for allowing trial and error, innovation and development about knowledge for implementing sustainability in higher education.

5.2.4 Building a knowledge base for transformation – 'reframing' courses as collaborative, bottom-up change platforms

At CEMUS, Each course/project can be seen as a student coordinated, interdisciplinary change initiative for sustainability, requiring integration of multiple disciplines, the involvement and engagement of students and faculty, the *use in practice of* experts and exert knowledge along with other types of knowledge in order to answer the questions posed. This integration of elements (skills, competence, materials) in new ways has important effects on the landscape of the university, including creating meeting points between diverse actors across disciplinary frames and building a 'knowledge base for understanding problems that also includes attention to action' on sustainability themes (Gustavsson, 2011; pers.com Stoddard, 2017). Courses at CEMUS aim to change students, change the university, and change society - not to claim that they succeed always or even often, rather it's the aim that I highlight here.

The practice began as a project in filling a gap the university was not addressing. The new practice was a way to reach outside the capabilities and directions of the university, pulling together an exploratory inquiry into subject matter the initiators believed the university and wider societies were not addressing, and build a knowledge base for action. Perhaps inadvertently they initiated a practice that allowed the university to have a space in which knowledge could be explored that the university had no practices or structures for exploring – i.e. explicitly digging into knowledge gaps but doing so through the frame of a creating a course[5] (a learning process).

It may be worth seeing this practice as a way to organise building a knowledge base for action around interdisciplinary questions at universities, rather than as a 'new way to make a course'. Sustainability projects that combine actors from across disciplines in such collective learning processes have been shown to stimulate organisational learning towards sustainability (Albrecht *et al*., 2007) and may offer ways forward for cultural change in universities "affected by the very same values and socio-ecological issues they set out to address, making transformation difficult at every level" (Wooltorton *et al*., 2015). Organising collective cross disciplinary processes like this thus has important implications for organisational learning at universities; the degree to which the university can build its own capacity to actually change itself, working in different ways to implement sustainability.

In 2015 the course Climate Change Leadership: Power, Politics and provided the basis for the Zennström Professorship in Climate Change Leadership, a 10 year rotating professorship attracting international climate researchers who are vocal advocates on leadership, politics and

[5] Crucially, this is not done through research, which is the 'usual' way universities might 'explore unknown territory'. The process and product of research does not translate to interdisciplinary practice 'on the ground' in the same way, nor 'reach the public' in the same way a collective learning process (like a course) does. In this way, the student led transdisciplinary model has also allowed for a crossing over of education and outreach in a way that opens up the university's learning spaces and processes outside of the disciplinary and funding demands of research tracks. To be clear, this does not mean that research is somehow deficient the point is that analysis of this practice and its enabling conditions suggest *a necessary piece of the puzzle in how to re-orient higher education towards embedding sustainability*, alongside research.

power questions of climate change (the course and professorship are described in Chapter 4). A course created and developed at a student-led center built from and around a practice, student-driven coordination of transdisciplinary teaching and learning for sustainability, provides a compelling example of how, as (Shove *et al*., 2012) argue, a focus on practice, rather than on individuals' behaviours, can result in making headway on wider scale change on environmental and sustainability questions. Furthermore, that policy makers would do well to study the contours of communities of practice (Shove *et al*., 2012, p. 161) rather than focusing on indivduals and their attitudes and behaviour.

Table 6. The relevance of student-driven coordination of transdisciplinary sustainability learning and teaching for transforming universities: some benefits and challenges

Enablers/Benefits • Strong collaboration with faculty-students - developing a culture of doing so, something which is often hard to achieve (Healey *et al*., 2014) the lack of which is a barrier to sustainability projects (Krizek *et al*., 2012) • Institutionalised practice and space for collective learning about sustainability (Albrecht *et al*., 2007; Sterling, 2004; Wooltorton *et al*., 2015) • Space for social learning in which a practice that is different to institutional context/norms and solves problems actors have in implementing sustainability is nurtured over time (Grin *et al*., 2011; Westley *et al*., 2011) and relies on actors working in informal (non-canonical) spaces (Pelling *et al*., 2008). • Re-purposing course design and implementaiton as a way to bring together knowledge and actors around sustainability questions for analysis and action • Inter/ trans disciplinary meeting point apart from disciplinary structures • Questioning/removing of the role of experts giving answers (rather they contribute as part of an exploration in unknown territory)
Challenges / drawbacks • Community of practice developed a culture quite different from the formal structure – not so easy to translate; practice is situated and does not travel easily (Wenger, 1999; Shove *et al*., 2012) • Non-PhD actors still excluded in many ways by the university hierarchy/power structure – for example, do not often communicate with other 'teachers' about pedagogy • Viewed as not rigorous by some, or as "community of activists" (Hald, 2011)

The point is not that the practice in this case is *the* way to implement sustainability transformation at universities. It is clear that, professorships, courses, learning, innovation processes etc. are created around for example addressing climate change issues at universities in different ways; through processes that do not involve anything like the practice at CEMUS. However, the additional integration of knowledge, skill and material, and the ensuing boundary crossing, creation of 'connector' roles within wide transdisciplinary frames, and the formation of knowledge bases for action happening at CEMUS is one compelling example of implementing sustainable development within higher education.

6. Conclusions

The aim of this research project was to investigate how universities can enable and support their own organisational transformation towards embedding sustainable development as part of their core purpose. To do this, this study has analysed and explained conditions and practices at a sustainability-focused university center that operates under and unconventional, student-driven, transdisciplinary model for organising its education and outreach.

The first research question asked about the relevance of student driven, transdisciplinary centres of learning and teaching for the challenge of embedding sustainability at universities. The second asked about institutional contexts that focster of learning and innovation for universities' own sustainability transformation. Focusing on the practice of 'student-coordination of transdisciplinary sustainability learning and teaching' in particular, the findings indicate that, from a social-practice perspective, such centres (contexts) and practices have relevance here in several ways. In integrating materials, competences and meanings in ways that allow for institutional critique, trans-and interdisciplinary approaches and discourses, drawing in actors to the university from outside academia around (non-disciplined) sustainability questions, implementing ESD, student engagement, and student-faculty partnership, the practice creates new roles and social arrangements in a way that is powerful across many areas key for sustainability in higher education. From this basis, the practice has allowed reframing of courses and projects as knowledge bases for creating knowledge and action around sustainability questions.

In analysing conditions and practices in an 'outlier' case study (Thomas, 2011) relevant for sustainability in higher education, this study offers modest insight into what institutional contexts can foster the types of learning and innovation needed to move towards sustainability transformation of universities. A community has emerged around a practice that has for some time, and continues to, innovate, adapt to, and attempt to work on problems faced by universities and the higher education sector in general (Lozano, 2006): implementing sustainability at universities. Growing from an innovative practice, we see the development of space for social learning, semi-detached from institutional context, harbouring innovative capacity for implementing sustainable development in the higher education sector. This is in line with theory about transformation and transition towards sustainability, which posits such spaces as crucial points for social and technical innovations that have a hope of moving societies towards sustainable development, as actors within them work to influence and solve problems of sustainability can happen under different values goals and incentives to the mainstream (O'Brien and Sygna, 2013; Westley et al., 2011).

6.1 Practical Implications

This practice under focus in this study is rather 'lucky' in terms of its career. It was started intentionally and with great effort, yet the way in which the practice integrated elements ended up meeting a number of criteria that sustainability would call for and universities would struggle to implement over the coming decades, sidestepping many locked in, structural norms that intentionally or not made implementing sustainability difficult. It also persisted across generations of practitioners operating within (but also semi-outside) the formal (canonical) institutional structures of a major, centuries old, conservative, universit(ies) and university town. The initiators of the practice surely had little understanding that what they were doing would match up so well with the coming turn towards interdisciplinarity and discourse of sustainable development.

This is not to say that they have 'found the answer' or produce a higher quality of education than others. This remains an open question, and the claim here is not that CEMUS' work surpasses that

of the many excellent teaching and learning environments at other places in higher education. Rather that the 'bottom-up', activist-infused community managed to last 25 years because of a peculiar set of conditions and practices that allowed it to persist over time. It is possibly the only sustainability-focused transdisciplinary student-driven organisation that has formal responsibility for creating education, driving a research agenda (to some extent), and creating framings, through its education, that have led to among other changes within the university environment, a formal, 10 year, rotating guest professorship in Climate Change Leadership.

Such novel ways of operating should not be overlooked, being difficult to achieve in practice. Shove *et al*. (2012) call for policy makers to put aside behaviour change initiatives focused on changing people's behaviour in an A-B-C model that seeks to inform and incentivise the individual to change their behaviour, and instead to "study the contours of communities of practice". The decentring of the individual and allowing a focus on both structure and agency in a dynamic relationship afforded by practice theory may be something universities should take heed of in considering how to shift their operations towards embedding sustainability. Change at the level of practice can be key in this transformation, with new practices leading to new networks, groups and structures being formed as a result. But a campaign or policy that truly alters practice requires concerted efforts from multiple directions.

Shove et al. (2012, pp. 147–151) present a case in Japan where policy makers took a practice approach to changing air conditioning energy-use by shifting the practice of suit-wearing among business people, leading to huge energy savings and a new view on how to shift energy patterns through policy underpinned by practice theory. The case showed that shifting practices can happen on a large scale, changing seemingly locked-in unsustainable behaviours and patterns. Shofting focus to universities, we might ask what new integrations of elements (materials, competences, meanings) are needed to meet the goals of sustainability universities have set for themselves. How can universities promote 'good' elements and reduce the circulation of 'bad' ones? How can the university learn from experiments in practice that lead to new knowledge and to innovative configurations of practices that could help shift them towards embedding sustainability?

In the case of CEMUS, what may be learned is that multiple locked in patterns and behaviours (practices) can be challenged or circumvented successfully and productively by innovations in practice that can lead to new configurations for learning and teaching, and research and outreach. This may be one crucial component for the challenge of embedding sustainability at universities. Enacting it also took a university management willing to support an experiment, and to support something developed by those with little formal power within the hierarchy, mirroring the kind of societal shift sustainability requires– actors seeking change must be supported by those who hold power over the very systems that need to change. If we accept that institutions of higher learning are both implicated in and hold capacity to influence the problems of sustainable development, the argument that radical transformation is needed in (some of) the university's practices and structures becomes a valid line of reasoning. However, as Grinn *et al*. 2010 clarify, radical change does not necessarily refer to the timeframe of the change, but rather the scale, proposing the notion of *incremental radical change*. Surely experimenting with and supporting new practices that in and of themselves challenge meso-level structures (e.g. education and research themes, employment positions) within universities and macro-level, well-established regimes (e.g. institutional norms in higher education) is one place to start.

6.2 Methodological reflection and future research

In this study I interviewed only people who work or had worked as part of the organisation in the case study . This was an intentional choice, to exclude for example teachers and students from

interviews. This was a decision taken due to the resources available to me in the study. However, in future research, one could include perspectives of these groups, along with also administrators, who have an often overlooked insight into practices in university contexts (Trowler, 2014).

As Thomas (2011) argues *"the theoretical enterprise of case study is not about testing probabilistically stated theories. Rather it is about discovering or testing tools of explanation"* (p. 514). In this study I made an attempt to integrate, or at least create a meeting between, two different theoretical approaches, a focus on practices and a focus on long-term and large-scale transitions towards sustainability. This was not easy, and one could imagine a larger project asking for empirical research beyond the delimitations of this study. However, the idea that one can study conditions and innovative practices and how these contribute to transformation towards meeting sustainability challenegs at macro-level forms the basis for work being done in the sustainability transformations field. For example, the project TRANSIT: Transformative Social Innovation Theory, funded by the EU's FP7 framework and due to be completed in 2017, seeks to theoretically integrate social innovations in practice and large scale social challenges and crises like the global financial crisis of 2007-8 (Haxeltine et al., 2015). It has already produced a series of compelling working papers (TRANSIT Project, 2017) This and similar approaches may be fruitful in developing new knowledge about the complex challenge of transforming universities towards sustainability in creative, innovative ways in practice.

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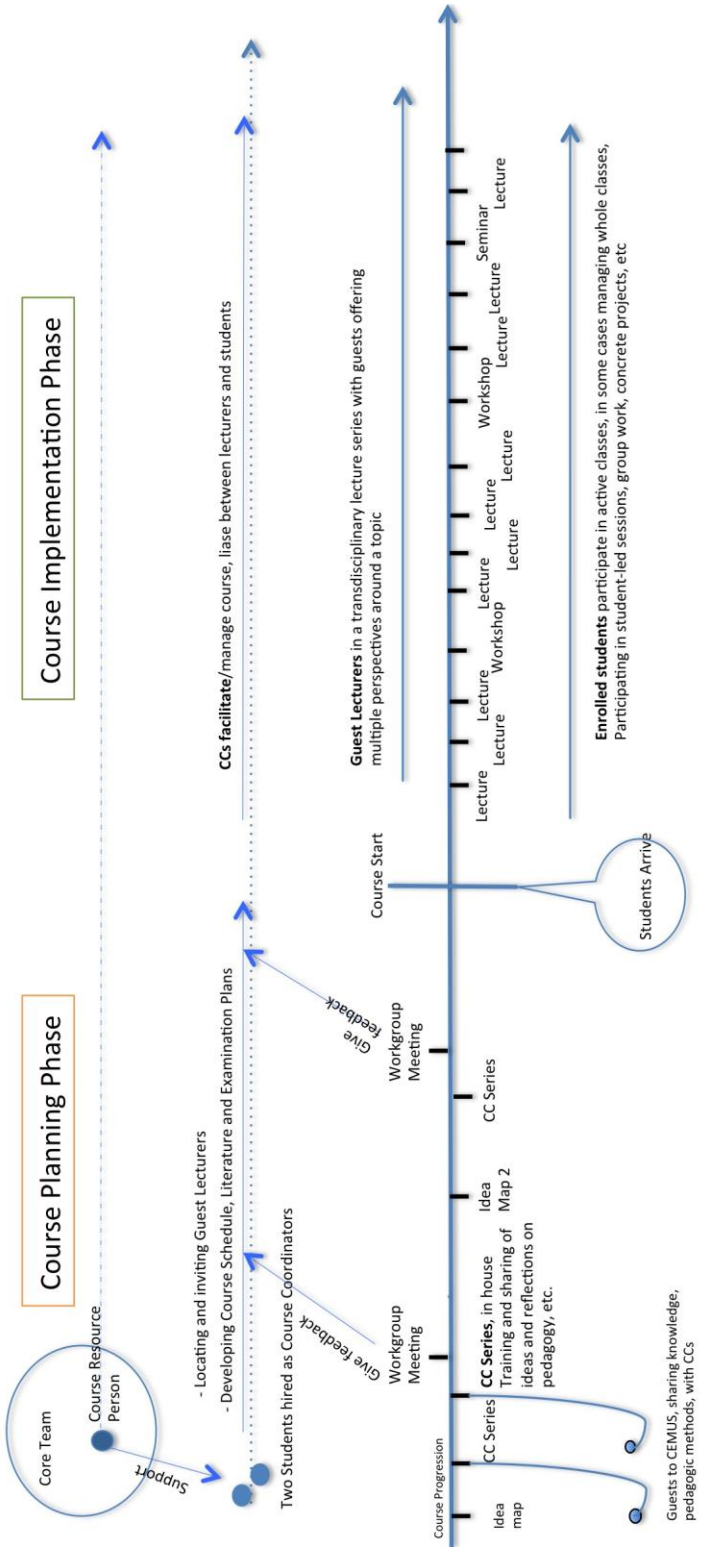
8. Appendices

8.1 Appendix 1. Course planning and implementation timeline



8.2 Appendix 2. Courses Run at CEMUS in 2017

Table 7. Courses run at CEMUS as of 2017

Spring Semester

- Hållbar utveckling B 30 hp
- Hållbar utveckling – värderingar, världsbilder och visioner, 15 hp
- Teknik, makt och mänsklighetens framtid, 7.5 hp
- Livsfilosofi och det moderna samhället, 7.5 hp
- Applied Sustainability Studies Course Package, 30 hp
- Actors and Strategies for Change – Towards Global Sustainabilities, 7.5 hp
- Sustainable Design – Ecology, Culture and Human Built Worlds, 7.5 hp
- Climate Change Leadership – Power, Politics and Culture, 15 hp
- Sustainable Development - Project Management and Communication, 15 hp
- Master in Sustainable Development: Worldviews and Discourses – A Seminar Series, 5 hp
- Technology, Power and the Future of Humanity (distance), 7.5 hp

Autumn Semester

- Hållbar utveckling A, 30 hp
- Global miljöhistoria, 7.5 hp
- Klimatet, energin och det moderna samhället, 7.5 hp
- Global Sustainability Science Course Package, 30 hp
- Global Challenges & Sustainable Futures, 7.5 hp
- Critical Perspectives on Sustainable Development in Sweden, 7.5 hp
- The Global Economy – Environment, Development and Globalization, 15 hp
- Sustainable Development - Project Management and Communication, 15 hp
- Master in Sustainable Development: Introduction to Interdisciplinary Science, 5 hp
- Master in Sustainable Development: Worldviews and Visions – A Seminar Series, 5 hp
- Climate Change Leadership in Practice, 30 hp

8.3 Appendix 3. Outline of Steps for How a Course at CEMUS is Formed and Implemented

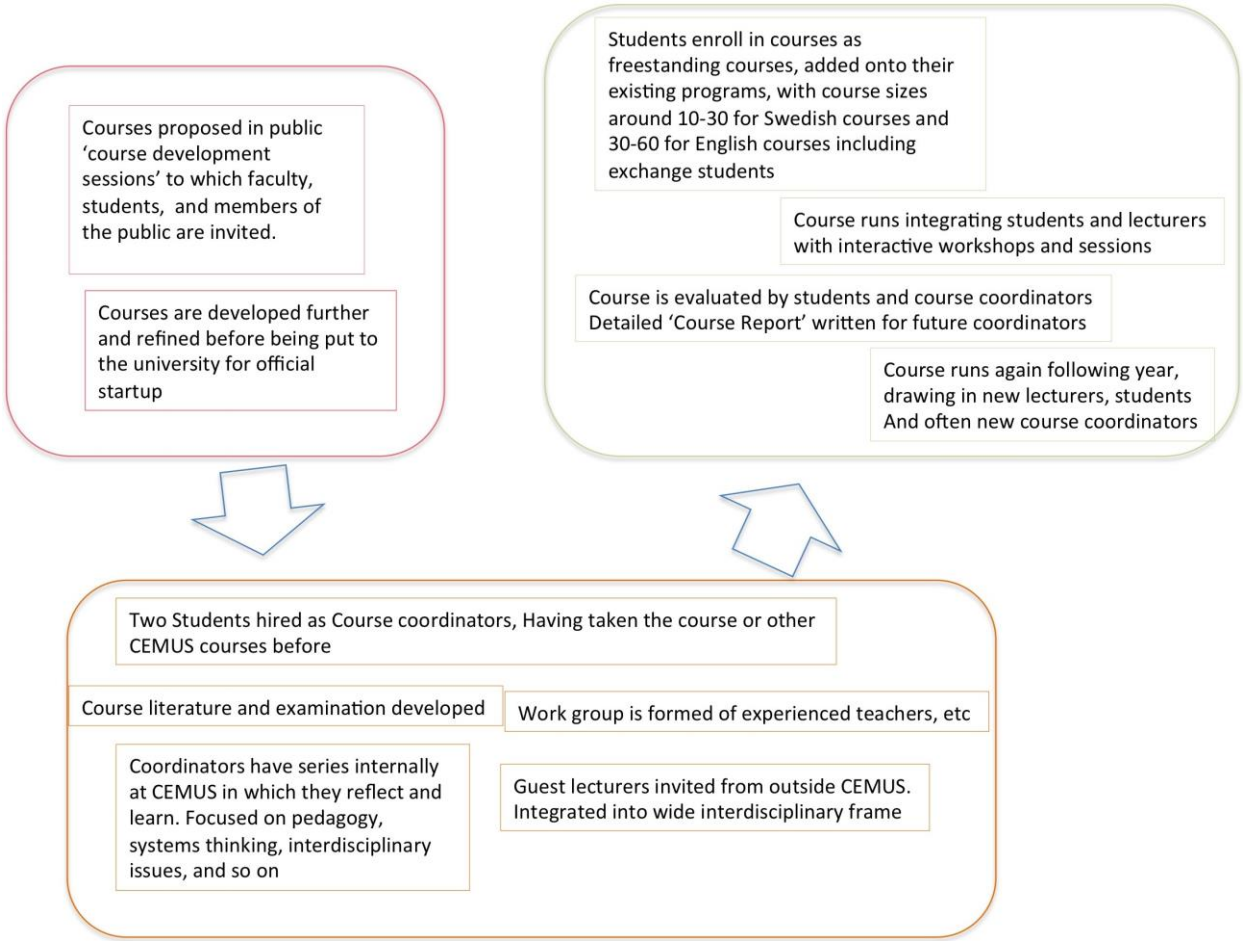


Figure 8. Steps for how a course at CEMUS is formed and implemented (produced by the author)

8.4 Appendix 4. Interview Questions

Interview questions are listed as so: Stated question (*more about the content of the question*)

Opening

1. What were you doing in the months before you were hired at CEMUS? (*starting personal and reflective conversation*)
2. What was the last education/other thing you were doing before CEMUS *(not asking for a judgement of it, just description)*

Inside the classroom / course / planning

3. What do you personally see as your main responsibilities? *(What are you trying to do?)*
4. During a guest lecture, what are you paying attention to*? (What is important in the learning setting?)*
5. Think of the first class you were a CC. How did you communicate your role to students? Can you give an example? *(How do you explain your job?)*
6. Think of a recent example when you communicated your role to students? *(How do you explain your job?)*
7. How do you think students perceive your role?
8. Can you give an example of what has been particularly successful with the course? *(what is a successful performance of this practice)*
9. In your experience, what does the 'student coordinated' model add to the courses? (how does this work?)
10. What kind of skills are you learning in this work?

Outside classroom / meeting / collaborating

11. Do you feel you work in collaboration or partnership with other UU staff? Who? When Does this happen? *(Who are you in partnership with and what does the partnership look like?)*
12. How do you explain your job to teachers or faculty? Can you give an example? *(How do you talk to them about what you are doing?)*
    i. -How does do you feel when communicating your role as a CC with others outside CEMUS? *(is this an uncertain and insecure conversation? Or a confident one?)*
13. Do you feel CEMUS work has an influence on the University itself? How? *(How do you perceive our work in relation to the wider context?)*
14. What kind of student is good/not good for CEMUS courses? and what skills do they need?
15. How do you choose which guest lecturers to bring in? and what skills do they need?
16. Location wise, do you think you could run a CEMUS course 'anywhere'? Why do you say so*? (what are the minimum requirements for running this course…what are the essential ingredients… is the course anchored in a local context)*

Extra Questions for CEMUS core team members, and Coordinators of CCL course

17. Can you tell me what makes the CCL course different to other courses at the university? (examples?) (*Practice)*
18. How have you seen CEMUS / the CCL course has had influence on the university as an organisation and how? *(context)*
19. How do you see that that the 'student coordinated' model made a difference in getting the professorship? If so why/why not?