Education for Sustainable Development for Everyone: Massive Open Online Courses and global, climate literate, sustainable citizens

Kristina Naunova
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Abstract:

This thesis contributes to knowledge about how Massive Open Online Courses (MOOCs) as educational online platforms can be utilized in achieving the purposes of Education for Sustainable Development (ESD). Starting out from a view that, in the face of global challenges every individual is an important actor with agency to drive for necessary social changes, the overall ambition of this thesis is to investigate the role of MOOCs, as a specific form of online learning, in empowering and enabling learners to acquire the competences needed to take responsible actions and informed decisions in a rapidly changing, interdependent and unequal world. More specifically, this thesis aims at providing a deeper insight into the question of whether the pedagogic approaches used in ESD (learner-centered, action-oriented and transformative learning) and the learning processes that they promote, can be incorporated in the MOOC environment. This issue holds importance due to the global and intergenerational character of ESD where providing access to training and learning for sustainable development for all is vital. In this respect, MOOCs have been envisioned as revolutionary in the provision of access to education to a wider audience. Nevertheless, the “massive” part of MOOCs could pose a challenge in connection to ESD, due to the fact that ESD is not easily generalized and aims at upholding local relevance. Therefore, this thesis also looks into the question of the implications posed by scale and the issue of scalability when investigating how MOOCs can enable the application of ESD pedagogic approaches, thus also contributing to the achievement of the purposes and learning objectives of ESD and Climate Change Education as its constituent part. Utilizing a case study methodology, the MOOC in Climate Change Leadership at Uppsala University is chosen as a case example of the MOOC learning environment and learning circumstances. By conducting a content analysis of the MOOC materials as presented on the online platform, and developing an analytical framework based on the ESD pedagogic approaches, this thesis reaches the conclusion that some aspects of the ESD approaches benefit from the networked environment and large-scale participation in the MOOC environment, while the incorporation of others is more challenging and asks for further research and improvement of the MOOC learning environment in order for them to provide for the optimal learning circumstances and outcomes in connection to ESD.

Keywords: Sustainable Development, Education for Sustainable Development (ESD), Massive Open Online Courses (MOOCs), Climate Change, ESD pedagogic approaches

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Summary:

In the face of global challenges such as climate change, it is commonly perceived that everyone should be given the possibility to be educated about sustainability issues and thus, develop capabilities to better adapt to and navigate the uncertainty of the challenges that the future holds and contribute to the needed societal transformations. The relevance of Massive Open Online Courses (MOOCs) in connection to Education for Sustainable Development (ESD) is mostly connected to the promises of wider access that the MOOCs offer. Therefore, this thesis explores the learning circumstances that are present in a MOOC environment with an aim to make conclusions regarding its suitability to implement the pedagogic approaches used in ESD (learner-centered, action-oriented and transformative learning). This is done in order to evaluate if and how the learning processes that are advocated by the ESD pedagogic approaches could benefit from the large scale MOOC environment and thus, contribute to achieving the learning objectives and goals of ESD and Climate Change Education (CCE) as it constituent part. The results from the research conducted in this thesis showcase that to some extend the MOOC environment endorses the incorporation of some aspects of the ESD pedagogic approaches, while others pose higher challenges. However, the overall impression of MOOCs in the context of ESD is positive and future research is suggested that would reveal ways by which the current limitations will be overcome as to create optimal learning possibilities within the MOOC.

Keywords: Sustainable Development, Education for Sustainable Development (ESD), Massive Open Online Courses (MOOCs), Climate Change, ESD pedagogic approaches

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List of abbreviations:

CCE – Climate Change Education
CCL – Climate Change Leadership
CEMUS – Center for Environment and Development Studies
EE – Environmental Education
ESD – Education for Sustainable Development
MOOC – Massive Open Online Course
SD - Sustainable Development
SDG(s) – Sustainable Development Goal(s)
SLU – Swedish University of Agricultural Sciences

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One cannot participate actively in history, society, in the transformation of his reality, if he is not helped to become aware of reality and his own capacity to transform it...

- Paulo Freire

Education is the practice of freedom the means by which men and women deal critically and creatively with reality and discover how to participate in the transformation of their world.

- Richard Schauell

1. Introduction

During the past few decades humanity has developed an increased awareness for environmental issues and the relationship of humans with nature. The World Commission on the Environment and Development: Our Common Future (the Brundtland Report) has formalized the quest and efforts of the global community towards sustainable development and achieving an environmentally sustainable, more humane and equitable society as common goals. In the creation of this society, every individual is seen as an important actor with agency to drive the necessary changes. As stated in the Brundtland Report, education is seen as vitally important in enabling each individual to develop a new understanding and action base for her/his responsibilities to contribute to a healthy future for Earth (Goldsmith, 1986, in WCED, 1987, p.95). As a result of this, the field of education for sustainable development (ESD) was developed, with an aim, through promotion of holistic and culturally sensitive learning (World We Want, 2013, iv, in Leicht et al. 2018, p.29; Rieckmann, 2018, p. 40), to provide a basis for people's empowerment and action-oriented transformations both on individual and societal level.

The introductory quotes from the influential Brazilian educator and philosopher Paulo Freire, and Richard Schauell (made in the preface to one of Freire’s books), illustrate the crucial role of education in enabling individuals to re-imagine and transform the world towards socio-ecological sustainability. This is related to what Kolb names as adaptive capacity of humans as a learning species, with our primary adaptive specialization taking the form of learning, adapting in a proactive sense by recreating and reshaping our world (Kolb, 1984, p.1). Accordingly, embarking on the path of sustainable development requires for individuals to become sustainability change-makers (UNESCO, 2017, p,7) or so called “sustainabilists” or “sustainability citizens” (Wals, 2015; Wals and Lenget, 2016; all in UNESCO, 2017, p.10). As such, they need to possess qualities i.e. sustainability competences like: anticipatory thinking, systems thinking, empathy, open-mindedness and ability of coping with uncertainty (Barth et al., 2007; Wals, 2010; all in Wals and Corcoran, 2012 p. 24). Whereas these concepts are sometimes challenged by other ESD-scholars, these competences are especially important with regards to complex, inherently wicked, ‘post-normal’ issues such as climate change (Funtowicz and Ravetz, 1993, in Hulme, 2009, p.78; Kronlid, 2014, p.13) - a global problem that will leave no country unaffected (UNESCO, 2010, p.2). In connection to this, it can be argued that the educational activities of ESD with Climate Change Education (CCE) as its constituent part, are highly ambitious as they set out hopes for achieving sustainable development by educating people worldwide (Lohrmann, 2017, p.214). Hence, a central premise for ESD is providing access to training and education for sustainable development regardless of where one lives in the world (ibid.).

The past few decades have also been characterized by high level digitalization and the integration of technology in education which has given rise to Massive Open Online Courses (MOOCs). Some have envisioned MOOCs as revolutionary in democratizing education and enabling access to education to people whom otherwise would have been left without it - many of which live in non-OECD countries (Lohrmann, 2017, p.222). Recent research supports this view by showing that particularly economically and academically disadvantaged populations are taking advantage of MOOCs (Lohrmann, 2017, p.220).
This is especially relevant in connection to climate change, as climate-change-induced human suffering will affect vulnerable individuals and communities in developing countries most severely (IPCC 1990; Watson et al. 1996; Dokken et al. 2001; Parry et al., 2007; Field et al. 2014; all in Kronlid, 2014, p.14).

Therefore, there is a general agreement among researchers and academics on the need for higher incorporation of digitalization in ESD. Namely, Paas (2008, p.5) concludes that a greater incorporation of integration of information and communications technology (ICTs), could provide for many of the changes needed in ESD. The delivery of traditional single-directional knowledge is not regarded to be sufficient to inspire learners to take actions as responsible citizens, and therefore ESD entails rethinking the learning environment, including its virtual and online aspects (Leicht et al., 2018, p.8). A recent publication pointed to the study results of a ‘Learner Outcomes in Open Online Courses 2015’ survey that supports the hypothesis that MOOCs can contribute to the goals of ESD as formulated in Agenda 21 (Lohmann, 2017, p.221). Furthermore, MOOCs have been acknowledged as an educational tool in recent UNESCO documents and have been put forward as an example of what universities can do to raise awareness about Agenda 2030 (Duran y Lalaguna and Dorodynkh, 2018, p.974). The importance of investigating how to utilize these emerging forms of learning and technological tools in creating “sustainability wisdom” among learners is also put forward by Wals and Corcoran (2012, p.21). Moreover, exploring the promises of digitalization could be argued as relevant in relation to creating capabilities for people around the globe to better cope with the impacts of climate change. Namely, as stated by Robeys (2006, p. 78, in Kronlid and Lotz-Sisitka, 2014, p.80), being knowledgeable and having access to education is a valuable capability, which as Kronlid and Lotz-Sisitka argue (2014, p.103) holds additional significance in relation to climate change as it arguably expands people’s abilities for adaptation and reduces their vulnerability. Finally, as providers of wider access, there is the standpoint that a MOOC can go far beyond any traditional course as it provides huge range of perspectives and thus, offers opportunity to address wicked problems as climate change which cannot be solved by an individual, or one country, but require the commitment of the global community (Ferguson and Sharples, 2014, p. 109).

Following the rise of MOOCs, research has been done on the learning and teaching circumstances in MOOCs. According to some of the research, the challenging thing about MOOCs is not only the “online” and “open” parts, but also the “massive” part (Bali, 2014, p. 51; Ferguson and Sharples, 2014, p.98). Here the issue is about scale and scalability and how methods of learning and pedagogies can be used effectively and scaled in the massive online classroom (Ferguson and Sharples, 2014, p.99). Namely, within the educational sphere, the use of the concept of scaling is fairly novel (Spira and Tshiningayamwe, 2018, p. 197) and hence, currently there is not one generally accepted definition of scaling. Nevertheless, with regards to the use of ICTs in education and MOOCs as one part of it, the aspect or dimension of scaling that focuses on function (i.e. functional scaling) is most applicable as it refers to “increasing the scope of activities of an initiative” (WHO, 2009, in Do, 2015, p.7). Such activities or specific aspects of them that are being scaled are termed by Do, (2015, p. 14) and Mickelsson et al. (2018, p.7) as ‘scaling objects’. A question of importance that arises is whether different elements of ESD (for ex. principles, goals, educational method or pedagogic approaches), taking in the role of a scaling objects, could leverage from the wider reach offered by MOOCs. In relation to this, since the challenges of sustainable development are not precisely identical all over the planet, but are context-dependent (Wals and Corcoran, 2012, p. 24), the difficulty of scaling and wide spreading one-size-fits-all educational innovations (Dede et al. 2005, in Clarke and Dede, 2009, p. 353), becomes even more apparent in ESD practices. As pointed by Mickelsson et al. (2018, p.1), in relation to ESD activities, UNESCO has primarily adopted the meaning of scaling as scaling up, which refers to moving ESD activities from a small to a larger impact (Elmore, 1996; Do, 2015; Looi and Teh, 2015; all in Mickelsson et al., 2018, p.1). However, UNESCO has also committed to the development of ESD content, which provides hybridity of relevant global and local aspects of sustainable development (Wals and Kieft, 2010, p.22). Hence, a significant question for ESD is how to help learners to understand, navigate and find a balance between sustainability issues and accelerating change on a global level on the one hand, and their daily lives actions embodied in local
settings, on the other (Krogh and Jolly, 2012, p.213).

In relation to this, the role of MOOCs and learning-by-MOOCs-experiences in providing for the aforementioned mixture will be in focus of the thesis. More precisely, MOOCs and their learning environment will be put in correlation to ESD pedagogic approaches, as one central part of ESD. The reasoning behind this choice is that, on the one hand, MOOCs are promoted as tools that could contribute to the goals of ESD, however, on the other hand, previous research has shown that creating pedagogic approaches for the MOOC environment is a challenging issue. In relation to this, MOOCs and their pedagogy have so far been researched only in terms of their role in education in general, thus pointing to a gap when it comes to the utilization of MOOCs in the context of ESD specifically. Hence, it is relevant to explore what aspects of the ESD pedagogic approaches are offered i.e. can be incorporated within a MOOC (knowledge object). A specific MOOC in Climate Change Leadership (CCL) at Uppsala University serves as a research object utilized for achieving the aim of the this thesis, as presented in the following sub-chapter.

1.1. Aim and research question

In connection to what was presented above, an overall ambition posed for this thesis is to investigate the role and positioning of MOOCs as education platforms within ESD. By using the MOOC in CCL as a case study, the aim of the research is to examine the MOOC learning environment and how does it enable and limit the application of ESD pedagogic approaches, thus, facilitating or hindering the possibilities for achieving the goals and learning objectives of ESD and CCE. Conclusions on whether the ESD pedagogic approaches are sensitive to scale and how they could benefit from the effects of a networked environment and large-scale participation, will be also attempted in this thesis.

The following research question is formulated:
Which ESD pedagogic approaches are enabled within the CCL MOOC?

1.2. Outline

This thesis is organized in the following structure. The introduction chapter (Chapter 1) provides the broader setting and context of the problem and points to the existing knowledge gap and the importance to address it. The aim and the research question are further presented in this chapter. Chapter 2 familiarizes the reader with the background of the problem, by providing some key aspects on Education for Sustainable Development (ESD), Climate Change Education (CCE) and Massive Open Online Courses (MOOCs). In Chapter 3, the theories and concepts relating to learning and the ESD pedagogic approaches, which frame the research in this thesis, are presented and described. Chapter 4 displays the methodological approach adopted in this thesis, while Chapter 5 presents the findings of the conducted analysis. Chapter 6 elaborates and discusses the findings in connection to the research question and the aim of this thesis, by also putting them in correlation to previous research and the broader implications for ESD and SD. Finally, Chapter 7 presents the concluding remarks, where the importance of the findings is stated and suggestions for future research are provided.
2. Background

In this chapter some necessary background information for this thesis will be provided. To begin with, the scope of ESD as well as the historic development of the concept is overviewed with a further insight being given on the ESD teaching traditions and CCE as a constituent part of ESD. Subsequently, the history, typology and pedagogy of MOOCs as educational online platforms are briefly presented. Information on the provision of MOOCs by Uppsala University is also given, with accent on the specific characteristics and data related to the MOOC in CCL. The aim is to familiarize the reader with the context of this study.

2.1. Education for Sustainable Development and its historic emergence and guiding principles

As it was presented in the introductory chapter, education is attributed by many as a key response to the pressing sustainability challenges (Wals and Corcoran, 2012, p.24). As it is argued by Grice (2017, p.20) in an educational response to the global issues of sustainable development, what knowledge is or might be is a crucial question, and since there are no given end and universally distributive solutions to these complex issues (Wals and Corcoran, 2012, p. 26), therefore an element of uncertainty needs to be incorporated in knowledge and educational practices (Grice, 2017, p. 21). Currently, the “version” of education that is most widely endorsed and promoted as the one that would guide or lead to the wanted societal transformation is ESD (UNESCO, 2014, p.12, in Mochizuki and Yarime, 2016, p. 13). As defined by UNESCO, the objective of ESD is to “empower learners to take informed decisions and responsible actions for environmental integrity, economic viability and a just society, for present and future generations, while respecting cultural diversity” (UNESCO, n.d. a). ESD addresses: a) learning content, b) learning outcomes, c) pedagogy and the learning environment (ibid.). Important feature of ESD, as pointed by Hägström (2017, p.98), is that it cannot be restricted just to a classroom environment, but it rather includes mixed approaches of informal, non-formal and formal education. In this thesis however, the latest of these forms of ESD (i.e. the formal aspect) will be in the focus of the research. More precisely, in this thesis ESD is dealt with on a meso level, concerning with questions of the learning environment, or more precisely with the ESD pedagogic approaches as one part of it.

Looking in retrospect, the concept of ESD is closely related to and has its roots in Environmental education (EE). Namely, it is the 1960s that mark the development of EE as a separate field of study with its genesis lying in nature study, outdoor education and conservation education (Disinger, 1983/1997, p.18; Roth, 1978; all in Scott, 2014, p.52). The emergence of EE was then perceived to be a result of the growing awareness regarding the environmental calamities that human society has imposed to the surrounding world (Scott, 2014, p.52) and it had a purpose to “navigate” people’s behavior and modes of living which are in line with our planet’s carrying capacity (Wals, 2012, in Woldemariam, 2017, p. 106). This initial development was followed and reinforced by the Man and Environment conference held in Stockholm in 1972 and the UNESCO-UNEP conference on Environmental Education held in Tbilisi in 1997 (Wals and Kieft, 2010, p.11), where EE was further emphasized as crucial for environmental protection (Öhman, 2011, p. 4). Education’s aim was shifted more towards the achievement of sustainable development in 1987 when the Report of the World Commission on Environment and Development: Our Common Future (The Brundtland Report) was adopted (Læsøe et al., 2009, p.10) and sustainable development emerged as one of the most relevant questions of our present-day societies. Consequently, sustainable development oriented education has become at the core of subsequent UN policy declarations and reports such as:
• The Agenda 21 (outcome of the Rio Earth Summit in 1992), where Chapter 36.3 acknowledged that “Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues.” (UNCED, 1993, p. 320);
• The UN Decade of Education for Sustainable Development (DESD), 2005-2014 (outcome of the (Rio plus 10) Johannesburg World Summit on Sustainable Development in 2002), which aimed to re-emphasize the role of education and learning for achieving sustainable development by acknowledging that everyone needs to be provided with the opportunity to benefit from education in the creation of a sustainable future (UNESCO, 2009, p.8);
• The Agenda 2030 for Sustainable Development (outcome of the (Rio plus 20) UN Conference on Sustainable Development in 2012), where SDG 4 (Quality Education) and explicitly its target 4.7 state that: "By 2030, [the Agenda and the UN member nations will] ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development.” (UN, 2015). Within the Agenda 2030, education in not just seen as one of the SDGs, but also as an essential enabler for the achievement of all the other goals (UNESCO, 2017, p.6). Or simply, as stated in Leicht et al.(2018, p.8) the realization of the SDGs asks for profound transformations both in modes of thinking and acting, a process crucially grounded in and facilitated by education.
• The Global Action on Education for Sustainable Development (GAP), which is a continuation of the DESD and is seen as a tangible contribution to the SDG 4 and Agenda 2030 (UNESCO, n.d. b). As defined by UNESCO (n.d. c), the goal of the GAP is “to generate and scale up action in all levels and areas of education and learning to accelerate progress towards sustainable development”.

The current use of the concept of ESD reflects the ambitions of these latest initiatives. The essence of ESD is clearly captured in the definition provided by Wals and Kieft (2010, p.7) according to which: “Education for sustainable development (ESD) is a vision of education that seeks to balance human and economic well-being with cultural traditions and respect for Earth’s natural resources.”. Broadly speaking, ESD embodies a range of approaches in education that encourage changes in knowledge, competences, values and attitudes in order to enable the active contribution of learners in the transition towards a more sustainable and just society for all (Leicht et al., 2018, p. 7). Because of this wide reach, the lines between ESD and its so-called ‘adjectival’ educations (Wals and Kieft, 2010, p.11) such as development education, global citizenship education (O’Flaherty and Liddy, 2017, p. 1), are sometimes blurry and not easily identifiable which could result in their interchangeable use. In other words, ESD incorporates learning around various sustainability-related issues that are inherently complex and dynamic. As such ESD itself involves high degree of interdisciplinarity and complexity, which makes it a subject of the attainment of different meanings and interpretations (Læssøe et al., 2009, p.10-14). Or as it is simply put by Læssøe et al. (2009, p.10), “ESD is an open, vibrant, and contested concept and is likely to remain so.”

2.2. Climate Change Education

As discussed above, ESD encompasses the development of sustainability competences and some key themes (Leicht et al., 2018, p. 10). As one of our time’s most serious environmental and development question - climate change is one of these themes (together with biodiversity, catastrophic risk reduction, sustainable consumption, global justice and poverty (Leicht et al., 2018, p. 11; Häggeström, 2017, p.99) and thus, holds a central place within ESD (Kronlid, 2009, p.27). Climate change represents a complex set of challenges and it is marked by uncertainty stemming from its co-related risks which are not easily observed, identified or estimated (Helgeson et al., 2012, p.329). On the other hand, the consequences of climate change are immanent and currently there is a widespread consensus that even with the most
immediate mitigation efforts, it is too late to prevent its negative effects (Lovelock, 2009, in Davies and Pitt, 2010, p. 134). The reality of these consequences adds sobriety and increasing urgency for people to be not only educated in climate change issues (Gardner and Stern, 2008, in National Research Council, 2011, p. 1), but also to have the capabilities and be able to handle the related consequences that will affect their lives (Kronlid and Öhman, 2010, p.160).

Due to its global character, climate change demands cumulative responses worldwide, the implementation of which asks for enhancing people’s abilities to make agreements and compromises and deal with value-related differences in order to achieve the common goal (Öhman, 2009, p. 50). In relation to this, education and learning are considered to be central and essential in this process of creating a climate literate citizenry. Therefore, the goal of CCE is to provide learners with understanding of the basic science of climate change, to support their behavioral change and to inform their everyday-life decision-making (National Research Council, 2011, p. 5). These aims are also formulated and put forward in the Climate Change Education for Sustainable Development Program which was enacted by UNESCO as part of its Climate Change Initiative (UNESCO, 2010, p.4). Furthermore, Climate Action as postulated in the Sustainable Development Goal (SDG) number 13, is addressed in recent UNESCO publication which deals with Education for the Sustainable Development Goals (UNESCO, 2017, p.36). In it, the learning objectives in relation to climate action education are presented, which as such are divided in three groups:

a) Cognitive – The objectives in this group are directionalized on learners’ development of understanding of the phenomenon of the greenhouse effect as a cause for climate change and its anthropocentric underpinnings found in human socio-economic activities. The consequences of climate change as well as strategies for their prevention, mitigation and adaptation also included (ibid.)

b) Socio-emotional – Belonging in this group is the aim to develop learners’ competences for collaborations with others on creating strategies to deal with climate change, as well as abilities for encouragement of other actors to protect the climate. Recognizing ones responsibility through everyday behaviors and, in connection to it re-evaluating her/his worldviews are objectives positioned in this group (ibid.).

c) Behavioral – The objectives in this group are more action oriented and entail the abilities and readiness of the learners to act in favor of people more directly impacted by climate change, to promote climate change policies and to implement and support climate-friendly economic activities and lifestyles in general (ibid.).

What is also relevant in CCE and was set forward by Stevenson et al. (2012, p.374) is that in order to engage people to think about climate change and its related consequences, one needs to start at where a person stands both cognitively and emotionally. Questions like what is people’s mental model of climate change i.e. how they make sense and shape their meaning and understanding of climate change and are there any misconceptions revolving around it (ibid.) are things that should serve as a starting point in order for meaningful learning process to be initiated. This is turn avoids the possibility for perpetuating of incorrect or distorted representations of climate change, which could otherwise hinder actions for change (Helgeson et al. 2012, p. 340). Another important issue which is relevant when educating about wicked issues as climate change was pointed by Funtowicz and Ravetz (1991, in Helgeson et al., 2012, p. 341), which state that in order to re-imagine society and think of strategies for doing so, there is a need for creation of an “extended peer community” where all who are affected by the said issue should enter into dialogue and share their (local) understandings and views on it. This is further relevant for broadening people’s image on climate change, because as for now, as Osbeck (2017, p.55) states, people’s worries regarding sustainability and climate change issues to a large extent are related to the environments where they reside and live in. Therefore, extending the scope of the sustainability dialogues in turn opens paths for co-production of knowledge thus, eliciting more sustainable behavioral changes (Helgeson et al., 2012, p. 341). Finally, in relation to climate change and climate change justice as a very important part when
teaching about the phenomenon, as Kronlid (2014, p. 16, 17) argues, instead of labeling climate change as “anthropocentric” it should be rather perceived as “afflugenic”, thus acknowledging that it is not the human species universally that has caused climate change, but instead it is a result of a specific lifestyle (affluent) and the “luxury emissions” of a certain part of the human population.

In general, it can be stated that likewise ESD, CCE (although encompassing a problem of global measures) should be made appropriate and relevant both locally and culturally as the expressions of climate change will be different throughout the world (UNESCO, 2015, p. 20).

To conclude, in relation to its overall aim, the essence of what makes CCE is captured in the following quote by Kagawa and Selby (2010, p. 243) where they state that:

“As a fundamental contribution to climate change it seems that educational spaces should build a culture of learning awash with uncertainty and in which uncertainty provokes transformative yet precautionary commitment rather than paralysis.”

2.3. Teaching traditions in Education for Sustainable Development and Climate Change Education

Touching upon the question of the substance of ESD and what makes for the features and characteristics by which it can be defined, one can draw conclusions by comparing current ESD practices with earlier forms of environmental education (Sandell et al., 2005, p. 155). The basis for the distinction lies in the different modes of content and method selection, which Williams (1973, in Sandell, et al., 2005, p. 155; Öhman, 2009, p. 51) terms as “selective traditions” that entail the existence of various approaches to knowledge and educational praxis which are chosen within a specific cultural context or framework. Currently a distinction between three such traditions is made: a) fact-based environmental education, b) normative environmental education, and c) education for sustainable development (Sandell, et al., 2005, p. 160).

The first of these is regarded as one whose goals can be best communicated as “furnishing” learners with facts about the state of the world (Österbergh and Kronlid, 2011, p.67). In other words, this tradition portrays environmental problems as questions of science (Sandell, et al., 2005, p.160) and thus, poses scientific knowledge as the only reliable foundation in the educational context and in the forming of a basis for learners’ opinion-making about environmental issues (Öhman, 2009, p. 51). Another feature of this approach is that it communicates the view of humans being separated from the natural world, which they have the task to control (Sandell, et al., 2005, p. 161). In relation to climate change education, this fact based tradition is seen as limiting firstly due to fact that it undermines the importance of understanding climate change problems as such that are inherently connected also to people’s values and interest (Öhman, 2009, p. 52). Moreover, this approach is seen as faulty in relation to providing possibilities for discussion and the development of democratic action competence among the learners that would lead to transformation of their standpoints and behaviors (ibid.).

On the contrary, the normative tradition presents environmental problems primarily as question of values (Sandell, et al., 2005, p. 162). It incorporates the political dimension of environmental issues (Öhman, 2009, p. 52) and ultimately, aims at developing environmentally-friendly attitudes and behaviors among learners (Öhman, 2009, p. 52; Österbergh and Kronlid, 2011, p.68). However, a possible concern within this tradition is that by delivering specific answers to value-related questions, there is the risk of indoctrination and reducing the diversity of ideas and opinions (Öhman, 2009, p. 52). In relation to climate change education, this is unfavorable as it promotes sameness, thus also reducing the imagination
of possible ways for addressing future problems as the ones that might arise from climate change (Öhman, 2009, p. 54).

As an alternative to the previously presented traditions, and as a response to both increasing uncertainty and diverging opinions and understandings about environmental issues, the pluralistic tradition has been conceived (Sandell, et al., 2005, p. 163). It is the one that mirrors UNESCO’s policies (Hägghström, 2017, p.99) and hence, is adopted by ESD and its defining feature is that it perceives environmental and development issues as conflicts of human interests and thus, adds political and moral aspect to sustainability questions (Sandell, et al., 2005, p.164). This tradition also focuses on the democratic aspects of education, meaning that education should aim at promoting students’ critical thinking (Österbergh and Kronlid, 2011, p.71; Öhman, 2009, p. 52) and serve as a forum or a meeting place for people with different worldviews and experiences. It focuses on participatory pedagogy that empowers learners (Hägghström, 2017, p.99). Hence, in this tradition communication and peer interaction are seen as tools that open opportunities for common meaning-making processes (Öhman, 2009, p.53) and facilitation of thinking outside or beyond accepted frames (Österbergh and Kronlid,2011, p.71), which is seen as crucial in relation to complex sustainable development issues such as climate change. Student agency expressed in the form of possibilities for student-led contribution in the courses (Österbergh and Kronlid, 2011, p.70) as well as their ownership and responsibility for lesson plans and realizations (Sandell, et al., 2005, p.165) are also a characteristic of this tradition. Finally, the incorporation of experiential, embodied, moral, aesthetic and artistic learning is embraced and fostered within this tradition (ibid.).

2.4. Massive Open Online Courses (MOOCs)

*Defining MOOCs* - The phenomenon of Massive Open Online Courses (MOOCs) is a relatively recent one, with MOOCs being present in the educational sphere for less than a decade. As such, MOOCs are still in development and offer space for innovation and improvement in various aspects and directions (UNESCO and Commonwealth of Learning, 2016, p. 17). Therefore what regards as a MOOC can be open for interpretation (ibid.), which is why one should restrain from generalized definitions. Nevertheless, some elements that all MOOCs have in common are hinted in the acronym1 itself. Those are the following:

- **Massive** – This refers to the fact that MOOCs are larger in scale in comparison to traditional courses. In other words, the design of MOOCs is scalable or (in theory) made for an unlimited number of participants (UNESCO and Commonwealth of Learning, 2016, p. 17);
- **Open** – As a product of the “open educational resource” (OER) movement2 (Storme et al., 2016, p.310), a crucial part of what characterizes a MOOC is that there are no monetary restrictions or entry qualifications and access to the course is open for everyone (UNESCO and Commonwealth of Learning,2016, p. 17; Yuan and Powell, 2013, p. 6);
- **Online** – The content of the course is available to everyone that has an Internet connection and possesses a computer or a smartphone (UNESCO and Commonwealth of Learning, 2016, p. 17);
- **Course** - A complete learning experience is offered to the learners, with defined learning goals, course materials, modes of examination, assessment and certification (ibid.)

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1 The MOOC acronym was coined by Cormier (2008 in Storme et al., 2016, p.310).
2 The OER movement endorses the setting of educational material as free for everyone to use (Unesco 2002, 2012, in Storme et al., 2016, p. 310), which is enforced by the underlying thought of education as a common good and that educational resources should as such be made public ( Wiley et al. 2012; The William and Flora Hewlett Foundation 2013, all in Storme et al., 2016, p. 310).
History and development - The term MOOC dates from 2008 and was initially connected to a pedagogical experiment which aimed at creating a learning environment that is more connected and democratic (Mor and Koskinen, 2013, p.2). This was conducted by Stephen Downes and George Siemens at the University of Manitoba and the result of their work is proclaimed to be the first true MOOC with the name “Connectivism and Connective Knowledge” (Downes, 2009; Fini, 2009; both in Brown, 2013, p. 238). The idea behind the MOOC phenomenon, however, is not a recent one, but can be traced back to the early 1960, when Fuller proposed industrial scale educational technology (Adamopoulos, 2013, p.2). Nevertheless, it was not until late 2011 when MOOCs caught the attention of learners worldwide (Brown, 2013, p. 237) and consequently 2012 was proclaimed to be the year of the MOOCs (Jawaharlal, 2015). Since then, close to 800 universities have created more than 8000 MOOCs and only in the autumn of 2017 over 200 Universities have announced the outset of 600 new MOOCs (Shah, 2017). Many of the leading universities have now adopted and are delivering MOOCs, however most of them are situated in the Global North which some observe as problematic as it reinforces one-way transfer of knowledge from developed countries to the developing world (UNESCO and Commonwealth of Learning, 2016, p. 11). In relation to this, as stated by Lotz-Śisitka (2014, p. 2,3) the trend of North to South construction and transfer of MOOCs needs to be addressed as to avoid the danger of them becoming a neo-colonial instrument of control and marginalization.

An important issue regarding the development and the quality of MOOCs is also the financial aspect. Although MOOCs are portrayed as “free”, this only relates to the students that are partaking in the MOOCs (Baker and Passmore, 2016, p.1). For the universities, on the other hand, the development and the maintenance of the MOOCs incur costs related to human resources and technological development (Gaebel, 2013, in Baker and Passmore, 2016, p.2). Therefore, with regards to the future development and improvement of MOOCs, an important question is the economic and financial sustainability of the MOOCs for the universities that provide them (Baker and Passmore, 2016, p.2).

Online distribution - When it comes to the provision of MOOCs, in general this is not done directly by the universities, but it is rather in collaboration with outside platforms which specialize in the field of open online education. A recent review from 2018 shows that there are around 19 platforms that deal with the delivery of MOOCs, however only six of them (Coursera, edX, Udacity, FutureLearn, Iversity and Cognitive Class) have been evaluated and put forward as the ones that deliver the best learning experience (Reviews.com, 2018).

Typology - As previously mentioned, MOOCs nowadays can take many different forms and although the use of a dualistic typology is no longer applicable, it is important to touch upon the initial distinction between the so-called ‘xMOOCs’ and ‘cMOOCs’. The latter represent the “connectivist” model of a MOOC which is characterized by a social learning approach that focuses on communication and peer-learning (Hill, 2012, in Brown, 2013, p. 239; Bayne and Ross, 2013, p.21). What is notable about ‘cMOOCs’ is that they are a manifestation of a proposed learning theory for e-learning environments called connectivism (Goldie, 2016, p. 1064, 1066). This connectivist theory builds on behaviorist, cognitivist-constructivist, and humanist theories of learning (Dunaway, 2011, p. 683) and asserts that knowledge and learning are distributive, i.e. they are not located in any given place, but instead reside and emerge within networks (Goldie, 2016, p. 1065). However, the key problem concerning this theory and type of MOOCs is scalability (Brown, 2013, p. 240). The ‘xMOOCs’ on the other hand are regarded as

3 The motivation for universities behind the offering of MOOCs is diverse and although the enhancement of the access and reach of education and the adoption of innovation in teaching and learning is an important goal, marketing and the building or maintaining of a brand is also identified as a reason for the provision of MOOCs by universities (Stansbury, 2014).
the opposite of the ‘cMOOCs’ as they are an example of a more traditional model of content-led learning where the transmission of content in central (Brown, 2013, p. 241) and knowledge acquisition is assumed to be made through repetition and testing (Bayne and Ross, 2013, p. 4). As the content is provided by professionals rather than co-constructed by the learners via dialogue and interaction, this type of MOOCs avoid the scalability question (Brown, 2013, p.241) since their functioning is not affected by the number of learners participating in the course. Most of the currently available MOOCs however belong somewhere in the spectrum between these two types.

**Pedagogy** – It has been acknowledged that a question of huge gravity when it comes to the use of ICTs in education and MOOCs as one manifestation of them is pedagogy. This is amplified in this quote by OECD (2015, p. 4, in Storme et al., 2016, p.315) that goes as follows:

“If we want students to become smarter than a smartphone, we need to think harder about the pedagogies we are using to teach them. Technology can amplify great teaching but great technology cannot replace poor teaching”

In other words, MOOC pedagogy is important as it vitally determines the MOOC learning offerings, i.e. the possibilities or potential to foster or inhibit for (especially deep and critical) learning to occur (Bali, 2014, p. 46, 51).

A few points of relevance in MOOC pedagogy are identified and are presented in the following categorization:

- **Teaching and instruction** – Within most currently available MOOCs the equivalent of traditional classroom teaching is “served” in the form of a pre-recorded video lecture, which the learners can pause or replay and reflect upon at their own pace (Ferguson and Sharples, 2014, p.99). Or as stated by Morris and Stommel (2013, in Bali, 2014, p. 45) in the MOOC environment a form of pre-packaged instruction takes place. This approach, as argued by Prensky (2011 in Bali, 2014, p. 45) presents a “not necessarily best way for every person to learn”. Therefore, the lack of a proper teacher figure in some cases (as for ex. The Open University) is addressed by an approach called “supported open learning” where a local teacher network is created that provides for the needed additional support to students (Ferguson and Sharples, 2014, p.100). However, this is costly and hence, can be applied in paid-for courses only (*ibid.*). Therefore, in general it can be stated that in MOOCs the nature of the teacher-learner relation or the (lack of) quality of it, can pose certain limitations in terms of learning possibilities when compared to campus “face-to-face” courses (Jaschik & Lederman, 2014, in Evans and Myrick, 2015, p.296).

- **Assessment and assignments** – The overview of the types of assessment that dominate in current MOOCs revolves around two approaches. The first is assessment through quizzes with multiple choice questions, while the second is implemented through peer assessed assignments. As stated by Lotz-Sisitka (2014, p.2), these methods are rather patronizing as they place education and learning to the lowest controllable denominator. This statement is supported by Bali (2014, p.50) who in relation to the quizzes states that it is a simple application of Bloom’s taxonomy, that merely fosters “remembering” that is meaningless and does not involve the learner in deeper reflections thus, promoting for higher level learning to take place. On the other hand, peer assessment of assignments by nature enables interaction and the learning opportunities that come with it (Bali, 2014, p.51). However, the efficiency and quality of the peer assessment is questionable because, as argued by Lotz-Sisitka (2014, p.2) it is “a highly situated and specialized practice if it to be successful”. This shortcoming is also acknowledged by Bali (2014, p.48) who posed the problem of learners receiving “inexpert peer feedback”. However, Ferguson and Sharples (2014, p.102) state that the peer-assessment should not be looked at as a method for assessment but rather as a learning activity, which in turn as stated by Bali (2014, p.50) holds possibilities to promote the occurrence of metacognitive learning among the peer learners. Finally, within the MOOCs highest (procedural)
learning opportunities are said to be offered by the assignments that ask the learner to involve in some kind of reflection and action in relation to what was taught in the course (Bali, 2014, p.50, 51).

- **Peer-interaction** - One of the most notable features of most MOOCs is the possibility for learner-to-learner interaction. This stems from the endorsement of a social-constructivist pedagogy according to which “learning happens through conversations, with oneself and others, about the immediate world and about abstract concepts” (Ferguson and Sharples, 2014, p.101). Hence, the MOOC educational environment is structured as to prompt interaction and learning in networks, by also incentivizing reflection and inquiry (ibid.). Although there are many registered advantages of learners collaborating and co-constructing knowledge, however there is also some critique regarding the scalability and effectiveness of these processes when they engage thousands of people (Ferguson and Sharples, 2014, p.103). Namely, according to Davies (2012, p.293) in order for successful collaborative and reflexive practice to occur there must be a face to face interaction where learners can also communicate through their body language. A further obstacle for meaningful interaction can also be the effect of information overload (Morrison, 2013; Mak et al., 2010; both in Bali, 2014, p. 51; Ferguson and Sharples, 2014, p.102) as well as language barriers and differences in previous educational and cultural capital (Gulati, 2004, in Bali, 2014, p.51). Nevertheless, it is also argued that the interaction and discussion in MOOCs open possibilities for learning that goes beyond what could be achieved solely by the lectures and instructions (Bali, 2014, p.48). Therefore, in general this part of the MOOC is considered to be beneficial both for those who participate actively in the discussion and for the so-called “lurkers” that just read other people’s comments and reflect upon them (Milligan et al., 2013 p. 154).

In overview, when talking about MOOCs’ design and pedagogy and especially their related instruction methods, the ultimate problem is posed by the fact that MOOCs attract learners with a variety of cultural and professional backgrounds, previous experiences, level of preparation, skills and competences which therefore, poses a hard task to the MOOC designers to accommodate these varied learner profiles and offer a learning environment that would account for these differences (Milligan et al., 2013, p. 157). Hence, in the essence the value of a MOOC lies in the spaces it provides for different learning pathways to occur that the learner can choose from (Bali, 2013; Kitsiri, 2013; both in Bali, 2014, p.52).

### 2.5. The MOOC in Climate Change Leadership at Uppsala University

A core mission of Uppsala University is through education to enable people to acquire the skills and tolls needed to help create a better world (Äkesson and Malmberg, 2014, p. 2). When it comes to conducting fundamental and advanced research and education in relation to sustainable development, Uppsala University has been proclaimed to be a major player on both regional and international levels (Uppsala University, 2017, p.3). This was further confirmed with the results of a 2016 evaluation study whose conduction was commissioned by the University Chancellor's Office (UKÄ) and which aimed at investigating the work of Swedish Universities and Colleges in promoting sustainable development as required by the Swedish Higher Education Act (SWEDESD, 2017). The results of this evaluation showed that Uppsala University was among the one quarter of the country's institutions that meet the criteria, which is mainly due to the University’s adoption and implementation of its Program and Action Plan for Sustainable Development (ibid.). As part of this commitment in promoting sustainable development and the engagement towards the delivery of the Agenda 21 and the United Nations Sustainable Development Goals (SDGs), Uppsala University has been involved in initiatives that aim to effectively disseminate new knowledge related to answering complex questions (Uppsala University, 2017, p.3). One of the methods by which this is done is by the hosting of MOOCs (Uppsala University, 2017, p.8). Namely, in the
academic year of 2016/17, Uppsala University has created three MOOCs - one from each disciplinary domain (Uppsala University, n.d.). These are the following:

- Antibiotic Resistance: the Silent Tsunami (domain of Medicine and Pharmacy);
- Climate Change Leadership (CCL) (domain of Sciences and Technology);
- Understanding Financial Crisis: Business Cycles and Policy (domain of Humanities and Social Sciences). (ibid.)

The provision of these MOOCs was enabled in agreement with FutureLearn as an external platform. Uppsala University is the first Swedish University which has initiated a collaboration with FutureLearn, which is an independent company owned by the UK’s Open University (ibid.) that aims at empowering people and transforming education by delivering online courses (FutureLearn, n.d. a).

The MOOC in Climate Change Leadership is a part of the first “package” of MOOCs related to Sustainable Development that was offered by Uppsala University. The course design is connected to and inspired by two campus courses: a) Climate Change Leadership in Practice, b) Climate Change Leadership – Power, Politics and Culture that are offered by The Centre for Environment and Development Studies (CEMUS) at Uppsala University. In connection to this, before elaborating on the details of the MOOC in Climate Change Leadership, it is important to provide some general information on CEMUS as an organization and its connection to the Zennström professorship in Climate Change Leadership. As a center CEMUS was established in 1996 and it is jointly supported by the Center for Sustainable Development at Uppsala University and the Swedish University of Agricultural Sciences (SLU) (Hällström, 2011, p.23). The courses at CEMUS utilize interdisciplinary approaches when dealing with a wide range of sustainability relevant topics (Hällström, 2011, p.26), which reflects the center’s aim at being a creative and transboundary complement to the educational offers by Uppsala University and SLU (Friman et al., 2011, p. 93). Another unique characteristic is that CEMUS provides for a model of student-led education (Hald, 2011, p.10), or also referred as grass root education (Österbergh and Kronlid, 2011, p.76), where the course coordinators are students themselves. In addition to this, within the courses students take on a active role (ibid.) and are given a high level of ownership in the learning process, which is focused on their participation, collaboration and communication as a way of co-creating knowledge on sustainability issues (Grandin, 2011, p.48). Closely linked to CEMUS and the Center for Sustainable Development at Uppsala University is the Zennström Professorship in Climate Change Leadership (May, 2015, p.5). The 10-year series of visiting professorships is funded by Niklas Zennström’s organization – Zennström Philanthropies, with the aim to contribute in the creation of knowledge and an action base for addressing the challenges of climate change (CEMUS, n.d. a; May, 2015, p.5). Both the current visiting Professor Kevin Anderson and his predecessor Doreen Staninsky, as part of their work within the Zennström Professorship, have contributed to the development of the aforementioned courses in Climate Change Leadership and their lectures are also part of the Climate Change Leadership MOOC (CEMUS, n.d. a), which is in focus of this thesis.

The MOOC in Climate Change Leadership aims at combining subject matters on climate change as an issue of unprecedented global urgency and importance, with topics on leadership and their climate change associated opportunities (CEMUS, n.d. b). The overall development of the MOOC was a result of the work of a team of people affiliated with CEMUS4 (FutureLearn, n.d. b). A more detailed description of the structure and layout of the MOOC will be provided in point 4.1 of this thesis.

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4 Daniel Mossberg (Director of Studies and Acting Program Director CEMUS/CSD, Uppsala University), Jakob Grandin (PhD fellow at SpaceLab, University of Bergen and previous employee of CEMUS, Uppsala University), Friederike May (Course Coordinator at CEMUS/CSD, Uppsala University) and Alexis Engström (Course Coordinator CEMUS/CSD, Uppsala University).
In the academic year 2016/17 the course was given in two rounds, one that took place over the five week period following the starting date on 2016-11-07, while the second cycle commenced on 2017-04-10. According to the statistical data that FutureLearn provided to Uppsala University, 4163 people participated in the first round, while the second round of the course attracted 2372 learners. However, only 235 people in the first round and, respectively 171 people in the second round were marked to have completed at least 90% of the course.

Due to the fact that the partnership between Uppsala University and FutureLearn was set for a limited amount of time, it remains to be seen if and how the MOOC in Climate Change Leadership will be provided to learners around the world in the future.

3. Theory

As previously mentioned, the field of ESD was born out of the realization that global challenges, such as climate change, require a re-orientation of education and exploration of new ontologies (ways of being in the world) and epistemologies (ways of knowing) (Wals et al., 2016, p. 28) in order to enable learners to make new mental models (Helgeson et al., 2012, p.331), to develop capabilities and ecological identities as well as innovations and grounds for ethical thinking (Sanders, 2017, p.134) and feelings of agency and ownership when acting to contribute to sustainability. As argued by (Franck, 2017, p.15) ESD will, “from time to time and place to place be in need of being rethought, reinterpreted and reconstructed”. Hence, it requires a learning environment that enables the emerging processes of knowledge co-creation which Grice (2017, p.31) terms as “knowledge-creating orchestration”. In other words, ESD asks for modes of teaching and learning that aim at fostering learners in becoming future leaders able to collaborate and to engage in working flexibly, across disciplines and geographic scopes in order to deal with wicked “mega-problems” as climate change and to contribute to sustainable development (Grice, 2017, p.23). The pedagogic approaches that are most adequate for reaching these aims of ESD are learner-centered, action-oriented and transformative learning (UNESCO, 2017, p.54). The features of these approaches are interconnected and complement each other and they constitute the analytical framework in this thesis. Before delving into the characteristics of ESD pedagogic approaches individually and considering that the notion of learning is central in relation these approaches, it is therefore important to stipulate that in this thesis the following definition of learning by Abbott (1994, in Carnell et al., 2000, p. 91) is adopted:

“Learning . . . that reflective activity which enables the learner to draw upon previous experience to understand and evaluate the present, so as to shape future action and formulate new knowledge.”

As further elaborated by Carnell et al. (2000, p. 91), learning is more than a passive process of knowledge acquisition, but it is rather an active process that relates new meaning to existing meaning, that is not always linear but might include both unlearning and relearning, and ultimately influences future actions in which what is learned is retrieved and used. These elements of learning as channeled by the ESD pedagogic approaches are to be more explicitly elaborated in the following text in this chapter on the basis of which the learning circumstances in the MOOC environment will be presented in the findings chapter of this thesis.

5 The statistic data used in this paragraph is provided by the Department for Education at Uppsala University and it was collected in collaboration with FutureLearn for the purposes of evaluation of the outcomes of the Climate Change Leadership MOOC.

6 According to Kearney and Kaplan (1997 in Helgeson et al., 2012, p.331), “a mental model is a person’s internal, personalized, intuitive and contextual understanding of how something works”.

13
3.1. Pedagogic approaches in Education for Sustainable Development

It is argued by many scholars that within ESD a re-imagination of pedagogy is needed that transcends transmissive approaches to education and adopts learner-centered teaching methods (Cotton and Winter, 2010; Sterling, 2004/2012; Tilbury and Cooke, 2005; all in Evans, 2016, p.445). The defining characteristic of the learner-centered approach lies in the relationship between the teachers and students. In learner-centered classrooms students are perceived as autonomous learners (UNESCO, 2017, p.55), which hold ownership over their learning (Bransford et al. 2000; Cornelius-White and Harbaugh, 2009; McCombs and Whisler, 1997; Reigeluth, 1994; all in An and Reigeluth, 2011, p. 54) and have an opportunity to interact with the content and in a way that they mold the new information with what they already know, thus deepening their understanding and actively developing knowledge (Weimer, 2013, p.24). This standing finds its roots in constructivist learning approaches according to which knowledge cannot simply be transferred, but the “hard and messy” process of learning is in the hands of the learners themselves i.e. it is the learners that construct knowledge and make their own meaning of it (Weimer, 2013, pp. 10, 21-23). Therefore, since it is perceived that learners learn better when they do it “on their own terms” or by figuring out things by themselves, the learner-centered approach embraces the notion that learners are to be self-regulated and self-directed in the learning process (Weimer, 2013, p.10). Furthermore, within this approach learners are not perceived as tabula rasa, but rather their personal foundations of experience, assumptions, values, conceptual frameworks and socio-cultural contexts are acknowledged as starting points for stimulating learning and meaning making processes (Evans, 2016, p.448). Therefore, as Grice (2017, p.31) states, the teacher still has an important role which is realized by interacting with the student and thus, recognizing and helping the occurrence of learner’s knowledge creation, what she also names as le moment – “the moment in time when knowledge comes to be and the learner comes to know”. In other words, the teacher and the learner engage in a learning process that goes both ways (teacher – learner and vice versa), thus them becoming co-creators or “partners” in the creation of knowledge. The learner centered approach furthermore embodies the notion that the content is to be shaped in such a manner that promotes learning rather than defining what is to be learned (Weimer, 2002, in Kayler, 2009, p. 59). This includes tasks and assignments that do not have just one right answer thus, allowing for the learner to make their own sense of the said exercises (Blumberg, 2015, p. 89). In accordance to this, the role of the teacher within this approach is shifted from being an expert who only transfers structured knowledge into a one that supports and stimulates learner’s reflection, designs learning experiences and facilitates learning (Weimer, 2002, in Kayler, 2009, p.59; UNESCO, 2017,p.55).

The action-oriented approach in teaching relates to the theory of experiential learning that was most notably developed by Kolb (1984) and Dewey (1938). What defines it is the ‘learning by doing’ approach, which presupposes that learners make meaning by engaging in action and reflection on experiences that might come from a project, an internship, the facilitation of a workshop, etc. (UNESCO, 2017, p.55). This connects to the understanding of phenomenological learning, according to which knowledge is embodied (SégoIsson, 2011, in Haggström, 2017, p.86) and therefore, bodily self-experience (which also includes relations to others) is emphasized as a process that is crucial for learning and meaning making (Haggström, 2017, p.85,86). As Dewey (1938;1997, p.20, in Nyberg, 2017, p.140) notes, “there is an intimate and necessary relation between the process of actual experience and education”. Or put simply, to experience is to learn (ibid). The four stages of experiential learning as set up by Kolb’s theory go as follows: “1. Having a concrete experience, 2. Observing and reflecting, 3. Forming abstract concepts and 4. Applying them in new situations” (Kolb, 1984, in UNESCO, 2017, p.55). This model is shown with the following illustration by Dennison and Kirk (1990, in Carnell et al., 2000, p. 91):
In relation to this, as Finkel (2000, in Bartoletti, 2016, p. 11) argues, the role of teaching should be to provide experience that provokes reflection. To learn reflectively, means to gain new insights about a phenomenon, to see it through one’s own lens and generate questions about it, which ultimately results in having greater control over understanding the said phenomenon (Finkel, 2000, p.153, in Bartoletti, 2016, p. 11). Hence, reflection and reflective praxis are perceived to encourage learning and are referred as a tool that can enhance sustainability education (Davies, 2012, p.291) and help the learner to think more systematically (Davies, 2012, p.284), which is one of the crucial competences in relation to ESD. With regards to climate change, it is argued that its gravity and consequences are most strongly understood through the living experience (Stevenson et al., 2012, p.375). Here, especially valuable are experiences of aesthetic nature combined with emotions. As regarded by Dewey (1934/1987, p.49, in Nyberg, 2017, p. 147), “emotion is the moving and cementing force when it comes to experiencing”. Combined with the arts and aesthetic readings, as argued by Rosenblatt (1994/1995/2005, in Hansson, 2014, p.44) they make more powerful imprint to the learner than ‘efferent readings’, which focus only on generating information. Namely, aesthetic processes and art are seen as promoting deep level of learning as they support the occurrence of scaffolding (Bruner, 1996, in Häggström 2017, p.96), which is defined as “supporting knowledge of self, others and the world at large.” Wickman (2006, in Nyberg, 2017, p. 142) is also a proponent of this standing, and he claims that aesthetic experiences should be involved to a larger extent in science teaching and learning. In line with Wickman is Hansson (2009, p.79), who accents that the arts should be given more prominence and therefore, suggests further investigations of the role of aesthetic experiences in CCE.

In general, the action-oriented approach points that experience as an educational tool is the “glue” between abstract concepts and meaning making that regards for concrete knowledge acquisition. Hence, this approach presupposes a learning environment where the role of the teacher lies in creating conditions that enable and incentivize learners’ experiencing and reflective thought processes (UNESCO, 2017, p.55).

**Transformative learning** explained in a most simple way refers to “a deep, structural shift in basic premises of thought, feelings, and actions” (Transformative Learning Centre, 2004, in Calleja, 2014, p. 118). As noted in UNESCO’s publication “Education for Sustainable Development Goals: Learning Objectives” (2017, p.55), rather than pointing concrete teaching and learning strategies, transformative learning is best defined through its aim, which is to enable learners to question and change their preconceived ways of seeing and thinking about the world (Slavich and Zimbardo, 2012; Mezirow, 2000; both in UNESCO, 2017, p.55). This approach relates to Mezirow’s transformative learning theory used to
describe the ways in which people apply self-reflection in connection to their beliefs and experiences, thus, changing their existing dysfunctional worldviews (Christie et al., 2015, in Learning Theories, 2017). A major phase in this way of learning is the encounter with a so-called ‘disorienting dilemma’, that acts as a catalyst for change (Taylor, 2007, p.174) by illuminating unquestioned assumptions in one’s worldview (Taylor and Elias, 2012 in Calleja, 2014, p. 129; Weimer, 2013, p.25). From the moment of disorientation, the learner is pushed to a moment of transformative self-reflection, resulting in transformation of perspective (Calleja, 2014, p. 117). Mezirow believed that this happens through critical reflection in the context of dialogue with other people (Howie and Bagnall, 2013 in Learning Theories, 2017), which requires for a learning environment that enables possibilities for students to bounce ideas and opinions off one another. Or as stated by Freire (2002, 2006, in van Dijk and van Dijk, 2012, p.233) learning is most fruitful and effective in a group setting, as dialogue increases the possibilities for collective construction of knowledge. In connection to this, an essential part of the transformative experience, interacting with other allows for identifying alternative perspectives where one is encountered with interpretations of a same situation from a different point of view than his own (Mezirow and Associates, 1990, in Calleja, 2014, p.119). Applied in a learning context, this means that student interaction enables the process of ‘mirroring’ to take place, where one relates her/his personal ideas, insights, experiences and feeling to the ones of other learners, which ultimately could provide for their shift or change as a result (Wals and Kieft, 2010, p.25). Or as stated by Rogers, (2002, p.847, in Nyberg, 2017, p.141), “without interaction learning is thought of being sterile and passive, never fundamentally changing the learner”. Hence, the role of the teacher is to facilitate a democratic learning situation which fosters discussion and participation as well as critical reflection upon it (Mezirow, 2003, p.63). As stated by Tassone and Wals, (2014 in Wals et al., 2016, p.33) the transformative learning process encourages change not only in learners’ perspectives but also supports them to critically and creatively reflect on current socio-ecological challenges and to act upon them. In other words, cognitive transformations of the individual may lead to the development of systemic agency and collective transformation of human activity (Lotz-Sisitka et al., 2015, p. 75, 78). Therefore, transformative learning is perceived as being at the heart of sustainability education (Wals et al., 2016, p.32).

![Fig. 2. Illustration of transformative learning (“Learning for walking the change”). Source: Wals et al., 2016, p. 31.](image)
4. Method

In this thesis the primary method of inquiry is an empirical case study of the pedagogy and learning environment offered by the CLL MOOC. The chosen case study will be presented in point 4.1. Within the case study, the data collected are analyzed via conducting a content analysis, the details of which will be presented in point 4.2. An analytical framework is developed based on ESD pedagogic approaches (point 4.3), which is applied to conduct the analysis of the empirical material in this thesis.

4.1. Case study

A case study is a comprehensive description of an individual case (Mesec, 1998, p. 45, in Starman, 2013, p.31). As a method, it is largely used in the social sciences and has been found to be especially valuable in practice-oriented fields (such as education) (Starman, 2013, p.29). The benefit of conducting case study research (CSR) as accented by Woodside (2010, p.1) lies in the provision of a detailed describing, understanding or prediction of a singular occurrence. Or in the broadly accepted definition of Yin (1994, p.13): “A case study is an empirical inquiry that investigates a contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and context are not clearly evident.” This usefulness of the case study as an “inquiry on the individual” (Woodside, p.2, 2010,) is clearly stated in the example by Skinner (1966, p. 21, in Woodside, 2010, p.2), who states that “instead of studying a thousand rats for one hour each, or a hundred rats for ten hours each, the investigator is likely to study one rat for a thousand hours” the particularized results of which make the main advantage of this method.

The selection of a case study research as primary method of inquiry for this paper was done due to the fact that, considering the aim and the research question, an investigation of one specific MOOC as an analytical object, provides for the optimal opportunity to obtain detailed observations and understanding on the pedagogies and learning environment within MOOCs as educational online platforms. The MOOC in CCL at Uppsala University is the chosen case for this thesis. The reasoning behind this decision stands on three grounds. Firstly, because the main topic (climate change) is related to SDG number 13 (Climate Action), which is considered to be one of the most urgent SDGs (UNDP, n.d.). Secondly, the MOOC was developed by the Centre for Environment and Development Studies (CEMUS), which aims at applying ESD principles and pedagogies. Hence, the CCL MOOC makes for an unique opportunity to observe the application of ESD pedagogies in a MOOC learning environment. Lastly, the MOOC is designed and is provided by one of the leading platforms in online education, FutureLearn, which enables for the possibility of making (to a certain extent) generalizations of the acquired results from this study to other MOOCs.

As presented in point 2.5, the MOOC deals with complex questions related to climate change and their associated leadership opportunities (CEMUS, n.d. b). The course was designed to run for a period of 5 weeks with a projected four-hour workload per week (FutureLearn, n.d. b). Each week was designated to deal with different perspectives on climate change and leadership, with the following structure:

Week 1: Putting Climate Change into context: Past and Present
Week 2: The Road Ahead: Bending the curves to a sustainable future
Week 3: Complex challenges and possibilities for change
Week 4: Leadership, Communication and Climate Change
Week 5: Climate Change Leadership in Practice (ibid.)
Within every week, the subject matter is covered through lectures, articles and discussions7 (ibid.). Every week of the course further incorporates teaching elements termed as “steps”, which is a characteristic for all MOOCs provided on the FutureLearn platform (Ferguson and Sharplès, 2014, p.101). In connection to this it is important to state that while content-wise the development of the MOOC was a responsibility of CEMUS and Uppsala University as a partner institution of FutureLearn, the layout of the MOOC as delivered on the platform was entirely governed and defined by the generic technical, visual and design settings of FutureLearn.

4.2. Content analysis

The empirical data collected within this study is analyzed by utilizing a content analysis. As a research method the content analysis is in generally used for subjective interpretation of content, by means of which one makes inferences from texts (or other meaningful matter) to the contexts of their use (Hsieh e Shanon, 2005; Krippendorff, 2013; both in Rossi, et al. 2014, p. 40). This is done by conducting a systematic classification, codification and identification of patterns and themes within the content matter that is being analyzed (Hsieh e Shanon, 2005, in Rossi, et al. 2014, p.40). There are three main approaches to content analysis (basic, interpretive and qualitative), the distinction among which is based on the ways researchers conceptualize the content and employ methods for the collection, coding, and analysis of the data (Drisko and Maschi, 2015, p.2).

In this thesis I make use of qualitative content analysis, which can be described as “a systematic analysis of texts of many kinds, addressing not only manifest content but also the themes and core ideas found in texts as primary content.” (Mayring, 2010 in Drisko and Maschi, 2015, p.82). It is important to state that in qualitative research it is generally accepted that books, images, physical artifacts, audio files, video files, or other media fall under the umbrella of “texts” used as subjects of the analysis (Drisko and Maschi, 2015, p.85). In this thesis the content analysis is applied to the course curriculum, syllabus, the video lectures and written instructions, and the layout of the course as presented on the online platform, which make the empirical data collected within the case study.

The use of a content analysis within the case study was chosen as most appropriate in order to answer the research question and achieve the aim of this thesis. Namely, the role of the content analysis is to identify indicators relating to the main features of the ESD pedagogic approaches as presented in the analytical framework. Hence, a deductive approach (using theory to inform the content analysis) is utilized. The choice for content analysis instead of, for example, conducting interviews with the lecturers and educators or the learners, was done due to the reasoning that the content analysis will provide for a more holistic insight of what is offered within the MOOC, thus also avoiding bias and one-sided perspective on the MOOC that might arise from only conducting interviews.

4.3. Analytical framework

The analytical framework is theory informed (constructed on the basis of the defining features of the learner-centered, action-oriented and transformative learning pedagogic approaches) and it serves to analyze and describe the pedagogies and learning environment within the MOOC.

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7 The information on the development and structure of the course was obtained from CEMUS and from the data about the CLL MOOC available on the FutureLearn platform.
### Pedagogic approach

<table>
<thead>
<tr>
<th>Learner – centered</th>
<th>Defining feature</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>- Democratic relationship between teacher and learners; The teacher follows up the learning progression and facilitates learning;</td>
</tr>
<tr>
<td></td>
<td>- Consideration of the learner’s contexts and previous experiences;</td>
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<tr>
<td></td>
<td>- Recognition that the students have ownership and responsibility for their learning;</td>
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<tr>
<td></td>
<td>- Using content to promote learning rather than to define what will be learned; (adapted from Weimer, 2002, in Kayler, 2009, p. 59)</td>
</tr>
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| Action – oriented | - Learning through experience (action-related, aesthetic and/or emotional); |
|                  | - Fosters reflective thinking; |
|                  | - Fosters action; |

| Transformative learning | - Opportunities for peer interaction and dialogue; |
|                        | - Content that incentivizes disruptive thinking and transformation; |

Table 1. Analytical framework of the thesis

### 4.4. Limitations

The research conducted in this thesis is based upon empirical material regarding the MOOC in CCL over which Uppsala University has copyright and thus, a right to use for research purposes. These rights fall over the content and design of the course. On the other hand, the data collected by FutureLearn are not included in this category and as such is not part of the empirical material. Therefore, course evaluations or data about the learners that took part in the course, the content of their contributions in the comment and discussion forums as well as their quiz results or submitted assignments were not taken into account in this thesis.

### 4.5. Ethical considerations

This thesis is in line with and follows the Research Ethics Terms and Conditions of FutureLearn as presented publicly and online on the platform⁸. The research conducted in this thesis did not raise any questions that could be considered as being of sensitive nature and no personal information was collected or used in the thesis.

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5. Findings

This section provides detailed description of the findings concerning the learning circumstances in the MOOC learning environment and relates them to the ESD pedagogic approaches, their characteristics and needed pre-conditions for their application, which are presented in the theory chapter and the analytical framework. These findings aim in addressing the question of what ESD pedagogic approaches (and their defining features) are enabled in the MOOC environment.

5.1. The learner centered approach in the MOOC setting

5.1.1. The teacher – learner relationship

The relationship between the teachers and the learners within the MOOC can generally be characterized as one that is traditional or instruction-based, while also adopting some features of the learner-centered approach.

To start off, it is important to clarify that the teacher role within the MOOC is being operationalized by: a) educators (the people behind the development of the course, whose names and affiliations are given on page 12 of this thesis) and b) guest lecturers.

The latter appear as the ones who conduct the actual lecturing on a certain climate change related topic via a video lecture. Their engagement starts and ends with the lecture. Since the videos are pre-recorded, there is no possibility for direct and real-time interaction between the lecturers and the learners and the lecturers are also not further involved in following up the learners’ progress or answering question. In other words, the relationship between the lecturers and the learners exemplifies the traditional one-way transfer of knowledge from teacher to student, where the democratic process is highly limited as the student is not provided with the opportunity to engage in critical discussion or co-creation of knowledge together with the lecturer.

The educators, on the other hand, adopt the role of facilitators or a “navigating voice” by summarizing the key points from each lecture, suggesting further readings and incentivizing learners’ discussion via questions and reflection points. The positioning of the educators towards the learners is more open as they take on a more active role in connection to following up the learners’ progression and answering questions. Learners are incentivized to familiarize themselves with the educators and pose them questions. This is exhibited in the initial steps of the course (step 1.1), where it is stated:

*Click on the names below to follow each lead educator, this is important since we’ll be commenting on the discussions throughout the course.*

*If you have any questions or feedback at any stage throughout the course, feel free to contact us. Tweet us or post on our Facebook page.*

However, the extent of the educators’ interactive engagement with the learners is unclear and could not be assessed within this study due to the fact that there was no further information on this within the empirical material. Nevertheless, it is reasonable to assume that if the interactive engagement would be of great concern for the layout of the MOOC, this would surface in the material.

When it comes to assessment of the learners’ progress, within the MOOC this is conducted by having two multiple answer (tick box) quizzes (in step 1.9 and 2.7) and one peer-assessed assignment at the end of
the course. Hence, no direct involvement of the educators and lecturers is included also in this part of the course.

From all of the above, a general observation is that the teacher – learner relations within the MOOC is characterized with a low level of learners’ emancipation as the MOOC leaves a very narrow space for these two parties (teachers and students) to become “learner partners” and cooperate in the process of knowledge construction. Nevertheless, the role of the educators in the MOOC can be said to deter from the traditional teacher positioning (equivalent to the fact-based teaching tradition), as they take more of the task of facilitators and designers of the learners’ learning experiences, which is one focal point in the learner centered approach.

5.1.2. Consideration of the learner’s contexts and previous experiences

Making relation to the learners’ aspirations, values and contexts is attempted throughout the course and is incorporated within the course goals and aims while it is implemented through a variety of exercises and tasks, as well as thought-provoking questions.

At the very beginning of the course, at step 1.4, the learners are asked to introduce themselves, to write down and share in the comments section their gifts, passions, purpose and core values. According to this step, the learners are given a central position in the execution of the course and achieving its goals. It is stated that:

*We want to know who you are.*

…it’s time to focus on the most important part - you as a learner and human being. **This course will be very much shaped by your input, ideas and experiences.**

*Getting a feeling for who is taking this course will make this a much more engaging and rewarding experience.*

However, as the lectures are pre-recorded and the content of the course is pre-designed, the learners do not influence or shape the further conduction of the course, both content-wise and in terms of the educators and lecturers making actual adaptations in their approach in order to fit the needs or previous experiences of the learners. Nevertheless, the learners do have an effect in the undertaking of the course as their degree of engagement and active participation in the course tasks and discussions determine the achievement of the learning outcomes of the course.

When it comes to making relation to the learners’ context, this is stipulated as one of the main points of the course. Namely, in the overview of the course goals it is explicitly stated that:

*A central part of the course is therefore to identify, discuss and work with climate change leadership challenges in your own context.*

This is further seen, in step 1.3, where it is said that learners will:

*… get the chance to identify and discuss the climate change leadership challenges that you are facing in your own contexts - the communities, organisations, or businesses that you are involved with and care about.*

The actual “connection-making” to the learner’s context and previous experiences is done by implementing a reflection-inducing method, where the educators only facilitate the making of this connection by providing conditions that enable it. However, it is the learners and their individual commitment to the tasks of the course that determine the extent to which this connection will be made. The examples for this are multiple. To begin with, step 1.5. (*Living within our carbon budget: the role of*
politics, technology and personal action), step 4.2 (Leadership starting points and experiences), step 4.3. (Finding principles on climate change leadership) and step 4.6 (How can we overcome barriers to climate change engagement?) present a clear illustration of a case where after the lectures which are generalized and provide basic insight into their respective topics, in the reflection section the learners are encouraged to relate the topics to their closest surroundings or to themselves by being asked to think about the following questions:

(Step 1.5) What changes do you think are needed in the country and place where you live? How could a rapid transition towards a zero carbon society begin? What are your experiences of climate change in your lifetime? Are the changes sudden or slow and harder to detect? How are human and natural communities affected?

(Step 4.2) What are your leadership starting points and experiences? Add your stories, starting points and key experiences.

(Step 4.3) What are your climate change leadership principles? How can you use them in relation to your own climate change action plan?

(Step 4.6) Which of these narratives are relevant to your particular context and how can they help improve your communication strategy? What are other forms or ways of communication do you think are helpful or effective in engaging people with (behaviour) change?

Another important element of the MOOC where making a more concrete relation to the learners’ contexts is attempted is within the course exercises and assignments. For example, step 1.13 (Climate change leadership in your own context), summarizes on the topics learned within the first week of the course (climate change impacts and vulnerabilities, outcomes of the Paris Agreement, and the historical perspectives on narratives, humanity and nature) and makes these topics more “visible” or easy to grasp for the learner by a reflection exercise. Namely, the educators provide links from two web pages, one showing scenarios of projected sea level rises worldwide (Surging Seas MAPPING CHOICES), while the other deals with climate changes around the globe based on different emission trajectories (Explore Climate Anomalies, Variability, and Uncertainty in Space and Time with the Climate Inspector). By using these tools the learners can easily look for their geographical location and see how the places they live in could be affected by climate change related consequences. In this way, there is a possibility for the establishment of a more “personalized” relationship of the learners with the implications in their own localities which makes the issue of climate change more real. The connection with the learner is further incentivized by them being asked to reflect on their thoughts and feelings regarding the outcomes of the exercise. Questions like the following are posed:

(Step 1.13) How will the place where you live and places you care about be affected by sea level rise? How will other people, animals and ecosystems be affected?

A task with a similar aim is conducted in step 2.2 (Climate justice and the inequalities of climate change) where a link to the Environmental Justice Atlas, is provided which shows stories regarding environmental conflicts around the world. Furthermore, step 2.6 (Bending the curves towards a sustainable future) directs the learners to visit the Global Carbon Atlas and the Carbon Map. These exercises hold again the potential to make less abstract connections of the issues of climate change to the learner and her/his context. Similar elements and effects of the learner centered approach are further identified as part of step 4.7 (Build/make/draw a representation of leadership) and in step 5.7 (Your own climate change leadership
plan). These however also have characteristics that slide into the category of the action oriented approach and therefore, will be showcased later in this thesis.

Last but not least, an important observation when it comes to (not) taking into account the diverse backgrounds of the learners is related to the content of the lectures. Namely, here there is an inconsistent use of the word “we”. In some of the lectures its use refers to us as human beings individually or the collective society. However, in other lectures the term is used to direct to the people living in the countries of the Global North, which points to the fact that the lectures are not fitted to the origin of the learners who potentially could come from all around the world or from the Global South. The lectures in steps 2.3; 3.2, and 1.8; 5.4 respectively, are given as examples of these two different uses and meanings of the word. First the more generic “we”:

(2.3) *And leadership for transformation, then, I think, is to bring that into this larger idea, where we, as a species, as a society, we have to adapt to the very idea that we are changing the climate, that we have this choice about the future.*

(3.2) … *we underestimate this idea that we, as humans, are changing the global climate system.*

Second, the more specific “we”:

(1.8) … *one other major point I think, is that there is some money put aside in the Paris agreement for the poorer parts of the world to mitigate their emissions and to respond to the climate change that we have imposed upon them.*

(5.4) *We as citizens of the developed world, we have a pretty significant responsibility for the problem because of our historical emissions. We have a responsibility to clean up our mess, and we have a responsibility to take care of our neighbours,…*

To summarize, it can be said that the MOOC is framed in such manner that enables for indirect connections to the learners’ contexts, values and experiences to be made. They are indirect because their emergence or “coming to be” is left in the hands of the learners themselves solely and how they reflect the content of the lectures and make meaning of it in their locality. The lecturers within the MOOC are not included in the execution or facilitation of this process by following up the learners’ progress or modifying and adapting the content and the lecturing to the needs of the individual learners. Hence, regarding this aspect of the learner-centered approach, to say that the MOOC does not hinder, but also does not fully enable for the consideration of the learner’s contexts and previous experiences would be the most correct representation of the learning circumstances within the MOOC.

5.1.3. Learner’s autonomy and ownership in the learning process

Except from the fact that (as mentioned previously) the learners are being limited in the opportunity to interact with the lecturers and thus, to interfere with the content and drive the direction of the lectures, in general regarding all other aspects within the MOOC, learners have freedom and responsibility for their own learning process. This is exemplified in step 1.4, where the educators state that:

*We’ll be commenting on the discussions throughout the course, but remember that it is you as a learner together with other learners that are moving the discussions forward.*
The structure of the MOOC leaves space for the learners to make choices regarding their level of engagement in the course and learning pace. Namely, within the MOOC learners are presented with various learning opportunities whose following through depends on the learners’ decisions. This can be seen in the optionality of doing the suggested further readings, the level of engagement in discussion with peer learners and the undertaking of various exercises (for example the exercise in step 4.7 that asks learners to draw a representation of what leadership means to them or the voluntary self-guided climate change leadership study visit at step 5.6.). The learners are also offered with special tools within the design of the course named “To do” and “Progress” which allows for them to easily overview the topics they have covered, what they have missed and what is there left to do before the completion of the course and thus, plan and organize their learning process.

From what is presented above, it can be concluded that the framing of the MOOC enables for learners’ autonomous actions and decisions regarding their learning process, which regards high level of learners’ ownership over their learning progression and consequently, over the outcomes to be achieved.

5.1.4 The content of the MOOC and its role in promoting learning

Content-wise the MOOC covers topics and present them in a manner which leaves freedom for the learners to make their own conclusions in relation to the said topics. Except from the initial lectures on the Paris Agreement and the United Nations Framework Convention on Climate Change (step 1.7 and 1.8), on the Anthropocene (step 1.11) and carbon budgets (step 2.4 – 2.7) which mostly entail scientific facts underlying the phenomenon and consequences of climate change (see example below), in the rest of the course there is no “uncontested truths” that are being presented to the learners.

(step 1.11) ...the impacts of climate change is most visible among of the lives of people in the south, while the cause is mostly due to the life of people in the north.

(step 2.4) ...it will be extremely difficult for us to reduce our emissions in line with 2°C, but if we don’t do something now it will be much more difficult. And very soon we will completely lose any opportunity for 2°C.

In general, within the MOOC climate change is framed in its broader historic (step 1.10) environmental and socio-political underpinnings (step 3.2) and consequences (the alike of climate justice, step 2.2) and is presented in its complexity (step 3.6); but in a manner that poses a possibility to re-think and re-create the future (step 1.3; 3.3). Examples of this are the following steps:

(step 1.10) ...the industrial revolution was a major event in history because it changed our relationship to nature and it also started global warming. But to me what is interesting is looking back to history in specific cases of how people have managed to change a difficult situation.

(step 3.2) While most climate change efforts are currently focused at the practical sphere and involve technical solutions and behavior changes, the political and personal spheres are just as important... If it was just a technical problem, it would have been solved 20 years ago.

(step 2.2) This burning of fossil fuels has primarily benefitted the elites in the developed countries. However, the ones most affected by climate change, the result of burning fossil fuels, are the poor in the developing and the developed world. So there is a differential benefit and impact from the current activities of fossil fuels emissions.
(step 3.6) ...climate change can, of course, too have a number of connections in the peace and conflict area. But one thing is particularly the climate change and its impact on the natural resources, particularly naturally renewable resources.

(step 1.3) Climate change and leadership are issues where there often is not only one single answer to the many questions asked. We firmly believe that we cannot understand the challenges related to climate change leadership by only learning facts about climate change and going through different theories about leadership.

(step 3.3) ... we need new ways of thinking, creating and acting in the face of climate change. And also some humility and the acceptance that there is no one-fix solution to the problem, but rather a diverse and mixed set of approaches.

Furthermore, the lectures in the MOOC do not serve just for mere passive process of knowledge acquisition, but rather by asking question as the ones presented below, by which critical thinking is provoked.

(step 3.3) Do you agree with the two arguments above that climate change is a new type of problem not faced before and that the problem is complex both in its nature (how it has been created) and how it can solved?

(step 3.9) Who is responsible for climate change? Do you agree or disagree with the statement that nation states are responsible for present and future emissions?

Moreover, as leadership is regarded as vital in climate change related transitions, the MOOC is framed to provide learners with guidance and general principles (step 4.3) and leadership skills and tools (step 4.8) without offering a certain definition on leadership, but rather inspiring the learner to take on the role of a leader in the way she/him perceives it. As stated in step 4.3:

...there are many different theoretical and practical theories and approaches to leadership, none of which is more 'right' or 'wrong', 'better' or 'worse' than the other, it all depends on context.

In general, regarding the content of the MOOC it can be said that it provides the basis or the initial conditions and framing of climate change related topics and issues in a manner that promotes learners’ own meaning making of the concepts covered rather than imposing them with certain understanding of the said concepts. Hence, the MOOC setting fosters learning instead of defining what is to be learned, which is the implementation of this aspect of the learner centered approach.

5.2. The action oriented approach in the MOOC setting

5.2.1. Possibility to learn through experience and reflection

As part of every week of the MOOC, in their later stages, there is an incorporation of a text or a task which connects to the topics previously covered in the said week. These texts or tasks aim at initiating a topic-related experiencing by the learners.

Examples of this are most clearly exhibited in the following steps of the course:

Step 3.10 (Connecting the dots in your own context)
In this step the topics covered in week 3 (climate change, leadership and their relations to a range of sustainability challenges) are summarized by asking the learners to engage in a map-making exercise in which they connect the aforementioned issues covered in week 3 to their local context. The map can take different form and be either an artistic expression of the learner or have a more technical nature. Nevertheless, the ultimate goal is to “connect the dots” and initiate meaning making processes by engaging the learner in a certain “doing” or activity.

Step 4.7 (Build/make/draw a representation of leadership)

As part of this step and in relation to the topics covered in week 4 that associate climate change with leadership issues, the learners are asked to make a representation of what they conceptualize as leadership, i.e. to use their own experience and idea of the term and to materialize it by making a drawing, building a LEGO or using other materials and expression forms by their choice.

Step 5.6. (Voluntary self-guided climate change leadership study visit/field trip)

This step being one of the last in the course incentivizes learners to make an excursion or a field trip that is connected to the topics covered throughout the course. They are encouraged to bring with them friends or family and write down or record their impressions and reflections.

The common feature of these exercises is that they, through incentivizing a direct experience and reflection upon it, enable the implementation of the “learning by doing” element which is central to the action oriented approach.

Except from bodily experiences, in the MOOC learning is fostered also by artistic, as well as indirect or “channeled” experiences. The latter category holds a dual meaning making opportunity, firstly by relation to (indirect) past experiences and secondly, by incentivizing action. Examples for this will be covered below in point 5.2.2.

With regards to artistic experiences, an example of this is seen in step 1.13 (Climate change leadership in your own context), where in order to recapitulate on what was covered during the first week of the course, the learners were encouraged to “take in the challenges facing us in other-than-text/numbers way” by watching a three minute video named “Elegy for the Arctic”. In this video the Italian pianist Ludovico Einaudi performs the “Elegy for the Arctic” while floating on a platform in the Arctic Ocean, surrounded by melting glaciers in the background. Similar to this, in step 5.5, links are provided to: the composition A Song of Our Warming Planet, the web-page - Paintings Turn Climate Data Into Art and to the Acclimatize Art exhibition at Moderna Museet in Stockholm. This creates an opportunity for the learners to make meaning of the climate change related consequences by relating to the artistic pieces, their message and most importantly, the emotions they invoked within them (which is in line with the pluralistic ESD teaching tradition).

5.2.2. Directionality towards action

Indirect experiences are used within step 4.2 (Leadership starting points and experiences), step 5.2 (Civic courage) and step 5.3 (On giving up privilege) where other people’s stories and experiences are given in order to make meaning and provoke learners’ action oriented practices. The latter of these steps aim at encouraging civic courage, giving up privilege and engaging in action by delivering (in an emotional and dramatic way) the stories of people like Malala Yousafzai, Sophie Scholl, Amy Goodman and Marla Ruzicka. Statements like the following are used:
(5.2) ...civic courage, the willingness to take risks for persons outside one's own family and circle of friends or to defend a common value, such as planetary survival.

courage has this enormous power. It creates moral authority.

(5.3) One of the privileges of privilege is that you can give it up. And when you walk away from comfort and other privileges, that act can astonish and nourish the world.

Similarly, step 4.2, promotes climate change leadership and individual action by presenting the leadership journey of one of the course educators. Among other things, in the text it is stated:

You don’t have to have a job title or even a job to be a climate change leader. Leadership is everywhere and practiced mostly unknowingly in many different contexts.

With climate change and other related challenges it’s easy to become trapped in stories that make us feel helpless and dis-empowered. Although the seriousness of issues should not be downplayed, we can as leaders tell different stories that open up possibilities and make people around us feel that they have an unique role to play.

Directionality towards action is finally promoted in Step 5.4 (Working with change from the bottom up: grassroots initiatives) and 5.7 (Your own climate change leadership plan). The former aims at encouraging people to take action on grassroots levels in their communities and daily lives. The latter step 5.7 makes the concluding assignment within the course and asks the learners to use what they have learned throughout it to identify a climate change challenge in their surroundings and to suggest ways to address it. The ultimate goal is for the plan to be a basis for learners’ real life action in connection to climate change, which makes for the “Apply” part of the experiential learning cycle.

To connect the presented findings in point 5.2.1 and 5.2.2, the general observation is that the MOOC setting enables for the application of the action oriented approach and experiential learning. Relating to Kolb’s theory of learning through experience, in the MOOC we can identify both the elements that draw on experiences (past and present) and reflection upon those experiences as to inform and incentivize future action (action–reflection–action cycle), which makes the essence of the action oriented approach.

5.3. Transformative learning within the MOOC

5.3.1. Possibilities for learners’ interaction within the MOOC

The MOOC is structured in a manner that regards learners’ interaction as central in the learning process. This is reflected in step 1.3, where it is stated:

… this course will be a better course if we all take part in creating a new understanding about of climate change leadership together, where different experiences and ideas meet. We have therefore structured this course so that there is plenty of room for discussion.

Take part in the discussions throughout the course in the comment and discussion areas and contribute with your thoughts, ideas, reflections and experiences.

Therefore, multiple possibilities for peer dialogue and discussion are provided with its layout and encouraged by the content of the tasks and assignments. These include:

Comment sections after each step of the course,
Discussion areas (after steps 1.4, 1.13, 2.8, 3.5, 3.7, 3.8, 3.9, 3.10, 4.7, 4.9 and 5.10),
Study groups (which offer the possibility to share thoughts and ideas with a small group of other learners),
Connection to social media (via the #FLecleadership hashtag on Twitter), and
Peer-assessment of the final assignment of the course (step 5.8).

By utilizing these possibilities for interaction, opportunities are created for realization of transformative learning. Namely, in this way learners can familiarize themselves with other people’s values, feelings, experiences, and local climate related challenges, which can open spaces for disruptive thinking and a ‘disorienting dilemma’ to appear that will make the learner question her/his assumptions of the world.

An example for such possibility is given in step 2.8 (Local climate change leadership challenges), where learners are asked to take a photograph which represents a climate change leadership challenge in the learner’s surrounding, post it on Twitter and have a related discussion regarding the identified challenges.

*Use the discussion thread below to discuss your climate change leadership challenges. How are they similar or different from each other? Did some challenges strike you as particularly interesting? Are there connections between the different challenges? How can you be a resource for each other?*

Similarly, in step 5.7 (Your own climate change leadership plan), which makes the course concluding assignment (that is assessed by a peer learner), questions as the following are posed:

*What current behaviours (eg. people driving to work rather than biking) or technologies (eg. inefficient stoves or housing) contribute to the problem?*

*What current beliefs, values, worldviews and paradigms may stand in the way for change – or facilitate it? Are there any psychological barriers to change?*

The two afore given tasks from the course are examples that enable the so-called “mirroring” of the learners’ ideas, values, experiences, and assumptions about the world with one another, which ultimately is a precondition for possible change and occurrence of learning that invokes cognitive transformation in the learner.

5.3.2. Content that incentivizes disruptive thinking and transformation

Despite from creating opportunities for transformative learning by enabling “peer encounters”, the fostering of reflection upon and questioning about one’s values and worldviews within the content of the MOOC lectures gives further possibility for new understandings of the world and “basis for transformation” to emerge among learners.

An example of this is given in steps 2.3 and 3.2, where transformation is encouraged by self-reflection and embracing collaboration in diversity.

(step 2.3) Deliberate transformations are really reflective, based on a holistic perspective and based on the idea that we can really change the change, we can actually move in a different direction. [...] We can actually create a different future.

(step 2.3) ...the real leadership comes when people start to challenge their own assumptions, when they start to question, what is given? Why does it have to be this way?

(step 3.2) To act effectively as a climate change leader means being able to collaborate with people who don’t share our world-view”... And when you start to do that, you open up for changes in all of the
spheres to happen, and I think that’s where people come in as the solution to climate change through transformations.

To recapitalize on point 5.3.1 and 5.3.2, the learning circumstances in MOOC are at most favorable in relation to enabling for transformative learning to occur. These enabling conditions stem from both the transformation-fostering content of the lectures and the multiple opportunities for interaction and discussion between the learners which consequently increases the probability of the occurrence of a ‘disorienting dilemma’ and the encounter of the learned with values, opinions, practices that are different or counteract with her/his own preconceived worldviews, that ultimately incentivize self-reflection and related transformation in both the modes of thinking and acting of the learner. This however by no means says that transformative learning will happen within the MOOC, nevertheless the MOOC environment is pro such occurrence.

5.4. Summary of findings

The above presented findings provide a picture of the learning environment within the MOOC according to which it can be stated that in generally it supports the application of subtle variations of the ESD pedagogic approaches. These nuances derive from and are subordinated to the issue of scale and appear as adaptations to the circumstances in the “global online classroom”. Three important and defining features can be highlighted. First is that a focal point that appears in the implementation of all three ESD pedagogic approaches is the process of the learners’ (self-regulated) reflective praxis. As such it is put in the core of the contextualization and the creation of local relevance within the learner centered approach and it is central in bridging experiences with meaning making processes in the action oriented approach. Reflection upon ones worldviews is a flipside of the mirroring process that lies in the essence of transformative learning. A second characteristic is that an accent is put on the collaboration and “peer-support” instead of teacher assistance in the learning process, which especially holds importance in the creation of a disorienting dilemma and transformative learning. Third and, in my view, a feature that is most obviously a result of the large scale component in the MOOC, is that both of these aforementioned crucial learning processes within the ESD pedagogic approaches are left to or their undertaking is dependent solely on the skills, will, confidence, previous experiences and other factors that shape the learner. In other words, the learner is the main driver of the learning processes while the content and framing “served” by the MOOC and the instructions of the educators and lecturers have the role of incentivizing and to some extent directioning the occurrence of this process. The implications of this and its influence in the position of MOOCs as learning platforms within ESD will be discussed in the following chapter.

6. Discussion

In this chapter the above presented findings will be put in correlation to the research question of this thesis. A further connection to the theory as well as the ESD and CCE principles, teaching traditions and goals (as presented in the background section) will be made in order to provide a more detailed insight into the positioning and the role of MOOCs within the context of ESD.

As outlined in the theory and theoretical framework chapters, the features of the ESD pedagogic approaches are intertwined and jointly aim at providing an environment where learning (as defined on page 13 of this thesis) can occur and thus, enable for learners to develop as sustainability citizens, with
acquired ecological identities, grounds for ethical and moral thinking, and feelings of ownership and competences for acting in connection to sustainability related issues and dilemmas the consequences of which are not only local but could be often identified far from their immediate surroundings. Relating to the background chapters on ESD this process of learners “becoming sustainabilists” requires for an environment that is structured in a manner that enables for “knowledge-creating orchestration” Grice (2017, p.31) or learning circumstances which incentivize activities that lead to emerging processes of knowledge co-creation.

Drawing from the findings as presented in the previous chapter of this thesis, it was showcased that the framing and design of the MOOC is such that endorses the application of some features of the ESD pedagogic approaches, while the incorporations of others pose higher implementation challenges. This mainly relates to the amount of sensitivity of certain elements of these approaches to the conditions imposed by a large scale and their manifestation in such a learning environment. As such the learning circumstances in the MOOC environment could be said to present challenges but also possibilities in relation to ESD.

To begin with, as it was presented in the theory chapter, a feature especially relevant to the learner centered approach, but also bearing importance in the action oriented and transformative learning processes, is the teacher-learner relation. As illustrated in the findings chapter, a teacher–learner relationship which fosters democratic relations, collaboration and meaningful facilitation that enables for occurrence of a process of knowledge co-creation, is namely the hardest to accommodate within the MOOC. It can be argued that this stems initially from the fact that learners outnumber the educators and lecturers in a ratio that is close to 1:1000. Coupled with lectures that are pre-recorded and without opportunity for learners’ interference, assessment with no teacher presence (conducted either via two (tick-box) quizzes and a peer assessed assignment) and low levels of teacher facilitation in learners’ reflective and discussion activities, it could be stated that in this respect the MOOC limits the possibilities for qualitative relational processes to occur, thus to some level limiting learning and knowledge creation. As it was pointed by Grice (2017, p.31) the teacher and the learner engaging in interaction creates opportunities for le moment of knowledge creation to occur. This is firstly related to the ability of learners to enter in discussion with the teachers in an environment that is emancipatory and fosters learners’ participation as this kind of interaction (as stated in the ESD pluralistic teaching tradition) is crucial for the development of critical thinking (Österbergh and Kronlid, 2011, p.71; Öhman, 2009, p. 52). Hence, it can be argued that the opportunity for achievement of one of these focal competences within ESD is to some extent limited in the MOOC environment. Furthermore, the teacher holds an important role as to recognize the time-space perspective and to sense the happening of the moment of knowledge creation in the learner and to facilitate the “transition” in this messy process of learning (Grice, 2017, p.31). This is crucial especially in the practicing of activities of self-reflection and peer-discussion. Namely, what can be seen from the findings is that a feature of the learner-centered approach that is least affected by scale is the positioning of the learners as autonomous actors that are self-guided in this non linear process of learning. On the other hand, the learner centered approach asks for the learners’ contexts and previous experiences to be taken into account, especially in regards to CCE which acknowledges that in order to engage people to think about climate change and its related consequences, one needs to start at where a person stands both cognitively and emotionally (Stevenson et al., 2012, p.374). Related to this, as it was stated by Osbeck (2017, p.55), people’s worries regarding sustainability and climate change issues to a large extent are related to the environments where they reside and live in, hence contextualization is important. However, such direct and personalized interaction and opportunity to get to know each and every learner that takes the course and adapt to her/his level is not enabled within the MOOC. This is further rendered more difficult with the fact that, as mentioned by Milligan et al. (2013, p. 157) the MOOCs are attracting a variety of learner’s profiles. As a scale-related issue this is attempted to be overcome through indirect contextualization the enforcement of which ultimately is left in the hands of
the individual learner and her/his reflective thought processes. Such learning environment could however obstruct learning processes since, as stated by (Helgeson et al., 2012, p.331) in relation to CCE, people have their own mental models and conceptualizations of climate change. Hence, it can be argued that reflective processes and discussions left only to the learners without some needed amount of an intervention from a teacher “figure” could perpetuate people’s misconceptions about it, although in theory the possibility for co-creation of new knowledge within the MOOC is not excluded. A conclusion that could be made about this, but will also be touched upon later in this discussion is that learning based on reflection and peer-interaction could happen in a MOOC environment, but its occurrence is by chance or flux, without any “safeguards” that will avoid learners to persevere to what they already “know” and thus, not engage in meaningful processes of questioning and “unlearning”.

This last point also holds relevance for the action oriented approach and its application in the MOOC environment. Namely, learning through experiences is a process which, as it was shown in the theory chapter, involves not just experiencing by itself, but also how one reflects, understands and creates meaning out of the experience (Hägström, 2017, p.85, 86). If fragmented to the experiential learning constituent parts (1. Experience, 2. Reflect, 3. Make meaning, 4. Apply), this previously described process makes for step 2 and 3, or the connection between the experience and how it shapes the learner’s future actions. Thus, the same challenges within the MOOC of an “unmonitored” reflection process are present here. Conversely, regarding the first and fourth step, the MOOC circumstances are more beneficial towards enabling their occurrence. Namely, the findings illustrate that in the MOOC there are possibilities for the learner to learn through self-experience and experiences mediated by others. These possibilities are enabled by the content of the lectures and articles, but also the assignments that frame elements for embodied, aesthetic and “channeled” learning experiences (which goes in line with the pluralistic teaching tradition). On the other end of the process, to apply or engage in action is also facilitated by assignments that ask the learner to involve in action in hers/his living and working surroundings. As it was stated by Bali (2014, p.51) this kind of assignments in MOOCs enable valuable learning opportunities. Furthermore, they go in line with the behavioral learning outcomes of climate action education according to which learners should be able to implement and support climate-friendly economic activities and lifestyles in general.

Such learning aimed at transformation oriented actions as presented in the background of this thesis is arguably essential in relation to sustainable development and is also a part of transformative learning. As it was presented in the theory chapter, the aim of transformative learning is to foster for change in possible dysfunctional worldviews that the learners hold and thus, to enable for opportunities and space where new modes of thinking and doing that are beyond existing and accepted frames could emerge (Christie et al., 2015, in Learning Theories, 2017). The occurrence of this transgression relies upon a “disorienting dilemma” pushing the learner into critical self-reflection, which the learner could most likely encounter when engaged in collaboration and dialogue with other people who often hold different worldviews and life experiences (Calleja, 2014, p. 117). This corresponds to the standpoint promoted within the pluralistic teaching tradition, according to which the classroom should serve as a forum for people to communicate and share different worldviews and experiences in a manner that opens spaces for learning from one another and collectively constructing knowledge (Österbergh and Kronlid, 2011, p.71; Öhman, 2009, p. 52). To relate this to the findings of this thesis, the MOOC structure and content is such that puts peer interaction central in the learning process. A discussion incentivizing content and instruction, peer assessed assignment, as well as spaces for commenting and peer discussion are characteristics of the MOOC environment that in theory could lead to transformative learning. In connection to ESD and CCE in particular, providing for this kind of environment that acts as a “meeting place” for what Funtowicz and Ravetz (1991, in Helgeson et al., 2012, p. 341) define as the “extended peer environment” of people coming from around the world, goes in line with statements that re-imagining society and changing the course for the future is bound to the process of dialogue and
sharing local knowledge as a way leading to co-creation of new understandings of the world. As it was argued by Öhman, (2009, p.50) this is beneficial in order for development of learners’ competences to navigate in an environment of value-related differences and not only make compromises and agreements with people around the world but also sympathize with them, which furthermore, reflects the socio-emotional learning outcomes regarding climate change action as designated by UNESCO (UNESCO, 2017, p.36). As stated previously, the environment in the MOOC holds potential for dialogue and interaction, nevertheless, the implications of large scale participation could be both positive and negative in relation to the learning processes. Namely, having more people in the MOOC means more diversity and thus opportunities for transformative learning. On the other hand, to connect to what was pointed in the background of the MOOC pedagogy, massiveness also poses challenges related to the quality and efficiency of discussion, especially when it involves a whole spectrum of different learner profiles. Therefore, in order to enhance the circumstances within the MOOC that can enable for transformative learning “occasions” which harbor constructive exchange of arguments, visions, goals among learners, further research should be conducted on methods to improve and facilitate these peer-to-peer interactions thus, turning the challenge of scale into a learning possibility.

<table>
<thead>
<tr>
<th>Key finding</th>
<th>Weak spots</th>
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<td>• the MOOC enables or is pro the occurrence of some aspects of the ESD pedagogic approaches. However, this is not ensured or safeguarded, and could happen by flux or chance.</td>
<td>• reflexive processes are to a large extent left in the hand of the learners themselves;</td>
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<td></td>
<td>• learner-to-learner interaction is left unmonitored or safeguarded by teachers;</td>
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<td></td>
<td>• the MOOCs holds possibilities for the reinforcement and perpetuating of misconceptions and misleading mental models that the learners have in relation to climate change.</td>
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Table 2. Key finding and related weak spots identified in the MOOC in relation to enabling ESD pedagogic approaches

When touching upon the issue of scale and scalability, one ought not to avoid another key issue, regarding the level of universality of the content of the MOOC, which is equally important for the learning processes endorsed by all ESD pedagogic approaches as well as the overall learning objectives of CCE and ESD. The background and theory chapters of this thesis revealed the standpoint that the content of ESD should reflect the fact that sustainability issues, especially climate change related ones, although holding global importance (both due to the wide reach of their consequences and the inherent interconnectedness of the modern society and planetary systems), they however manifest in unique ways in different geographic and socio-economic contexts (UNESCO, 2015, p. 20). Consequently, it can be argued that this forms additional challenge in designing content for a course with large scale participation in a manner that does not exclude its local relevance. Moreover, the ESD pedagogic approaches ask the content to be directed towards promoting a learning process rather than defining what is to be learned, while also advocating for course material that fosters action and transformative oriented learner practices. What was illustrated by the findings in this thesis is that content-wise the MOOC is structured in a manner that to some extent goes along these lines of the ESD pedagogic approaches and CCE learning objectives and teaching traditions. This is ultimately by framing an “interactive” or open-ended material around climate change which aims at grasping the complexity of the issue, by providing the basic science behind the phenomenon and connecting it with broader socio-political underpinnings, consequences and moral aspects (for example climate justice) as to “paint the (general) picture” of climate change (thus, following the pluralistic ESD teaching tradition). In relation to the political and moral aspects of climate change and especially climate change justice as an important topic, the results presented the use of a
generic, hence vague “we” which lacks clear instruction value and seems to be in fact misleading since it does not account the different backgrounds of the learners and points to the notion that humanity as a whole has caused climate change, instead of as Kronlid (2014, p. 16, 17) advocated for it to be presented as “affugenic” or a result of the lifestyle of just a part of the human population. Nevertheless, in general within the MOOC the learners are left to make their own conclusions about the topic that are covered and are invited to, by communication and discussion to discover new modes of understanding climate change issues and thinking and acting when dealing with its related causes and/or consequences. Local relevance is only attempted indirectly by incentivizing learners’ reflective thought processes. Thus, it can be stated that the MOOC is an example of how up-scaling in relation to ESD can on one hand enable for broader access (as a central premise for ESD), but in turn have questionable local effects due to the “looseness” of the connection it creates. Hence, again hopes are on further research to reveal on methods for how to provide both quantity and quality in relation to the use of MOOCs for achieving the goals ESD.

Taking into consideration all the points discussed above, it could be summarized that the findings of this research point to the conclusion that the large scale MOOC learning environment holds (in theory) possibilities for implementation of ESD pedagogic approaches, thus channeling the learning outcomes of CCE and ESD goals. However the efficiency in the modes of operationalization of some features of the ESD pedagogic approaches (in practice) and the learning processes that they advocate requires further innovation, development and adaptation of the MOOC environment as to provide for the optimal learning opportunities and outcomes.

7. Conclusion

The overall ambition of this thesis was to closer investigate the role of MOOCs as the latest developments at the intersection between education and technology and the role they can play in the context of ESD. As holding vital importance in relation to the occurrence of learning processes that will enable the realization of ESD learning objectives, the ESD pedagogic approaches (as scaling objects) were in the center of the research conducted in this thesis. As it was presented in the previous chapters, a duality of challenges revolves around the topic. First is the one of the possibility to “incorporate” the ESD pedagogic approaches to the large-scale MOOC environment. Second is related to the nature of ESD and CCE by themselves, as having an emerging aspect and additionally being unfitted for great generalizations as they need to also take account of local and cultural aspects. In order to be a valuable educational tool used to enhance the reach of ESD, MOOCs thus face a hard question regarding their design and the learning environment they offer. The findings of this thesis allow for making a generalized conclusion that the MOOC being studied offers a mixture of both opportunities for ESD pedagogic approaches to leverage from the large scale environment, however with some shortcomings which need addressing. In other words, the framing of the MOOC as such holds possibilities for application of ESD pedagogic approaches and the learning processes they endorse, however it does not ensure this. The weak spots being most prone to the issue of scale are the process of contextualization and the lack of facilitation of the reflection processes that underpin it. However, it was also showcased that the circumstances in the MOOC benefit transformational learning as they provide for a unique possibility for encounters of people of all ages, experiences, cultural and socio-economic backgrounds.

When connected to the broader learning outcomes and goals of ESD and CCE which aim at developing a base for learners to understand sustainability issues emerging on a global level while adapting their behaviors and action in relation to it in their everyday surroundings, it could be stated that the MOOC fosters the creation of such understandings, by providing a mixture of generalized climate related topics and assignments that incentivize local action. Being a meeting place also creates an opportunity for learners to develop awareness and better perceive the interconnectedness and complexity of the world and
act as global citizens with a sense for responsibility, empathy and developed moral compass as to guide actions that reflect and derive from this realization of each and every one of us as actors in one interdependent, rapidly changing, unequal world. Although the quality of the learning processes enabled in the MOOC needs further improvement, however by providing access to a wider audience of people, thus crossing current structural and socio-economic limitations in formal education, MOOCs relate to questions of equity and opportunities for all to realize their human right to education and thus, develop capabilities to flourish by transforming their current lives into sustainable and meaningful ones. Hence, it can be stated that the MOOC provides a good starting point for empowering people to engage in action-oriented transformations essential for sustainability transitions. Reflecting to the rapidly changing nature of our world, ESD is also in constant emergence and in the need of being rethought in order to be relevant. The networked environment of MOOCs could promote this by fostering diversity instead of sameness, thus increasing the imagination of possible sustainability pathways. With that said, I hold the opinion that MOOCs are to be worked on and improved as to optimize the possibilities they offer for meaningful learning experiences emerging between people from around the world, which are ultimately vital for obtaining sustainability in our co-evolutionary futures.

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