FACULTY OF EDUCATION
DEPARTMENT OF PEDAGOGICAL CURRICULAR AND PROFESSIONAL STUDIES

EDUCATION FOR SUSTAINABLE DEVELOPMENT IN ONLINE LEARNING ENVIRONMENTS

STUDENTS' CONCEPTION OF ESD/SD AND DEVELOPMENT OF CRITICAL THINKING

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Supervisor:	Irma Brkovic, Magdalena Svanström
Examiner:	Dawn Sanders

Abstract

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Aim: The aim of this study is to examine students' beliefs about "education for sustainable development", "sustainable development" and development of critical thinking after experiencing online interactions with peers and teachers in an online programme focused on education for sustainable development (Education for Sustainable Development Master´s Programme at Gothenburg University).

Theory: Four concepts were introduced to bring together the theoretical framework; "education for sustainable development", "online learning environment", "adult learning" and "critical thinking".

Method: The research was conducted with a qualitative methodological approach and data was collected via semi-structured interviews with 7 students. These interviews took place in an online environment (ZOOM meetings). Thematic analysis was applied on the collected data while findings were complemented by a literature survey.

Results: It was found that the programme experience led to perceived changes in students' understanding of sustainability between the start and finish of the programme The evidence was presented in the form of students' understanding of the complexity of "sustainable development" and "education for sustainable development" also in its interdisciplinary and transnational context; understanding the system connectivity for example when relating the future of sustainable development to the ongoing COVID-19 pandemic. Most students believed that they learned critical thinking, self-directed learning, to feel personal responsibility and to apply "glocal" approach when looking for solutions to sustainability problems. These new insights were mainly collected by reading the literature list and completing assignments. Unanticipated result of the research was the finding that human interaction in the ESD programme is extremely important for students learning experience. Student perceive that they would largely profit from having on-line meetings both with the tutors and peers that resemble face-to-face situation.

Abreviations

DESD	United Nations Decade of Education for Sustainable Development declarations
ESD	Education for sustainable development
HESI	Higher Education Sustainability Initiative
GU	University of Gothenburg
ICT	Information and communication technologies
RQ	Research question
SD	Sustainable development
UNESCO	United Nations Educational, Scientific and Cultural Organization
YMP	Young Master Programme

Foreword

This thesis is original, unpublished and independent work by the author and was written as completion to the Master´s Programme in Education for Sustainable Development (ESD) at the University of Gothenburg (GU). The ESD programme was delivered to us students as e-learning and since we will be the first absolvents of this programme, I have chosen to research how online learning environment impacted students learning for ESD. Specifically, I have stated two research questions dedicated to student's conception of the phrases "education for sustainable development" / "sustainable development" and their perceived development of critical thinking. The research was performed by conducting semi-structured interviews which were followed by thematic analysis and complemented by literature overview.

I was writing the work in the spring semester 2020 while the COVID-19 pandemic spread through the world and changed the daily life almost in all countries. Most educational facilities moved their lessons to online learning environments and I believe that this global trend will persist in the future. I think that my research is highly relevant at these transformational times and hope that it will prove to be helpful to those who will design future ESD programmes in online environments.

I would like to express my appreciation to my supervisors, Irma Brkovic and Magdalena Svanström for their guidance, helpful inputs as well as constructive criticism. I also wish to thank all the interview participants, without whose cooperation I would not be able to conduct this study.

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Introduction

In a study related to my master thesis I interviewed my peers from Gothenburg University´s Education for sustainable development Master´s Programme through semi-structured interviews. The planned outcome of the research is to learn more about students experience with "education for sustainable development" in an online learning environment, their perception of concepts of "sustainable development" and "education for sustainable development" and their development of critical thinking.

1. Research problem and questions

- **RESEARCH PROBLEM**: Online learning is being used in "education for sustainable development" in order to allow education across geographical boundaries. Students understanding of "education for sustainable development", "sustainable development" as well as development of critical thinking after experiencing online "education for sustainable development" education needs to be identified.
- **STATEMENT OF RELEVANCE:** The aim of this thesis is to examine students' beliefs about "education for sustainable development", "sustainable development" and development of critical thinking after online interactions with peers and teachers after studying online Education for sustainable development Master´s Programme at Gothenburg University. Students opinions and experiences will be researched trough semi-structured interviews. Findings will be complemented by literature overview.
- **RQ1:** What is students' conception of "sustainable development" and "education for sustainable development" and what were their beliefs after experiencing interactions in an online "education for sustainable development" programme?
- **RQ2**: How do student perceive their development of critical learning and thinking while studying "education for sustainable development" in online learning environments?

The ESD Mater´s Programme centres on a question of how education can support critical enquiry and be a positive force in transformation and change towards a sustainable future (GU, 2018). With a rising world population and limited natural resources people (as individuals as well as societies) need to learn to live sustainably because all our actions today can have implications on the lives of people and the planet in the future. Education for sustainable development aims to empower people to change the way they think and work towards a sustainable future (UNESCO, 2019). Access to quality education on sustainable development is important in order to help people develop knowledge, skills,

values and behaviours needed for sustainable development. For example, UNESCO (2019) plans to achieve such society transformation by lifelong learning while addressing learning content and outcomes, pedagogy and the learning environment (physical, virtual and online). This programme is aiming to prepare students to respond to local and global sustainability challenges, but also to counteract them and contribute to a more sustainable future through education and research (GU, 2018). As suggested by Caniglia et al. (2018) such an approach can be called "glocal" since it is mixing peers discussions on a global level with engagement in local sustainability issues. Glocal model for transnational collaboration in higher education for SD combines the use of digital technologies for global collaboration with experiences and engagement for local learning and impact.

2. Education for Sustainable Development Master's Programme: Response to global crises

The programme should be a response to the major environmental crises and changing life conditions for humans as well as other species (GU, 2018).

New development in the world added another factor of importance to this research. Relevance of this study is especially in the right timing. As mentioned, the world is going through a major environmental crisis with the major threat of climate change. UNESCO defined climate change as one of the defying issues of our time and is helping to educate its´ members and partners for sustainable development in the context of climate change (UNESCO, 2019). But there is another ongoing global crisis which is attracting a lot of attention; Coro pandemic. Although climate change and COVID-19 pandemic are two separate global threats; ESD in online learning environment will bring them together. Education as we know it today is changing in the global outbreak of COVID-19 crisis. At the time of conducting the study presented here has COVID-19 pandemic reached 213 countries (WHO, 2020) and many of them entered isolation. Closed schools forced many educational facilities to deliver education online to their isolated students. QS (Quacquarelli Symonds) is a company specialized in providing services, analytics, and insight to the global higher education sector. According to their research will online learning during the COVID-19 virus outbreak rapidly develop since universities are quickly embracing new tools and platforms (QS, 2020).

The rapid spread of COVID-19 has demonstrated the importance of building resilience which must be built into the educational system as well. Traditional in-person classroom learning will be complemented with new styles of learning; from live broadcasts to 'educational influencers' to virtual

reality experiences. Learning could become a habit that is integrated into daily routines, a lifestyle. Most schools in affected areas are finding solutions to continue teaching but the quality of learning is dependent on the digital access. However, only 60% of global population is online. The gap in education quality and socioeconomic equality will be further exacerbated unless access to technologies increases in all countries (World Economic Forum, 2020).

And while COVID-19 pandemic is forcing educational sector to become resilient and move towards online learning, it is also forcing educational facilities to team up internationally to press for action on climate change. Such an example is The International Universities Climate Alliance, unveiled on 2 April which showcases climate change research from 40 universities in 18 countries across six continents. The organization is warning that the COVID-19 virus pandemic should not erase attention on the dangers of a warming world. They claim that COVID-19 virus pandemic is a problem we can solve by coming together globally and within communities, sharing scientific knowledge but also understanding the need for cooperation across nations. They believe that COVID-19 can be solved, and so can be solved climate change; with enough of a coordinated effort. A global alliance of top climate researchers will provide an international platform for universities to communicate climate research with authority to global leaders (The world University ranking, 2020).

The changing world is forcing education to move to online learning environments and facilities for adult education to start international cooperation's in order to do a research on sustainability problems. Students from all over the world will be learning about ESD online. Use of online learning environments in ESD is not only a short-term solution in the COVID-19 pandemic, but long-term answer to a rising need for global cooperation in solving crisis situations. Distance learning and use of technologies constitute key factors in education for sustainable development (Bell et al., 2017). Virtual mobility allows students to connect to international communities and develop intercultural competence; use of information and communication technologies (ICT) can in this way support learning together across cultural and geographical boundaries (Caniglia et al., 2018). The online ESD programme at GU is such an example of ESD delivered online and connecting students from various countries with different backgrounds.

3. Anticipated contributions

A study related to experiences and perceptions of my peers may contribute to better understanding for adult education for ESD in an online environment. The result of my research will hopefully help to achieve better understanding of learning for ESD in other programmes which will be using

information and communication technologies. Kishita et al. (2018) states that higher education programmes that have already introduced e-learning environments have it easier to support analysis of student's perceptions and access programme effectiveness. Using social network services and internet is helpful to maintain a long-lasting connection with students and alumni and keep them involved in the programme. And most importantly, programme evaluations provided by students can generate important information necessary to the gradual improvement of a curriculum. To understand how existing ESD programmes has been designed, relatively little knowledge has been made available. Integration of ESD into higher education is different and diverse from one programme to another. That is why it is invaluable to undertake an in-depth analysis of the existing ESD Master´s Programme at GU and learn experience and lessons which will help to design other ESD programmes.

4. About the writing process

As already mentioned, this thesis was written just when the COVID-19 pandemic started spreading through the world. This had also direct impact on my writing. My isolated research participants had difficulties to access printers to print out written consent to participate in interviews. Higher use of WIFI in my housing area where I was sitting in isolation presented connection problems which meant that some interviews were performed over a phone without recording. And last and not least, the special conditions of quickly moving all university activities to online platforms presented increased workload for my supervisors which resulted in some delays in the writing process. However, even though this special and unexpected working conditions, I managed to collect a rich set of data translated into interesting results.

5. Structure

Throughout writing this thesis I have identified 4 theoretical concepts I will be working with and which will be introduced in the next chapters; ESD, online learning environment, adult learning and critical thinking. All these concepts were directly and indirectly used when conducting semi-structured interviews which were finally analysed through thematic analysis. This work is divided into 7 chapters. The aim of the study is summarized in the introductory chapter and is followed by literature overview in which I present existing research on similar topics. Next section, theoretical framework further clarifies the four key concepts which will be the connecting aspects of this study. Straight after I explain method which was used in data collection, explain data analysis and reflect over ethical dilemmas I have been facing. Finally, results are discussed in separate chapter and concluded in recommendations chapter.

1. Literature overview

Literature used in the literature overview below was looked up in Scopus database while searching for combinations of key concepts used in this work (ICT, online learning, critical learning, ESD, sustainability, sustainable development, critical thinking/learning, lifelong learning, adult learning). All search results were filtered for journal articles written in English. The search resulted in relatively high number of articles which were further delimited by abstract readings which helped me to choose relevant publications.

1.1. Education for sustainable development in higher education

Sivapalan et al. (2017) state that higher education must prepare its graduates to embrace sustainable development. Universities must be part of global structure offering ESD with the aim of empowering people with the knowledge and ability to reflect of their behavior on the globe (Azeiteiro et al., 2015). But this responsibility cannot be over-exaggerated considering the evidence for the negative influences of university graduates on the ecosystem. Higher education commitment to sustainable development is evidenced by the Higher Education Sustainability Initiative (HESI) which emerged from the Rio 2012 summit. The HESI action plan addresses five areas which cover both the contribution and the responsibility of higher education. The articulation of the five indicates a holistic approach that connects sustainability to all disciplines:

- Teach sustainable development concepts as part of the core curriculum for all, developing employable graduates with sustainability literacy;
- Encourage research, knowledge exchange and innovation;
- Model sustainability throughout all operations and campuses;
- Work in partnership to support sustainable local community-building;
- Share learning through international frameworks and report regularly on progress and challenges

While HESI and other initiatives are positive, it is important to scrutinize the learning environments in which ESD operates. If learning occurs in an educational system based on educational views that ‘sustain unsustainability’, then this learning can itself contribute towards the continuing production of graduates with unsustainable behaviors. Several studies have urged higher education to ‘re-think’ its curriculum and pedagogy, in particular by the application of systemic thinking to course design and

delivery. Delivering sustainable development literacy through the curriculum is claimed to be the most important contribution that a university can make to the global sustainability agenda. A study on inserting sustainable development in higher education in the United Kingdom revealed four obstacles facing attempts to make sustainable development mainstream: an overcrowded curriculum; irrelevance of sustainable development as perceived by academic staff; lack of staff awareness and expertise; and a lack of institutional drive and commitment. Furthermore, lack of content boundaries, the use of holistic and interdisciplinary approaches, the issue of ethics and the fact that sustainable development is an evolving field, are factors that hinder the implementation of sustainable development. Organizational issues include time, the availability of resources and personnel or political processes within departments. Strategies to counter these challenges are seen as important measures in smoothing the transition to sustainability in institutions of higher learning. Wals and Jickling (2002) explain that attempts to integrate sustainability into higher education brings academics into whole new pedagogical worlds of learning because the concept is so slippery, open to differ interpretations and so complex (involving ethical, moral, aesthetic and spiritual issues as well as the more conventional technical, economic, social and cultural ones).

1.1.1 Global cooperation in education for sustainable development in higher education

According to the UNECSO Higher Education Information Brief from 2004 is the challenge for higher education in the context of UN Decade of Education for Sustainable Development to innovate traditional learning environments and learning process in such a way that they support the learning process in formal education but as well life-long learning and informal learning (van Dam-Mieras et al., 2007). Higher education institutes are challenged to cooperate together in local and global networks in order to create a supportive infrastructure for lifelong learners.

Global learning for sustainable development in higher education has been researched by Anderberg et al. in 2009. According to these researchers has ESD been one of the top priorities on the global agenda since the Earth Summit in Rio in 1992. Although evidence of an interest in the global dimensions of environmental issues is found from the1970s, specific awareness of these issues in the context of higher education is only found from early 1990. The Kyoto Declaration of 1993, adopted by 90 universities across the globe, challenged higher education worldwide to accomplish an essential mission in global sustainable development. The Declaration points out the responsibility universities have to students, and the broader community, in calling for an increased awareness of the need for sustainable development highlighting the priority and significance of a global perspective on higher education, and thereby also marks the origin of the notion of ‘global learning’. The emergence of

international concern with SD issues increases the demand for both global learning as well as education for SD. Sustainable development issues need to be reformulated to incorporate diversity and multilingual aspects, and it is important to examine how local experiences can be related to global perspectives. The appearance of global online learning settings is calling for new modes of learning, such as learning by simulating and learning in online networks. Information technology and internet-based distance education allows for reduced costs and increased flexibility in offering materials, making high quality lectures available to a wider audience. However, if such education should be successful on a broader scale, careful planning is required. In ESD play universities a central role (particularly in developing areas). They are helping to raise community awareness and carrying out critical analysis of policy issues for public debates. They are also assuming the task of educating for environmentally literate students who are able to take on responsibilities for a sustainable future; and taking an active role towards integration into the national knowledge infrastructure.

Anderberg et al. (2009) claim that there is an increased awareness of the global perspective in the higher education. The global perspective can stimulate students to widen their thinking and go beyond their own national context, by being more critical and imaginative when considering how classical problems are developed globally; it provides students with possibilities to relate their experience to a wider context. The new globally-based economy has changed the conditions and culture for teaching and learning; teachers focus more on preparing students for their individual life and rights, rather than preparing them to become responsible environmental citizens, with the capacity to collaborate for a better world. This could be solved by moving focus towards a competence-driven curriculum instead of content-focused and subject-based curriculum. Such approach would foster responsible citizens and promote the development of essential skills, including problem-solving and critical thinking. Education for sustainable development programme should be holistic, conveying knowledge, issues, skills, perceptions, and values associated with searching for and progressing towards SD. Related research was conducted in the research project Learning in the ICT-extended University based on data from the Young Master Programme (YMP), offered by the International Institute for Industrial Environmental Economics at Lund University, Sweden. A total of 7 000 students from 120 countries participated in the YMP involving young people learning in a global online context about Preventive Environmental Strategies, with a view to promoting sustainability. The results show that learning meetings in a global context particularly supports students' commitment to SD. Students experienced that they developed their critical thinking skills and became aware of the complexity and the interrelation between the different concepts in the area of SD, as well as adjusting their understanding of this interrelation. They learned to ask, search and reflect on subject matters relevant for SD. They

found it useful to be involved in an extended global learning space and thereby developed potentials for more critical learning and thought processes. The YMP studies show that meeting other students on a global online forum is a good start for learning on issues and challenges in the area of SD. A further conclusion is that online discussions provided students with an opportunity to work in a deductive way, not only inductive, which is of a major importance for a holistic approach and for learning about complex problems.

1.1.2 Inter-disciplinary collaborations and experience sharing

Karatzoglou (2013) studied the need for an extensive collaboration among diverse partners in order to effectively pursue sustainability. Higher education institutions are considered to be significant contributors to the promotion of sustainability which has been recorded in numerous pre-DESD documents (United Nations Decade of Education for Sustainable Development declarations) such as the Halifax, Talloires, Tbilisi and Kyoto Declaration. In this study it was proven that universities continue to cope effectively and sustainably with the dynamic nature of sustainability by displacing barriers, changing teaching paradigms, developing social competencies, communication skills, and community relations, and deepening their involvement in local and regional initiatives. However, Howlett et al. (2015) explain that here is a consensus that one of the problems in teaching about SD is the dominance of traditional single discipline-based subjects with universities still primarily structured along disciplinary lines. The significant sustainability challenges are complex and interdependent and therefore require an educational approach that can prepare students to respond to the interconnected economic, social, scientific, political and ethical aspects of a transition to sustainability. Such an approach will prepare students to develop creative and innovative ways of thinking about sustainability. An interdisciplinary approach to subject content is therefore required. An interdisciplinary approach, which focuses on fostering different ways of looking at the world, can also create conflict in the minds of learners and this is where genuine and transformative learning occurs. Transformative learning is learning that effects change our worldviews. Interdisciplinary approach does not require expertise in every discipline, but rather a willingness and ability to interact, communicate and learn from different perspectives (Howlett et al., 2015).

Existing ESD programmes at universities often look at the balance between natural, economic and social systems by taking interdisciplinary and integrative approaches (Kishita et al., 2018). This is also the case of the ESD Master´s Programme at GU; this interdisciplinary programme brings together four departments at GU and Chalmers University of Technology in a pioneering curriculum at the forefront of the international research debate on education and sustainability. Sustainability in higher education is aiming to deepen understanding of the interactions between nature and society, provide

holistic views of sustainable futures, and clarify the necessary actions to be taken. Sustainability science differs from conventional disciplines because it explicitly seeks potential solutions for socially relevant problems, and hence involves value-laden concepts of sustainability; it entails not only learning knowledge in specific domains, but also nurturing competencies that support inter- and trans-disciplinary research. Such competencies are problem framing, co-producing knowledge through collaborations and application of created knowledge in real world in order to integrate knowledge from various scientific disciplines and social bodies and create ownership for problems and solution options). Reunamo and Pipere (2010) came to a similar conclusion, ESD needs to enhance the capacity of individuals and organizations to confront change and transformation rather than focusing on the transfer of knowledge. According to Kishita et al. (2018) should each ESD programme include collaborative work between students and faculty to address real research questions. Critical factor to take into consideration in ESD education is a maintenance of student´s diversity because international students create multicultural environment. Therefore, curriculum in English is essential. Mixing students with various educational backgrounds (humanities, science or engineering) is also an effective way to present multiple views on sustainability from peers' own expertise. GU`s programme has achieved that from the start of the programme; students are residing in various countries of the world (both developed and developing) while students background is also varying.

Interdisciplinary approach is the first step towards successful collaboration. The next step, equally important, is sharing of experience. According to Karatzoglou (2013), there is a dichotomy of apprehension when universities publish their ESD research results. If the emphasis lies on sharing experiences to contribute to the improvement of institutional practices elsewhere, the emphasis should go to transferability and abstraction, and this choice would have implications for the way in which the case-study research was conducted, documented and shared. The development of a rigorous conceptual framework and terminology, the instrumentation of case-study research and the standardization of the reporting of the published findings would improve comparability and allow the easier implementation in other locations. At the same time, an emancipatory approach, with no prescriptive guidelines, increases the levels of freedom with which the reader will get new ideas and suggestions that could have been overlooked or missed. The ideal balance might be attained with the use of critical considerations for conducting case study research considering collaborative learning process to benefit actors involved in the process and those external parties who may be interested in extracting knowledge out of it.

Online learning environment can be labelled with different terms (Moor et al. 2010); distance learning, e-learning or online learning. The lack of consistency in research makes it more difficult for experience sharing and impact researchers who would like to build upon existing studies but also designers who are creating similar types of environments. Therefore, it is important that specific context of the learning environment is described in enough detail in each study.

1.2. Online learning environment for the needs of education for sustainable development in higher education

E-learning in higher education can be a great tool in effective life-long learning education for sustainable development in a population of students who are simultaneously full-time employees. Universidade Aberta, the Portuguese Distance Learning University made a research between graduated students of the Education of Sustainable Development (Azeiteiro et al., 2014). The expectations and experience of students were analyzed, and the results showed that the surveyed students felt that they attained a high level of motivation and satisfaction, and had reached an effective learning outcome of knowledge, competences, values, attitudes and behavior in sustainability sciences. The authors concluded that formal e-learning programmes can provide an effective alternative to face-to-face training, allowing students to pursue their studies, in a flexible, collaborative and interactive way, whilst holding down full-time jobs. In this way can ESD in an e-learning regime contribute to, and have a role in, the transition to sustainable societal patterns. E-learning allows flexible learner-centered education independent on time and place since it is based on information and communication technologies. E-learning takes place in virtual learning environments (also known as learning platforms) where multidirectional communication is possible (teacher-student and student-student).

Van Dam-Mieras et al. (2007) write that sustainability issues must be approached by interdisciplinary and multiculturally composed groups. Online learning environments provide almost an ideal solution to this problem as the modern ICT tools enable to bring repeatedly together students from different disciplines, national and cultural backgrounds; at the same time and in the same place. From educational point of view a central question in designing an ESD programme is how to develop an effective online learning environment and educational instruments that enable students to become competent in promoting and implementing SD in their chosen field of endeavour. Interaction in an online platform should enhance dialogue and understanding among the users. New media and ICT offer many possibilities to enhance educational activities by providing flexible access to educational resources, assisting in information management and facilitating active discussions. Emphasis should be on sharing of knowledge at a global scale. Education for sustainable development can provide

critical reflection, greater awareness and empowerment to people so that new visions and concepts in favour of sustainable development can be explored and new methods and tools developed.

1.3. Empowering “Education for Sustainable Development” students

Addressing complex societal dilemmas is an important element in SD. Main aim of ESD is to empower people to deal with such dilemmas taking into consideration between and across different levels of scale, from the local (daily life) to the global (such as climate systems). To be able to address these complex issues requires inter- and transdisciplinary approaches and competencies; as well as the ability to work together with people of varying disciplinary, social and cultural backgrounds. That is why ESD should focus on identifying competencies and designing relevant learning environments rather than defining specific type of knowledge learners should acquire. These so-called shaping competencies (summarized in the German concept of “Gestaltungskompetenz”) are expected to enable active, reflective and collaborative participation towards sustainable development. Van Dam-Mieras et al. presented a list of 8 competencies which provide for a forward-looking and autonomous participation in designing SD:

- **Competency in foresighted thinking:** describes the ability to consider developments concerning the future while seeing relevant chances and risks
- **Competency in interdisciplinary work:** understanding of system connectivity and the principle of “Retinität” which is translated as the total networking of all human activities and products with the nature that bears them
- **Competency in cosmopolitan perception**. Transcultural understanding and cooperation: the answers to global issues should be sought through worldwide cooperation.
- **Learning participatory skills:** the ability to participate in SD and the process of shaping it because SD requires an active support from citizenry
- **Competency in planning and implementation skills:** Ability to coordinate processes, to develop work in cooperation and to foresee side effects and consequences
- **Capacity for empathy, compassion and solidarity**: this is closely connected to justice and worldwide solidarity
- **Competency in self-motivation and in motivating others:** high degree of motivation is needed to change ourselves and to encourage others to change as well.

- **Competency in reflection on individual and cultural models:** being able to perceive one´s own behavior as culturally influenced and to analyze societal models critically.

Howlett and Ferreira (2016) state that educational approaches must facilitate genuine interdisciplinary thinking, and must be conducive to the cultivation of agency, self-determination, critical thinking, a reflective capacity and the development of what might be called “a planetary consciousness”. Nobody has a single right vision of what “good” lifestyle means or how to best sustain earth´s ecosystem to benefit ourselves, future generations as well as other forms of life (Wals & Jickling, 2002). Students need to be able to cope with uncertainty, poorly defined situations, conflicting norms, values, interests and reality constructions as well as complex problems such as climate change while not knowing what the future will look like. UNESCO identified critical skills for ESD: creative and critical thinking, oral and written communication skills, reflective thinking, collaboration and cooperation and problem solving. Key focus of ESD should be therefore following: envisioning a better future, critical thinking and reflection, systemic thinking, participation in decision-making and working in partnerships for change.

1.4. Ethical framework

As suggested by Kronlid and Öhman (2012) ethical issues need to be taken into consideration in ESD. Although the economy growth allegedly brings education, energy, increased security and health to people around the world, the high-consumerism lifestyle of privileged groups exacerbates the vulnerability for non-human species, future generations and disadvantaged people in distant places. New generations in both North and South will face a vast number of complex moral dilemmas in the future and environmental ethical issues are therefore of considerable significance for education for sustainable development. The content of ESD is in a constant change. Lately, climate change has presented new challenges to education with regard to the ethical dimension. The challenges that climate change poses for education, policy-making and individual responsibilities and choices are a reminder of the importance of developing analysis tools in cross-disciplinary educational research. Climate change is a so-called post-normal problem with epistemological, ethical, economic and political worries that cut through societal sectors and spaces of power and domination. A climate change ethic does not only concern care for the natural environment, but also involves a concern for the well-being of humans within nature and culture. It is a common global problem. This highlights new demands on the functionality of an environmental ethical framework for ESD.

2.Theoretical framing

2.1 Education for sustainable development (ESD)

Education for sustainable development is considered to be one of the key pillars in sustainability science. Sustainability science aims to understand and provide solutions to the complex interactions between natural and human systems. These systems include a wide array of environmental problems (such as climate change, resource depletion, water scarcity, biodiversity loss and air pollution) and to address them, the concept of sustainability needs to be incorporated into teaching and learning (Kishita et al., 2018). One of the most known definitions of sustainable development has been stated in the Brundtland report (1987). It states that humanity has the ability to make development sustainable by ensuring that humanity meets the needs of the present generations without compromising the ability of future generations. Such a definition sounds straightforward, but real-life choices which need to be made politically in the interest of sustainable development are not straightforward. Sustainable development problems are often complex which is why numerous definitions of SD arise from different disciplines and perspectives (ecology, economics, sociology, biology etc.). The concept of SD has been criticized for its polysemy which is undermining the concept's credibility. It can simply mean many things to different people. The polysemic nature of the concept may be seen both as an opportunity to keep the concept open to conversations about what kind of life we want to live today and in the future; as well as a threat having a concept which is not well defined and cannot be applied when formulating policies (Bolis et al., 2014).

The very nature of ESD results in a diversity of perspectives, which is of course a potential risk of conflict. As Öhman (2006) states, in recent decades, many authors have claimed that a pluralistic perspective should be a significant feature of ESD. This pluralistic viewpoint is often connected to an emphasis on the democratic mission of education, and the opinion that ESD should support free opinion-making and enhance students' competence to act. An important aspect of pluralistic education is the evaluation of different voices in discussions about sustainable development including perspectives that dominate contemporary understanding of these issues, as well as alternatives to the mainstream perspectives. But this kind of pluralism has been criticized. Criticism of modern science can be seen as the result of people reacting morally, questioning norms or reflecting over scientific activities in relation to specific circumstances, rather than as a theoretical position. The question is therefore not whether the criticism is correct or not but rather what people actually believe, and which opinions and perspectives play a significant role in their lives. Criticism is a reason for including

things, namely the criticism itself and the alternative perspectives that the critics might bring up. Therefore, it seems reasonable that this approach should continue to be given specific attention in education as they represent the diversity of human life and opinion. So consequently, there is no contradiction between a pluralistic perspective and the criticism of modern science in a practical understanding.

Wals and Jickling (2002) also recognize that there has been much debate over the terms “sustainable development” and “sustainability”. Not surprisingly the education community is divided on how to respond to the emergence of ESD. Some are comfortable with the term and seek to infuse it with meaning; others express concerns about the globalizing nature of ESD and look for alternative approaches. The third group, while recognizing limitations to this terminology still use it to accommodate the global political agenda. The ambivalent nature of the concept of sustainability has a great potential to exchange views and ideas. These discussions may generate a fruitful working hypothesis for the formulation of curricula. Sustainability has many faces which greatly enhance its educational potential from a more emancipatory perspective. Teaching about sustainability presupposes that those who teach consider themselves learners as well and that students are considered as repositories of knowledge too.

The aim of the study presented here is not to look for a perfect definition of the concept: I want to leave the concept open, so I can look at it through the eyes of my peers and listen to their definitions of SD and ESD. This is necessary because some authors imply that unless ESD and generally the discourse on SD stay open to opinions and debates, it runs risk of becoming indoctrinating. Research on ESD is presently supposed to support emancipatory education, encourage multiple perspectives and critical dialogue on the very concept of SD and ESD (Bolis et al., 2014).

2.2 Online learning environment

Use of information and communication technologies is critical for ESD because geographical separation and complex sustainability problems are the reasons why ESD cannot be carried out without ICT's support (Mohamed, 2010).

While Web 2.0 technologies seem to be scaling up students' informal learning, personal learning environments (in this case Canvas used by Gothenburg University) can be considered as a promising pedagogical approach for intentional integration of formal and informal learning spaces. Dabbagh and Kitsantas, (2011) explain that learning is most effective when the learner engages in both formal and informal learning activities. Formal learning is described as learning that is institutionally sponsored or

highly structured (courses, classrooms, and schools, resulting in learners receiving grades, degrees, diplomas, and certificates), whereas informal happens through observation, trial and error, asking for help, conversing with others, listening to stories, reflecting on the day's events, or stimulated by general interests. Digital and networked technologies are helping students to seek and share information. Students at GU are given the freedom to use Canvas or to choose other social media tools to cooperate. Social media use in higher education is enabling the creation of personal learning environments that empower students with a sense of personal agency in the learning process. Dabbagh and Kitsantas, (2011) state that learning in the context of social media has become self-motivated, autonomous and informal, as well as an integral part of higher education. Such learning spaces facilitate student´s own learning activities and connections to peers and social networks across time and place. Dabbagh and Kitsantas (2011) claim that social media can help learners aggregate and share the results of learning achievements, participate in collective knowledge generation, and manage their own meaning making. However, students must acquire skills such as creating, organizing and sharing digital content or the critical ability to balance formal and informal contexts.

This is in agreement with Caniglia et al. research from 2018 which states that all involved (both educators and learners) must adopt digital literacy and critical mindset; only then they can find personalized ways to use digitally mediated spaces and sources in a way which does not distract the learning process. Ideally, they should possess not only one digital literacy but multiliteracies in digital technologies including the computer, information, critical media and multimedia literacies (Kahn, 2005). Media culture is also a form of pedagogy which is accessible to people via digital technologies; it teaches behavior, values and knowledge of the world while people are not aware that they are being educated and constructed by media. Critical approach and media literacy help people to use media intelligently, to discriminate and evaluate media content and see through corporate and state propaganda. Kahn claims that people who adopt techno literacies adopt also emancipatory learning which enables democratic and emancipatory changes; this can be interpreted as the ability to engage in a variety of problem solving related to self and society. People with critical mindset and emancipatory techno literacies are able to use technologies for progressive ends such as social justice and ecological well-being.

It is important to mention that the use of ICT has been suggested as an easy way to provide relatively flexible and cost-effective access to learning opportunities. However, such initiatives have been criticized due to a range of complex factors where social exclusion is key (non-participation in adult and lifelong learning is rooted in class, gender, generation, ethnicity and geography, which are established at an early age (Eynon & Helsper, 2011). In contrast to all expectations, access to the

internet and other new technologies has not increased the number of adults engaging in significant learning opportunities. ICT is mostly increasing levels of participation within the social groups that were already learning.

2.3 Adult learning

This study is focusing on higher education which is part of adult learning. Biesta and Tedder (2016) write that there is a long-standing tradition in seeing adult education as a major lever for empowerment and emancipation. Lifelong learning is often presented as a purely positive concept of adult learning. Nevertheless, Biesta and Leary (2012) criticize the assumption that learning is inherently good and should go on from cradle to grave; in the end, who wants to and can learn the whole life? According to Biesta lifelong learning has shifted strongly in the direction of its economic function (from learning to be' to 'learning to be productive and employable') in the last two decades. Adult education has been turned into lifelong learning which has linguistically turned learning into a duty of the individual who needs to adjust to the demands of the global economy. In such 'politics of learning' social and societal problems are being turned into learning problems; including learning for employability, learning for social inclusion, learning for citizenship etc. Through lifelong learning individuals are becoming responsible to solve problems that should be addressed at the collective level. This problem is also evident in ESD. Both instrumental and emancipatory approaches in ESD are aiming to create "active citizens" whether it is through manipulation or emancipation. Therefore, it is critical that learners of ESD develop critical thinking.

2.4 Critical thinking in education for sustainable development

There is broad acceptance that the development of critical thinking is a central feature of university education, with critical thinking listed by most universities as being a key graduate quality taking into consideration that disciplinary knowledge is temporary (Hawlett et al, 2015). Critical thinking encourages a skepticism of thoughts and can be defined as an "active" process in which you think things for yourself, raise questions yourself, find relevant information yourself, etc. rather than learning in a passive way from someone else.

Thomas (2009) states that education associated with sustainability must focus on elements relating to the processes of learning, rather than the accumulation of knowledge in order to develop graduates with capabilities to improvise, adapt, innovate, and be creative. Skills such as interdisciplinary thinking, problem solving, team working, and holistic thinking are needed; the key link here is critical thinking. Development of thinking is the critical element in education related to sustainability. Dam

and Volman (2004) suggest that critical thinking is a crucial aspect of the competence citizens need to participate in society. Critical thinking can be described as reasonable reflective thinking that is focused on deciding what to believe or do. It includes such acts as ‘formulating hypotheses, alternative ways of viewing a problem, questions, possible solutions, and plans for investigating something. Critical thinking should be also complemented with being open-minded and considerate of other people and perspectives. Thomas (2009) writes that critical thinking is akin to emancipatory learning and involves people recognizing the assumptions underlying their beliefs and behaviors.

People who adopted critical thinking:

- reject standardized formats for problem solving;
- have interests in a wide range of related and divergent fields;
- can take multiple perspectives on a problem;
- view the world as relative and contextual rather than universal and absolute;
- often use trial-and-error methods in their experimentation with alternative approaches;
- have a future orientation;
- change is embraced optimistically as a valuable developmental possibility;
- have self-confidence and trust in their own judgment

Learning activities that are assumed to enhance critical thinking are: paying attention to the development of epistemological beliefs of students; promoting active learning; a problem-based curriculum; stimulating interaction between students; and learning on the basis of real-life situations (Dam & Volman, 2004).

3. Method

3.1 Data collection instrument

The research was conducted within a qualitative methodological approach. Qualitative researchers are keen to generate a rich data pool which focuses on meanings and interpretations that individuals ascribe to a given concept or situation. These methods are used to access the subjective experience of groups of people and their behavior (Cassel, 2013). The goals and objectives are set in the beginning

of a research study in order to collect and analyze data on a phenomenon, which has been identified to be significant, relevant and warrants exploration, description and understanding. In this study it is the phenomenon of students' experiences while learning ESD online, their perception of the concept of ESD and SD as well as their awareness of development of critical thinking. The research is relevant because this is a new topic of research taking place in a newly designed ESD programme at Gothenburg University. I have decided to use an unstructured approach in the research. This kind of research allows to focus on the phenomenon being studied which requires an individually designed approach since it differs from other studies' phenomena (Cypress, 2018).

The data collection method I applied was semi-structured interviews. Qualitative interviewing is motivated by the aim to gather information useful to a study. The researcher wants to enter the participant's world and perspectives with the assumption that the perspective of others is meaningful, knowable, and able to be made explicit. Interviews permit the participants to move back and forth in time to reconstruct the past, interpret the present, and predict the future while allowing to provide a complete and more in-depth picture than other forms of inquiry. I have used phenomenological interviewing which involves an informal interactive process that aims to produce a personal comprehensive description of a lived experience of a phenomenon for a small number of individuals who have experienced it. Gathering other people's experiences allows the researcher, in a mediated sort of way, to become more experienced (Cypress, 2018).

Semi-structured interviews are those where the interviewer has prepared a list of topics and questions to be asked. These guidelines are followed during the interview but the interviewer leaves space for open responses that enable conversations which were not anticipated when the interview was being prepared (Brown & Danager, 2017). They are positioned between wholly structured interviews (the interviewer does not deviate from the prepared questions) and unstructured interviews (freely flowing conversations that respond to general topics rather than to specific questions). Semi-structured interview may have various formats and deploy different technologies; face-to-face, via telephone, by using email or e-interviewing with Skype and Zoom or other computer-assisted strategies where participants complete their responses online. This seemingly straightforward practice of designing and conducting semi-structured interview must entail the application of interpersonal skills. Researchers need to possess the interpersonal skills necessary for building rapport with research participants to maximize the interview´s potential as a dialogical source of knowledge and meaning making. In semi-structured interviews is researchers' approach and decision-making important for establishing strong relationships with participants which will have impact on participants' engagement and richness and quality of collected data. Semi-structured interviews invite the application of intelligent creativity and

reflexivity in relation to the ethical, methodological and theoretical elements of the research. However, like other data gathering techniques, they need to undergo fundamental critique in connection to their claimed intentions and outcomes.

3.2 Use of data collection instrument

Data collection involves consideration of some ethical issues. Before I started with the research I asked for an approval from the programme coordinator at Gothenburg University to undertake a research related to their ESD programme. After the approval was granted, I have prepared the semi-structured interview guidelines including informed consent forms (attached in the final version of appendix 2) providing information about the project and informing participants about their rights including the rights for privacy, use and storage of the interview data.

The preparation of materials was followed by a choice of an appropriate sampling strategy. The interviews were conducted with 7 students while the minimal recommended sample size for phenomenological studies is 6 (Mason, 2010). In an ideal scenario would the sample size follow the concept of saturation - when the collection of new data did not shed any further light on the investigated topics. To collect a rich set of data, I chose research participants based on their personal written introduction to the programme in which they often revealed their country of origin, country of residence, age, educational and professional background. All chosen participants were invited to an online ZOOM interview via email. People invited to the interview were heterogenous in many aspects. The gender composition of the group was 4 females and 3 males; the majority of the group was in the ages between late-twenties to mid-thirties, but I had also older participants in the group. Participants were living in (and originating from) various continents; in total 10 countries were mentioned either as a place of origin or a recent stay. All participants had a previous higher education certificate in various subjects such as teaching, engineering, economy and various forms of social and environmental studies. Professional background of targeted group was also diverse, ranging from teachers and researchers to small scale entrepreneurs.

All participants were invited to 60-minutes long ZOOM meeting and asked to send in a signed consent form. This requirement proved to be difficult for 3 participants due to COVID-19 virus isolation. They were asked for a consent verbally during a voice recording after assurance that they read all the information, understood it and agreed to participate in the research. Also, the online ZOOM meeting failed in two cases due to connection problems caused by higher WIFI usage in my living area. These

interviews were done over a phone while I was taking written notes. All the other interviews took place via ZOOM and were voice recorded as well as noted down on a paper. All interviews followed the same structure; pre-prepared questions were asked followed by free discussion and additional questions where needed. At the end of the interview all participants were thanked for their cooperation and asked if they would like to add anything or comment on any point of the discussion. After completion of each interview all conversations were retyped on a computer for easier analysis.

3.3 Data analysis: thematic analysis

According to Liamputtong (2009) the main aim of an analytic process is to turn the voluminous qualitative data, into "a clear, understandable, insightful, trustworthy and original analysis". To start with, the collected data were re-read and re-listed in order to make sense of the generated material. By commencing such data analysis at an early stage, I was able to collect new and often better data. At the same time, data analysis is still a part of the research design including literature review, theoretical concepts, the data collection etc.; all these parts of the research had significant ramifications of how the analysis was undertaken. In qualitative research various types of analysis are used. I have decided that thematic analysis will suit my research best.

Braun and Clarke (2008) state that thematic analysis is a method for identifying and analyzing patterns, so called *themes*, within collected data. The advantage of thematic analysis in contrast to other analyses is that it is not bonded to any pre-existing theoretical framework; and therefore, it can be used within different theoretical frameworks. As a theme we consider a pattern in a data set which captures something important in relation to the research question. Ideally, there should be a number of instances of the theme across the data set but more instances do not necessarily mean that the theme itself is crucial. There is not any rule saying that if the answer is presented in 50% of collected answers it is a theme while 47% is not. Some themes may appear in relatively small portions of the data set. It is the researcher's judgment which decided what a theme is; importance of a theme is not dependent on quantity but rather on whether it captures something important in relation to the research question.

Themes can be identified in two ways, in an inductive or bottom-up way. In inductive approach themes are strongly linked to the data themselves; it is a data-driven process of coding the data without trying to fit them into a preexisting coding frame. Nevertheless, the researcher cannot free himself from the theoretical framework which means that data cannot be coded in an epistemological vacuum. Theoretical analysis is in contrast driven by the researcher's theoretical or analytic interest in the area.

This form of analysis tends to provide a less rich description of the data overall, and a more detailed analysis of some aspects of the data. If the researcher is coding for a quite specific research question it will be a more theoretical approach (which is the case in this study) or the specific research question can evolve through the coding process (inductive approach).

Another decision concerns the 'level' at which themes are to be identified: at a semantic or explicit level, or at a latent or interpretative level. With a semantic approach, the themes are identified, and the analyst is not looking for anything beyond what a participant has said, attempting to theorize the significance of the patterns and the broader meanings and implications; often in relation to previous literature (this type of level was used in this study). In contrast, a thematic analysis at the latent level goes deeper and starts to identify or examine the underlying ideas, assumptions, that are theorized as shaping or informing the semantic content of the data.

The research epistemology was based on an essentialist/realist approach, while theorizing motivations, experience, and meaning in a straightforward way, because a relationship is assumed between meaning and experience and language (language reflects and enables us to articulate meaning and experience)

I have engaged in a theoretical approach which required engagement with the literature prior analysis (conceptual framework was outlined as a starting point of this study). I have followed 6 phases of thematic analysis as stated bellow (Braun & Clarke, 2008).

Phases of thematic analysis

1. Familiarizing myself with data: Transcribing data, reading and re-reading the data, noting down initial ideas.

2. Generating initial codes: Coding interesting features of the data in a systematic fashion, collating data relevant to each code.

3. Searching for themes: Collating codes into potential themes, gathering all data relevant to each potential theme.

4. Reviewing themes: Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2) and generating a thematic 'map' of the analysis.

5. Defining and naming themes: generating clear definitions and names for each theme.

6. Producing the report: Selection of extract examples, final analysis of selected extracts, relating back to the research question and literature, producing a scholarly report of the analysis.

Data from my research were analyzed manually with the help of grouping in Microsoft Excel 365 MSO and later doing a matrix display by hand. However, according to Bazeley (2009) thematic analysis should go deeper than just dividing codes into a theme. I have followed her advice to make a first draft of a report without any quotes; this forces the writer to focus on wider evidence for conclusions. Only when this evidence is built, illustrative quotes may be added to add interest and clarity for the reader. Further, I have avoided identification of themes as a goal and as an end point of analysis. I kept my mind open to analyse the data set for the unexpected. Finally, I was looking for connections between the emerging themes (anticipated and not-anticipated) and literature in order to present a unique and well-argued research.

3.4 Ethical considerations

Generally, when conducting semi-structured interviews, it is necessary to create ethical, respectful and meaningful relationships with participants (Brown & Danager, 2017). Brown and Danager suggest that respecting people and taking account of their well-being should define research ethics. Openness and non-judgment must be maintained throughout the interview treating each interviewee with fairness and impartiality (Herlihy & Corey, 2006). I believe that the success of semi-structured interviews is often based on social and communication skills of the researcher. During all interviews I did my best to take into consideration, not only personal needs of the participants to feel comfortable, but also our cultural differences which may have an impact on the way we communicate and receive information. The advantage of this research was that I was working only with adult learners. My project depended on others and I was fully aware that without their free will to help me I would not succeed. That is why my personal code of ethics was simple; to be honest to all involved and considerate to their needs in all interactions. This aim required extra attention and clear communication since we were cooperating in an online environment where it is easy to misinterpret each other.

Herlihy and Corey (2006) propose that interviewing should be established on thorough preparation and there is no excuse in taking shortcuts in the interview, including fatigue or disinterest. Participants were informed about the project and were invited to ask any questions about it before the interview started. Of course, session time of the interview was agreed on both sides in order to avoid time pressure, tiredness etc. Participants had the possibility to contact me via email or phone and discuss

the research if they had any concerns with the project. Finally, informed consent was collected to expressly gain permission to use data collected in interviews.

With regard to privacy and confidentiality, e-mail communication is analogous to a letter or phone call, with private intentions, but capable of being intercepted (Brownlow & O'Dell; 2010). Although confidentiality in the way the data is used can be promised, a guarantee that electronic communication will not be accessed and used by others is not possible. Therefore, assurances which is given to participants regarding confidentiality must be handled carefully. All data has been stored on my private computer and in email communications with my teachers I protected participants identity by deleting any revealing data about their backgrounds. The privacy and anonymity of the participants was protected by pseudonyms and generalized level of information about their backgrounds. The ESD programme counted a small number of students who got to know each other during the 2-year programme. If I would reveal participants individual backgrounds both peers and teachers would instantly know who they are. I see this as an ethical problem for two reasons. Firstly, I wanted to receive honest feedback from the participants about their learning which was achieved throughout the programme without fear of being sanctioned. Secondly, any controversial results of the interviews could have brought unwanted attention to these people from teachers at GU before their studies were completed. Since critical thinking is the building stone of ESD, I was convinced that participating students will be able to think critically and act as active citizens who are interested in the development of the programme for the benefit of future students. This study in the form of master thesis will be publicly available to the participants as well as collaborators. In the ideal scenario, all involved should benefit from the research results. Nevertheless, in this case, the results won't be directly beneficial for the participants (with exception of reflections on their own learnings) but will serve as a source of information and inspiration for GU as well as other educational institutions.

Research ethics is not only about relationships with participants but also about the work ethic of the researcher. Interviews, decisions and records should always remain untainted by personal influence (Herlihy & Corey, 2006). I have identified two major ethical concerns which were verbally introduced to all interview participants before the start of each interview.

1. This research is not meant to be an evaluation of the ESD programme at Gothenburg’s University but a research on students’ experiences and beliefs related to some aspects of the programme.

2. I am not an independent researcher but a peer of the participants which means that during both interviews and analysis, I always had to be conscious about the risk of reflecting my own

experiences and opinions and making sure that I avoid it. During the interviews I announced that if I am not responding to some points of discussions, it is just because I do not want to bring in my own views - the interview should only be about the participant's experience.

When we look at the technical side of the research, the topic of ESD taught via information and communication technologies may be seen as controversial from ethical perspective. Technologies use up lot of resources and energy which does not go hand in hand with sustainable education. However geographical separation and complex nature of international sustainable development are the reasons why ESD cannot be carried out without ICT's support (Mohamed, 2010).

Yet, I conclude that here presented researched problem has an ethical background. If I could contribute to understanding of what learning was achieved in Gothenburg University ESD Master´s Programme and in that way possibly help teachers to improve the design of upcoming master programmes, then we are all moving towards a more sustainable future through developing the science of ESD. What is most important is well stated in Franck and Osbeck´s publication (2018): The main ethical question to be focused on within sustainability didactics is not 'Is this ESD programme done in right or wrong way?' but 'Does the generated learning lead to the development of a good common life, a good society and a good world?'

4. Results

4.1 About the ESD Master´s degree programme, background information

This interdisciplinary ESD Master´s Programme has been developed by 4 departments at GU University and one at the Chalmers University of Technology based on a pioneering curriculum at the forefront of the international research debate on education and sustainability. The teachers of the programme come from a wide range of higher education departments. The programme seeks to prepare students not only to respond to local and global sustainability challenges, but also to counteract them and contribute to more sustainable futures through education and research. Students in the ESD programme will enter into critical dialogue with recent scientific debates in the educational, social, and natural sciences, and get access to a range of analytic tools that will help them develop theoretical as well as practice-based knowledge in education for sustainable development. The whole programme is entirely web-based with all teaching carried out online. Programme language is English, and the programme welcomes students from all parts of the world with a variety of backgrounds (e.g. environmental sciences, social sciences, educational sciences, economics, arts and humanities). All

these factors are in agreement with Kishita´s et al. (2018) recommendation to maintain student´s diversity because international students create a multicultural environment (which is the reason why the English curriculum is essential). Mixing students with various educational backgrounds (humanities, science or engineering) is also an effective way to present multiple views on sustainability from peers' own expertise. GU`s programme has achieved that from the start of the programme; students are residing in various countries of the world (both developed and developing) while students background is also varying as is described in the method section of this study.

To be selected for the programme a Bachelor s Degree of 180 credits is required, or a professional qualification specializing in the school system of at least 180 credits and an individual degree project/thesis of 15 credits within or outside the degree, or equivalent knowledge and skills. Applicants must prove their knowledge of English by an internationally recognized test, for example TOEFL or IELTS.

The first program started in September 2018 and was designed for a period of four semesters. The technical basis for the virtual learning were two student platforms used by Gothenburg University (Gul and Canvas) which facilitates cooperation, written discussions and group work related to storage of literature, videos, documents and projects. The virtual platform allows to store distance learning modules as well as enables cooperation between students and teachers. The education process is designed to facilitate in-depth studies in the first three semesters while the last, fourth, semester is dedicated to the master thesis writing and carrying out independent research studies on a scientific basis.

First year

1. Education for sustainable development, an introduction

2. Environment, Nature and Sustainable Development in an Educational Perspective

3. Citizenship, social values and ethics in sustainability education

4. Economy, Global Inequality and Pathways to Sustainability

Second year

5. Researching Education for Sustainable Development

6. Degree Project for Master in Education and Sustainability

During the programme students were requested to use the virtual platform and engage in written conversations with peers and teachers in discussion forum or via emails. Some courses were offering video tutorials, voice recorded presentations and ZOOM meetings.

4.2 Findings

4.2.1 The choice of the programme

To introduce the findings of my research I will start with summarizing students' reasons to participate in the ESD programme at Gothenburg's´ University. Although this question was not officially presented in my questionnaire, I realized that all conversations at some point came to this topic when discussing online learning. The majority of the students valued the flexibility of the programme and possibility to work fulltime (or be at parental leave) at the same time. These students mentioned the wish to receive a formal master's degree in the area of sustainability; mostly for the reason to incorporate it in their own teaching or other types of work. This can be seen as learning for earning as defined by Biesta and Leary (2012). But such view would be too simplified. Most students were complementing their previous higher education with Master in Sustainability with a hope to understand the topic of sustainability better and be able to introduce it to others when they are finished with their education. Their learning is therefore naturally connected to their professions but with altruistic goals.

E-learning flexibility is important motivation which consists of various factors according to the participants. From possibility to work at their own pace to the advantage of studying from anywhere since many of these students live abroad. Olivia expressed it: "*Even if it would be one meeting per month, I couldn't do it"*

One student, we can call him Julian, mentioned the advantage of the Swedish educational system which is for free and the admission process does not take grades into considerations; which I find as an important factor. The opportunity to study for free makes this programme available to all Swedish residents and EU/EEA citizens. Even though Eynon and Helsper (2011) argue that access to the internet and other new technologies is mostly increasing levels of participation within the social groups that were already learning; the aspect of free education on top of the online delivery can be removing some of the social exclusion barriers in adult education linked to individual financial situation and geographical segregation. This aspect is a positive factor in creating a heterogenous

group of students. As previously mentioned, Van Dam-Mieras et al. (2007) consider it necessary that sustainability issues must be approached by interdisciplinary and multiculturally composed groups.

4.2.2 Understanding of "sustainable development" and "education for sustainable development

Students were asked to explain in their own words how they understood the concepts of SD and ESD before they started the ESD programme at GU and after it (ll students were at the same level, they completed all courses of the programme and were in the process of writing their master thesis). It is a difficult task to reflect on one owns thoughts a couple of years back and even if some students expressed this opinion, all of them were able to formulate an answer.

4.2.2.1 Sustainable Development

The understanding of the concept of sustainable development before the programme was clearly influenced by previous education. Three students in the group studied some sustainability in former higher education. Each of them had a different level of understanding depending on their level of education in the field of sustainability. Julian mentioned the Brundtland report definition, Camilla diversity and complexity of the term, while Martin remembered his own criticality of the concept. Remaining students have not had an educational experience of the term and connected SD mainly with ecological problems. Cleo was exception with her own definition which took into consideration equality aspects:

> Cleo: *Sustainable development is about being able to live a life that will be able to sustain the life that you have, not to make things worse. Everyone has the same rights and possibilities".*
>
> Olivia: *"I had no idea. I was curious to find out more about it. I knew it is something about the world, the future, the society. I just connected it to the ecological part of sustainability"*
>
> Linda: "*I had no idea. Ecology, permaculture, nature studies, environmentally friendly living. I haven't expected so many elements of sociology."*
>
> Patrick: *"I understood just basics. I thought it was about recycling and not throwing away plastics"*

When the students were asked to formulate their current understanding of SD, Olivia, Cleo and Linda expressed definitions like the one provided by Brundtland report (not harming living forms and just and fair to future generations). Camilla and Martin (both of them had previous knowledge of SD) said that they are still looking for their own personal definitions while Camilla said that she is more critical to the concept after the programme. Four students said that the concept of SD is much broader than

they originally thought and covering many aspects (political, social, economic, ecological etc.). "*It´s a holistic concept*" said Olivia.

4.2.2.2 Education for sustainable development

The concept of ESD proved to be even more unclear to students before they joined the programme. Only Martin knew what ESD was about and perceived it easier to answer than SD.

> Martin: *"I was more in the emancipatory field, being very critical."*

Remaining students either didn't know what ESD was and how it can be implemented or on the contrary looked for a connection between education and sustainability

> Linda: *"Education was not that much of interest to me"*
>
> Patrick: *"Education which will teach me about recycling"*
>
> Olivia: *"Something to do with education and future. I was curious to find out about that."*
>
> Julian: *"In my previous education was lot of courses about human relation to nature but not so much about sustainability. I wanted to do this education. I knew there was a link between education and SD."*

Perception of ESD after the programme changed dramatically. Almost all students shown their understanding of the complexity of the term but also critical thinking when considering the educational approaches:

> Patrick who first thought that SD is about recycling said: *Now I know that ESD is not subject like a history. You are changing the way people think; not just telling them what to do. It is about the relationship between the student and the environment- the world*
>
> Julian said: *"Education for sustainable development is used in many different ways and people define it in many different ways. If you talk about ESD, you need to define it, so the reader knows what you mean. I don't know, it means different things in different context and finding a definition is almost a mistake."*
>
> Camilla: *"In the beginning I didn't know what ESD was. It is also complex and will be perceived differently depending on glasses you are wearing. I was hoping to systemize it and get tools to do so during the ESD programme but didn't. I am still looking for my personal definition, but it is inkling to Education for sustainability. The world is continuing in unsustainable tracks; therefore, I would like to leave the word development out."*
>
> Linda: *"Education for sustainable development is more complex than SD. There is the element of activating students, empowering them, teaching them critical thinking and critical literacy skills".*
>
> Martin: "*Now I am much less on the emancipatory side.*

> Cleo: *"It is very hard to answer, it has much deeper meaning. I realized how important it is to reach this state of sustainability. It hasn't changed the original ideas, I always felt we need to be more aware of what we are doing and have the skills and knowledge* (meaning learning for SD).

4.2.3 Learnings

While some students like Patrick and Olivia, entered the programme with curiosity, other students had expectations before the programme started which hasn´t been fulfilled. These expectations were very diverse reflecting various backgrounds of programme participants. While Olivia mentioned that she missed sustainability content in the second study year; Martin perceived the programme content to be very focused on sustainability while leaving very little space to educational theory. Camilla was hoping for complete list of methods and tools which would be applicable in real business life:

> Camilla: *"I hoped for more tools which would be applicable in real-life but academia is not practical in that sense; it is more about writing tools, searching tools and advising what to look at, very focused on formal education but missing out tools for informal education (how to implement SD in companies).*

4.2.3.1 What initiated new insights?

When I asked students, what initiated their new insights they gained through the programme, they mentioned repeatedly that they learned most from exposure to the new literature, materials and assignments. Assignments were highlighted repeatedly as a good source for training critical thinking.

> Julian: *"I learned most from the literature that we were reading, we were doing it most of the time"*
>
> Patrick: "*It was the exposure to the literature and philosophy behind"*
>
> Cleo: *"The programme provided us with quite a good range of reading materials and viewpoints"*
>
> Linda: "*I found assignments very helpful in systemizing what I have learned. It made us think, critically reflect and change point of view"*

Martin and Patrick mentioning that they didn't know exactly how big part the ESD programme played in changing their viewpoint and how much changed due to students' other activities and exposure to other cultures.

4.2.3.2 Knowledge and skills

As a part of the research I was interested to hear what knowledge and skills students perceived to gain after completion of the programme.

When it comes to student's perception of overall learning; the researched data revealed a pattern that students without previous knowledge of SD felt that they got answers to what sustainability is while students with previous SD knowledge felt like they are still looking for answers. It is well visible on two contradictory answers of Linda and Camilla:

> Linda: "*It was gradual learning. My knowledge was fragmented but it is more systemized after the programme. I see how everything is connected. For example, that environmental justice cannot be achieved without social justice."*
>
> Camilla: *"I need time and distance to realize what I have learned. Right now, I feel like a fish swimming in the ocean, looking for something."*

From the overall answers I identified 4 skills which were named by almost all students: self-directed learning, "glocal" learning, development of personal responsibility, and development of critical thinking.

4.2.3.2.1 Self-directed learning

Six out of seven students named self-directed learning as a main benefit of this programme. The only exception was Olivia who did such an online programme before and knew what will be expected from her. The self-directed learning was mentioned while using various expressions such as self-discipline, self-motivation, isolated learning, responsibility, independent in learning etc. Students highlighted self-directed learning in direct comparison to their previous experience with campus-based higher education, where they used to study in groups and were not used to synthetizing knowledge on their own.

> Martin: *"Isolated learning, learning by myself, given the little interaction. Before we could exchange interpretations, learn together, we had lots of group assignments. Now I had to motivate myself to read the compulsory literature. You don't really have negative consequences when studying in Sweden, if you fail you do it later and you need to motivate yourself."*
>
> Camilla: "*We used to work in groups in previous studies but during the programme I had to learn to work independently, it was more difficult to find energy and motivation. I had to learn self-discipline and structure my time."*

The need to work on your own was seen as a benefit which can be applied in further studies or job activities. Other skills commonly mentioned in connection to self-directed learning were research and writing skills.

> Linda: *"I learned to guide myself, find answers and go beyond the literature* (meaning doing her own research*)"*

> Julian: *"I learned to synthesize the literature by myself and write about it. I am also able to research articles which I haven't researched in the past. Qualitative data is new to me. I used to work with quantitative data and graphs; now I am thinking about research in different way."*
>
> Patrick: "*You learn to research, write, change world-view and put the puzzles together- philosophy, ethics, social aspects etc. You have to be able to write better, make an argument, do a research"*

Nevertheless, Camilla also mentioned a negative aspect of self-directed learning; insecurity.

> *"Sometimes I felt that we didn't get a full list (research methods) but just some examples. Then I did the research on my own but never knew if the sources I am using are good enough (reliable)."*

4.2.3.2.2 Development of critical thinking

Thomas (2009) writes that education associated with sustainability must focus on elements relating to the processes of learning, rather than the accumulation of knowledge; the key link here is critical thinking. Discussions with all students revealed that they perceive to develop critical thinking. Five students recognised that they developed critical thinking after finishing the programme while Martin, Camilla and Julian developed critical thinking in their past and were actively applying it when learning ESD (these three students had previous knowledge of SD). Camilla reflected that the programme made her even more critical. While Julian spoke about his increased ability to introduce critical thinking to others:

> Julian: *"I have always been a critical thinker, my father (professor in education) is that. I haven't necessarily picked up critical thinking in the programme, but I talk a lot more about it with my students. I am not great about teaching about knowledge; that can be gained easily and lost easily. I am focusing on students getting skills, critical thinking and problem solving."*

Words which students used when talking about critical thinking included: *ability to read between the lines, having broader understanding of history (not only 1-sided view), having analytical critical thinking, ability to differentiate points of view, understanding that what was right yesterday does not need to be right today- the need to keep oneself updated, ability to change worldview and "put the puzzles together, ability to make a research when instances come up, ability to think critically when reading media releases and when to what is seen in the society and also the ability to reflect over to what activities they want to expose their own students to*.

The ability to apply critical thinking to SD was completed with the ability to apply the critical thinking to education as well. An example which was brought up twice is the grading system or a hinder of

high workload at some parts of the programme which limited their possibilities to do their own research and go beyond the literature.

> Camilla*: "I am seeing education from critical perspective. The programme made me critical about the programme. Mix of passed and grades was confusing. I was also asking question; how sustainable are grades when delivering ESD?"*
>
> Olivia: *"I am more critical about some aspects of education"*
>
> Julian: *"I don´t put value in grades, I care about what I am learning."*

4.2.3.2.3 Personal responsibility

Majority of the students talked about their increased awareness of their personal responsibility. They talked about changes in their daily habits while trying to live environmentally friendly.

> Cleo: *"I was pretty good before (living sustainably) but now I think that making exceptions is not ok. It is serious now, we all have to do this without exceptions."*

Many students also mentioned their feeling of personal responsibility when educating others about sustainability.

> Cleo: "*I don't force my colleagues, but I tell them why I don't take the kids to the farm anymore"*
>
> Olivia: "*Often I have discussions in myself; shall I tell them how to behave?"*
>
> Julian: "*I think that I apply it every day when teaching my students or talking to my colleagues. They fall into the classic of 3 pillars and I am encouraging them to go beyond that type of thinking, there is more to SD than these 3 pillars. They haven't bothered to look it up a bit more. The research I am doing is my daily life."*

4.2.3.2.4 Glocal approach

Majority of students recognised the benefit of being part of global group. They appreciated to be exposed to different perspectives and ways of thinking and recognised that people from different backgrounds would not get to meet and learn from each other in campus-based education.

Some of the students further developed their thoughts when talking about the need that ESD focuses on the connections between local and global; "glocal". This realisation was linked to both; to the interaction within the international group as well as to the content of the programme.

> Patrick: *"SD is a global issue. Global solutions to global issue. That's why it is good to have an international group" (...). History is fascinating and how it is manifesting in*

> *other countries and how SD looks in different countries. The programme was never "fixed" to what is Europe saying. (...) Webinar about environmental justice shifted my perspective. What everybody picked. Well, the environmental problems are everywhere; and it was interesting to see how people approached it (peers when doing assignment).*

4.2.4 Online delivery

In general, students were satisfied with the online delivery and thought that the learning outcomes would be the same if compared to campus-based education.

> Cleo: *"I do not think online courses has many disadvantages, it is all about how we organize them/design them.".*

However, all the student mentioned that the learning experience would have been better in campus-based environment. Some of the students, like Martin and Olivia, directly prefer campus-based forms of education while other students even though they prefer the flexibility of online learning were missing human interactions in this particular programme. Discussions regarding lack of interactions became usually a central part of most interviews.

> Julian: "The *online nature means it's more difficult but not impossible. It depends more on a delivery method. In real life it is easier to create learning environments which are not just lecture based (rather small groups, seminars). My father is professor in education and he has online classes every week when he talks to the students. It makes me jealous; we have all the technology, why do not we do it?*

Camilla made a valid reflection when she pointed out a change of an online platform in the middle of the programme which might have had an impact on the overall learning process; together with the fact that this group was the first one to graduate from the programme:

> Camilla: "*We were the first batch/guinea pigs for this programme. We changed the technical tools (platform) in the middle of the season but there are so many things that are needed to keep the content to work. Where can we find the literature list? Comment on each other? If that is lacking is not that good. Discontinuity and technical problems are standing in the way to what we wanted to achieve."*

4.2.4.1 Human interaction

Lack of "face-to-face" interaction in the online delivery has been the most discussed topic in all interviews and it is also area where I have received the most input from the research participants. Participants were lacking both face-to-face interaction with peers as well as with teachers. Students would value more informal discussions about philosophy and areas of interests which were not touched by the programme. They see these informal points of discussion as a way of learning from each other (also how different concepts work in different places) and bringing in new ideas/topics

which were not raised in the programme. They expressed understanding that it is difficult to coordinate students from all corners from the world to find time for a face-to-face meeting; but they would still like to have them. Patrick and Julian even expressed a wish to have it as a mandatory requirement to plan discussion with peers (both with and without tutors). They were aware that they could have organised their own face-to-face meetings, but they felt there was a social barrier and so they have not done that.

> Julian: *"The programme design wasn't so much given to bringing social or cooperative learning space. There was lots of individual focus; read this, write about it. But we do not just learn from what we are reading. People have various backgrounds and we could get lots of insight from each other and also from talking to the professors. One of the teachers gave a very good feedback on assignments and in the forum but I would have liked to talk to her about her philosophy. There is so much out there (knowledge), so much potential that is not utilized"*
>
> Martin: "*I don't think the new insights were initiated by interaction with people. I didn't get so much from the interaction, there wasn't enough of it. It is not a problem with online education, it could have been more interactions; we had very little group work and little live sessions. Many of the staff, I don't even know what they look like; most of the voices I haven't even heard. I haven't bothered to google them.* (…) *The delivery form didn't help me, I always received very little feedback. I would appreciate more interactions."* "
>
> Olivia: *I would like to have more face-to-face discussions and also social things from outside; we don't know each other. I was so much concerned with my own ideas and myself and I don't know what the others think. And I think that it is important. It is a thing which I missed; we could have learned from each other."*
>
> Patrick: "*I would have liked to have more face-to face interactions. It is very beneficial to get a tutor for ESD700 and actually talk to them. There is only so much you can learn from reading or emails; I don't know how people look like and who they are. Some of them have photo but not all of them. It humanizes, makes it more real."*

Many comments were also related to the written form of interaction. Students raised various disadvantages of written interaction. Camilla was talking about missing the essence of what is important, at the same time as she and another student brought up the lost element of test-thinking (asking silly questions). Students also felt that written discussion is not promoting informal interactions and idea sharing beyond discussion forum (which consisted mostly of teacher-suggested topics of conversations).

> Cleo: "*We didn't have much face to face interactions. Whatever few interactions we had, it was discussing assignments and not our thinking, no informal discussions on what we read. I didn't experience any heated arguments about what we think; no elaborate discussions on how we think. "*

Camilla: *"Webinars (face-to-face) brought in more ideas. In some courses was human interaction missing and it was more about reading the text. I needed feedback to know what to focus on. Feedback was often "passed" with one sentence. That is not enough to understand the essence of what is important. Especially if it is 90% reading and 1 video; then it is difficult to understand what the teachers considers important."*

Camilla*: Sometimes I felt that we had to write something special and clever and it didn't feel open to throw in ideas. In discussions it is easier to say stupid things than in written form. Test-thinking is easier in discussions (and that can be online). If you speak to someone it is easier to interact with them in written discussions later on"*

Patrick: "*It´s more comfortable to ask silly questions face to face, you wouldn't ask silly questions in an email.* "

Martin: "*There was little feedback and in discussions (about the written interaction).; you had to do it and then you left the conversation. I found the format of interaction difficult as well, I would prefer more live interactions"*

Julian: "*I would have liked a lot more interaction with peers talking about SD issues but not in the forum where you cannot have these discussions (written forum). I would like to have more face-to-face discussions. Whenever you are typing in discussions in the forum, you can share some ideas, but you are missing the tone. It is not the same as live discussions. Synchronous forum is a way of sharing information, but people are not really willing to dive into it because typing is more work. We were at the forum because we were told to do so. Forums were forced, and people were talking only because they had to, only few real conversations happened because we were told to respond on each other's posts. When students don't see a value in doing forum, there won't be so much value. Better to create an environment where students can discuss what they think is interesting, clarify something or discuss something what wasn't touched."*

Another missed aspect which was mentioned several times was being a part of an online community. Majority of the students felt they got no friends from this programme, no one to ask: *did you understand this question*? The students usually reached out only if they didn't understand something but not to have informal conversations about ESD. The feeling of lacking personal relationships with peers was so strong to that point that couple of students mentioned that they were discussing their studies with their partners rather than with peers.

Julian: *"I was always talking to my wife about what I was reading but it would be so much better to synthesize it with someone who read the same, not to synthesize it on my own."*

Olivia: "*Online studies benefit is that it opens lots of opportunities and you meet people from the whole world. But I was frustrated at some points, especially when there was nothing happening. In the beginning we received email every week but later at some courses there was absolutely no interaction. People were asking in discussions for help*

and teachers didn't respond; I was feeling no one was interested. I initiated no interactions when I was frustrated, I told my husband"

4.2.5 Future of "sustainable development" and "education for sustainable development"

4.2.5.1 Sustainable development´s future

With the ongoing COVID-19 virus pandemic, it was not a surprise that majority of students expected that it will change the future development of SD. The points of view though were very different. Martin expressed a pessimistic view with an expectation to further focus on economic growth in SD. Olivia on the contrary hoped that people will recognize the need for equality after the COVID-19 pandemic is over. Linda didn't know what will happen and Patrick see a benefit in media picturing the beauty of nature without people's interference.

The students expressed their personal hopes for SD. In their answers I have identified 4 areas of interests:

- Camilla and Martin hoped that SD will drop the "development" part and will focus only on sustainability.
- Linda and Cleo wished that sustainability will be achieved by removing power structures and aiming for global equality.
- Further, Cleo, Camilla and Olivia mentioned the need to educate individuals globally and so influence their personal choices (with seeing the link between what we do and the "glocal" arena).
- Patrick on the contrary, saw benefit in governmental pushes, saying that people will change their mindset and get used to changes.

4.2.5.2 Education´s for sustainable development future

The hopes for ESD were circling around similar topics as hopes for SD ("glocal" approach, shift in power structures, individual responsibility). Majority of students said that they wish that ESD will shift the power structures and focus on a pluralistic world. Education for sustainable development should become more group focused instead of individualistic and become a global value which will be part of cultural awareness (on individual level). This should be achieved through incorporating ESD in everything we teach; because as Camilla suggested, ESD should aim to educate active citizens.

Olivia said that there are teachers who have not heard about ESD and that should be the point where we could start. Julian contributed with an important reflection about the connection between research and education:

> *"I'm not sure about the future but I can tell you what I hope: As a teacher, it appears that the research community sits apart from the teaching community or at least I've noticed anecdotally that very little teachers are involved with or even look at research very often. This means that any research that is being done in ESD remains mostly only in academic circles and the question is, who is that serving? I hope that the future will see academic researchers in ESD and teachers who are on the ground, begin to bridge the gap between one another, where journals are written for teachers and teachers seek them out. Education for sustainable development must be about making changes now in order to secure a better future. It is imperative that ESD and ESD research becomes a talking point among teachers if things are to change, otherwise, the future seems less hopeful."*

5. Discussion

5.1 Learnings

Critical thinking skills and students understanding of SD and ESD were the main RQ´s in this study. Thomas (2009) wrote that development of critical thinking is the key element in education related to sustainability; this connection is also the red thread through the whole research.

While Dam and Volman (2004) add that critical thinking is a crucial aspect of the competence citizens need to participate in society; this skill should be complemented with being open-minded and considerate of other people and perspectives. Students´ interviews proved that the programme experience led to changes in their understanding of sustainability between the start and finish of the programme; the greatest self-perceived shift in understanding was by students who didn't have any previous knowledge of SD. The evidence was not presented in a form of long personal descriptions, but rather in understanding of the complexity of SD and ESD. These new insights were mainly gained by reading the literature list and completing the assignments. Some students mentioned that their insights changed after discussions with peers from other countries which allowed them to achieve a "glocal" perspective in sustainability. The ESD programme at GU University was studied by a diverse group, some had previous knowledge of sustainability while others had only a vague idea of what sustainability means. It is just natural that every one of them came to the programme with different expectations on the programme content. Nevertheless, after finishing the programme, most students believed that they learn to develop critical thinking (or pass it to others when speaking about

sustainability problems), self-directed learning (which will also come in handy in students' jobs), feeling of personal responsibility (when changing daily habits) and "glocal" approach to looking for solutions to sustainability problems.

I consider self-directed learning to be a corner stone for critical thinking since it involves the need to look up reliable information and do research to make up one's own opinion. As Dabbagh and Kitsantas (2011) describe; learning in the context of social media has become self-motivated, autonomous and informal, as well as an integral part of higher education in which learners can aggregate and share the results of learning achievements, participate in collective knowledge generation, and manage their own meaning making. Being part of an online ESD learning programme is a preparation for gaining necessary multimedia literacies including the computer, information and critical media literacies (Kahn, 2005). The ability to keep one updated about the development in the field of sustainability is necessary to be able to make the right individual choices (personal responsibility) on local as well as global level. Students learned that SD and ESD are complex issues which are made up of many aspects and can be described by many definitions depending on describers' values and worldviews. At the same time, they learned to apply critical thinking not only to SD but also to educational methods applied to SD.

Students views on future development of SD and ESD were embraced by the view that the current COVID-19 pandemic will have a mixed impact on SD. Students expressed their hopes that the world will shift the current power structures in order to achieve equality and cooperate on sustainability issues on "glocal" level while giving people the necessary knowledge to make the right individual choices for sustainable development; or even better by dropping the "development" part as suggested by a couple of students. Their hopes showed that students reached most of the 8 competencies which provide for a forward-looking and autonomous participation in designing SD as described by Van Dam-Mieras et al. (2007):

- ✓ ***Competency in foresighted thinking:*** *describes the ability to consider developments concerning the future while seeing relevant chances and risks.* Both chances and risks were considered in students' expectations for future development of SD and ESD.
- ✓ ***Competency in interdisciplinary work:*** *understanding of system connectivity and the principle of "Retinität" which is translated as the total networking of all human activities and products with the nature that bears them*. Yes, students' understanding of the system connectivity and complexity of SD was proved in their description of SD and ESD before and after the programme

- ✓ ***Competency in cosmopolitan perception***. *Transcultural understanding and cooperation: the answers to global issues should be sought through worldwide cooperation.* This skill was reflected by students glocal approach
- ✓ ***Learning participatory skills:*** *the ability to participate in SD and the process of shaping it because SD requires an active support from citizenry.* Development of personal responsibility was also reflected in students' perceived skills; including change of their daily habits to educating people in their surroundings
- ***Competency in planning and implementation skills:*** *Ability to coordinate processes, to develop work in cooperation and to foresee sight effects and consequences.* Unfortunately, I cannot comment on this skill as I have not been researching students' agency skills in practice
- ✓ ***Capacity for empathy, compassion and solidarity****: this is closely connected to justice and worldwide solidarity.* Students often brought up equality and necessary shift in power structures
- ✓ ***Competency in self-motivation and in motivating others:*** *high degree of motivation is needed to change ourselves and to encourage others to change as well.* Almost all students claimed to develop self-directed learning skills, including self-motivation. Motivation of others was often mentioned in their description of how they apply their learnings in daily life
- ✓ ***Competency in reflection on individual and cultural models:*** *being able to perceive one´s own behavior as culturally influenced and to analyze societal models critically.* Reflection on cultural models was also mentioned, as was an ability to shift world-views

According to Reunamo and Pipere (2010) ESD should enhance the capacity of individuals and organizations to confront change and transformation rather than focusing on the transfer of knowledge. I believe that with achievement of above-mentioned competencies students of GU´s ESD programme will be able to keep themselves updated about the sustainability problems which are constantly evolving, critically analyse available information and take actions on them, whether in personal changes of habits or by educating others. The GU ´s ESD programme seems to succeed in the challenge set for higher education facilities to innovate traditional learning environments and learning process in such a way that they support the learning process in formal education as well as life-long learning and informal learning (van Dam-Mieras et al., 2007).

Yet, what should be taken into consideration is the practical application of the programme content to the real-life. As Camilla mentioned, she was lacking tools to apply the theoretical concepts she learned to informal education. More students would probably appreciate practical tools which would help them to transfer their knowledge from academia to their daily activities at home or in business. Such

tools should help students to keep their knowledge alive by having a practical use for their newly gained ESD skills and knowledge.

5.2 Online delivery

An unanticipated finding from this research was the enormous importance of human interaction in the ESD programme. Dam and Volman (2004) claim that learning activities that are assumed to enhance critical thinking are: paying attention to the development of epistemological beliefs of students; promoting active learning; a problem-based curriculum; stimulating interaction between students; and learning on the basis of real-life situations. From results of this study I conclude that stimulation of human interaction is especially valued in the online environment. As presented in the results, all students wished to have more “face-to-face” online contact with both peers and teachers. Being part of an online community proved to be very important to them. Azeiteiro´s et al (2014) study is aligned with my findings. Flexibility, interaction, teaching presence, collaborative learning and a great sense of community are very important categories for students studying online. Online learning pedagogy allows students to have a more accurate perception of the effectiveness of their own learning and is increasing student-teacher interaction, as well as critical thinking. Interaction among peers, and with teachers, is appreciated by online students. Students experience the teacher's support and expertise as being particularly important for the acquisition of knowledge and skills, as well as for course satisfaction. Azeiteiro et al. (2014) state that online programmes seem to produce comparable learning outcomes as face-to-face programmes; namely in the sustainability science fields. Students in this study expressed the same feeling; they believed that the learning outcome of a campus-based education would have been the same, but their learning experience would have been more positive. This expectation was linked to their need for human interactions and relationship building (through video calls where they would have had the opportunity to see and hear their peers and teachers).

Students really desired to hear their peers and teachers’ thoughts but felt that they have not had the opportunity to have such discussions in the written forum with pre-defined areas of discussions. The students agreed that written discussions are not promoting interaction for several reasons. For example, they felt that writing is impersonal, and it stops them from test-thinking and asking silly questions. Students´ feedback on test-thinking agrees with findings of Thomas (2009). Thomas states that people who adopted critical thinking, often use trial-and-error methods when looking for alternative solutions or ideas. Participating students developed critical thinking but thought that they have not got the opportunity to come up with silly ideas in written discussions. Impersonal written discussions made them feel that they have to come up only with clever ideas.

Students appreciated the diverse groups and the possibilities for exchange of experiences and alternative viewpoints but at the same time, these students started interactions with other students only when they faced problems or questions; not to talk about sustainability or share ideas. Mandatory face-to-face meeting were suggested as a solution to create relationships and take away social barriers in further studies. Students felt that once they spoke with someone, it was easier to enter written discussions with these people at a later stage (both peers and teachers). Learning from each other would support exchange of experiences of how certain concepts work in different locations and finding solutions to local problems in global context. Furthermore, test-thinking which is more natural in "life" conversations is another aspect which would have promoted critical thinking. And finally, more real-time conversation with teachers would allow for discussing philosophy and get more understanding to what is really "the essence" of their teaching; which students found difficult to get from limited written feedback.

Another important factor is the frequency of these interactions. As Olivia mentioned, she was feeling frustrated when there was nothing happening (meaning no interaction) and she felt that no one is interested, at the same time a social barrier stopped her from taking on the initiative and contacting her peers. Students generally admitted that they contacted peers when they faced a problem but not to start deeper discussions about sustainability or education.

Camilla also mentioned a technical hinder in the learning process when the university's virtual learning platform was changed in the middle of the programme. According to her such discontinuity was an obstacle when wanting to continue in commenting on each other's posts, looking for materials or just struggling with the new technology.

The fact that students had to study at their own forced them to adopt self-directed learning which was appreciated by all but also criticized by some; for the feeling of insecurity at some points and the need to synthesize knowledge on their own. Most students believed that they developed critical thinking. My question is if the development of critical thinking could have been deepened if students would had more face-to-face interactions with both peers and teachers as well as more group work. Descriptions of different levels in the development of critical thinking would be an interesting point for further research.

As mentioned by Julian: it is easy to gain knowledge and loose it; therefore, the focus should be largest on getting critical thinking skills. The fact that the programme was administered online, meant that the students demographic was more varied than it might be in a campus-based programme, students in such a variable group will always have a different expectation on the programme content

(more educational theories, more sustainability, more tools). GU University ESD Master´s Programme adopted an interdisciplinary approach for a diverse group of students. Howlett et al. (2015) states that interdisciplinary approach does not require expertise in every discipline, but rather a willingness and ability to interact, communicate and learn from different perspectives. This seems to be aligned with students' wishes and expectations to learn from each other and from the teachers. Here is another opportunity to further research; what is the right balance of learning content between reading compulsory literature and group work/ discussions on real-life sustainability problems.

As Bolis et al. (2014) explain, research on ESD is supposed to support emancipatory education, encourage multiple perspectives and critical dialogue on the very concept of SD and ESD and the results of this study proved to have this character. Students understood the complexity of SD and ESD and left their definitions of these concepts relatively open, while critically reflecting on the current weak spots of these concepts (focus on development, existence of inequality in power structures and the lack of ESD on individual level globally).

5.3 Choice of method

The use of semi-structured interviews proved to be an optimal choice of a method, since students got the freedom to express their opinions without limitations and research questions, explorative in their nature, could have been answered based on results of this method. Thanks to this liberty, I got enough materials to answer both research questions but also cover an unexpected, reoccurring topic; the need to have face-to-face interactions for positive learning experience. Of course, every method has its limitations Semi-structured interviews became very time consuming both for me and for the participants. The long interview was a barrier for students to participate (since they were themselves busy by writing master theses), while time demanding transcription and analysis were setting a time barrier for me. Within the limited time frame of the master thesis, it was possible to interview 7 students; in other words, only one more then is recommended as minimum sample size for phenomenological studies (Mason, 2010). Nevertheless, even this limited data set was saturated enough to draw interesting conclusions. If similar study would have been done with more resources available even deeper knowledge could have been gained by interviewing students before and after the programme. In this study I relied on students' memories which can be misleading at some points. It would have been also interesting to follow up with students one year after the graduation. Then it would be truly possible to judge if they have been using the knowledge and skills from the ESD programme to create a sustainable future.

It was also helpful that I could brought into the research method my situated knowledge based on the fact that I was a peer of research participants. Situated knowledge is the result of mutually immanent social relations among researcher and researched, who collaborate and settle for a mutually agreed upon knowledge. By bringing together one's personal and professional experience, the researcher allows the reader to fully grasp the contextual nature of knowledge production, thus increasing the trustworthiness of the research. Being a peer also allowed me to act as my own research assistant; taking on the role of translator, cultural broker, and mediator in cross-cultural, cross-language research (Caretta, 2015).

6. Conclusions and recommendations

In this research, students´ experiences from GU ESD Master´s which was delivered as an online programme were studied. The focus was on students' learning experience in the online environment, related to students´ understanding of the concepts SD and ESD, as well as perceived development of critical thinking. This study looked into the topic of ESD in online environment. Thanks to the use of semi-structured interviews I was able to collect a rich data pool including students' thoughts and opinions which went beyond the planned framework of this research. The immense importance students see in human interactions should be taken seriously when designing new ESD online programmes or developing the existing one further.

The interviewed students reported a development in their perceived understanding of SD and ESD; the perceived increased knowledge led to larger awareness of the complexity of the term which is a positive sign because students then accept the polysemic nature of the sustainability concept. Students are keeping the definition of SD and ESD open which is promoting conversations about what kind of life we want to live today and, in the future (Bolis et al. 2014). Simultaneously, a majority of the students developed skills such as self-directed learning, critical thinking, feeling of personal responsibility and understanding the need for a "glocal" worldview. Development of thinking is the critical element in ESD (Thomas, 2009) and also a crucial aspect of the competence citizens need in order to participate in society (Dam & Volman, 2004). Critical thinking accompanied by independent learning skills, feeling of personal responsibility and "glocal" worldview is a good starting point for students to cope with uncertainty while not knowing what the sustainable future will look like. Poorly defined situations and conflicting norms, values, interests and reality constructions are typical for complex problems such as climate change or the COVID-19 pandemic (Wals & Jickling, 2002).

Most of these students felt satisfied with the learning outcomes. However, they strongly felt that their learning experience would have been better if they would have the opportunity to have more face-to-face interactions in the online environment (with both peers and teachers). Students understand the difficulty to organize life meetings in online environment with group of participants from different geographic locations and time zones, yet they suggested few ways how to develop such human interactions despite these barriers. Such suggestions included obligatory one-to-one meeting with both peers and teachers. The students expressed the wish to synthetize their knowledge together with other students and exchange ideas on sustainability topics as well as being involved in more group works.. With the teachers the students would like to discuss philosophy, the essence behind their teaching; as well as more detailed feedback which would help students to navigate through never ending choices of resources in online studies. Students mentioned that only one life session is an immense help in feeling comfortable to contact someone again in written form. That suggests, that life sessions would be ideally organized in the beginning of each course, so students and teachers get the chance to get to know each other and create a sense of community. The feeling of knowing each other is removing social barriers in further written cooperation according to students. Another form of humanization of online learning environments could be online lessons posted by teachers; the students expressed the wish to hear their voice and see their faces to know who they are working with. But even small gestures such weekly emails from the programme coordinator were highly valued; they still brought in the human touch.

These results allow to conclude that the online ESD programme is in general appreciated as a flexible and effective way to achieve ESD of a high quality. Although the ESD programme at GU was planned as a full-time study programme, the time flexibility to organize one´s study plan is enabling adults to adjust their daily life and combine it with other responsibilities. Nevertheless, to achieve a positive learning experience, more focus needs to be placed on the maintenance of the humanizing element (face-to-face discussions in online environment).

Van Dam-Mieras (2007) states that the central question in designing an online ESD programme is how to develop an effective online learning environment and educational instruments that enable students to become competent in promoting and implementing SD in their chosen field of endeavor. This study revealed that the starting point is promising; the students who joined this ESD master programme did so with altruistic goals. They saw the need to understand sustainability better and be able to transfer ESD to others; often within their current professions. The question is how to sustain this optimistic and proactive approach throughout ESD programmes and especially after graduation.

As presented in the results, students' ideas of a positive learning experience in online learning environments is strongly interconnected with stimulation of regular face-to-face discussions between teachers and peers. Students elaborated that this type of discussions is supporting test-thinking which as a result may be an origin to new unique ideas. Sustainability problems are complex, but students of varying disciplinary, social and cultural backgrounds can exchange views on interconnected economic, social, scientific, political and ethical aspects while discussing SD issues from a holistic perspective (on local, glocal as well as global level). By implementing regular face-to-face interactions in online environment, higher education institutions can help students to remove social barriers and build a relationship network. In this way, higher education facilities can act as a truly positive force in transformation and change towards a sustainable future. Student networks could give a beginning to creation of international ESD communities which would have the needed knowledge and skills to effectively spread ESD knowledge. As presented in results, some students specifically expressed the wish to be a part of a community. Azeiteiro´s et al. (2014) add that sense of online community is a significant predictor of online learning outcomes.

Education for sustainable development in online learning environments has a great potential to reach adult learners in employment or adults living in remote locations; people who would not be able to attend campus-based education. Public campaigns may be a way to speak to these people about ESD but there could be also more informal ways. Absolvents of ESD programmes who are left with positive learning experience would be more likely to act as promoters of life-long learning for SD. Many of the students who participated in this study are teachers and the impact they can have on their environment is not negligible. Therefore, students' learning experiences should be considered as very important not only during the programme (when students have the opportunity to build their relationships networks) but also after graduation (when they will talk about their experiences with others).

As suggested in the introductory chapter, the COVID-19 crisis lead to a rapid development of online learning worldwide and I truly hope that results of this study will be helpful for people designing future ESD programmes. Experiences from online learning in sustainability courses collected through students' responses provides a resource for other educators and researchers in sustainability education and professional practitioners and may help with the development and effective use of on-line technology for sustainability knowledge (Azeiteiro et al., 2014). Nevertheless, it is necessary to take into consideration Julian´s worry that the ESD research community and teaching community sit apart. Research on ESD must become a talking point among teachers so the future of ESD turns out to be

hopeful. The discussion about how to achieve this point of cooperation between the ESD research community and the ESD teaching community is beyond the scope of this study and should be a topic for further research.

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Appendices

Apendix 1: Semi-structured interviews

Introduction

- Interview Length: 60 minutes
- Primary goal: Conversation with participants and focus on their opinions based on experiences while st udying ESD programme at GU

Verbal consent:

- Would you like to participate in this interview? (YES/NO)

Background Information: Invite participants to briefly tell me about him/herself, general information about background:

- Age
- M/F
- Educational background (other experiences with adult education?)
- Professional background
- Country of origin / Country of residence

Narrative analysis

RQ1: What is students' conception of "SD" and "ESD" and how did their beliefs changed after experiencing interactions in an online ESD course?

- Can you tell me in your own words what was your personal perception of the phrase "SD" and "ESD" before the course? Did you have a clear idea? Even if you now think that it was wrong, can you tell me about it? And Sd
- What would you say about it now?
- What would you say that initiated these new insights?
- Did online interactions with your peers and teachers throughout the course initiated any new ideas?

RQ2: How do student perceive their development of critical learning and thinking while using ICT in ESD?

- We have absolved all courses in the programme, what have you learned in terms of skills and knowledge?
- How will you use the new information (or skills) in your day-to-day life?
- How do you think that will ESD & SD develop in the future?
- What would you say initiated this learning?
- Did online interactions initiate any new ideas?
- How would you compare education outcome of campus-based education versus online delivery?

Prepared additional and probing Questions:

- What makes you say that? Could you give me an example (clarification)?
- Tell me more about that (details)?
- And what do you think of that that (opinions)?
- What do you mean when you say … (understanding)?
- Yes, but didn´t you say a moment ago ...(contradictions)?
- How does that relate to ... (comparisons)?
- What would you say to the criticism that … (offering alternatives)?
- Would it be correct to say... (summarising)?

A General Last Question

- "Thank you for all that valuable information, is there anything else you'd like to add before we end?"

Apendix 2: Consent form for interviews

CONSENT FORM FOR "Students conception of ESD, SD and development of critical learning and thinking after experiencing Gothenburg´s University ESD education".

My name is Barbora Kubista and I am a Student of master's Programme in Education for Sustainable Development (ESD) at Gothenburg University. In my research I am conducting interviews with my peers in order to find out what is students' conception of "SD" and "ESD" and explore their beliefs in relation to experiencing interactions in an ESD programme. I also want to know how student perceive their development of critical learning and thinking after the ESD course. Results of this study will be published as a part of my Master thesis in June 2020.

Taking Part
I have been given the opportunity to ask questions about the project.
I agree to take part in the project. Taking part in the project will include being interviewed and recorded
I understand that my taking part is voluntary; I can withdraw from the study at any time and I do not have to give any reasons for why I no longer want to take part.
Use of the information I provide for this project only
I understand my personal details such as my name, phone number and address will not be revealed to people outside the project.
I understand that my words may be quoted in publications, reports, web pages, and other research outputs.
Privacy
I understand that all information I provide for this study will be treated confidentially.
I understand that in any report on the results of this research my identity will remain anonymous. This will be done by changing my name and disguising any details of my interview which may reveal my identity or the identity of people I speak about.
Use of the information I provide beyond this project
I agree for the audio recordings to be archived at Barbora Kubista´s computer
I understand that information I provide will be never sent by email to anybody and Barbora Kubista will be the only coder of the data.
I understand that other genuine researchers may use my words in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.

Name of participant……. Signature
……Date ……

Project contact details for further information: Barbora Kubista.
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