FACULTY OF EDUCATION
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PROFESSIONAL STUDIES

SUSTAINABILITY COMPETENCIES AND EXPERIENTIAL LEARNING IN HIGHER EDUCATION:

STUDENT PERCEPTIONS

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Abstract

Aim: The purpose of this study was to investigate university student perceptions of their competencies of and propensity to act for sustainability, while they study on a module designed with use of the experiential learning approach.

Theory: The conceptual framework of this research was based on a combination of theories; experiential learning (Dewey, 1963) that focuses on the development of student knowing, being and doing, and transformational learning theory (Mezirow, 2000) that has inspired the key sustainability competencies (Brundiers et al., 2020; Wiek et al., 2011).

Method: A mixed method approach to research has been used to collect empirical data through questionnaires, discussion forum activities and reflective papers from a class of first year undergraduate business students at a university in Sweden.

Results: Firstly, there was evidence to suggest that the students' confidence in their key sustainable competencies (KSC) increase as the students approach the end of the module. Secondly, evidence shows that as the students' confidence in their KSC increases, so does their propensity to act for sustainability. Thirdly, the students' experiential learning and intrapersonal competency for sustainability has a positive relation with the students' propensity to act for sustainability, regardless of the students' confidence in their KSC. Therefore, the students´ being and doing mediates the relationship between the relation of knowing and having the propensity to act for sustainability, which suggests the importance of using such pedagogical approaches and developing students' intrapersonal competencies for sustainability.
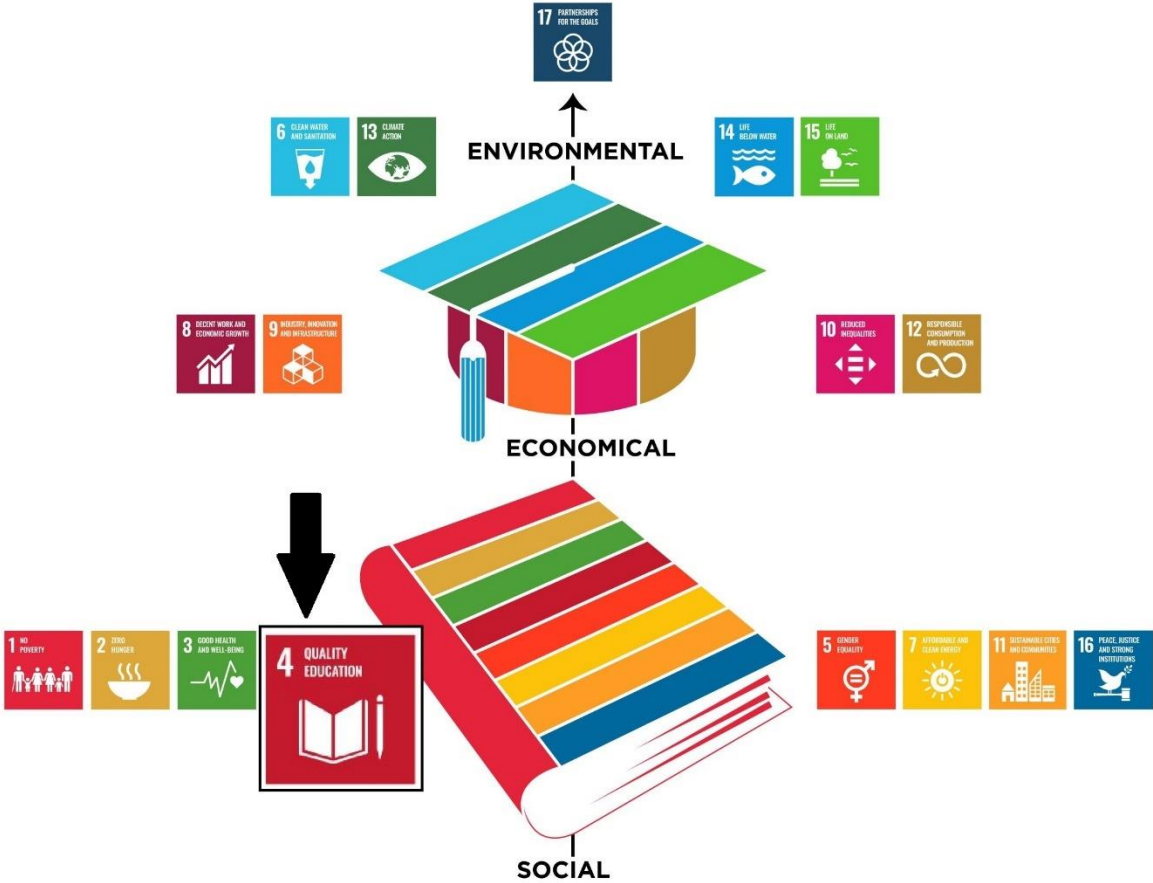
Foreword

First and foremost, I would like to thank everyone at the Department of Pedagogical Curricular and Professional Studies, Faculty of Education, at the University of Gothenburg for making this master program in ESD possible. Without all your hard work, I would not have been able to have the wonderful experience of studying such an important, inspiring and stimulating subject.

Secondly, I would like to thank all the students who have gotten involved in the many interesting discussions, creative innovations and supportive environment. It has been a great pleasure getting to know you all during this remarkably strange period in our lives, since Covid-19 broke out.

I would like to especially thank Sally Windsor for her guidance during ESD101 (our first course in the program) to create a sustainable change challenge, which has become an ongoing project of mine. The support she has given me for my project at work has been a great catalyst for further projects within the faculty, university and local community that is only growing stronger and more exciting. Most of all, I would like to thank Gert-Olof Boström for his fantastic collaborations and ongoing work that we have created together. It is a pleasure to have gotten to work with you and get to know you better over the past two years. I hope we have many more years of work ahead of us.

It has been like a breath of fresh air to experience such a great community of support.

Thank you all and Enjoy!

Visual: The SDGs in ESD-designed by Alice Annelin

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List of Abbreviations

Education for Sustainable Development (ESD)
Higher Education (HE)
Key Sustainability Competencies (KSC)
Sustainability in Higher Education (SHE)
United Nations (UN)

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1. Introduction

1.1 Background and Research Problem

Since the United Nation's (UN) decade for sustainability (2005-2014) many universities have begun to emphasise the sustainability perspective in their education. More recently, universities have also started to integrate the UN's (2015) sustainable development goals (SDGs) into their education. Sustainability in higher education (SHE) research has documented a vast amount of evidence (see Menon & Suresh, 2020 for a review) that has covered subjects such as, sustainability on campus, energy consumption on campus, the critical attributes of SHE, and research on sustainability at universities in general. Altogether, this set of research take the perspective of how the application of sustainability is organised, the influences of sustainability policy making and extra-curricular activities that involve sustainability at universities.

There has also been SHE research that covers subjects about education for sustainability that is actually conducted by educators, such as, education for sustainable development (ESD) in higher education, the integration of sustainability into different specific subjects, sustainability in curricular, and the pedagogical styles or approaches that teachers use to teach SHE; including alternative methods such as massive open online courses (MOOC), social media and other e-learning activities. ESD has been criticised for its weak sustainability perspective of economic growth (Bonnett, 2002; Huckle, 2010; Huckle & Sterling, 1996; Scarff Seatter & Ceulemans, 2017; Tikly, L et al., 2020) and its political attachment to the UN and the SDGs, which has led to the emergence of Education for Sustainability (EfS) that takes on a strong sustainability perspective. However, ESD has helped develop the notion of transforming teaching to involve new teaching practices for advancing our education towards a sustainable future.

The change in educational approach towards advancing SHE has been described as a form of transformational learning (Mezirow, 2000; Wals, 2014) that should create an experience of life-long learning for sustainability. If teachers are to teach in order to transform the student experience to advance ESD, we need to know what and how much the students already know and have learnt during the course of their education. The key sustainability competencies (KSC) have been designed as an assessment tool (Wiek et al., 2011) for teachers and students to better understand how well students are learning for sustainability. These KSC have been recognised by the UN as an essential tool to help students learn for sustainability in order to help achieve the SDGs (UNESCO, 2017). The KSC differ from other academic competencies, which lead researchers in this field (Brundiers et al., 2020; Wals, 2015; Wiek et al., 2011) have defined as

A distinctive and multifunctional competency, which is composed of several sustainability competencies that functionally relate to each other. It facilitates achieving successful performance and a positive outcome that progresses sustainability (given what is known, valued, and aspired at a given moment in time), while working on specific sustainability challenges and opportunities in a range of contexts (Brundiers et al., 2020, p. 17)

The original KSC framework (Wiek et al., 2011) includes strategic, systems, anticipatory, normative and interpersonal competencies. A considerable amount of research has been carried out to better understand how these KSC can be classified (Barth et al., 2007; Brundiers et al., 2020; Glasser, 2016; UNECE, 2012; Wiek et al., 2011), which has led to several criticisms and different perceptions of what the KSC should be classified as. A recent collaboration between practitioners and researchers (Brundiers et al., 2020) has advanced this prior research to include action as an implementation competency and intrapersonal competencies, such as attitude, interest and motivation. The ability for students to take action is a core aspect of experiential (Dewey, 1963; D. A. Kolb, 1984) and transformational learning theory (Mezirow, 2000; Wals, 2014).

Much of this SHE research (Menon & Suresh, 2020) has provided an understanding about teaching SHE from a teacher's perspective and teacher perceptions of applying SHE, and what it means for the teacher. However, little research has shed light on what ESD means for the student (Backman et al., 2019) and what students think about ESD, in terms of attitudes, interest and motivation as well as competencies to act for sustainability. In summary[1], the research from a teacher´s perception suggest that in order for teachers to advance SHE they need to apply pedagogical approaches (see Lozano et al., 2017 for review) that go beyond the traditional lecture approach and instead employ a student-centred approach. Thus, pedagogical approaches that challenge mindsets through more creative techniques (Barth et al., 2007) should be applied. ESD then focuses on what we teach and how we teach it as a sustainability discourse (Scarff Seatter & Ceulemans, 2017), as well as how students think about this sustainability discourse.

There are several different pedagogical approaches that could be described as creative, and several studies have informed about the use of experiential learning as an applied and active approach for sustainability learning (Backman et al., 2019). However, most of the research about experiential learning has also been analysed from teacher perceptions and what it means for the teacher, not from student perceptions. Experiential learning theory (Dewey, 1963) has found that people can learn well through having different experiences that result in knowing (the subject), being (attitudes, interests and

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[1] For the purpose of this thesis, I do not review the SHE research from the teacher's perspective because it would be too vast and could easily be reviewed as part of several different thesis subjects.

motivations), and doing (physical activities/implementation). Thus, students who learn about and for sustainability through experiential learning approaches could develop knowledge, attitudes, interests and motivation in order to act for sustainability.

Cebrián et al. (2020) suggest there is little evidence about the outcome that courses can have on the development of students' KSC. Backman (2019) points out that student perceptions can enrich our understanding of the learning experience consequences in ESD, such as competency to act for sustainability. One important outcome for ESD is how well the students develop confidence in their KSC. Furthermore, Domask (2007), Ely (2018), Hull et al.(2016), Lee & Schottenfeld (2012), and Otte (2016), suggest that an international student perspective on learning for sustainability can contribute to SHE research by providing an understanding of ESD focused lessons for students with diverse backgrounds, which bring with them diverse opinions. Thus, an investigation about how international student perspectives of experiential learning, coupled with how their confidence in KSC develops towards an increased propensity to act for sustainability is necessary and can provide new information about ESD.

It is evident that learning through experience helps the student and the teacher to engage, empower, connect to the real-world and foster an interdisciplinary approach. A literature review on pedagogical approaches for SHE (Lozano et al., 2017) revealed that it would be beneficial to further test experiential activities in order to better understand how best to teach sustainability in different contexts. Traditionally university education is delivered through a transmission process of instrumental learning practices (Wals, 2012), which includes lectures that present knowledge and texts that students use for self-study reading. ESD calls for alternative practices (Brundiers et al., 2020; Glasser, 2016; Wals, 2012; Wiek et al., 2011) that can provide space for students to reflect, discuss and interact with a student-centred approach so that students are better able to act for sustainability. Thus, this research contributes to experiential learning practices by adapting online tools that can provide emancipatory learning practice.

Furthermore, there is some indication that the use of conceptual theoretical frameworks within SHE research is limited (Karatzoglou, 2013). The theory of planned behaviour (Ajzen & Fishbein, 1980) has been commonly used to explain intentions and perceived controlled behaviour. However, Sniehotta et al. (2014) argue that there is a lack of experimental evidence to support the theory and suggest that future research could use a combination of different action theories and affective measurements to contribute new knowledge about behavioural outcomes. Therefore, a conceptual framework of experiential learning that can guide and explain the students' perspective of their collective experience of learning for sustainability, through a variety of digital and traditional learning tools, can contribute to knowledge about pedagogical approaches in SHE, how sustainability competences develop and any

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influence on intentions to act for sustainability. As far as the author is aware, this research is the first to test the KSC conceptual framework of Brundiers et al. (2020) by applying an experiential learning model that is inspired by emancipatory affective practices (Wals, 2012) that are essential in ESD.

1.2 Research Purpose and Questions

The purpose of this study is to investigate how international students´ perceptions of learning for sustainability in HE relates to the students´ perceptions of sustainability competencies and readiness to act for sustainability. This study investigates the use of a pedagogical approach based on experiential learning theory (Dewey, 1963) in relation to improvement of student key sustainability competencies and the students´ propensity to act for sustainability (Brundiers et al., 2020). International students that study on a module, course or program[2] without an explicit and traditional connection to sustainability can reveal potential new and different information about the students' perceptions of their ESD.

The international[3] students that participate in this study are in their first year on a business program at undergraduate level at university in Sweden. The international students bring with them a variety of attitudes, interest and motivations (being), and during the lessons the students participate in several different types of activities (doing) that engage the students in a variety of experiences, which include developing knowledge (knowing) about and for sustainability. Hence, the main research question of this thesis is,

> *RQ 1. How do students perceive their experiences of ESD at higher education level in relation to their confidence for key sustainability competencies and their propensity to act for sustainability?*

There are also some related sub questions put forward:

> *RQ 2. Is the relation between the students' perceptions of sustainability competences and their propensity to act for sustainability mediated by their experience of ESD at higher education?*

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[2] At this business school, a module is 5 weeks long about one specific subject; a course can have 2 or 4 modules that make up half a semester or a whole semester, respectively; and a program can be 3-5 years long, which is the same as 6-10 semesters.
[3] Students from around the world; Asia, Europe, America

RQ 3. How do students explain their key sustainability competencies through experiential learning activities at higher education?

As researcher and teacher of the module, I take a participatory role in this study by designing the module, collecting the data and presenting the research in this thesis. In order to compare and analyse different sources of learning, questionnaires, experiential activities and reflective papers are used to gather data to better understand the students' perceptions of their whole experience learning about and for sustainability. Firstly, an objective approach is taken to conduct an empirical questionnaire study, which is analysed to test relations between the students experiential learning (being, doing and knowing) for sustainability and the propensity to act for sustainability. Secondly, a qualitative analysis of student reflections that provide subjective interpretations of the students' experiences and competencies for sustainability is applied for triangulation analysis (Creswell & Plano Clark, 2011; Denzin, 2015; Denzin & Lincoln, 2011; Tashakkori & Teddlie, 2010).

This study contributes to research on SHE by providing empirical knowledge from international student perspectives at undergraduate level on a business school program. Students that study on a program that has integrated sustainability but not explicitly named the education as a sustainability course or module contribute new perceptions of ESD, since most prior studies have been conducted with students that study on an explicitly named sustainability program. Contributions are also made to our understanding of how experiential pedagogical activities (doing) and international student attitudes towards sustainability (being), relate to student understanding of KSC (knowing), and student propensity to act (doing), which has not been tested before and provides a new conceptual framework. This research also contributes research about the use of online tools for new pedagogical approaches to HE studies that can be useful for future HE curricular and teaching activity designs. In order to provide new knowledge about teaching ESD and its contributions to urgent matters in society, we need to transform the manner in which we teach the next generation of business leaders (Haney et al., 2020; Hesselbarth & Schaltegger, 2014).

In the next section, the theoretical framework and previous research will be discussed. In section 3, the mixed method approach and ethical considerations will be presented, and the results of both quantitative and qualitative data of the study are provided in section 4. An analysis of the results includes a comparison of all data collected in section 5 and concluding remarks and research limitations are discussed in section 6.

2. Review of Previous Research

There are many questions yet to be answered about the ability of experiential pedagogical approaches to develop student competencies to take action for a sustainable future (Backman et al., 2019; Brundiers et al., 2020; Lozano et al., 2017). However, prior research that have used different assessment techniques to study the use of experiential pedagogical approach to teach SHE has provided some insight from student perceptions.

For example, Lee and Schottenfeld (2012) conducted a study to assess an international experience of their visit to an educational event abroad in China and found that this experience was central to the students' learning experience. The students revealed that the informal experience can develop ESD in terms of the students' affective and cognitive learning; results showed a high mean impact of inspiration, engagement, enjoyment and intrigue (affective learning) and knowledge, comprehension and capabilities (cognitive learning). Hull et al. (2016) conducted a similar study visit abroad, but the students also took part in project-based assignments. Assessments were conducted with the use of interviews with the students, which revealed that multiple pedagogical approaches, including international experiential learning, were important tools to build competencies for sustainability.

A pre- and post-assessment mixed-method study by Savage et al. (2015) tested the KSC that have been designed in prior research (Wiek et al., 2011) and adopted by the United Nations (UNESCO, 2017). The research was conducted in a sustainability leadership program that emphasised the flipped classroom, experiential learning pedagogical approach. The research was framed in the transformational learning and affective learning theories. Results of the quantitative assessment tool showed that students felt they had gained more confidence in their competencies for sustainability after the experience they had in a leadership course. Furthermore, qualitative evidence revealed that the students felt that learning for community, future thinking and personal development were the three dimensions most important when learning for sustainability.

However, Meza et al. (2018) used Savage et al.'s (2015) questionnaire to test the assessment tool further and consequently found different results. The study included three different groups of students who took courses also designed with the experiential learning approach. They found three dimensions (complex problem constellations, sustainability transition strategies and sustainability visions) of KSC that support Wiek et al.'s (2011) framework. However, instead of Wiek et al.'s (2011) five separate dimensions, Meza et al. (2018) suggest that some of the five dimensions overlap to form three dimension of sustainability competencies. Furthermore, Meza et al. (2018) also found evidence to suggest that the students' confidence in their sustainability transition strategies mediates the relation between complex

problem constellations and sustainability visions. Thus, they concluded that strategic thinking for sustainability can increase or decrease the students' confidence in their futures thinking for sustainability while working with sustainability problems.

Comparatively, Otte (2016) conducted a pre- and post-assessment study based on a problem-based experiential lesson of team work among a diverse student group. The research design inspired the students to question what the developed world can learn from the developing world to overcome sustainability problems. The purpose of the study was to see if student behaviour of waste, consumption, sustainable choices and recycling changed after the lessons. Since the behaviour did not change, the authors suggest that this was due to the pedagogical approach of experiential learning, which reveals that not all experiential learning approaches designed for the classroom may inspire sustainable action.

Lewis et al. (2019) also conducted a pre- and post-assessment study, but used an experiential learning lab environment to assess changes in students' values and behaviours towards sustainability. Results from questionnaires and reflection journals indicated that intrapersonal learning had developed and behaviours had modified to more sustainable choices. Similarly, Browne et al. (2020) conducted a pre- and post-assessment study including questionnaires and interviews with students who were encouraged to take part in practical work experience that could reflect different sustainability problems. They found that less engaged students were less likely to take part in the work experience projects, those that did take part improved their sustainability thinking, behaviours and attitudes towards sustainability and a close connection to the curriculum was suggested as a way to improve such experiences to increase students' engagement.

Using a different research method, Mercer et al. (2017) designed an experiential game to assess two groups of students, university students that teach science to school children by using the game design. Results of the study indicated that the experience had a positive influence on all the students' action for sustainability. In this community learning lab approach, the authors found that sustainability skills were developed and positive feedback was given about learning how to effectively communicate science. A contribution to experiential learning theory was given by testing and evaluating the study with use of the conceptual framework developed by Kolb et al. (2014) and adapted for the study.

Furthermore, in a mixed method, longitudinal study of international students' experience on a master's course called Innovation for Sustainability, Ely (2018) also investigated the role of experiential learning and pedagogical approaches in students' learning for sustainability. The author also framed the study in Kolb's (1984) depiction of the learning cycle of experiential learning[4]. The study found that

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[4] The learning cycle includes concrete experience, reflexive observations, abstract conceptualisation and active experimentation, that are said to occur in a cyclical manner.

experiential pedagogical approaches greatly aided students' learning of empathy for sustainability. However, since the course was designed by using the word sustainability in the name, the students' expectations of such a course might have led to biased results. For example, Birdman et al. (2020) also studied the influence of experience based learning on the students' sustainability competencies, with student interviews and questionnaires across three different sustainability programs. Evidence suggested that intrapersonal reflections about discomfort and expectations was a key driver for the student's sustainability competence development, and that this was influenced by experiential learning activities. So, student expectations can influence their responses to assessment questionnaires.

In an action research study involving the perspective of teachers and students in various forms over several years, Dobson and Thomkinson (2012) designed a problem-based approach to courses also framed in the experiential learning theory. An interdisciplinary approach to the problem-based designs was found helpful, but appropriateness of the wicked problem-based design for each cohort was suggested to require special attention. This conclusion seems justifiable, since sensitivity to student emotional capabilities of dealing with different wicked problems should be considered when conducting experiential approaches to learning. Therefore, the authors question whether designing a course for SHE with this approach is in itself a wicked problem.

Thus, some research based on different assessment techniques has been successful in providing information about learning for sustainability through experiential activities, such as international experiences, living lab community activities, or internships, all using an experience outside the classroom. However, much of this research is not based on the experiential learning theory of Dewey (1963). Instead the research is predominantly based in the argument for transforming learning through the use of experiential approaches.

There has been varied results in prior research (Meza et al., 2018; Redman et al., 2021; Savage et al., 2015) about how the students' KSC can best be developed. Several researchers (Brundiers et al., 2020; Evans, 2019; Meza et al., 2018; Wiek et al., 2011) have found that there might be a type of hierarchy between the KSC. While the Wiek et al. (2011) study describe the KSC with 5 competency dimensions (systems, strategic, anticipatory, normative and interpersonal) and the Meza et al. (2018) study described the KSC with three competency dimensions, the Brundiers et al. (2020) suggest that values thinking could provide direction for all other KSC, governing how well the KSC can progress. This research is in its infancy and much more testing of the KSC needs to be established in order to better understand the influence of ESD on the development of student KSC. However, both Savage et al. (2015) and Meza et al. (2018) reveal that no matter the way in which the factors of KSC develop, the student's perceptions of their KSC pre- and post-assessments show a significant difference.

3. Theoretical Framework

Much of the SHE research that emphasise experiential learning overlap with transformational learning (Wals, 2014). Transformational learning (Mezirow, 2000) has included studies on different types of sustainability competencies (Brundiers et al., 2020; Wiek et al., 2011). In comparison, experiential learning in HE has been widely studied, but does not always engage with the sustainability perspective (Cantor, 1995; Fenwick, 2000; Gosen & Washbush, 2004; A. Y. Kolb & Kolb, 2005; Marlin-Bennett, 2002).

3.1 Experiential Learning

Dewey's (1963) theory of education and experience proposes that an experience is influenced by the past and influences the future as education grows physically, intellectually and morally. An education through experience that is open to evolve and exist anywhere needs to be in its time, taking influence from the best knowledge at its time. It is recognised that this process can be slow and problematic, but an "education of, by and for experience" (Dewey, 1963, p. 10) brings a richer method to education. Dewey critiques the "Either-Or" spectrum of extremes, between traditional teaching and progressive perspective, and points out that there are several problems and advantages with the two methods. Instead, experiential learning addresses a continuum "between experiences that are worthwhile educationally and those that are not" (1963, p. 12).

Dewey suggests that the educator's role is to interact so that experiences are shaped by creating conditions that can inspire growth. The educator should provide the subject matter material as well as stimulate observation and judgement in order to develop new experience. There may be different types of experiences, such as physical, emotional, intellectual, and moral-ethical experiences for an individual, or collective group of individuals. The continuity of experiences and interactions between participants shape experience in an ever expanding and contracting manner, giving experience its value. Education and individuals need to adapt to each other's requirements, thereby flexible enough to listen to each other's needs. For the educator, "planning must be flexible enough to permit free play for individuality of experience and yet firm enough to give direction towards continuous development of power" (Dewey, 1963, p. 25). Education as a social process of interactive experiences occurs with the individuals and educator as leader within a community. Thus, experiential learning should be helpful in developing interpersonal and intrapersonal competencies for sustainability.

Dewey (1963) further argues that in the experience of self-control, individuals learn ways of knowing, being and doing that together create meaning. Knowing comes from studying the subject, however Dewey describes our being as the attitudes, interests and motivations that interact while we are doing and therefore with doing acts physically; implementing our being. Meaning and purpose grows through a combination of observation, knowledge and judgement while planning and conducting educative experiences. It is suggested that this educational experience can help the learner to study the past, its influence on the present state in order to prepare for a future and solve present problems in society, by use of scientific method that inevitably leads to intellectual organisation and a disciplined mind. Dewey acknowledges that there is "an organic connection between education and experience" (1963, p. 8) and that not all experiences are educative, but instead experiences can have both positive and negative influences, even simultaneously, and experiences do not always lead to a constructive future. Thus, experiential learning should also be able to help develop strategic, systems and future thinking competencies for sustainability.

This experiential learning theory has been developed and tested by many researchers (D. A. Kolb, 1984; D. A. Kolb et al., 2000; Ord & Leather, 2011), and most cited is the Kolb model that is based on Lewin's learning cycle model (D. A. Kolb, 1984). Kolb and Kolb (2005) describe the experiential learning process as a learning style cycle that can go through four stages; a concrete experience, reflective observation, abstract conceptualisation and active experimentation. It is said (D. A. Kolb et al., 2000) that we grasp knowledge through a concrete experience and abstract conceptualisation, while reflective observation and active experimentation is how we transform knowledge. Thus, experiential learning is a practical pedagogical approach that helps the student to better experience the problem in a real-life setting, even if the experience is inside the classroom (Lozano et al., 2017).

The Kolb model has been criticised for being too simplistic (Ord & Leather, 2011), which is easily recognised when reading Dewey's original philosophy. However, Kolb et al. (2000) point out that little is known about if it is possible for the learner to experience the whole process of thinking about knowledge, reflecting on meaning and acting on what is learnt. Therefore, I propose that it is possible to return to Dewey's three factors of "knowing, doing and being" as equally important parts of the whole experience that can help explain the students' perspectives of their KSC and their propensity to act for sustainability.

3.2 Key Sustainability Competencies

The key sustainability competencies (KSC) considered relevant for teaching and learning have been debated in literature over several years (Barth et al., 2007; Brundiers et al., 2020; Glasser, 2016; UNECE, 2012; Wiek et al., 2011), and are based in the transformational learning theory (Mezirow, 2000). There have been several different terms that have been used to categorise the KSC (Shephard et al., 2019; Sterling et al., 2017) and it is stated that they have not been modelled or operationalised properly (Gardiner & Rieckmann, 2015), which can give varied results on how best to develop the students' KSC. However, the KSC have been recognised as a helpful assessment tool to evaluate student learning and teaching practices (Redman et al., 2021; Wiek et al., 2011).

A recent refined framework (Brundiers et al., 2020) about these KSC has been proposed, which considers the new knowledge that has been established by practitioners and researchers of SHE. The new framework suggests that the KSC can be characterised as integrated problem-solving competencies, which develop interpersonal, intrapersonal and values thinking competencies throughout the process. Systems thinking competency and strategic thinking competency develop futures thinking competency and implementation competency in order to produce action. These competencies progress through an iterative process.

The KSC differ from other academic competencies in that they are a set of competencies that specifically act on solving sustainability problems. Researchers and practitioners (Brundiers et al., 2020) have described the set of KSC as; intrapersonal competencies is the ability to engage, motivate and empathise with all stakeholders; interpersonal competencies is the ability to work with others to solve sustainability problems; values thinking competencies is the ability to differentiate, identify and critically evaluate one's own and others' values; systems thinking competency is the ability to analyse complex systems across domains and scales; strategic competency is the ability to design, implement and lead transformative strategies; future thinking competency is the ability to continuously refine one's own futures thinking and reflect on what influences this.

Differentiating between the KSC and the generic academic competencies that have been applied in HE for many years may be challenging. For example, the business school where this study takes place already teaches organisational problem-solving for future anticipatory needs, systems thinking through a holistic view of the whole value chain and strategic thinking for improving a product or service. However, it is the purpose of teaching sustainability that sets KSCs apart from generic academic competencies in HE, and especially at a business school, because if we continue to teach for the

business-as-usual approach of continuous economic growth it will be hard to truly improve the students' KSC (Parkes et al., 2017; Raworth, 2017).

3.3 Summary: Conceptual Framework

Although the ability to attain sustainability visions is important, the ability to act on these visions is a more critical aspect of ESD (Brundiers et al., 2020; Cebrián & Junyent, 2015; Salgado et al., 2018; Wals, 2015; Wiek et al., 2011) that has yet been addressed. The propensity to act can be described as the competency to implement and is a crucial addition to the KSC framework (Brundiers et al. 2020). It can be argued that in order to develop the ability to act on sustainability visions, learners need to better understand real-life sustainability problems (Brundiers & Wiek, 2017).

Experiential learning has also been described as a real-life method that encourages action for social change, enabling the student to disrupt the status quo (Brundiers et al., 2020; VanWynsberghe & Herman, 2015). Evans (2019) found that experiential learning is not a widely recognised pedagogical approach in university programs that specifically address sustainability and suggest that its relevance should be addressed. Therefore, it is possible that experiential learning helps to develop KSC that lead to meaningful action.

Evans (2019) produced their own competencies framework based on a grounded theory approach and found similar results to Wiek et al. (2011) and Brundiers et al. (2020), however Evans categorises values under the concept of attitude orientation. Furthermore, Wamsler (2018) considers attitudes, motivations and values (in other words being) as antecedents for action. Thus, attitudes as an orientation or mindset (Dweck, 2016) towards sustainability could also be recognised as the experience of being and it seems likely that students' perceptions of being may develop intrapersonal thinking competencies.

Kolb et al. (2000) argue that there are certain types of learners that are more likely to act on their ideas or knowledge than other learning styles due to a concrete experience. Since the ability to work with others, collaborate and act on solutions found to sustainability problems are described as the professional skills (Brundiers & Wiek, 2017) that lead to activities of Doing (Dewey, 1963), it seems likely that students' experience of doing may develop interpersonal and implementation competencies.

As Dewey (1963) and Kolb et al. (2014) point out, the experiential learning theory proposes that the educator draws out knowledge from the learner through an inward reflective process that motivates the learner to use knowledge in an experience. However, it may not follow that learners who have the capacity to use their knowledge to understand an experience will in fact envision or act on their

understanding (Brundiers et al., 2020; D. A. Kolb et al., 2000). It is well understood in prior literature across disciplines that there are many factors that can influence our intentional and actual behaviour.

In the theory of planned behaviour (Ajzen & Fishbein, 1980), it suggests that there is a linear relation between attitudes, social norms and perceived controlled behaviour (PCB). Further studies (Ajzen, 2011, 2015; Ajzen et al., 2009) have indicated that there are many different influential factors that affect the relation between attitudes and behaviour. However, Sniehotta et al. (2014) argue that there is a lack of experimental evidence to suggest that most of this PCB research is valid, and that in fact there is more evidence to suggest that it does not hold. They suggest that the use of a combination of different action theories and affective measurements could serve as help to forward behaviour theories. Wals (2012) argues that the prior established PCB factors, when tested as teaching tools, are instrumental learning practices based in transmission based techniques. Instead, it is suggested that transformation based emancipatory learning practices, such as reflections, discussions and interactions work better to improve the students' capacity to learn for sustainability that builds not just cognitive skills but also affective skills. Therefore, the attitudes, interests and motivation (being) of the student and the emancipatory practices of experiential learning (doing) could then mediate the relation between the students' confidence in the KSC (knowing) and their propensity to act for sustainability (See figure 1).
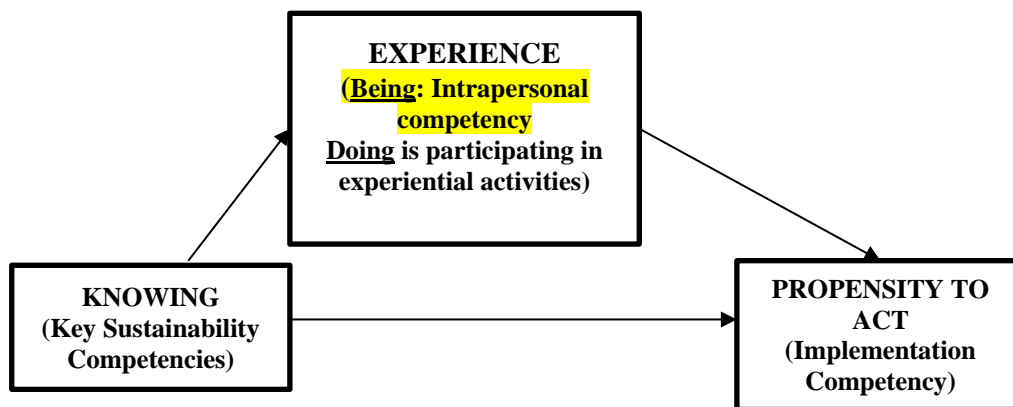

Figure 1: Mediation Model-The Whole Experience

Hence, this study addresses the research questions, firstly, by statistically testing a mediation model (see figure 1) using the questionnaire data, and secondly, by a qualitative analysis of student reflections that uses the discussion forum, reflections papers and open-ended questions from the questionnaire.

4. Method

4.1 Research Design

As a teacher of the module, I took a participatory role in this study. This means that I was responsible for the design of the experiential learning activities, the content of the module and educating the students through a student-centred approach; as well as collecting the data and presenting the research in this thesis. The research questions have been addressed by a mixed method approach (Sweetman et al., 2010), since it is believed that a pragmatic lens (Denzin & Lincoln, 2011) can provide improved knowledge to answer the research questions than if it were just answered with one form of data. It is also recognised to improve the quality of data reliability (Redman et al., 2021). Data was collected at the beginning of the module, during the module and at the end of the module that totalled five weeks. Questionnaires, reflection papers and discussion forums served as the data sources in this study.

4.2 Study Participants

The main participants were international students that study on a business university program in Sweden. The international student participants that have been selected are those that studied on an accounting module, whose tutor conducts this research project. The 79 students come from different countries around the world crossing Asia, Africa, Europe and America and study at the business school.

The number of registered students for the final exam was 65 students. The number of students that responded to the survey was 63, so the response rate was between 80% (63/79) and 97% (63/65). However, out of the 63 students that took the survey, 59 reflection peer review papers were collected, so the number of reflection papers does not completely pair with the number of questionnaire respondents. Most questionnaire responses were complete and missing responses were rare. There were only one or two missing responses in different questions, which indicated that using the mean value for missing values function in regression analysis could be conducted without too much influence on results.

The proportion of male (65%) to female (35%) participants resembled the proportion of female to male students in the class, and those that have taken the program over recent years. The proportion of age groups (94% 18 to 24-year olds; 6 % 25 to 34-year olds) and primary university place of study (Umeå 81 %; other university 19%) also resembled the class and previous years that usually start the program. Therefore, the data results resembled students on the business program. The percentage of responses that were studying in their first semester was 74.6%, which consisted of 47 out of the 63 participants. All other responses (16/63) that had studied for several semesters was considered exchange

students, students from other programs or those who could not attend the course completely in a previous year. More descriptive statistics about the participant sample are in the table below.

Table 1

Demographic Characteristics of the Study Participants

Characteristic	Category	Frequency	Percent
Gender	Female	22	34.9
	Male	41	65.1
	Other	0	0
Age	18-24	59	93.7
	25-34	4	6.3
University	Umeå	51	81
	Other	12	19
Number of Semesters (studied in HE)	1	47	74.6
	2	4	6.3
	3	1	1.6
	4	2	3.2
	5	8	12.7
	More than 10	1	1.6

4.3 Experiential Learning Activities

The module was conducted over 5 weeks and was the first accounting module the students had taken on the international business program. I was the lecturer responsible for the module and designed the module to include an experiential learning approach through the sustainability perspective. These practices included the use of several digital tools that helped the students to engage in real-life experiential activities, even though we had to conduct the module online due to Covid-19 restrictions. A guest lecturer participated in one live lecture about sustainability in business generally, as an introduction to business sustainability in the program. Other pre-recorded guest lectures were provided as a source of information more specific to sustainability accounting and business sustainability.

The students were given several experiential learning assignments during the module, which they had to participate in to pass the module. One assignment was a group work assignment where the students took part in a simulated case that combines traditional accounting with sustainability accounting. In the first part, the students used Excel to calculate costs of a business process and then analysed how well the company had performed, and if there should be any changes to the way cost had been accounted. Then the students needed to analyse the case in terms of sustainability accounting. This

was aided by the use of the Global Reporting Initiative (GRI)'s SDG Compass (GRI, 2019), which integrates the GRI guidelines[5] with the UN's Sustainable Development Goals (United Nations, 2015). It is an interactive website tool that connects the SDG targets with different measurements, across industries and SDGs. Also, a walk-along experience was required, where the students had to experience a similar companies' website[6] to see how they work with (measuring) sustainability in their business. This group work primarily helps to stimulate interpersonal, systems and strategic thinking, as well as futures thinking. However, all aspects of the KSC can be experienced.

Other experiential learning assignments were conducted as individual tasks to help the students reflect on what they learn. One short assignment asked students to reflect on the life-cycle-analysis by analysing their own clothing trends through an online tool, which helped to stimulate values and intrapersonal thinking. The life-cycle-analysis is then primarily used to inspire systems thinking with sustainability accounting in their group work assignment. Moreover, a discussion forum assignment requested the students to reflect on a work place environment they had experienced and how sustainable or unsustainable the experience had been, which stimulated reflections about sustainability accounting and the measurement tools used in accounting. Reflections from this activity have been used to qualitatively analyse the students' learning experience (see results section).

A seminar was also conducted at the end of the module, before the exam, where students were placed in small groups to present their Excel Case group work assignment solution to different group members. The students took on different roles, and so when they presented their solution they did so as if they were presenting the solution to the CEO of the company. The groups then came together to present their favourite ideas and the whole class got to vote on their overall favourite strategy solutions to the excel problem case. This role play activity stimulated reflections of the students' KSC, by setting the students certain key words to assess when analysing the group work. A final peer review reflection paper as an individual assignment was also required, where students read another group assignment report to critically analyse the solution. This reflection assignment was analysed as part of the qualitative analysis of the students' experiential learning and their KSC development (see results section).

Lectures, workshops, and seminars were conducted via zoom with the tutor that lead the module. Online conference tools, such as Zoom, provide a useful tool to be able to meet people in different locations around the world simultaneously. However, it is not as rich an experience as observing in close proximity and being able to see what is occurring during the whole interactional experience. For

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[5] The GRI guidelines have been developed by an independent organisation to help accountants to provide more transparent, comparable and reliable sustainability accounts on a global scale.
[6] Since the Covid-19 pandemic has restricted public gathering, I could not advise the students to do this in real-life.

example, in a zoom session the camera gives a narrow frame of view where one can observe, but students may have other people in the room or have a television on or other interactive influences that is not easily observed. Also, sometimes no observations can be made due to participants that keep their camera off during the sessions. Therefore, there are some drawbacks to zoom teaching, but it was the tool made available during the Covid-19 pandemic period.

4.4 Questionnaire design

A questionnaire was selected as the data collection instrument since, in my experience, students have been less willing to take part in interview studies. It can also be used to avoid a potential confirmation bias that face-to-face conversations can experience. By using a questionnaire where students remain anonymous to the teacher, students might feel more relaxed to give their opinion, and to provide more accurate information. However, it is possible that problems with response rates and quality of data also occur with questionnaire surveys (see data collection section 4.5.1 about questionnaire quality criteria). In order to collect deeper, richer data about the students' perspective of learning for sustainability, open-ended answer options to some of the questions were also provided on the questionnaire.

The questionnaire builds on prior research scales in order to contribute and improve the method and develop new knowledge about the self-assessment questionnaire method for KSC (Redman et al., 2021); based on theory and recent research progress about the connection between pedagogical approaches, such as experiential learning, and advancing student KSC. Another advantage of self-assessment student questionnaires is that it is an effective tool for formative assessment (Redman et al., 2021) and can improve student self-awareness (Andrade, 2019). Most of the measurements on the questionnaire have been borrowed from pre-tested scales from prior literature in order to improve the validity and reliability of the questionnaire items (Redman et al., 2021). However, in order to improve on the content of the questionnaire, some questions have been developed to better represent the content of the module that students have taken (Khaled et al., 2014).

Three pilot tests had been conducted with students that did not take part in this study. After each pilot test, feedback from students about the questionnaire were considered. The way in which the questionnaire functioned was also recognised and necessary adjustments were made. These pilot tests helped to improve the reliability of the questionnaire.

A pre-assessment version of the questionnaire was used to see if there is a change in the students' perceptions of confidence in their KSC. Since those who took the first questionnaire were the same student group that took the second questionnaire, a paired-sample test was used and results indicated a

statistically significant (p-value= 0.01, effect size 96%) and positive mean change between the pre- and post-KSC group responses [7].

The items on the KSC designed by Savage et al. (2015) were adjusted to help increase the content validity and reliability of the construct (Khaled et al., 2014; Meza et al., 2018; Redman et al., 2021). Content validity is the degree to which relations between items match the relations between the theoretical relations, and then whether inferences based on this are valid (Borsboom et al., 2004). Meza et al. (2018) believe that their tests of the questionnaire show that the items represent the theory of Wiek et al.'s (2011) framework.

The KSC construct (Meza et al., 2018; Savage et al., 2015) was used to operationalise Knowing (see table 2). The question asked was, "How much do you agree with the following statements? I feel confident and competent to...". There were 15 items (3 items for each competence) that measure strategic, systems, futures, values and interpersonal competencies (see appendix 1), and responses were graded on a 5-point Likert type scale from 1 (Strongly disagree) to 5 (Strongly Agree). The variable KSC is then measured by calculating the average (mean) of every item for each student.

Table 2

Operationalisation of the Constructs

Theory	Construct	Measurement	Questionnaire Questions
	Knowing	Key Sustainable Competencies	Part E (Systems, Strategy, Values, Futures, Interpersonal thinking; 15 items)
Experiential Learning	Being	Intrapersonal competencies	Part D questions 1-3 Attitudes, Interests, Motivations; 13 items
(EXPERIENCE)	Doing	Experiential activities	Part B questions 4-6 (How well the activity helped the student learn for sustainability; 3 items)
	Action	Propensity to act	Part D question 4; 4 items

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[7] The pre-assessment questionnaire only used questions in section A (background) and E (KSC). The test is not considered a major part to this thesis and will not be part of the analysis.

A question was developed based on Brundiers et al. (2020) findings, to measure the propensity to act main in the post-assessment questionnaire. The question asked, "How well did your whole experience taking part in this module help you to…" and has 4 items to address action. The responses were graded on a 5-point Likert type scale from 1 (Not at all well) to 5 (Extremely well). The propensity to act is the measurement used to operationalise Action. The variable is then measured by calculating the average (mean) of every item for each student.

The main questionnaire also measured Experience through both being and doing. Attitudes, interest and motivation together operationalise the construct of Being based on Dewey's (1963) discussion of experiential learning. Perspectives about and attitudes and interests have been loosely based on previously tested questionnaires (Brunstein et al., 2020; Zhu & Lu, 2017) and motivation (Shephard, 2008), which were adjusted to increase relevance for the participating students. The attitudes items test attitudes for importance, relevance and interest (the question was; How much do you agree with the following statements?"), and responses were graded on a 5-point Likert type scale from 1 (Strongly disagree) to 5 (Strongly Agree).

The motivation construct follows Shephard's (2008) research, which is based on the 4-stage motivation scale designed by Maslow as a hierarchical pyramid of needs (Kunc, 1992; Taormina & Gao, 2013). Shephard has adapted the scale for ESD and the question was "Which statement best describes your motivation for sustainability?". The measurement has four items that pertain to 4 different stages of our motivational development for sustainability. Each item has been adapted to help increase the content validity and reliability of the construct. Stage 1 was, "I am willing to listen, to read and to acquire information". Stage 2 was, "I discuss environmental issues with others and then formulate our own views on the issues to develop opinions that shape our own interactions with others, and with our environment". Stage 3 was, "I make life choices and experiment with prioritising "good for us" "good for our dependants" and "good for our descendants". Stage 4 was, "I aim to cooperate or even lead, and have the confidence and a commitment to constantly seek new ways to achieve and to reassess my decisions". The variable for Intrapersonal competency (being) is then measured by calculating the average (mean) of every attitude and interest item for each student plus the result for motivation.

The refined proposal of KSC by Brundiers et al. (2020) recognised that research needs to include an assessment of more specific values that can influence the ability to act for sustainability. Values as a norm has also been found to influence attitudes, intentions and behaviour in previous studies (Ajzen, 2011; Ajzen & Fishbein, 1980). Therefore a values construct is used to control for values other than the competencies values items, taken from the work of Schwartz (1992, 1994; 2001, 2012). This values construct has been tested and refined over several years and several different data sets, in several different countries. The question asked was "As a guiding principle in your life, how important are the

values stated below?" and responses were graded on a 6-point Likert type scale from 1 (opposed to my values) to 6 (extremely important). Schwartz's (2012) refined version of this scale has been used, which includes 10 values; self-direction, stimulation, hedonism, achievement, power, security, conformity, tradition, benevolence, universalism. Items were defined on the questionnaire to help students to better understand how this research comprehends these concepts. The variable Values is then measured by calculating the average (mean) of every item for each student.

In this questionnaire, experience is not considered as the affective learning of a student who experiences an emotional response to the module. Instead, in this study, experience is considered the action of doing the activities assigned in the module/classroom. The experiential learning activities measure the students' experience of discussion forums, group assignments and workshops or seminar that operationalise Doing in relation to learning for sustainability. The question asked was; How well did the (activity) help you to learn for sustainability? Please comment, if you would like to describe your experience". Responses were graded on a 5-point Likert type scale from 1 (not at all well) to 5 (extremely well). The variable Experiential Activities (Doing) is then measured by calculating the average (mean) of every item for each student.

The number of semesters a student has studied at university was used to control for experience, since it was a diverse class and some students have studied before, some in other countries and sometimes other programs or in different disciplines. Control variables included, Age, #Semesters, and principle University[8] because these factors seemed likely to represent experience and knowledge that the student's might have acquired prior to the module. Gender was also considered a possible determinant of KSC and propensity to act, because our biological differences can influence our emotions due to different hormonal structures (Kret & De Gelder, 2012). Also, different cultures can create differences between genders due to upbringing, life experiences and expectations, among many other elements.

4.5 Data Collection

Data for the main analysis was collected at different times throughout the module. The pre-assessment questionnaire was collected over the first two days, but is not used as part of the main analysis for this study. The discussion forum data was collected after 2 weeks of the module. The main questionnaire and the reflection papers were opened in the last week of the module and the students were given two

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[8] Some students are exchange students that study on the program for one or more semesters.

weeks to reply to the questionnaire but only one day to do the reflection paper. See table 3 for more information.

Table 3

Data Collection and Activity Schedule

Activity/Data	Date opened	Date closed	Task Responsibility
Pre-assessment Questionnaire	First day in module	Second day in module	Individual
Online Experiential Activities (Excel sheets, GRI links, lecture links and LCA tool)	First day in module	End of module	Individual & Group
Group Work Assignment	First day in module	End of week 4	Group
Discussion Forum	First day in module	Two weeks into the module	Individual
Seminar role play	One day in Week 4	Same day	Individual & Group
Reflection Papers	Beginning of Week 5	Two days later	Individual
Main Questionnaire	Beginning of Week 5	End of Week 6	Individual

4.5.1 Questionnaire Data Collection

Firstly, an interactive[9] web-survey tool called LimeSurvey was used to distribute the questionnaire online (see questionnaire in appendix 1). Online questionnaire survey tools can reduce respondent-researcher bias (Evans & Mathur, 2018) by influence of interaction between respondent and researcher while participating in the survey questionnaire. Online questionnaires are also cheaper and probably better for the environment, since there was no need to print out 79 paper surveys (twice). It is also an appropriate manner to conduct research in Covid-19 times. Data can transfer between the online survey system and statistical packages quickly and with less risk of human error during data input. However, there are some drawbacks. The students may not interpret the questions consistently, or represent what the students understands about the subject or the competency. The results of this study should therefore

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[9] A questionnaire designed with elements that the participants can interact with, for example, website links.

be interpreted as perceptions of students´ own experiences (Migliorini & Lieblein, 2016) throughout the analysis.

The descriptive statistics of the quantitative questionnaire data of each variable are in table 4 below. Several tests were conducted to determine validity and reliability of the constructs used in the questionnaire (Lans et al., 2014). Scale reliability was established through internal consistency measures. This is shown when the Lambdas exceed 0.60, but are not be too high (.95>λ>.5), which they did for all variables. When latent constructs have more than three items it is considered best to report the Cronbach's alpha (alpha>.7) (Bollen & Lennox, 1991; Clark & Watson, 1995; Hulin et al., 2001). Tests for reliability passed the adequacy level of >0.70 Cronbach Alpha (Cronbach, 1946; Hair et al., 2010) for all of the variables. Results of the Kolmogorov-Smirnov, and Shapiro-Wilk test for normality was statistically significant (p-value=<0.001) for all variables. The VIF test for multicollinearity shows low multicollinearity when the value lies between 1 and 10, which it did (1.041, 1.361, 1.402; p-value=<0.001) with the variables in this study. The inter-correlations and squared inter-correlations tests of validity (Bagozzi & Youjae, 1988) all showed statistically significant (p-value= < 0.001) for all variables.

Table 4

Descriptive Statistics and Correlation of the Scales

	Mean	Std. Deviations	Cronbach's alpha	1	2	3	4
1. Propensity to Act	14.038	2.737	0.840	--			
2. Experience	46.470	6.711	0.79	0.475**	--		
3. Key Sustainability Competencies	56.860	8.893	0.923	0.601**	0.447**		--

The Pearson correlation test (see table 4) showed that all variables have statistically significant and positive correlations with each other, which range between 0.447 and 0.601 with the dependent variable propensity to act.

4.5.2 Reflection Papers and Discussion Forum Collection

A discussion forum activity and reflection peer-review papers were also collected to qualitatively analyse the students' perceptions of their KSC from a subjective perspective. The discussion forum task was analysed to contribute a subjective perspective of the students' KSC at an early stage. Instructions were given (see appendix 2) and questions such as, "what is sustainable and what is unsustainable about a work experience you have had (or would like to have)", and "how could a tool like the SDGs help a management accountant to assess sustainability in the work place", helped to guide the students in their discussions. Students had to start at least one discussion and comment on at least two of their class members discussions.

Also, the students wrote a peer review reflection paper that critiqued the solution and strategy presented in the group work assignment reports of the class members work at the end of the module, before they took their final exam. The students were asked to reflect on the strategy, systems, values, future, interpersonal and intrapersonal thinking as well as the action plan (see appendix 4 for more information about the instructions).

4.6 Data Analysis

4.6.1 Quantitative Analysis of Questionnaire Data

The main quantitative analysis used the Ordinary Least Square (OLS) regression and the Sobel test (1982) for path mediation, following prior research (Meza et al., 2018; Savage et al., 2015). The Sobel test is "based on products of coefficients involving paths in a path model" (MacKinnon et al., 2002), thus inferences are made as a path mediation due to the research design. A hierarchical regression analysis is also conducted to further analyse the variation explained by the variables.

4.6.2 Qualitative Analysis of Reflection Papers and Discussion Forum

A qualitative data analysis of the discussion forum activity and reflection papers investigated themes of the KSC that were reported to be learnt by students. The discussion forum activity was analysed at midpoint to gauge what the students could reflect on in regards to the KSC and what they needed to develop further[10]. The reflection peer-review papers were uploaded into the software NVivo, which helped organise data, manual thematic codes were set and a correlation analysis of common words was performed.

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[10] See appendix 3 for an example excerpt from the discussion forum and how it is coded

Firstly, manual codes were set by reading the papers line by line and selecting text that reflected on any of the main themes of this research or emerging aspects. A colleague also coded the students' reflection papers and discussed the results with the researcher until both agreed on the codes, which helps to ensure inter-coder reliability (Kurasaki, 2000). The main coding themes were Action, Intrapersonal, Interpersonal, Systems, Strategy, Values and Futures, which were used for both discussion forum and reflective papers. It emerged that some aspects were discussed in a manner that overlapped these terms, and so an emergent node was used, called Combination[11].

Secondly, a text search query found several more data points that could help explain the main codes. The words in the text search query were set to include stemmed words and synonyms of the KSC, to ensure inclusion of meaning behind the words. A text search query allows the user to put a code word into the search engine and NVivo connects all the data points that link around that search word. The researcher can then click on the word tree to see the whole data around the data point in order to read the full meaning around the word. Then the researcher that searches for correlations between sentences that centre around the same code can manually code the data and see the patterns between what the students are talking about; for example, employees, health and the SDGs.

The words used in the text search analysis included strategy, strategic and strategically; system(s), process, procedure; future, anticipate, anticipation, predict, forecast; value(s), norm(s); collaborate, collaboration, cooperate, cooperation, partner; act, action, implement. The richness of the data for each thematic code indicated that the scope and nature of responses could help to answer the research question, and were therefore considered credible, dependable and transferable (Lincoln, 1995; Morse et al., 2002). Altogether, the qualitative data has been used to enrich the data analysis in combination with the quantitative data analysis, to improve the quality criteria (Lincoln, 1995) of the data analysis by this mixed method approach (Denzin & Lincoln, 2011). A systematic qualitative data analysis can provide an element of trustworthiness that differs to the reliability and validity of quantitative data analysis.

4.7 Ethical Considerations

This study took an ethical pluralistic perspective (Crane & Matten, 2010) and a responsive ethics approach that is inclusive to ethical relationships between researcher, colleagues and student participants. As we learn together we respect and listen to hear our diverse perspectives as equally important knowledge (Kemmis et al., 2013). It is possible that my participatory role in this study created ethical problems regarding confidentiality, since the qualitative data was not initially anonymous to the

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[11] See appendix 5 for a quantitative table of codes.

researcher. However, once the data was collected, each participant's data was given an ID number and names were deleted, which meant that once I took on the role of researcher to analyse the reflections I did not know who wrote which reflection paper or discussion forum contribution.

I was also able to create an open, honest and respectful environment where students were informed of the research process and how I would handle the data. I also informed the students that if they did not want me to use their data in the research they could let me know, to provide them with autonomy over their participation in research. No student asked to not be part of the research, however 4 students did not provide a reflection paper assignment and the same students did not take the exam. This indicated to me that these students did not intend to finish their studies on this module on this occasion. Several students had been influenced by Covid-19, stating that they needed to go to hospital or stay off screens. The sensitive issues of Covid-19 have social-psychological implications for teaching online and student care (Corbera et al., 2020), which had been considered during the research process.

This research follows the rules and regulations of ethical research at the university, and therefore complies with the Data Protection Act and the guidelines issued by the Swedish Research Council. The ethical review is regulated in the Act (2003: 460) on ethical review of research concerning individuals. If research is carried out on sensitive personal data, consent must be obtained from the individuals, and the project must be ethically tested and approved. Sensitive information includes, racial or ethnic origin, political opinions, religious or philosophical belief, membership in a trade union, and health and sex life. It was not necessary (or even possible) to apply for ethical permission, since the survey questions are not considered sensitive. Therefore, it was exempt from ethical review according to Act (2003: 460).

Instead, the participants were protected by informing them of the research and explicit information in an invitation letter to participate in the survey, as well as verbally at the beginning of the module so that participants could ask questions (see appendix 1 for the questionnaire introductory letter). Indubitably, respect for the participants' values, anonymity and the choice to participate was established, as well as allowing for self-expression and self-development without oppression (Kemmis et al., 2013). For example, permission to record lectures was asked on every occasion and rules were set for academic discussion forums and group work.

The questionnaire items did have identification variables, such as place of study, gender and age, but these are not variables of analysis that have been used to pinpoint an individual. Participants were made aware that no identifiable data would be used in an analysis that identifies an individual, but instead the data would be used as control variables and sometimes in an average response group analysis. The study was also designed to create value for the students, since the goal was to increase the students'

competencies for sustainability through experiences that can be useful for the students' futures and engaging, stimulating, and even an enjoyable experience.

2. Results

5.1 Questionnaire Tests

5.1.1 Hierarchical Regression

A hierarchical regression (see table below) test shows that the variable Experience explains 25.2 % of the variation in the dependent variable propensity to act, while the variable Knowing (KSC) explains a further 16.1% of the variation in the dependent variable propensity to act. Therefore, both independent variables together explain 41.3% of the variation in the dependent variable propensity to act and thus 58.3% of the variation in the dependent variable propensity to act is not explained by this model.

Table 5

Hierarchical regression analysis

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.502a	0.252	0.240	0.597	0.252	20.553	1.000	61.000	0.000
2	.643b	0.413	0.393	0.533	0.161	16.441	1.000	60.000	0.000

a Predictors: (Constant), Experience
b Predictors: (Constant), Experience, KSC

5.1.2 OLS Regression and Sobel Test

There are several steps to provide the Sobel test that includes using OLS regression. Step 1 showed that the relation between KSC and the dependent variable propensity to act was statistically significant and positive (b= 0.6007, t=5.8686, p-value=<0.001). Step 2 showed the relation between KSC and Experience (Intrapersonal Competencies and Experiential Activities) was also statistically significant and positive (b=0.4469, t=3.9103, p-value=<0.001). Step 3 showed that the relation between Experience and the dependent variable propensity to act was also statistically significant and positive (b=0.5603, t=4.3947, p-value=<0.001). Step 4 showed that when controlling for Experience, the relation between KSC and dependant variable propensity to act is no longer statistically significant (b=0.2261, t=2.3355, p=0.8244). Finally, the Sobel test results indicated statistically significant (z statistic 1.9571, p=0.0503)

evidence that Experience (Intrapersonal Competencies and Experiential Activities) mediates the relation between KSC and the student's propensity to act for sustainability.

Table 6

Sobel test models

	Independent variables	Propensity to Act	Experience
Step 1	Key Sustainability Competence	0.6007***	
Step 2	Key Sustainability Competence		0.4469***
Step 3	Experience	0.5603***	
Step 4	Key Sustainability Competence	0.2261	

5.1.3 Qualitative open-ended questions from the questionnaire

Qualitative data was also collected by the questionnaire open-ended sections to the questions about the students' experiential activities (see appendix 1 for questionnaire questions B4-B6). This data helped to receive more reflections about the students' learning experiences (DOING), for example, some students described the group work assignments

> It gave more depth and understanding of how business can work towards the SDGs. How to reach them and how important these actions can be. (ID 2)

> By working with a case, it becomes clearer how different aspects of sustainability influences a company. It gives you, as a student, an insight of how working with business creates opportunities to work and influence other fields with regard to sustainability. (ID 17)

> After being placed with other people from different groups for the seminar event, I was provided more useful ideas and reflection centred around how SDG's are involved in said assignment. Being able to discuss with people outside of one's own group was very fruitful and would definitely do it again, as it allowed me to broaden my horizon. (ID19)

> It really helped me realize how sustainability can be implemented into companies. (ID 31)

Some students also described their experience with the discussion forums, saying

This was interesting because it gave practical examples from real life and also many different perspectives and well outlined thoughts from classmates. It gives the whole content a context. (ID 6)

In my opinion, it gives the students a broader perspective on how different tools can be used to achieve certain goals within sustainability. I have learned how to implement them to different companies based on their internal structure. (ID 22)

The discussion forums allowed me to be able to talk about a topic, or organization of my choice which I was comfortable with. This allowed me to make more detailed comments about the company that I previously was unable to. (ID 36)

It was very interesting to learn about examples from every student. (ID 40)

5.2 Qualitative Results

5.2.1 Discussion Forum Experience

The discussion forum topic asked students about what was sustainable or unsustainable about the work environment in their experience and how could a tool like the SDGs help to assess sustainability in the work place. I have provided some examples of the discussion forum experience, but have chosen to not go into too much detail since it is the reflection papers that provided the richness of the students' learning experience.

DOING: Implementation competency-acting for sustainability

After reading through the students' discussion forum experiences[12] I was delighted by the enthusiasm some of the students had put into analysing their work experience (doing) in relation to the role of a management accountant and the SDGs as a measurement tool. For example, one student wrote about their experience in relation to work in Cameroon and the SDGs;

> The company is quite concerned about the SDGs as it has built residential camps for the workers and within all these residential camps are hospitals, schools for kids, portable water and electricity. Equally being in the agriculture industry, it automatically fights hunger which is one of the SDGs. Despite these positive efforts toward achieving some SDGs, the company is equally a threat as it has cut down thousands of hectares of natural forest to cultivate its crops and thereby destroying the natural habitats for wildlife like lions, gorillas, elephants etc. The company also uses plastic papers to protect bananas from the panama infections and some of these plastics end up littering the farms and is not collected for recycle. Equally, the company uses chemical fertilizers, pesticides and herbicides in the farms and some of these chemicals are carried into the nearby rivers by rain water where they become a serious threat to aquatic live. Finally, a good number of the rubber processing machines in their factories are old and produce a lot of smoke which definitely

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[12] An example of how the discussion forum was coded can be found in appendix 3.

contains carbon dioxide which is very dangerous to the environment (destroying the ozone layer and causing global warming / climate change). (ID 38)

In this description the student shows that they recognised sustainable and unsustainable activities that can impact social and environmental factors. By the end of the first half of the module and the discussion forum deadline, it was evident that there was much more to be learnt and that the element of putting ideas into action had not been considered in a deeper manner. Some students were unable to connect their discussion to at least one out of the 17 SDGs, even though this was the applied question in the forum ("how can a management accountant measure and account for the SDGs"). However, most of the students had been able to think about things in their own work experiences that could be changed in order to work towards a more sustainable future, which indicated some understanding of how sustainability can be implemented in different contexts (doing).

KNOWING: Key Sustainability Competencies

The prior example not only explains the student's past doing but also what they may already know about/ for sustainability. The analysis of this experience also seems to be based on thinking about the whole system in terms of sustainability. The student then went on to connect this to a management accountant's perspective, saying

> Looking at the SDGs weaknesses of the CDC, the management accountant needs to step in to salvage the situation. The management account needs to be inspired by the Triple Bottom Line (TBL) Model, which incorporates the societal, environmental and financial dimensions in business thinking. This enables the business to not only be concerned about profit making but to also measure the impact of their activity on the people and the planet at large. Another tool which can also be used is the Sustainably Assessment Model (SAM) which has as goal to involve organization members in sustainable development thinking and assess the sustainability of the business' activities…Yes, the management accountant can do these and even more but is there anything you think he can do about the cutting of the natural forest which is a habitat for biodiversity and a greenhouse gas absorber? (ID 38)

Here, the student has started to use what is learnt in the module through strategic thinking for sustainability, however it also shows that the student has not completely understood the use of the accounting tool, since the SAM is based on the TBL theory. While some students had been successful in connecting their experience or dream job to sustainability accounting, others had not quite achieved this yet. Some students had also been successful at incorporating a system-thinking approach, by thinking about where the resources come from, how resources are used and what happens to the resources at the end of life. These students had recognised this life cycle analysis can be a good way to find out where different types of costs/impacts affect an organisation's process, whether it be product or service. There was also a range of responses when it comes to the ability to connect their own

experiences to the holistic perspective of sustainability; economic, environment and social costs/impacts for the organisations. Some students found some dimensions relevant and others found all dimensions relevant, while others had not discussed them at all. Thus, there was evidence that the students' knowing for sustainability varied.

BEING: Intrapersonal Competency-attitudes, interests and motivation

Another student that had worked on an airline showed that they could reflect on the complex problems that some industries have when it comes to transforming to a sustainable society. A student responded to the airline experience reflection by asking

> Was there an active discussion of how the aviation company could improve environmentally and sustainably among the flight attendants, or were the environmental goals just discussed within the top management? I believe it is crucial that sustainability and the SDGs are actively discussed within the company, since informing and emphasising a sustainable environment and working towards the organisational goals, could be a motivation-boost for the employees. Do you agree? (ID 47)

This student has revealed their attitude, interest and perhaps even projecting how they are motivated to work for sustainability, which reflects somewhat on their intrapersonal competencies (being). However, some students only provided blanket statements about how we need to recycle and save energy, which indicated a lack of motivation to work with these activities. Some students also gave insightful and helpful feedback to their class members with good reflections and ideas in order to help their fellow class members to reflect a little deeper.

5.2.2 Reflection Papers

The definitions for each code of the qualitative data were based on Brundiers et al.'s (2020) conceptual framework study, which were used to continuously reflect on whether or not the students showed understanding in regards to these competencies. Results showed that most students could reflect on what they learnt about strategic thinking for sustainability (40/59 students). However, less than half of the responses could reflect on all other competencies and only 10 students reflected on the possibility of action for sustainability (see appendix 5 for results of the codes). However, the information provided in the reflections gave a rich understanding of what the students had learnt about the KSC and the experiential activities during the module.

The student peer review papers that were collected at the end of the module revealed that the students had been able to reflect much deeper about different types of sustainability problems and different solutions to these problems. The reflections revealed that most of the students had definitely

gained confidence in their competencies for sustainability in comparison to their reflections in the discussion forums. In the following sections, the data has been organised to explain how the students had reflected in regards to the thematic codes that organised this data.

KNOWING: KSCs of *Values, Systems, Strategic and Future thinking (combined)*

The definitions used to refer to when analysing the students' reflections for these KSC were, Systems-thinking competency "ability to collectively analyze complex systems across different domains (society, environment, economy, etc.) and across different scales (local to global), thereby considering cascading effects, inertia, feedback loops and other systemic features related to sustainability issues and sustainability problem-solving frameworks." (Wiek et al. 2011, p. 207); Anticipatory/futures-thinking competency "ability to collectively analyze, evaluate, and craft rich "pictures'' of the future related to sustainability issues and sustainability problem-solving frameworks" (Wiek et al. 2011, pp. 208–209); Normative/values-thinking competency "ability to collectively map, specify, apply, reconcile, and negotiate sustainability values, principles, goals, and targets" (Wiek et al. 2011, p. 209); Strategic-thinking competency "ability to collectively design and implement interventions, transitions, and transformative governance strategies toward sustainability" (Wiek et al. 2011, p. 210).

Supporting Weik et al. (2011) and Brundiers et al.'s (2020) conceptual frameworks, the students' reflection papers indicated how the competencies factors interrelate. For example, there were many examples (26 out of 59 students) where the students have related values thinking to strategic, systems or future thinking; for example

> The 'white collar' workers that do this work are low in numbers, thus most likely creating an already unbalanced workforce with more unnecessary stress. It doesn't either aid towards the fact that gender inequality exists in the workplace thus making a job order costing system less effective. (Student 2)

This student has thought about the values of equality for the workforce in a system that is designed to only calculate the cost of production, not the costs and impact on its workforce. Furthermore, another student reflects on values thinking in relation to systems thinking, by saying,

> Cutting trees that absorb CO^2 and produce oxygen, extracting from mines, which needs lots of water, and the procedure of the leather uses chemicals and water that are very harmful for the environment. Therefore, the goal is to improve every part of the product life to make it more sustainable and reduce the negative effects it has on the world around it. (Student 22)

This student has thought about the value of environmental preservation and system of resource use in a

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production and product life cycle. Other students have reflected on values in relation to future thinking, for example,

> Machines can't be creative and come up with new ideas, humans are the cornerstone of organisations. And to educate them in environmental issues is truly important to be able to achieve a more sustainable future. The "open door policy" is a really good idea. (Student 20)

The idea to educate the staff with an "open door policy" to achieve a more sustainable future can be considered an interrelated relationship between competencies thinking about a strategy in terms of the future. This student has shown that they considered the complexities of sustainability thinking. Another student also reflected on the relation between values and strategy thinking, with some insight in futures thinking, when saying

> I find that a proposed measurement that should be placed in order to reach a target to monitor the percentage of each gender in the employment of white-collar positions creates a problem that does not exist from the start, and making this the wrong solution. I do fully agree that all business should have equality as a standard, but I do not see that equality is the same thing as quoting when hiring. In this case the CEO, and owner, is a woman. From what I understand, judging all production workers names, I would claim the majority are women. I do not think that we could judge the CEO for hiring men to supervisor positions, I would rather argue that she probably has hired people that are suitable for the job. The simple answer is they could have had the most experience of all the applicants. It's not in my opinion being objective, when claiming that they do not run an equal company, just because they have more men at white collar positions. I do not compare equality and a quota of 50/50 between men and women. I would rather argue that they could invest in educating staff to future supervisors, when expanding on the Scandinavia market as is planned. You could promote some of the women in the production to get more diversity in leadership and offer them the opportunity. In that way you target a goal of having more mixed leaders in all departments. It is important to highlight this problem, but I do not fully agree that this is necessary to be a problem in this case. (Student 39)

Therefore, this student has been able to recognise the complexities of equality measures as a strategy and the reality of having a highly educated workforce. The ability to reflect on such sustainability values in relation to the future, systems and strategy is considered an urgent necessity for immediate decision making to be successful (Funtowicz & Ravetz, 1993). Since it is the principles and concepts taught, or already known by the students, that build the values thinking competencies for sustainability, it is likely that values competency should develop the students' other KSC. For example, strategic and systems competencies can be found in other assessment tools specific to measuring other knowledge, so if the students have not understood or aligned themselves with the values of sustainability, how do they then develop the other KSC.

DOING: *Interpersonal Thinking*

The definition used to refer to when analysing Interpersonal/collaborative competency was "ability to motivate, enable, and facilitate collaborative and participatory sustainability research and problem solving" (Wiek et al. 2011, p. 211). Part of the experiential learning activities during the module was developed to help increase the students' interpersonal competencies for sustainability, designed to simulate tasks that would be conducted in the professional world (Brundiers & Wiek, 2017). The students conducted group work to collaborate on a problem to solve together and in cooperation with the rest of the class as they take part in workshops and seminars about the case problem and their solutions over the course of the whole module.

Moreover, some of the students' peer review papers (11 out of 59) indicated the students' learning for interpersonal competencies, however this somewhat few number of student reflections about interpersonal competencies indicated that more needs to be done to emphasise the importance of this competence. The students showed they had reflected upon the complexities of creating collaborating networks that also follow sustainable practices and goals. For example,

> The production process is important to consider for sustainability. The internal and a few external systems, such as the importance of communication with customers and potential cooperation with other businesses, and for outsourcing companies. Taking more control of the pre and end phases can be a benefit and, in this case, perhaps a less impact on the environment could be reached (student 30)

This student has been able reflect on the impact of collaborators on the environment due the product process of the company, and had tried to connect the participating elements of the whole system to overcome environmental problems of the production process. However, other students have pointed out how some just collaborate with sustainable suppliers for their reputation, for example, one student said "Collaborating with local distributors and having an eco-friendlier image could be beneficial both for the company and the environment" (student 58).

Thus, these students have pointed out that collaborating for sustainability may not be considered in terms of the sustainability values, but even if the company holds unsustainable values. Business activities with other participating organisations to appear like they are working for sustainability, but are actually misleading observers is known as greenwashing (Delmas & Burbano, 2011; Laufer, 2003). This is one of the more complex matters and controversial aspect of business activities, and is a common discussion point with business students when teaching for sustainability. Another student recognised the complexity of producing a truly sustainable product with so many participating organisations that need to be controlled for and measured, commenting

> The manufacture of goods will never be 100% sustainable but the companies should try to improve their performance as best as they can to do their part to accomplish the SDGs. Therefore, the correct solution is to question the suppliers again and to check the partners, and to choose environmental-friendly companies, and try their best to make the product durable. (student 46)

Since these reflections indicated that the complexity of solving sustainability problems when some have low values thinking for sustainability and high interpersonal thinking for sustainability at the same time. This also indicated that low values thinking for sustainability could result in high confidence for students' systems, strategic and futures thinking competencies, if interpersonal competencies play a mediating role. Altogether, although there were few responses that indicated reflections on interpersonal competencies to solve the problem case, the students that have reflected show that interpersonal competencies may play an important role in the development process of student learning for sustainability. Thus, providing the opportunity to develop interpersonal competencies through experiential activities should become the norm in HE and its goal to advance ESD.

BEING: *Intrapersonal thinking*

The definition used to refer to when analysing Intrapersonal thinking/competency is the students ability to reflect on their attitudes, interests and motivation for sustainability as an affective competency (Brundiers et al., 2020; Shephard, 2008). Evidence from the peer review assignment also showed that the students had developed their intrapersonal thinking about the solutions given by their class members' group work solutions. For example, a student suggested the potential problems with trying to act for sustainability, saying

> Although we hear a lot about sustainability on social media and so on, I still believe that the silent majority still prefers a cheaper alternative over the eco-friendly one. Thus, an increase in pricing might not be the greatest idea, depending on the scale of increase of course. (Student 27)

This student recognises that if business continues as usual, without supply from the organisations driving the sustainability effort, demand from the customer may only ever be about what the customer can afford over any other goal. Therefore, some attitudes may stay in the individualistic mindset if the option still exists, even if we have confidence in our competence for sustainability action. Another student pointed out the problem of individualistic mindset, saying that "the solution about how being sustainable can help them as a marketing tool gave a rather general solution and seemed shallow to me" (student 47). Other students revealed that they are interested and willing to learn, for example,

I like the approach of the bamboo implementation. More specifically, are they going to import bamboo or grow it locally if they can? This information is needed to properly understand their intended meaning. It is a very interesting concept. (Student 1)

Another interesting thing about their SDG discussion is the fact that they bring up SDG 5 which is 'Gender equality'. It is an SDG that I didn't immediately think about when making this assignment which made it fascinating to read. (Student 35)

These students have indicated interest and willing to learn more about the solution given, as well as reflected on what they hadn't considered themselves while conducting the assignment. Other students used words that describe more than interest, such as intrigue and what is crucial to them, which also suggest they are willing to learn more, for example

One solution which is quite intriguing is the change to a more sustainable material which would increase the company's sustainability greatly and would help them in their work towards SDG 15. (Student 11)

I believe it is crucial to understand the background of the Life Cycle Analysis and why it is important for modern organisations to implement it in their daily operations. In comparison to my group, we introduced the section about the LCA, with structural and methodical information and how it can be applied to the circular economy. (student 24)

Other students showed agreement and reflected on the importance of all life, for example,

I strongly agree with the group's opinion, that forests are important to absorb CO2 and represent a habitat for animals. (student 22)

It is of course important that the company takes responsibility for their influence on the biodiversity on land. I also like that they invented a lot of good strategies to take care of the staff, since they are a key factor in the functioning of the company. (student 37)

The idea that company would go through automation struck me as odd as this goes against social sustainability, which is one of the three main components of sustainability. (student 46)

These students have been able to reflect on their own values and used this self-awareness to address the solutions given. Similarly, other students showed they had learnt from the peer review assignment and indicated they were willing to learn more by reflecting on their own values that revealed their attitude towards the solution given;

I must say that it is great that you bring up this SDG 3 and the importance of the mental and physical health of their employees, since my group did not really focus on it, and therefore it was an interesting read. You make a good point about how they can allow

breaks at certain instances and offer therapy for those who require it, but I was wondering if you could do something more to help the workers feel good at the factory. Since food is an important factor when it comes to stress, I think that it could be a good idea to invest a little bit of money to make sure that the workers eat well and by doing that they will be able to perform better. Another way to relief the stress of the workers could be to introduce yoga or something similar 2-3 times a month on non-working time. If you compare the cost of that type of activity to the effect it will have on the employee's mental health, I think it would be worth to at least give it a try. (student 48)

Overall, I think some given proposals were interesting and thoughtful, while other seemed to be experimental and not thought-out well. With such a controversial topic, I believe it is not an easy task to find a solution that fits all parties involved, and I weighed that into my evaluation to the best of my ability. (student 57)

Altogether, the students' reflections show some moderate to strong attitudes towards how important it is to work for sustainable solutions and their own interest in the subject. This evidence also suggests that the students are mostly motivated at a more intrapersonal level; attitudes and motivation to make decisions that is good for society (Shephard, 2008). Thus, it suggests that there is more space for these students to grow in terms of creating the attitudes that help lead to more action for sustainability.

DOING: *Propensity to Act*

Although the group work case study that the students' peer review papers were based on was an assignment that asked for the groups to come up with an (actionable) solution to the problems found in the case, there were few students that directly reflected on the possibility of creating actionable changes for the company. However, several of the students that show such an implementation competency have been able to connect the accounting measurements to the ability for companies to control past performance in order to create sustainable solutions (which is one of the expected learning outcome of this module). One student commented on group's solution, saying

It would be nearly impossible for the company to implement any of the changes proposed as there is too little information about how to do it, what would have to change, and how that change would affect the company and society. I think that performance measures have to be used in the life-cycle analysis. After all, how are you supposed to analyse if the changes you are doing is helping the life cycle if you can't measure them? For climate action, the measurement ISO14000 Serie gives a practical tool to organisations so that they can measure their global impact. (student 17)

This student has reflected on the complexities of how much information is needed to analyse the system of a company in order to put proposed sustainability ideas into action. This student has also recognised

the role of an accountant in their work for sustainability, which is something that several students found difficult at the beginning of the module.

The GRI's[13] SDG compass is an internet site (with other resources) that helps to connect the SDGs to measurement tools frequently used by different organisation across different industries, for example, the ISO series. This tool has proven to provide a useful and practical interactive resource for students to better understand the scope of the accountants' work, when it comes to measuring performance, not just on a financial basis, but through a holistic sustainability perspective. For example, several students could see how measuring performance can lead to action,

> I found a good idea also the initiative to improve the internal communication through the "Open Door Policy", so every problem could be easily traced and solved and afterwards measure the results with the help of the ESI (Employee Satisfaction Index). (student 14)

> I think that the tools that the company could use in order to measure progression with a sustainable goal should show how those would actually help the company work towards the sustainable goal. (student 25)

> A measure for action that fits very well is that of measuring the efficiency of the green power initiative since one of the SDG´s they decided to work mostly with is that of climate action or number 13. (student 7)

> Great points on which SDGs the company should be focused on, particularly as they are a company which generally requires large extraction of raw materials and the production with wood can have a large impact on the environment if lacking sustainable procedures. Although it would be helpful to see some practical methods in which they can build their product to last longer. (student 4)

Thus, the students learnt that it is important to be able to put ideas into action and how to use the measurements to map progress in order to know where changes need to be made. Although some tools provided by political means may be inconsistent with the sustainability perspective, and contain many other controversial elements than just the economic growth dilemma, the tools can be a useful stepping stone for undergraduate business students to be able to better understand their role in their future carriers; increasing their implementation competencies for sustainability.

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[13] The Global Reporting initiative (GRI) is an independent organisation that has helped the accounting industry to improve their work for sustainability by connecting sustainability and the SDGs to the business activities of all sorts of organisations, big and small.

3. Discussion

6.1 Quantitative evidence: Answering the Research Questions

The hierarchical regression showed that the students' confidence in their competencies for sustainability (knowing) is statistically significant and positively related to the students' propensity to act, but that this knowing only explains small variation in the students' propensity to act. The low variation results suggest that other factors could help explain the students' propensity to act for sustainability. This study followed prior research (Brundiers et al., 2020; Shephard, 2008) to test the students' intrapersonal competency (being) and the activities conducted during the module (doing), to help answer the research question, "*How do experiential learning approaches to ESD influence the students' perspectives of key sustainability competencies and propensity to act for sustainability?"*. The evidence found that the students' experience of conducting the activities (doing) and their own intrapersonal competencies (being) explain more variation in their propensity to act for sustainability than just the KSC. Thus, it is not just knowing the KSC that help us to learn for sustainability, it can be the students' whole experience that together help the student to increase their propensity to act for sustainability.

More significantly, the quantitative data showed evidence to answer the second research question *"Is the relation between the students' perceptions of sustainability competences and their propensity to act for sustainability mediated by their experience of ESD at higher education?"*. Results showed that the students' experiential learning (both being and doing) for sustainability has a positive relation with the students' propensity to act for sustainability, and the experience mediates the relation between the students' confidence in their KSC and propensity to act for sustainability. Therefore, the pedagogical approach (activities and techniques) chosen to conduct a module and the ability to foster affective intrapersonal learning is an important factor in education for sustainability in order to help students learn to find confidence in their abilities to act for sustainability. This result supports the suggestion of how important attitudes for sustainability are in order to create action to solve our sustainable problems (Leicht et al., 2018; Wamsler, 2018).

The result of the mediation analysis also builds on the Brundiers et al. (2020) framework for KSC and suggests that intrapersonal competency may be a growth mindset (Dweck, 2016), a mediating attitude between knowing and acting for sustainability. If teachers can encourage a growth mindset for their students to follow the sustainability perspective, perhaps they will be more likely to act for sustainability than just learning the knowledge about sustainability. For example, instead of feeling the anxiety that comes with our destructive behaviour towards our planet, we could teach our students to

feel that we are not sustainable yet. This growth mindset could create innovative thinkers that could find solutions to our sustainable problems and encourage students to act on these solutions.

Overall, this quantitative questionnaire survey evidence reveals that the international students' experience on a module helped to explain a significant amount of the variation in their propensity to act for sustainability in total, which helps to support the conceptual framework of Brundiers et al. (2020). However, it also indicates that there are more factors about the students' experience on a module that can help to explain the variation in the students' propensity to act for sustainability. Variables such as age, gender, number of semesters at a university, main university location and general values (Schwartz et al., 2012) were all controlled for in this study and showed no statistically significant influence. It was therefore interesting to see that no matter how long the students had studied at university, or which university the exchange students are based in, the attitudes, interest and motivation towards sustainability influence their propensity to act for sustainability.

Since there could be several other factors that could help to explain the influence of the students' whole experience (being and doing) on their confidence in KSC and propensity to act for sustainability, the Brundiers et al. (2020) conceptual framework could benefit from the theory of planned behaviour (Ajzen, 2015). However, several researchers in ESD have criticised this theory for its lack of application of emancipatory learning practices in education (Glasser, 2007, 2016; Wals, 2012), which could instead be a fruitful avenue for future research. However, more can also be learnt from the students' perspectives through their reflections of the module assignments and their own experience of sustainability in qualitative evidence. Qualitative reflective evidence can help to explain the students' understanding of the KSC, intrapersonal and implementation thinking for sustainability.

6.2 Qualitative evidence: Answering the Research Questions

The reflection papers indicated that most of the students were able to show that they understand how to analyse a case problem through the sustainability perspective. They were also able to think about the case problem in terms of the KSC (knowing) as well as reflect on their own intrapersonal competencies (being) towards sustainability in the workplace in more detail than they could in the discussion forum. Moreover, the students noted that they found the group work activities (doing) gave depth, context, and that talking to others inspired and increased their interest. The discussion forums helped to relate sustainability to an experience they were comfortable talking about, something they knew about and freedom to choose what they wanted to talk about. Thus, the experiential learning activities (doing) helped to develop the students' intrapersonal experiences, or in other words, the students' experience of doing helped to improve their being and knowing for sustainability. Thus, this evidence can help to

answer the research question, *"How do students perceive their experiences of ESD at higher education level in relation to their confidence for key sustainability competencies and their propensity to act for sustainability?"*.

Furthermore, the students provided evidence that can answer the research question *"How do students explain their key sustainability competencies through experiential learning activities at higher education?"* when they showed that values thinking drives their strategic, systems and futures thinking, and that their interpersonal thinking could influence these perceptions values and strategic, systems and futures thinking (Knowing). For example, the students were able to reflect on a management accountant's role in the strategies, systems and future thinking of the organisation and realised how the values of the organisation can be a significant driver of how well the organisation make their decisions in respect to sustainable choices and how they work with others.

While, Rieckmann et al. (2012) find that systems thinking competency drives all other KSC, the conceptual framework in Brundiers et al.'s (2020) study provides suggestions that values thinking in fact underpins all other competencies. However, the evidence in this study suggests that values thinking develops strategic, systems and futures thinking competencies for sustainability, and that it is the interpersonal competencies that moderates this KSC development. The students' reflection papers have therefore indicated how the knowing competencies factors interrelate in a slightly different manner to the Brundiers et al. (2020) conceptual framework, but supports the idea that values thinking for sustainability is an important factor if we are to inspire students to act for sustainability.

The students also discussed the complexities of putting sustainability strategies into action (doing), and reflected on the method of a management accountant and the enormity of a holistic systems approach, but also reflected on the importance of being able to act on the strategies in a realistic and urgent manner. Several of the students could understand that when the values of the company are not truthfully in line with the sustainability perspective they will be less likely to act for sustainability, and use sustainability to make profit rather than decrease any possible negative impact on the planet and society.

Many of the students were also able to use the knowledge they had learnt about the SDGs by using the GRI SDG compass (an online tool) to discuss the connection between the management accountant's work, the strategy of the organisation and the manner in which the company should act. Since increasing the ability of students implementation competencies is an important element for our sustainable future (Cebrián & Junyent, 2015; Salgado et al., 2018), perhaps the controversies that exist within the SDG framework are outweighed by the benefits that students can gain from creating critical mindsets.

Overall, the results have been able to show that in order to understand ESD from an international group of students' perceptions it is helpful to differentiate what the students think about sustainability and how they perceive what they have learnt for sustainability to become a norm for their futures, thus whether they will act for sustainability. To do this, the conceptual framework of Dewey's (1963) experiential learning theory can help to explain how the students experience building their confidence in sustainability competencies (knowing) about sustainability. It can also help explain how the students perceive their intrapersonal competency (being) while taking part in the module (doing) through developing implementation competencies for sustainability.

Although teaching the knowledge of the subject and creating different activities, even experiential learning activities, is a common part of teacher curriculum in HE, developing the intrapersonal competencies (Being) for sustainability is not so common. Many HE institutions consider that the political nature of developing intrapersonal competencies is risky and that the lecturer should always take a neutral position. However, teaching for sustainability requires us to make that stand and develop the skills to advance ESD and create urgent action for a sustainable future. Furthermore, developing intrapersonal competencies (being) through creative activities (doing) has proven to be a vital element of the students' whole experience in order to increase their propensity to act for sustainability. More importantly, the international students seem willing to learn and show largely positive attitudes, interest and motivation to learn for sustainability. Thus, the students are calling for tutors to advance their ESD for sustainability.

4. Conclusion

The student perceptions of their knowing being and doing for sustainability indicate several positive influences on the students' propensity to act for sustainability. Firstly, there is evidence to suggest that the students' confidence in their KSC (knowing) and intrapersonal competencies (being) while taking part in experiential learning activities (doing) is related to their propensity to act for sustainability. Secondly, the students' experiential learning and intrapersonal competency for sustainability has a positive relation with the students' propensity to act for sustainability, regardless of the students' confidence in their KSC. Therefore, the students being and doing mediates the relationship between the relation of knowing and having the propensity to act for sustainability.

More importantly, the evidence indicates that the intrapersonal competency to learn for sustainability is an important aspect of ESD that needs to be fostered in HE throughout the program, not just in some modules. The use of reflective work and interactive tools that can provide experiential

learning opportunities is a transformative teaching technique that should be applied throughout the curriculum and program design, in order to advance ESD across all of HE. In order for tutors to apply these new teaching tools in a pedagogical approach that can increase the students' propensity to act for sustainability, tutors need the adequate training and support to learn for sustainability as well as the students. During the UNESCO world conference on ESD (2021), a declaration was made that stated to be able to help our students to learn for our planet and act for sustainability we need to train our teachers to learn and teach for sustainability by 2030. Thus, the awareness of the importance of ESD is spreading, but support both financially and willingness on the part of teachers may be lacking. However, this research has shown that even students on an accounting module, with a tutor that had to quickly re-design[14] the module to apply the approaches online (with no extra cost), could learn for sustainability quite well.

Results from the qualitative reflection papers suggest that there was a favourable increase in confidence for the sustainability competencies after studying on the module (knowing), which applied experiential learning activities (doing) and opportunities to critically reflect on their own attitudes, interests and motivations (being) for sustainability. Compared to the reflections in the discussion forum activity at the beginning of the module, student reflections in the peer review assignment had deepened quite well; in regards to the KSC and their own attitudes, as well as applying ideas to how solutions can be acted on in reality.

Moreover, the students' reflections also indicate that values thinking for sustainability can be a significant driver that develops the other KSC. Also, the students' reflections indicated that the interpersonal competencies can help to moderate the development of the other KSC. Thus, creating collaborative assignments in higher education where students can foster a better understanding (knowing) of the sustainability problems together could be a necessity in SHE curricular design. On the one hand, fostering sustainability values of students at HE could be too late, since they have grown up with a variety of values already imbedded (knowing). On the other hand, students who have just left home for the first time and like to seek out who they are (being), away from their family and childhood, may be more open to new ideas. However, the idea that teachers foster values in students is considered controversial because of our political differences and traditional position of the teacher as neutral, which indicates possible resistance to teaching for sustainability and fostering growth mindsets.

Furthermore, even though the measurements tools, such as the UNs SDGs, have their controversial elements in regards to a lack of strong sustainability approach, they have been helpful as a pedagogical tool to teach the role of accountants in sustainability work. It was evident that this SDG

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[14] Due to Covid-19 restrictions.

tool set creates a platform for discussion about the reality of the goals and targets set, and helped the students to connect the practical work of an accountant (doing) with the theoretical concepts of non-financial information in accounting (knowing). Similar tool sets could be adapted for other disciplines so that they could be used to advance ESD through more active experiential learning approaches.

Although evidence seem to indicate positive results from the experiential learning approach to increase students KSC and propensity to act, there was also evidence to suggest that several students could not reflect deeper than what the costs for the solutions would be for the company. While impacts on society and the environment were reflected upon, the financial (economic) consequences were also commonly discussed in terms of costs for the company rather than impact for a sustainable world. However, since most students, especially a group of international students, can be quite diverse, there will always be some students that may not align with the sustainability perspective of considering our impact on others rather than just costs; and some may never change their mindset so that they act for sustainability.

Overall, the experiential learning approach and theoretical framework of combining activities to develop student being, doing and knowing in order to increase the students' propensity to act has proven to function well in an applied university program, such as business administration. Although experiential learning has been applied in modules that have been discussed in prior SHE research, much of this research have not addressed how the theory of experiential learning to help us to better understand how the whole experience of SHE influences the students' propensity to act for sustainability. This research is the first to return to Dewey's theory of experiential learning through the concepts of Knowing, Being and Doing to address different aspect of ESD in SHE. Thus, this study has contributed new information from the students' perceptions about the experiential learning designed lessons in a module that has integrated sustainability to advance ESD in a (covid-19 enforced) distance classroom environment.

The study has also contributed new information about international student perceptions of sustainability and ESD and their propensity to act for sustainability, which show that these students do not indicate different aspirations about sustainability to students that typically sign up to sustainability programs (Backman et al., 2019; Lozano et al., 2017; Menon & Suresh, 2020). Therefore, this research has also contributed to knowledge about traditional business school pedagogical approaches, showing that experiential activities can help students to reflect well on matters for sustainability (such as the use of discussion forums and reflection papers as well as role play seminars, and virtual experiential walks) no matter what their background knowledge, interest, motivations or attitudes may be to study on a HE program.

Contributions have also been made to practicing teachers about the use of digital tools in education. Transforming the education of a typical business program from a traditional transmission-

based lecture and assignment setting to a student-centred interactive, reflective and practical setting, that uses a variety of online digital tools, can help to provide future leaders in business with more confidence in their sustainability competencies and a higher propensity to act for sustainability.

7.1 Future Research

Future research could benefit from testing the experiential learning approach and theoretical framework in alternative university programs in order to better understand the different contexts; for example, if results are similar in natural science or humanities studies. Since intrapersonal competencies are such an important factor to influence students' propensity to act, are there different pedagogical approaches that work better for different intrapersonal characteristics; for example, fiction literature that can evoke emotional reflections. Furthermore, if intrapersonal competencies are developing student emotions, the sensitivity of shaping such emotions may include ethical factors that could be studied further in research. Also, a follow up study about the students' perspectives on sustainability in their workplace could help better explain more about the students' propensity to act for sustainability, too.

Furthermore, future research could conduct a validation study to test the KSC construct, since when I tested the KSC construct with a confirmatory factor analysis I found that the items loaded on three different factors compared to the Meza et al. (2018) study. Although this result may question the validity of the construct, it also somewhat supports the conceptual framework of Brundiers et al. (2020), which suggest that values thinking competency for sustainability is a driving factor towards creating higher confidence on the other KSC and higher likelihood that students will act for sustainability in the future. However, it is also possible that the way in which the sustainability competencies can develop best may depend on the context of the student; for example, the context for these international students on a business program could differ from students on a natural science program (Birdman et al., 2020).

7.2 Limitations

There are some limitations to this research that should be considered. Firstly, this study was not able to take the experiential learning activities outside the classroom, such as an active walk through the community to learn from real-life experience, due to covid-19 restrictions. On the one hand, similar in-classroom boundaries can be found across programs and universities on a global scale and thus innovative pedagogical approaches could help to overcome this predicament. On the other hand, such interactive learning lab experiences can greatly aid the students' propensity to act for sustainability (Mercer et al., 2017; Meza et al., 2018) and is instead considered for future projects at the university.

Secondly, since the classes were held online and not in the normal environment of the classroom on campus (due to covid-19 restrictions), observations of group interactions were not possible. A study that could include observations and in-depth interviews could help develop our understanding of the experiential learning activities and the practical tools used to help aid the students KSC development. However, the use of online tools in experiential learning designed education has been found to enrich the students' experience and encourage collaborative as well as independent learning experiences.

Thirdly, the quantitative data could not be connected to the qualitative data, so a direct comparison between students' perceptions could not be conducted. Thus, an experimental design that could account for changes in the individual and control for other contributing factors may help to determine more about how students experiential learning influences their confidence in KSC and propensity to act.

5. References

Ajzen, I. (2011). The theory of planned behaviour: Reactions and reflections. *Psychology & Health*, *26*(9), 1113–1127. https://doi.org/10.1080/08870446.2011.613995

Ajzen, I. (2015). The theory of planned behaviour is alive and well, and not ready to retire: A commentary on Sniehotta, Presseau, and Araújo-Soares. *Health Psychology Review*, *9*(2), 131–137. https://doi.org/10.1080/17437199.2014.883474

Ajzen, I., Czasch, C., & Flood, M. G. (2009). From Intentions to Behavior: Implementation Intention, Commitment, and Conscientiousness1. *Journal of Applied Social Psychology*, *39*(6), 1356–1372. https://doi.org/10.1111/j.1559-1816.2009.00485.x

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Prentice-Hall Englewood Cliffs, NJ.

Andrade, H. L. (2019). A Critical Review of Research on Student Self-Assessment. *Frontiers in Education*, *4*(87), 1–13. https://doi.org/10.3389/feduc.2019.00087

Backman, M., Pitt, H., Marsden, T., Mehmood, A., & Mathijs, E. (2019). Experiential approaches to sustainability education: Towards learning landscapes. *International Journal of Sustainability in Higher Education*, *20*(1), 139–156. https://doi.org/10.1108/IJSHE-06-2018-0109

Bagozzi, R. P., & Youjae, Y. (1988). On The Evaluation of Structural Equation Models. *Journal of the Academy of Marketing Science*, *16*(1), 74–94.

Baron, R. M., & Kenny, D. A. (1986). The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173–1182.

Barth, M., Godemann, J., Rieckmann, M., & Stoltenberg, U. (2007). Developing key competencies for sustainable development in higher education. *International Journal of Sustainability in Higher Education*, *8*(4), 416–430. https://doi.org/10.1108/14676370710823582

Birdman, J., Redman, A., & Lang, D. J. (2020). Pushing the boundaries: Experience-based learning in early phases of graduate sustainability curricula. *International Journal of Sustainability in Higher Education*, *22*(1), 237–253. https://doi.org/10.1108/IJSHE-08-2019-0242

Bollen, K., & Lennox, R. (1991). Conventional Wisdom on Measurement: A Structural Equation Perspective. *Psychological Bulletin*, *110*(2), 305–314.

Bonnett, M. (2002). Education for Sustainability as a Frame of Mind. *Environmental Education Research*, *8*(1), 9–20. https://doi.org/10.1080/13504620120109619

Borsboom, D., Mellenbergh, G. J., & van Heerden, J. (2004). The Concept of Validity. *Psychological Review*, *111*(4), 1061. https://doi.org/10.1037/0033-295X.111.4.1061

Browne, G. R., Bender, H., Bradley, J., & Pang, A. (2020). Evaluation of a tertiary sustainability experiential learning program. *International Journal of Sustainability in Higher Education*, *21*(4), 699–715. https://doi.org/10.1108/IJSHE-08-2019-0241

Brundiers, K., Barth, M., Cebrián, G., Cohen, M., Diaz, L., Doucette-Remington, S., Dripps, W., Habron, G., Harré, N., Jarchow, M., Losch, K., Michel, J., Mochizuki, Y., Rieckmann, M., Parnell, R., Walker, P., & Zint, M. (2020). Key competencies in sustainability in higher education—Toward an agreed-upon reference framework. *Sustainability Science*, *16*, 13–29. https://doi.org/10.1007/s11625-020-00838-2

Brundiers, K., & Wiek, A. (2017). Beyond Interpersonal Competence: Teaching and Learning Professional Skills in Sustainability. *Education Sciences*, *7*(1), 39. https://doi.org/10.3390/educsci7010039

Brunstein, J., Sambiase, M. F., Kerr, R. B., Brunnquell, C., & Perera, L. C. J. (2020). Sustainability in finance teaching: Evaluating levels of reflection and transformative learning. *Social Responsibility Journal*, *16*(2), 179–197. https://doi.org/10.1108/SRJ-07-2018-0164

Cantor, J. A. (1995). *Experiential Learning in Higher Education: Linking Classroom and Community* (No. 7; ASHE-ERIC Higher Education). https://files-eric-ed-gov.proxy.ub.umu.se/fulltext/ED404949.pdf

Cebrián, G., & Junyent, M. (2015). Competencies in Education for Sustainable Development: Exploring the Student Teachers' Views. *Sustainability*, *7*(3), 2768–2786. https://doi.org/10.3390/su7032768

Cebrián, G., Junyent, M., & Mulà, I. (2020). Competencies in Education for Sustainable Development: Emerging Teaching and Research Developments. *Sustainability*, *12*(2), 579. https://doi.org/10.3390/su12020579

Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in scale development. *Psychological Assessment*, *7*, 309–319.

Corbera, E., Anguelovski, I., Honey-Rosés, J., & Ruiz-Mallén, I. (2020). Academia in the Time of COVID-19: Towards an Ethics of Care. *Planning Theory & Practice*, *21*(2), 191–199. https://doi.org/10.1080/14649357.2020.1757891

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and Conducting Mixed Methods Research* (2nd ed.). Sage Publications. http://comsante.uqam.ca/upload/files/Seminaires/Chapitre_2_The_foundations_of_Mixed_methods_research.pdf

Cronbach, L. J. (1946). Response sets and test validity. *Educational and Psychological Measurement*, *6*(4), 475–494.

Delmas, M. A., & Burbano, V. C. (2011). The Drivers of Greenwashing. *California Management Review*, *54*(1), 64–87. https://doi.org/10.1525/cmr.2011.54.1.64

Denzin, N. K. (2015). Triangulation. In *The Blackwell Encyclopedia of Sociology*. American Cancer Society. https://doi.org/10.1002/9781405165518.wbeost050.pub2

Denzin, N. K., & Lincoln, Y. S. (2011). *Sage Hanbook of Qualitative Research* (4th ed.). Sage Publications.

Dewey, J. (1963). *EXPERIENCE & EDUCATION*. Scribner: Kappa Delta Pi Publications. https://archive.org/details/ExperienceAndEducation

Domask, J. J. (2007). Achieving goals in higher education: An experiential approach to sustainability studies. *International Journal of Sustainability in Higher Education*, *8*(1), 53–68. https://doi.org/10.1108/14676370710717599

Dweck, C. (2016). What Having a "Growth Mindset" Actually Means. *Harvard Business Review*, 1–5.

Ely, A. V. (2018). Experiential learning in "innovation for sustainability": An evaluation of teaching and learning activities (TLAs) in an international masters course. *International Journal of Sustainability in Higher Education*, *19*(7), 1204–1219. https://doi.org/10.1108/IJSHE-08-2017-0141

Evans. (2019). Competencies and Pedagogies for Sustainability Education: A Roadmap for Sustainability Studies Program Development in Colleges and Universities. *Sustainability*, *11*(19), 5526. https://doi.org/10.3390/su11195526

Evans, J. R., & Mathur, A. (2018). The value of online surveys: A look back and a look ahead. *Internet Research*, *28*(4), 854–887. https://doi.org/10.1108/IntR-03-2018-0089

Fenwick, T. J. (2000). Expanding Conceptions of Experiential Learning: A Review of the Five Contemporary Perspectives on Cognition. *Adult Education Quarterly*, *50*(4), 243–272. https://doi.org/10.1177/07417130022087035

Funtowicz, S. O., & Ravetz, J. R. (1993). Science for the post-normal age. *Futures*, *25*(7), 739–755. https://doi.org/10.1016/0016-3287(93)90022-L

Gardiner, S., & Rieckmann, M. (2015). Pedagogies of Preparedness: Use of Reflective Journals in the Operationalisation and Development of Anticipatory Competence. *Sustainability*, *7*(8), 10554–10575. https://doi.org/10.3390/su70810554

Glasser, H. (2007). Minding the gap: The role of social learning in linking our stated desire for a more sustainable world to our everyday actions and policies. In A. E. J. Wals (Ed.), *Social learning towards a sustainable world: Principles, perspectives, and praxis* (pp. 35–61). Wageningen Academic Publishers.

Glasser, H. (2016). Toward the Development of Robust Learning for Sustainability Core Competencies. *Sustainability: The Journal of Record*, *9*(3), 121–134. https://doi.org/10.1089/SUS.2016.29054.hg

Gosen, J., & Washbush, J. (2004). A Review of Scholarship on Assessing Experiential Learning Effectiveness. *Simulation & Gaming*, *35*(2), 270–293. https://doi.org/10.1177/1046878104263544

GRI. (2019). *Download the SDG Compass Guide – SDG Compass*. https://sdgcompass.org/download-guide/

Hair, J. F., Black, B., Babin, B., & Anderson, R. E. (2010). *Multivariate Data Analysis 7th edition.pdf* (7th ed.). Prentice-Hall.

Haney, A. B., Pope, J., & Arden, Z. (2020). Making It Personal: Developing Sustainability Leaders in Business. *Organization & Environment*, *33*(2), 155–174. https://doi.org/10.1177/1086026618806201

Hesselbarth, C., & Schaltegger, S. (2014). Educating change agents for sustainability – learnings from the first sustainability management master of business administration. *Journal of Cleaner Production*, *62*, 24–36. https://doi.org/10.1016/j.jclepro.2013.03.042

Huckle, J. (2010). ESD and the Current Crisis of Capitalism: Teaching Beyond Green New Deals. *Journal of Education for Sustainable Development*, *4*(1), 135–142. https://doi.org/10.1177/097340820900400119

Huckle, J., & Sterling, S. R. (1996). *Education for sustainability*. Earthscan.

Hulin, C., Cudeck, R., Netemeyer, R., Dillon, W. R., McDonald, R., & Bearden, W. (2001). Measurement. *Journal of Consumer Psychology*, *10*(1–2), 55–69. https://doi.org/10.1207/S15327663JCP1001&2_05

Hull, R. B., Kimmel, C., Robertson, D. P., & Mortimer, M. (2016). International field experiences promote professional development for sustainability leaders. *International Journal of Sustainability in Higher Education*, *17*(1), 86–104. https://doi.org/10.1108/IJSHE-07-2014-0105

Karatzoglou, B. (2013). An in-depth literature review of the evolving roles and contributions of universities to Education for Sustainable Development. *Journal of Cleaner Production*, *49*, 44–53. https://doi.org/10.1016/j.jclepro.2012.07.043

Kemmis, S., McTaggart, R., & Nixon, R. (2013). *The Action Research Planner: Doing Critical Participatory Action Research*. Springer Science & Business Media.

Khaled, A. E., Gulikers, J. T. M., Tobi, H., Biemans, H. J. A., Oonk, C., & Mulder, M. (2014). Exploring the Validity and Robustness of a Competency Self-Report Instrument for Vocational and Higher Competence-Based Education. *Journal of Psychoeducational Assessment*, *32*(5), 429–440. https://doi.org/10.1177/0734282914523913

Kolb, A. Y., & Kolb, D. A. (2005). Learning Styles and Learning Spaces: Enhancing Experiential Learning in Higher Education. *Academy of Management Learning & Education*, *4*(2), 193–212. https://doi.org/10.5465/AMLE.2005.17268566

Kolb, A. Y., Kolb, D. A., Passarelli, A., & Sharma, G. (2014). On Becoming an Experiential Educator: The Educator Role Profile. *Simulation & Gaming*, *45*(2), 204–234. https://doi.org/10.1177/1046878114534383

Kolb, D. A. (1984). *Experiential Learning: Experience as the Source of Learning and Development*. Prentice Hall.

Kolb, D. A., Boyatzis, R. E., & Mainemelis, C. (2000). Experiential Learning Theory: Previous Research and New Directions. In R. J. Sternberg & L. Zhang (Eds.), *Perspectives on Thinking, Learning, and Cognitive Styles* (pp. 227–248). Lawrence Erlbaum. https://doi.org/10.4324/9781410605986-9

Kret, M. E., & De Gelder, B. (2012). A review on sex differences in processing emotional signals. *Neuropsychologia*, *50*(7), 1211–1221. https://doi.org/10.1016/j.neuropsychologia.2011.12.022

Kunc, N. (1992). The need to belong: Rediscovering Maslow's hierarchy of needs. In R. A. Villa, J. S. Thousand, W. Stainback, & S. Stainback (Eds.), *Restructuring for caring and effective education: An administrative guide to creating heterogeneous schools* (pp. 25–39). Paul H. Brookes Publishing.

Kurasaki, K. S. (2000). Intercoder Reliability for Validating Conclusions Drawn from Open-Ended Interview Data. *Field Methods*, *12*(3), 179–194. https://doi.org/10.1177/1525822X0001200301

Lans, T., Blok, V., & Wesselink, R. (2014). Learning apart and together: Towards an integrated competence framework for sustainable entrepreneurship in higher education. *Journal of Cleaner Production*, *62*, 37–47. https://doi.org/10.1016/j.jclepro.2013.03.036

Laufer, W. S. (2003). Social Accountability and Corporate Greenwashing. *Journal of Business Ethics*, *43*, 253–261.

Lee, Y. S., & Schottenfeld, M. A. (2012). Internationalising Experiential Learning for Sustainable Development Education. *Journal of Education for Sustainable Development*, 6(2), 341–354. https://doi.org/10.1177/0973408213475377

Leicht, A., Heiss, J., Byun, W. J., & UNESCO. (2018). *Issues and trends in education for sustainable development*. https://unesdoc.unesco.org/ark:/48223/pf0000261445

Lewis, R. A., Kenerson, M. J., Sorrentino, C., & Rowse, T. H. (2019). Experiencing Sustainability Education: Insights from a Living and Learning Programme. *Journal of Education for Sustainable Development*, *13*(1), 24–44. https://doi.org/10.1177/0973408219847011

Lincoln, Y. S. (1995). Emerging Criteria for Quality in Qualitative and Interpretive Research. *Qualitative Inquiry*, *1*(3), 275–289. https://doi.org/10.1177/107780049500100301

Lozano, R., Merrill, M., Sammalisto, K., Ceulemans, K., & Lozano, F. (2017). Connecting Competences and Pedagogical Approaches for Sustainable Development in Higher Education: A Literature Review and Framework Proposal. *Sustainability*, *9*(10), 1889. https://doi.org/10.3390/su9101889

MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods*, *7*(1), 83. https://doi.org/10.1037/1082-989X.7.1.83

Marlin-Bennett, R. (2002). Linking Experiential and Classroom Education: Lessons Learned from The American University–Amnesty International USA Summer Institute on Human Rights. *International Studies Perspectives*, *3*, 384–395.

Menon, S., & Suresh, M. (2020). Synergizing education, research, campus operations, and community engagements towards sustainability in higher education: A literature review. *International Journal of Sustainability in Higher Education*, *21*(5), 1015–1051. https://doi.org/10.1108/IJSHE-03-2020-0089

Meza, R. M. M., Herremans, I. M., Wallace, J. E., Althouse, N., Lansdale, D., & Preusser, M. (2018). Strengthening sustainability leadership competencies through university internships. *International Journal of Sustainability in Higher Education*, *19*(4), 739–755. https://doi.org/10.1108/IJSHE-06-2017-0097

Mezirow, J. (2000). Learning to Think Like an Adult. In *Learning as Transformation: Critical Perspectives on a Theory in Progress* (pp. 3–33). Jossey-Bass.

Migliorini, P., & Lieblein, G. (2016). Facilitating Transformation and Competence Development in Sustainable Agriculture University Education: An Experiential and Action Oriented Approach. *Sustainability*, *8*, 12–43.

Morse, J. M., Barrett, M., Mayan, M., Olson, K., & Spiers, J. (2002). Verification Strategies for Establishing Reliability and Validity in Qualitative Research. *International Journal of Qualitative Methods*, *1*(2), 13–22. https://doi.org/10.1177/160940690200100202

Ord, J., & Leather, M. (2011). The Substance Beneath the Labels of Experiential Learning: The Importance of John Dewey for Outdoor Educators. *Journal of Outdoor and Environmental Education*, *15*(2), 13–23. https://doi.org/10.1007/BF03400924

Otte, P. P. (2016). Integrating Sustainable Development in Higher Education through Experience-based Learning: Insights from Experts in Team (EiT) for Developing a Combined Theoretical Framework. *Journal of Education for Sustainable Development*, *10*(1), 131–159. https://doi.org/10.1177/0973408215625550

Parkes, C., Buono, A. F., & Howaidy, G. (2017). The Principles for Responsible Management Education (PRME): The first decade – What has been achieved? The next decade – Responsible Management

Education's challenge for the Sustainable Development Goals (SDGs). *The International Journal of Management Education*, *15*(2), 61–65. https://doi.org/10.1016/j.ijme.2017.05.003

Raworth, K. (2017). *Doughnut Economics: 7 Ways to Think Like a 21st Century Economist*. Random House.

Redman, A., Wiek, A., & Barth, M. (2021). Current practice of assessing students' sustainability competencies: A review of tools. *Sustainability Science*, *16*(1), 117–135. https://doi.org/10.1007/s11625-020-00855-1

Rieckmann, M. (2012). Future-oriented higher education: Which key competencies should be fostered through university teaching and learning? *Futures*, *44*(2), 127–135. https://doi.org/10.1016/j.futures.2011.09.005

Salgado, F. P., Abbott, D., & Wilson, G. (2018). Dimensions of professional competences for interventions towards sustainability. *Sustainability Science*, *13*(1), 163–177. https://doi.org/10.1007/s11625-017-0439-z

Savage, E., Tapics, T., Evarts, J., Wilson, J., & Tirone, S. (2015). Experiential learning for sustainability leadership in higher education. *International Journal of Sustainability in Higher Education*, *16*(5), 692–705. https://doi.org/10.1108/IJSHE-10-2013-0132

Scarff Seatter, C., & Ceulemans, K. (2017). Teaching Sustainability in Higher Education: Pedagogical Styles that Make a Difference. *Canadian Journal of Higher Education*, *47*(2), 47–70. https://doi.org/10.47678/cjhe.v47i2.186284

Schwartz, S. H. (1992). Universals in the Content and Structure of Values: Theoretical Advances and Empirical Tests in 20 Countries. *Advances in Experimental Social Psychology*, *25*, 1–65. https://doi.org/10.1016/S0065-2601(08)60281-6

Schwartz, S. H. (1994). Are There Universal Aspects in the Structure and Contents of Human Values? *Journal of Social Issues*, *50*(4), 19–45. https://doi.org/10.1111/j.1540-4560.1994.tb01196.x

Schwartz, S. H., Cieciuch, J., Vecchione, M., Davidov, E., Fischer, R., Beierlein, C., Ramos, A., Verkasalo, M., Lönnqvist, J.-E., Demirutku, K., Dirilen-Gumus, O., & Konty, M. (2012). Refining the theory of basic individual values. *Journal of Personality and Social Psychology*, *103*(4), 663. https://doi.org/10.1037/a0029393

Schwartz, S. H., Melech, G., Lehmann, A., Burgess, S., Harris, M., & Owens, V. (2001). Extending the Cross-Cultural Validity of the Theory of Basic Human Values with a Different Method of Measurement. *Journal of Cross-Cultural Psychology*, *32*(5), 519–542. https://doi.org/10.1177/0022022101032005001

Shephard, K. (2008). Higher education for sustainability: Seeking affective learning outcomes. *International Journal of Sustainability in Higher Education*, *9*(1), 87–98. https://doi.org/10.1108/14676370810842201

Shephard, K., Rieckmann, M., & Barth, M. (2019). Seeking sustainability competence and capability in the ESD and HESD literature: An international philosophical hermeneutic analysis. *Environmental Education Research*, *25*(4), 532–547. https://doi.org/10.1080/13504622.2018.1490947

Sniehotta, F. F., Presseau, J., & Araújo-Soares, V. (2014). Time to retire the theory of planned behaviour. *Health Psychology Review*, *8*(1), 1–7. https://doi.org/10.1080/17437199.2013.869710

Sobel, M. E. (1982). Asymptotic Confidence Intervals for Indirect Effects in Structural Equation Models. *Sociological Methodology*, *13*, 290–312. https://doi.org/10.2307/270723

Sterling, S., Glasser, H., Rieckmann, M., & Warwick, P. (2017). 10. "More than scaling up": A critical and practical inquiry into operationalizing sustainability competencies. In P. B. Corcoran, J. P. Weakland, &

A. E. J. Wals (Eds.), *Envisioning futures for environmental and sustainability education* (pp. 153–168). Wageningen Academic Publishers. https://doi.org/10.3920/978-90-8686-846-9_10

Sweetman, D., Badiee, M., & Creswell, J. W. (2010). Use of the Transformative Framework in Mixed Methods Studies. *Qualitative Inquiry*, *16*(6), 441–454. https://doi.org/10.1177/1077800410364610

Taormina, R. J., & Gao, J. H. (2013). Maslow and the motivation hierarchy: Measuring satisfaction of the needs. *The American Journal of Psychology*, *126*(2), 155–177.

Tashakkori, A., & Teddlie, C. (2010). Putting the Human Back in '"Human Research Methodology"': The Researcher in Mixed Methods Research. *Journal of Mixed Methods Research*, *4*(4), 271–277. https://doi.org/10.1177/1558689810382532

Tikly, L, Batra, P, Duporge, V, Facer, K, Herring, E, Lotz-Sisitka, H, McGrath, S, Mitchell, R, Sprague, T, & Wals, A. (2020). *Transforming Education for Sustainable Development: Foundations Paper (extended background paper for consultation)* (1.0). Zenodo. https://doi.org/10.5281/ZENODO.3952649

UNECE. (2012). *Learning for the Future: Competences in Education for Sustainable Development; UNECE: Geneva, Switzerland, 2012*. UNECE. http://www.unece.org/fileadmin/DAM/env/esd/ESD_Publications/Competences_Publication.pdf

UNESCO. (2017). *Education for sustainable development goals: Learning objectives.* UNESCO.

UNESCO. (2021). *ESDfor2030-berlin declaration.* UNESCO. https://en.unesco.org/sites/default/files/esdfor2030-berlin-declaration-en.pdf

United Nations. (2015). *Transforming Our World: The 2030 Agenda for Sustainable Development*. https://doi.org/10.1891/9780826190123.ap02

VanWynsberghe, R., & Herman, A. C. (2015). Education for social change and pragmatist theory: Five features of educative environments designed for social change. *International Journal of Lifelong Education*, *34*(3), 268–283. https://doi.org/10.1080/02601370.2014.988189

Wals, A. E. J. (2012). *Learning Our Way Out of Unsustainability: The Role of Environmental Education*. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199733026.013.0032

Wals, A. E. J. (2014). Sustainability in higher education in the context of the UN DESD: A review of learning and institutionalization processes. *Journal of Cleaner Production*, *62*, 8–15. https://doi.org/10.1016/j.jclepro.2013.06.007

Wals, A. E. J. (2015). *Beyond unreasonable doubt: Education and learning for socio-ecological sustainability in the anthropocene*. Wageningen University, Wageningen UR.

Wamsler, C. (2018). Mind the gap: The role of mindfulness in adapting to increasing risk and climate change. *Sustainability Science*, *13*(4), 1121–1135. https://doi.org/10.1007/s11625-017-0524-3

Wiek, A., Withycombe, L., & Redman, C. L. (2011). Key competencies in sustainability: A reference framework for academic program development. *Sustainability Science*, *6*(2), 203–218. https://doi.org/10.1007/s11625-011-0132-6

Zhu, X., & Lu, C. (2017). Re-evaluation of the New Ecological Paradigm scale using item response theory. *Journal of Environmental Psychology*, *54*, 79–90. https://doi.org/10.1016/j.jenvp.2017.10.005

6. Appendix

1. Questionnaire

Welcome to this questionnaire survey about your experience on this module. I am conducting research about education for sustainability and will use the information to apply to this work. Please answer the following questions to help provide feedback.

Your answers will be held anonymous, which means you will not be identified personally to any future use of the information collected. Thank you for your time!

Section A: Your Background

A1. **What is your gender?**

Male ☐
Female ☐
Other ▼

Other

A2. **What is your Age?**

under 18 ☐
18-24 ☐
25-34 ☐
35 + ☐

A3. **Which University was your principle place of study?**

Umeå University ☐
Other ▼

Other

Section B: Participation

B1.   **How many semesters have you studied at univeristy?**

Typically, autumn is one semester and the spring is one semester. Therefore, one year contains two semesters.

1	☐
2	☐
3	☐
4	☐
5	☐
6	☐
7	☐
8	☐
9	☐
10	☐
More than 10	☐

B2.   **How much has your whole education involved sustainability?**

Not at all	☐
A little bit	☐
Somewhat	☐
Quite a bit	☐
A tremendous amount	☐

B3. **Which of the UN sustianable development goals (SDGs) were addressed in the module?**

1-No poverty ☐

2-Zero hunger ☐

3-Good health and well-being ☐

4-Quality education ☐

5-Gender equality ☐

6-Clean water and sanitation ☐

7-Affordable and clean energy ☐

8-Decent work and economic growth ☐

9-Industry, innovation and infrastructure ☐

10-Reduced inequalities ☐

11-Sustainable cities and communities ☐

12-Responsible consumption and production ☐

13-Climate action ☐

14-Life below water ☐

15-Life on land ☐

16-Peace, justice and strong institutions ☐

17-Partnerships for the goals ☐

All of them ☐

None of them ☐

B4. **How well did the group assignment help you to learn for sustainability? Please comment, if you would like to describe your experience.**

Not at all well ☐

Not so well ☐

Somewhat well ☐

Very well ☐

Extremely Well ☐

B5. **How well did the discussion forums help you to learn for sustainability? Please comment, if you would like to describe your experience.**

Not at all well ☐

Not so well ☐

Somewhat well ☐

Very well ☐

Extremely Well ☐

B6. **How well did the Workshops/Seminar help you to learn for sustainability? Please comment, if you would like to describe your experience.**

Not at all well ☐

Not so well ☐

Somewhat well ☐

Very well ☐

Extremely Well ☐

Section C: Values

C1. **As a guiding principle in your life, how important are the values stated below?**

	Extremely Important	Very Important	Important	Scarcely Important	Not Important	Opposed to my values
Self Direction	☐	☐	☐	☐	☐	☐
Stimulation	☐	☐	☐	☐	☐	☐
Hedonism (Pleasure and sensuous gratification for oneself)	☐	☐	☐	☐	☐	☐
Achievement	☐	☐	☐	☐	☐	☐
Power	☐	☐	☐	☐	☐	☐
Security	☐	☐	☐	☐	☐	☐
Conformity	☐	☐	☐	☐	☐	☐
Tradition	☐	☐	☐	☐	☐	☐
Benevolence (Preservation and enhancement of the welfare of others)	☐	☐	☐	☐	☐	☐
Universalism (Appreciation, tolerance and protection for all life)	☐	☐	☐	☐	☐	☐

Section D: Attitude

D1. **How much do you agree with the following statements?**

It is important for...

	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Agree strongly
me that the courses in my education address sustainability.	☐	☐	☐	☐	☐
me that the courses in my education address the SDGs.	☐	☐	☐	☐	☐
my future work that I learn about sustainability.	☐	☐	☐	☐	☐
the planet that I learn about sustainability.	☐	☐	☐	☐	☐

D2. **Which statement best describes your motivation for susatianability?**

I am willing to listen, to read and to acquire information about sustainability. ☐

I discuss environmental issues with others and then formulate my own views on the issues ☐

I make life choices and experiment with prioritising "good for us" "good for our dependents" and "good for our descendants". ☐

I aim to cooperate or even lead, and have the confidence and a commitment to constantly seek new ways to achieve and to reassess my decisions. ☐

D3. **How much do you agree with the following statements?**

	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Agree strongly
It was very relevant to bring up sustainability in the module I studied.	☐	☐	☐	☐	☐
I have a very great interest in sustainability.	☐	☐	☐	☐	☐
I have a high degree of climate concern.	☐	☐	☐	☐	☐
Due to unsustainable behaviour, I am afraid for the future.	☐	☐	☐	☐	☐
I believe that solutions can be found to sustainability problems.	☐	☐	☐	☐	☐

D4.

How well did your whole experience taking part in this module help you to

	Not at all well	Not so well	Somewhat well	Very well	Extremely Well
be able to act on a sustainability-informed vision	☐	☐	☐	☐	☐
to monitor and evaluate the process to your actions	☐	☐	☐	☐	☐
address emerging challenges	☐	☐	☐	☐	☐
recognise that sustainability problem-solving is a long-term, repetitive process between planning, acting, and evaluation	☐	☐	☐	☐	☐

Section E: Competence

E1.   **How much do you agree with the following statements?**

I feel confident and competent to...

	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly Agree
Articulate a vision of a just society	☐	☐	☐	☐	☐
Understand your own strengths and weaknesses as a sustainability leader	☐	☐	☐	☐	☐
Collectively assess the current and future states of social-ecological systems	☐	☐	☐	☐	☐
Motivate positive change in others	☐	☐	☐	☐	☐
Pursue collaborative approaches to problem solving	☐	☐	☐	☐	☐
Work together across differences	☐	☐	☐	☐	☐
Assess the resources available and necessary for an action	☐	☐	☐	☐	☐
Design integrated actions that draw on resources from across disciplines	☐	☐	☐	☐	☐
Develop practical tools to advance a sustainability agenda	☐	☐	☐	☐	☐
Analyze complex problems drawing from multiple disciplines	☐	☐	☐	☐	☐
Account for social, environmental, and economic implications of a decision	☐	☐	☐	☐	☐
See both the whole system and its parts, as well as the extent to which you can place yourself within the system	☐	☐	☐	☐	☐
Deal with uncertainty in future predictions	☐	☐	☐	☐	☐
Predict by considering possible repercussions of our actions prior to their implementation	☐	☐	☐	☐	☐
Understand the future as something that we can help to shape	☐	☐	☐	☐	☐

Thank you for your participation!

2. Instructions for the Forum Discussions

Think about a job you have had or would like to have and what that organisation produces or achieves. In the forum discussions (found on the forum tab in the menu to the left), I would like each of you to reflect on some questions and try to address one or several of the questions, in order to start discussions with your other class members.

What is sustainable and what is unsustainable about a work experience you have had (or would like to have)?

How could a tool like the SDGs help a management accountant to assess sustainability in the work place?

How could a management accountant control for what they do and how they are performing through the perspective of sustainability?

What risks might be experienced?

What opportunities might there be for the organisation?

What decisions could be made?

Each student needs to contribute one discussion point and give feedback to at least two class members' discussions. More information about sustainability and the SDGs can be found on the SDG tab, in the menu to the left.

3. Discussion Forum Excerpts: how the discussion forum reflections were coded

Excerpt: Discussion and response from a class member	Codes
"Sustainable sourcing is one of the themes that **the SDG compass ties to SDG 12.** Sustainable sourcing is also something that ties into IKEA's internal sustainability measures seen in the choice of suppliers and materials for their products. **The role of the management account** is to manage the allocation of cost and cost classification. In my opinion, it is the role of the management accountant to weigh the benefits and the costs of using a specific material from a specific supplier. For example, supplier A might charge 15% extra per unit of raw material compared to supplier B. **However, supplier A has aligned themselves better with the SDGs and use ethical practices.** Therefore, the accountant needs to answer certain questions: Can the company afford a price increase? What consequences will changing to more sustainable practices have? What do you think? What role and what responsibilities does the management account have in terms of ensuring sustainability on a micro and macro perspective?"	Knowledge used to connect to real-life Values-in terms of what is our role in society Interpersonal/strategy problems
I'd like to ask just what kinds of rare and scarce materials do Ikea use? They use a bit of rare earth minerals in their new lines of home electronics, but I believe that most of their stuff is made quite eco consciously. They don't use whole wood only, but a honeycomb pattern which reduces the need for the origin material and for glass products they use at least some recycled glass. **Although this might lead to higher consumption due to the fact of lesser quality, but that's a different argument.** Talking about the role of a management accountant, **I believe you are correct in the statement that they need to assert the need of the company to succeed in the focussed SDG's, but some discrepancies are to be expected in a company the size of Ikea.** It would require high surveillance of the work environment, which in turn would probably lead to workers dissatisfaction. In the numbers that they produce, **it is hard if not impossible to completely implant the idea of sustainability to every worker,** especially if they don't care for the company and only treat it as a way to earn a living.	Critical mind/ systems thinking Systems thinking Values thinking Strategic thinking

4. Instructions for the Reflective Paper Assignment

Read one report assignment from a different group to yours

Write a reflection paper (as long as you like) that discusses at least three different aspects about the group's solution. Be critical about the group's reflections and analysis of the sustainability solution. Think about how the group has addressed

- The whole system
- Strategic planning
- Their ideas about collaborations or partnerships
- The group's opinion/values about sustainability for the company and as a whole
- What they anticipate about the future
- The group's attitudes or interest about sustainability for the company and as a whole
- The group's ideas about how to act for sustainability

5. Code Table

Name	Sources	References
Action	10	13
Combination	7	7
Futures	16	20
Interpersonal	11	17
Intrapersonal	29	40
Strategy	40	56
System	21	34
Values	26	37

Name is a list of codes; Sources are the number of students that have been linked to the codes; References are the number of cites that can be linked to the code.