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THREE 'POWERFULS' FOR THE SUSTAINABILITY CURRICULUM IN HIGHER EDUCATION: INVESTIGATING EMPOWERING KNOWLEDGE FOR SUSTAINABILITY STUDENTS

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Abstract

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Aim: The aim of this research is to define theoretical/conceptual and practical knowledge from different disciplines and sustainability as an academic field, that has the potential to empower students to influence the world towards sustainability and that could constitute components for the sustainability curriculum in higher education. This thesis will use three curriculum concepts of knowledge to serve that aim.

Theory: To serve that aim, the thesis makes use of three curriculum concepts of knowledge, Powerful knowledge (Young, 2009, 2013; Young & Muller, 2013; Muller & Young, 2019), Powerful regional knowledge (Shay & Steyn, 2015) and Powerful knowings (Carlgren, 2020, 2023).

Method: The study has a qualitative research design and utilises two focus groups with academics from various disciplines, who research sustainability and are teachers and curriculum planners of master's programmes in sustainability in Sweden, to investigate theoretical/conceptual and practical knowledge from disciplines and sustainability as an academic field that could constitute components for the sustainability curriculum in higher education.

Results: By laying out and analysing the data from the two focus groups, the thesis defines several Powerful 'knowledges' from disciplines, namely 'systems thinking', knowledge about 'gender, power and discourses', knowledge about how 'social sciences and social theory can support critical questioning towards natural sciences and technical solutions to sustainability problems', 'scientific knowledge of principles, numbers and scales related to sustainability issues', knowledge from 'political science', 'geographical knowledge', knowledge about 'earth system processes in relation to sustainability', knowledge of the 'separation of law and morality' and 'juridical knowledge about the law'. In addition, 'socio-ecological frameworks', 'complexity' and 'environmental communication' are defined as Powerful regional 'knowledges'. Moreover, the disciplinary Powerful knowings defined are the capability of 'problem identification, quantification and being able to measure sustainability problems' and the capability to use disciplinary lenses' to approach sustainability problems. The defined Powerful knowings from the academic field of sustainability are the capabilities of being 'open-minded', 'engaging in interdisciplinary work and collaboration to tackle sustainability issues', 'unlearning

Western academic knowledge and its production processes' and 'thinking about justice and sustainability'. Importantly, the results expand the research on components of importance for the sustainability curriculum, which can have practical implications for curriculum design of master's programmes in sustainability in higher education.

Foreword

“It is a highly problematic heritage that we leave to future generations – namely that there is no explicit knowledge that it is important enough to be ‘transmitted’ to the next generation. It is a heritage that has none of the visibility of the environmental or sustainability crises, although arguably, addressing it is fundamental to whether we are able to deal with either.” (Young, 2009, 194)

In writing this thesis, I want to thank my supervisor Olof Franck for their continuous support. In my opinion, we have had stimulating conversations about knowledge and its, for students, empowering potential. Moreover, I want to express my deepest and heartfelt gratitude to my partner. Thank you for being patient and supportive throughout this whole process. We are the best team! I also want to thank my son, Ruben, who continuously makes me smile, laugh and appreciate the things in life that are of most importance. To all his grandparents and his aunt Alice, thank you for taking care of him and supporting our little family when we need it.

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List of abbreviations

PEI-knowledge – Place-based, Everyday and Indigenous Knowledge

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Introduction, research problem and research question

The context of this thesis is the curriculum of higher education programmes in sustainability. Many higher education institutions currently offer undergraduate and master's programmes in sustainability (O'Byrne et al., 2015). These programmes have developed out of the academic field called 'Sustainability science', a field that has been established in academia over the last few decades (Kates et al., 2001).

Research into what sustainability programmes in higher education could or should entail has partly been dedicated to seeking out sustainability competencies students should acquire by studying these programmes (see Brundiers et al, 2021; Kishita et al., 2018; Redman & Wiek, 2021; Rieckmann, 2012; Salovaara et al., 2019; Wiek et al., 2011). The research into sustainability competencies has been praised and received great attention, and many higher education institutions have tried to adopt frameworks for students' development of these (Redman and Wiek, 2021, 3-5). Moreover, much research exists on pedagogical and didactical arrangements suggested to suit sustainability education in HE (see e.g. Barth et al., 2023; Lotz-Sisitka et al., 2015; Sinakou et al., 2019; Van Poeck et al., 2019), accompanied by a scholarly debate on how place-based, everyday and indigenous knowledge¹ has a rightful role in sustainability teaching and learning in higher education, alongside more 'traditional' academic knowledge (see e.g. Morgan, 2012; Jimenez & Kabachnick, 2023; Robertson & Tsang, 2016; Thomas, 2020). However, previous research has not been engaged in defining important theoretical/conceptual knowledge from academic disciplines and sustainability as an academic field², that could serve as constituents for the sustainability curriculum. This thesis argues that it is important to engage with this endeavour since it can contribute to the work of defining a disciplinary and sustainability theoretical/conceptual knowledge base and subject- and field-specific capabilities that can inform the sustainability curriculum in higher education. To define such theories/concepts and capabilities, the thesis turns to actors who should be able to contribute to such a process, namely academics with different disciplinary backgrounds who research and teach in sustainability.

In 2015, O'Byrne et al. called for research to define disciplinary and practical knowledge for the curriculum of sustainability programmes in higher education. After analysing the content and structure

¹ In this thesis, for practical purposes, 'PEI-knowledge' is short for place-based, everyday and indigenous knowledge.

² In this thesis, the author uses the terms 'sustainability as an academic field' or the 'academic field of sustainability' and does so to highlight that it is sustainability as an *academic* field, with theories, concepts, capabilities and knowledge that the thesis occupies itself with, and not e.g. sustainability as a more 'general', political or broader field.

of undergraduate and graduate programs in sustainability offered at higher education institutions internationally, they found that there is a wide divergence regarding content and structure between sustainability programs offered by higher education institutions. O’Byrne et al. concluded that if sustainability programmes are going to be “effective in training the next generation of sustainability scholars and scientists” (2015, 43) and if students are going to be able to impact society towards sustainability, then they should “indeed be equipped with the *appropriate disciplinary knowledge (and interdisciplinary skills)*” (2015, 58) (the author’s emphasis). This study will contribute to addressing the call from O’Byrne et al. (2015), by investigating what could constitute important components for the curriculum of master’s programmes in sustainability in higher education, but in a way and with a focus that differs from earlier scholarly productions on the topic. Master’s programmes will be in focus because, at least in the Swedish context where this study is situated, sustainability as a topic is often studied on the graduate level, as a continuation of more disciplinary-focused studies on the undergraduate level. In addition, in master’s programmes, the author believes that there could exist a somewhat cohesive, empirically and (presumably) theoretically grounded idea regarding how central theoretical/conceptual and practical knowledge connected to sustainability can be articulated and manifested, which is why it is interesting to investigate those aspects in relation to such programmes.

The author takes a perspective that complements and partly critiques earlier research into what the sustainability curriculum could or should include since it brings academically produced theoretical/conceptual knowledge, together with subject- and field-specific practical knowledge, a knowledge which is tightly connected to the study of disciplines or fields, into the debate about the sustainability curriculum in higher education. In this thesis, the theoretical/conceptual knowledge is regarded as a form of knowledge that proponents of it have defined as being systematic, objective, reliable and generalisable, produced by academic experts of disciplines or fields, that has the potential to empower students to influence the social and natural worlds (Chapman, 2021, 9; Young & Muller, 2013; Shay & Steyn, 2015), but that the author argues has not received the attention it could in relation to the sustainability curriculum. In addition, the idea of subject- or field-specific capabilities, which is practical knowledge knowledge that is developed while studying disciplines or fields, and thus is dependent on the understanding of theoretical/conceptual knowledge in them (Carlgren, 2020), is used to expand earlier research regarding practical knowledge of importance for the sustainability curriculum.

Several current issues on the societal agenda also justify the engagement with disciplinary theoretical/conceptual knowledge and such knowledge from the field of sustainability, together with practical knowledge tied to such knowledge. In the event of growing scientific scepticism present in

e.g. internet forums (see e.g. Augé, 2022; Oswald & Bright, 2022), in social media (see e.g. Lubicz-Zaorski et al., 2024) as well as in right-wing politics (see e.g. Hawkins and Chinn, 2024) that question the scientific knowledge base of climate change and other sustainability problems, accompanied by the discussion about fake news, misinformation and the post-truth society (see e.g. Davies & Mah, 2020), it is possible to argue that it is important that students studying sustainability learn important disciplinary and sustainability theoretical/conceptual knowledge together with practical knowledge tied to disciplinary and sustainability knowledge. In learning this combined knowledge, students can have a better chance at navigating scepticism and counter false claims about the state of the natural and social worlds, since this knowledge gives them ‘‘a language for engaging in political, moral and other kinds of debates’’ (Young, 2008b, 14), which such current issues just described can be seen as examples of.

Thus, the aim of this research is to define theoretical/conceptual and practical knowledge from different disciplines and sustainability as an academic field, that has the potential to empower students to influence the world towards sustainability and that could constitute components for the sustainability curriculum in higher education. Importantly though, in seeking to define such knowledge, the author wants to see how academics *reason about* and *discuss* such forms of knowledge in relation to the sustainability curriculum, rather than arriving at a definite generalisable result on the topic. The thesis will use three curriculum concepts of knowledge to serve the thesis’s aim, concepts that are intertwined with a social justice purpose, in the sense that they aim to capture the knowledge that students in formal education should be entitled to because this knowledge can empower them to, based on the most reliable theoretical/conceptual and practical academic knowledge to date, influence society and the environment (Muller & Young, 2019; Young, 2008b; Young & Muller, 2013). The first concept, ‘Powerful knowledge’, from which the other two concepts have grown, refers to disciplinary theoretical/conceptual knowledge that derives from systematic knowledge production by communities of experts connected to academic disciplines (Wheelahan, 2007; Young, 2008a, 2008b; Young & Muller, 2013). Secondly, ‘Powerful regional knowledge’ refers to Powerful knowledge with an increase in conceptual and contextual complexity (Shay & Steyn, 2015). Lastly, ‘Powerful knowings’ (Carlgren, 2020) refers to subject- or field-specific capabilities that are implicit/tacit practical knowledge that is learnt by studying academic subjects or fields. This is a brief account of these concepts and they will be described in detail in the theory chapter.

Thus, this research seeks to answer the following research question:

- What ‘Powerful knowledge’, ‘Powerful regional knowledge’ and ‘Powerful knowings’ do academics consider could be important for the curriculum of sustainability master’s programmes in higher education?

The thesis is structured as follows. First, in the literature review, the author accounts for previous research on important components for the sustainability curriculum in higher education. Next, the author presents the theoretical framework of the thesis which contains Powerful knowledge, Powerful regional knowledge and Powerful knowings. Then follows the method chapter where the author describes the sampling of master’s programmes and participants, the method for data collection which was focus groups, the operationalisation of the theoretical framework, the method for data analysis, and discusses research quality and ethical aspects. The thesis continues with a presentation of its results and the analysis of them, which is followed by a discussion of the results in connection to previous research and a conclusion.

Literature review

This chapter lays out previous research about important components for the sustainability curriculum in higher education. The review brings up scholarship on what the author has termed the ‘sustainability competencies perspective’ and the ‘PEI-knowledge perspective’. Research about pedagogical and didactical arrangements for sustainability education, such as the research mentioned above, is not considered. This is because the focus of the thesis is to contribute to the scholarly debate about the potential contents of the sustainability curriculum, rather than ways of teaching and learning about that content.

The sustainability competencies perspective

As mentioned in the introduction, a significant amount of research (Brundiers et al, 2021; Kishita et al., 2018; Redman and Wiek, 2021; Rieckmann, 2012; Salovaara et al., 2019; Wiek et al., 2011) has identified and discussed key competencies that students studying sustainability need to acquire to work towards solving sustainability problems, and thus are regarded as important for the sustainability curriculum. This research partly stems from the argument that knowing about sustainability problems, i.e. what they consist of and how they have come about, is not enough for solving them, but that different approaches, values and practices have to accompany this understanding, to “move (...) knowledge into action” (Kates et al., 2001, 1950).

Wiek et al. (2011, 204) argue that many educational scholars agree that identifying key competencies (in this case, sustainability ones’) and learning outcomes connected to these is essential to teaching in

and designing different academic programs. In addition, Wilhelm et al., for example, with emphasis state that what is required to solve sustainability problems is a “shift from knowledge-orientation to action-orientation and therewith a shift to competence-orientation in teaching at all levels of education, including in HESD” (2019, 2). Indeed, influential international institutions, such as the International United Nations agency UNESCO also champion this idea in suggesting an educational transformation that “goes *beyond* the transfer of knowledge (...) by developing empowered, critical, mindful and competent citizens.” (2016, 11) (the author’s emphasis).

In the foundational review article about “key sustainability competencies” for program development in higher education, Wiek et al. (2011, 203) argue that educational literature is clear on the fact that identifying key competencies is essential when designing the sustainability curriculum in academia. They synthesise and define five sustainability competencies: ‘Systems-thinking competence’ (the ability to collectively analyse complex problems), ‘Normative competence’ (the ability to collectively map and negotiate values), ‘Anticipatory competence’ (the ability to collectively analyse and investigate sustainable futures), ‘Strategic competence’ (the ability to collectively plan and deliver sustainability transitions and transformations) and ‘Interpersonal competence’ (the ability to collectively develop, facilitate and encourage research about and solving of sustainability issues) (Wiek et al., 2011, 207-211). Wiek et al. (2016, 243, 251-252) also highlight a sixth competence, ‘Integrated problem-solving competence’ as a form of meta-competence that includes the ability to make use of the five first competencies together in sustainability problem-solving.

Additionally, In 2012, Rieckmann internationalised the sustainability competencies research with a mission to establish more international uniformity regarding key sustainability competencies that could guide curriculum development of sustainability academic programmes globally. Academic experts from different continents defined twelve different competencies. Among them, the most important were, similar to two of the competencies defined by Wiek et al. (2011), ‘Systemic competence’, ‘Critical thinking’ and ‘Anticipatory competence’ (Rieckmann, 2012). In the same spirit, Brundiers et al. (2021) investigated to what extent experts in sustainability in higher education agreed about the key sustainability competencies framework developed by Wiek et al. (2011). They suggested two additional sustainability competencies, ‘Intrapersonal competence’ (the ability to reflect on one’s emotions, position, thoughts and more) and ‘Implementation competence’ (the ability to collectively realize, monitor and evaluate sustainability visions) (Brundiers et al., 2021, 20-21).

Of importance for this thesis, it must be noted that scholars have criticised the inclusion of competencies/capabilities/skills³ as core components of the higher education curriculum, which is what Wiek et al. (2011, 2016), Rieckmann (2012) and Brundiers et al. (2021) suggests for the sustainability curriculum in referring to the competencies as ‘key’ and the ‘key sustainability competencies’ as a ‘reference framework for program development’. Critics argue that competencies suggested for higher education curricula often suffer from unclear definitions (which Wiek et al. (2011, 2015) also admit), and may not be as adaptable across different contexts as stipulated. Moreover, they suggest that students acquire competencies as part of a ‘typical’ higher education experience by studying disciplines or programs and activities that students go through while studying these. Therefore, they argue, there is no need to explicitly formulate novel competencies, such as the key sustainability competencies, i.e. students develop such competencies anyway (Barrie, 2004, 2006; Green, 2009; Hyland, 1993; Sadler, 2013). The key sustainability competencies proposed by Wiek et al. (2011) and others can be criticised in the same manner (McPhail & Rata, 2016; Hyland, 1993, 2006). Moreover, empirical research has shown that students' development and use of competencies often depend on having a strong academic theoretical knowledge foundation, which in the case of the sustainability curriculum could mean that students need to have a good theoretical/conceptual understanding of sustainability as a field and disciplinary knowledge important for sustainability issues. In that way, competencies are seen as bound to theoretical knowledge of academic disciplines and fields and come to best use when they develop out of studying these for a considerable time. Thus, the ability to make use of a specific competence is related to how well someone knows the theoretical and conceptual knowledge in a discipline or a field (see e.g. Duncan, 2007; Halliday, 2000; Smith, 2002; Tricot & Sweller, 2013; Willingham, 2008), which is why it is important to investigate what such theoretical/conceptual knowledge could be in the sustainability curriculum.

It is fair to say that the importance of theoretical/conceptual knowledge seems to be clear to Wiek et al. since they include ‘knowledge’ as one aspect of sustainability competencies, which can be interpreted as them pointing to theoretical/conceptual knowledge. They define competencies as being ‘‘(...) combinations of knowledge, skills and attitudes that can enable students to solve sustainability problems’’ (2011, 204). In addition, Brundiers et al. describe these competencies as ‘‘(...) a combination of dispositions (knowledge, skills, motives, and attitudes) that enable successful task performance’’ (2021, 15) and Rieckman refer to them as ‘‘(...) an interplay of knowledge, capacities

³ Terms such as ‘competency’, ‘capability’, ‘skill’ are often used interchangeably by scholars to describe practical knowledge. In the context of this thesis, discussing the potential difference between these terms from an etymological perspective is not particularly fruitful.

and skills, motives and affective dispositions.” (2012, 129). Nevertheless, what this ‘knowledge’ entails is never made clear by these scholars. They do not define what kind of knowledge they describe, is it theoretical/conceptual or practical knowledge (?) or where the knowledge should come from, i.e. is it knowledge produced in academic disciplines, including the natural and social sciences, or is it knowledge formed somewhere else? In other words, could it just be any knowledge that serve as important components in the interplay with skills, attitudes and motives? Indeed, the author of this thesis argues that the lack of a definition of the knowledge these authors refer to is rather unsatisfactory given the great body of knowledge concerning sustainability issues, their factors, components and drivers produced in the natural sciences, social sciences and the arts and humanities alike. The fact that proponents of the key sustainability competencies also regard their frameworks as ‘reference frameworks’ that are supposed to inform the development of sustainability programs in higher education, can be problematic when their view of knowledge is not defined. What is the theoretical/conceptual knowledge that is part to be part of the sustainability competencies? What theoretical/conceptual knowledge are students going to learn by studying the sustainability programmes in higher education? Based on this situation, the author of this thesis argues that research on important components of the sustainability curriculum in higher education needs to engage with defining theoretical/conceptual knowledge, from disciplines and sustainability as an academic field alike, of importance for that curriculum. Moreover, until the ‘knowledge’ that is a component in the key sustainability competencies is defined, the author argues that it is more fruitful to research and define competencies that have been argued to be developed simultaneously with the study of theoretical/conceptual subject matter and that is dependent on the knowing of that matter. Therefore, the author instead turns to Carlgren’s (2020, 2023) theory of subject- or field-based capabilities to see whether such capabilities can be found in academic disciplines and sustainability as an academic field and be included as components in the sustainability curriculum in higher education.

The PEI-knowledge perspective

As mentioned at the beginning of this thesis, the curriculum of sustainability programmes at higher education institutions has also been investigated from the perspective of PEI-knowledge. It is essential to shed light on research that engages with this form of knowledge, since this research often critiques the hegemony of ‘Western’ theoretical/conceptual academic knowledge in curricula of higher education institutions, which is arguably one of the forms of knowledge that this thesis seeks to investigate and define. The general underlying claim from the researchers studying this form of knowledge is that PEI-knowledge has an essential, and some argue principal, role in understanding and addressing sustainability problems (see e.g. Morgan, 2012; Jimenez & Kabachnick, 2023;

Robertson & Tsang, 2016; Thomas, 2020). In addition, the theory that will be applied in this research, Powerful knowledge (from which the other theories used in the thesis have developed), has been accused of colonial and racist ‘epistemic violence’, i.e. for being part of the dominance of Western academia with regards to how knowledge and data are produced and extracted (Rudolph et al., 2018). It is important to lift this critique against Powerful knowledge, and this will be done more in the theory chapter. That said, it is now time to engage with the question of how scholars have defined place-based, everyday and indigenous knowledge, and how one can argue that these forms of ‘knowledges’ differ from Powerful knowledge.

First, Morgan (2012) argues that education concerned with sustainability in higher education offers a context where communities and participants external to academia could be invited, to make learning about sustainability issues more just. Instead of sustainability education being about learning universalist, disciplined and de-contextualised knowledge, it should make room for the lived experience of learners and invite community participants to formulate knowledge and learning. In such ‘place-based education’, learners become ‘co-constructors of new, contextually relevant and useful knowledge’ (Morgan, 2012, 633). This type of sustainability education and curriculum invites an ‘epistemology of multiplicity’ where diverse actors, academics and citizens alike, often for justice reasons, are collectively forming knowledge and solving sustainability issues (Morgan, 2012, 634).

On the theme of ‘Everyday knowledge’, Robertson argues that the incorporation of everyday, local and culturally situated knowledge in the curriculum of formal education, including higher education, is necessary when trying to best understand and analyse sustainability problems. This contextual knowledge, they state, provides a more detailed and nuanced understanding of local sustainability problems, and how to locally manage and adapt to sustainability problems and environmental events and contributes to an understanding of how local problems affect global ones, and vice versa (2016, 6-8). Sustainability problems require that sustainability education, and its curriculum, ‘expand (...) beyond the narrow corridors of traditional academic disciplines’ (Robertson, 2016, 4) and invite local and indigenous people into collaborative knowledge and curriculum building on the topic (Robertson, 2016).

Similarly, but with perhaps greater force and with a postcolonial lens, Jimenez and Kabachnick (2023) call for higher education institutions to orient the sustainability curriculum towards indigenous knowledge. Many indigenous communities have long experience about and have come to know how to live sustainably in their local regions, while the current state of many pressing socio-environmental problems shows that Western communities, built on knowledge developed in Western academia, do

not succeed in sufficiently addressing these problems (Jimenez & Kabachnick, 2023). Thus, higher education institutions should:

[...] focus on reshaping [the] sustainability curriculum [...] to promote the notion that our collective survival depends on how well and quickly we heed the voices and perspectives of the relatively few people in the world (i.e. Indigenous people) that retain the knowledge of how to live sustainably. (Jimenez & Kabachnick, 2023, 1100)

Thus, the higher education sustainability curriculum should, according to Jimenez and Kabachnick (2023), be reformulated to be based on indigenous knowledge about sustainable practices and living.

The PEI-knowledge perspective on what the important knowledge to include in the sustainability curriculum in higher education is, differs from the Powerful knowledge perspective on knowledge used in this thesis. The PEI-knowledge perspective can be seen as a critique of the type of knowledge that is suggested as important for formal education in the Powerful knowledge perspective, namely ‘context-independent knowledge’ that is produced by academic experts in academic disciplines or fields, that assists learners in transcending contextual, individual and everyday experiences (Young, 2008b, 13-15). The PEI-perspective seeks to bring other types of knowledge than ‘traditional’ academic theoretical/conceptual knowledge, that Powerful knowledge can be argued to be a form of, into the debate about the sustainability curriculum in higher education. It is based on the argument that students’ learning of this knowledge will not be enough to tackle sustainability challenges, but that students need to learn more knowledge that is connected and situated in local contexts, retained by indigenous communities and co-constructed together with other communities than solely the academic (Morgan, 2012; Jimenez & Kabacknick, 2023; Robertson, 2016). Nevertheless, the author still argues that in the context of research on the sustainability curriculum in higher education, important context-independent academic knowledge, be it theoretical/conceptual or practical, has not been formulated or defined. It is such a process that this thesis seeks to contribute to.

Therefore, what follows next is the theory chapter where the theoretical framework that will be used in this thesis will be described.

Theory

In this section, the concepts of Powerful knowledge, Powerful knowings and Powerful regional knowledge are described. These are the three concepts that are investigated in this thesis. To explain them, a short account of ‘Social realism’ as a curriculum perspective will first be given. Building on

that account, the author will then describe why these different concepts have been selected for achieving the aim of this thesis.

Social realism as a curriculum perspective

To understand the concept of Powerful knowledge, from which Powerful knowings and Powerful regional knowledge have grown, it is important to first account for the ‘Social realism’ perspective in education more broadly and curriculum theory more precisely. According to social realism, the social and natural worlds exist independently from human observations of them. Thus, knowledge is seen as ‘real’, as existing ‘out there’ and not only in the minds of humans. The ‘realist’ part of the term refers to the independent existence of these worlds, while ‘social’ is about the social processes of systematic knowledge production about the worlds. Looking at formal education through the social realist lens means that of most importance is that students learn about the empirical, actual and real knowledge, to achieve the best current explanation of a thing, process or phenomenon (Wheelahan, 2010).

Importantly, the social realism perspective is essential in the critique that has been directed towards developments in curriculum policy and making over the last half-century, where some scholars argue that disciplinary, academic theoretical/conceptual knowledge has been displaced in favour of curriculum policy and design that is centralised around competencies and skills that aligns with the needs of the employment market (Moodie & Wheelahan, 2012; Young 2009, 2013; Young & Muller 2010, 2013, Young 2008a). The problem with letting the curriculum be centralised around the needs of the employment market is, Young (2008b) argues, that such needs are constantly changing and are influenced by economic and political forces, whereas empirical, actual and real knowledge developed in academic disciplines, which is the knowledge that is of importance in formal education in the perspective of social realism, is more stable and ‘neutral’. Therefore, learning this form of knowledge offers students the best opportunity to be empowered to affect the environment and society and participate in the debates around social and environmental issues (Young, 2008b; Young and Muller, 2013).

Indeed, it is this critique from the perspective of social realism that is the rationale behind the choice to, in this thesis, investigate Powerful knowledge (Young, 2009, 2013; Young and Muller, 2013; Muller and Young, 2019), Powerful knowings (Carlgren, 2020, 2023) and Powerful regional knowledge (Shay & Steyn, 2015) in relation to the sustainability curriculum in higher education. As argued in the introduction, research concerning the sustainability curriculum in higher education has mostly engaged with defining competencies of importance for such a curriculum (Brundiers et al, 2021; Kishita et al., 2018; Redman & Wiek, 2021; Rieckmann, 2012; Salovaara et al., 2019; Wiek et

al., 2011) and forms of knowledge that critiques theoretical/conceptual academic knowledge and that derive from other contexts than the academic (Morgan, 2012; Jimenez & Kabachnick, 2023; Robertson & Tsang, 2016; Robertson, 2016; Thomas, 2020). In engaging in such perspectives only, this research area has not paid attention to defining theoretical/conceptual and practical knowledge found in disciplines and fields in academia, and has thus, from a social realist perspective, neglected considering empirical, actual and real knowledge, a form of knowledge that, from a sustainability education perspective, the author, with support of Young (2008b) and Young and Muller (2013), argues has the potential to support students learning about e.g. the functions, components and complexities of sustainability problems (what they consist of), not only how to practically tackle them through e.g. competencies, and base sustainability actions upon this knowledge. Furthermore, the author puts forth the argument that theoretical/conceptual knowledge, in the form of Powerful knowledge or Powerful regional knowledge, has the potential to empower students and bring about social equality in modern post-industrial society. This society is partially defined and structured around this form of knowledge due to its perceived benefits for economic and technological growth as well as human development (Bell, 1973; Stehr, 1994; UNESCO, 2005). Powerful knowledge and Powerful regional knowledge can thus give students the power to influence their own lives, such as their working and civic lives, because of their elevated position in society. Therefore, when designing higher education curricula, this aspect should also be considered, including for the sustainability curriculum. By utilising the concepts of Powerful knowledge and Powerful regional knowledge, it is possible to engage with such forms of knowledge, which will soon be clarified when these concepts are laid out.

In addition, by using the concept of Powerful knowings, it is also possible to engage with practical knowledge with regards to the sustainability curriculum, which scholars of sustainability science and sustainability education have argued to be essential for students to learn to be able to tackle sustainability problems (Clark, 2007; Fang et al., 2018; Komiyama & Takeuchi, 2006; van der Leeuw et al., 2012). However, the sustainability competencies perspective that is accounted for in the literature review is defining competencies without relating them to theoretical/conceptual knowledge of academic disciplines and fields, which some scholars have argued to be of importance if students are going to be able to sufficiently make use of competencies (Duncan, 2007; Halliday, 2000; Smith, 2002; Tricot & Sweller, 2013; Willingham, 2008). This relation is however central to the concept of Powerful knowings (Carlgren, 2020, 2023). Thus, using Powerful knowings enables the author to look into and define practical knowledge that has close ties to disciplines or fields, and that is dependent on the knowing of theoretical/conceptual content in them. Seeking out this form of practical knowledge

(Powerful knowings) for the sustainability curriculum in higher education, the author argues, is a new and important way of approaching the question of what should constitute important components for such a curriculum.

Powerful knowledge

Powerful knowledge as a concept was first coined by Wheelahan (2007) but was later developed by Young (2008a, 2008b, 2009, 2013), Young and Muller (2013) and Muller and Young (2019). Young (2008b, 15-17) argues that Powerful knowledge, on the curriculum level, is sequenced and selected subject knowledge that has been produced in academic disciplines. Lambert and Marsden (2014, 7) argue that knowledge that typically qualifies as Powerful knowledge is abstract, or theoretical/conceptual knowledge. According to Chapman, based on Young (2014), this abstract, theoretical/conceptual knowledge has some features. It is a) *specialised* because it is produced in disciplinary or epistemic communities by academic experts, b) *systematic*, in that theories and concepts that make up this knowledge are developed systematically according to established academic/scientific methods, c) *distinct* from knowledge acquired from experience in everyday life (common-sense knowledge) and d) *objective and reliable*, since it arises from peer review in disciplinary epistemic communities to control for potential subjectivity (2021, 9). Thus, Powerful knowledge can be seen as a form of ‘know-that’ knowledge, a form of knowledge about how things, processes or phenomena ‘are’, to know about them. This form of knowledge is usually referred to as theoretical or conceptual knowledge in epistemological literature (Gustavsson, 2002, 85-86). Powerful knowledge differs from ‘context-dependent knowledge’, which is knowledge that is related to everyday living; knowledge that students need in their everyday life Young (2008b, 13-15). For example, knowing how to ride a bike and repair that bike if it breaks, can be seen as an example of context-dependent knowledge. The knowledge of bike riding and repairing is tied to the context, in this case, the specific bike, and cannot necessarily be transferred to other contexts, i.e. knowing how to ride a bike does not mean that one knows how to ride any other two-wheeled vehicle. Hence, this context-dependent knowledge is characterised by its connection to a specific context because it ‘‘deals with particulars that arise in everyday life but provides no reliable basis for moving beyond those particulars’’ (Young, 2008b, 14). However, ‘context-independent knowledge’, which is another way of describing Powerful knowledge, provides students with knowledge that can move them beyond particular contexts, cases and their everyday experiences. It has been tested and discussed by ‘specialised knowledge communities’ (see e.g. Young, 2013), disciplinary or field-related communities of academic experts, to increase its reliability. For Young (2008b) students’ learning theoretical/conceptual knowledge is the main task of formal education, since it is not guaranteed that

students can learn this knowledge in their homes and in other communities than the academic. This is however not to say that context-dependent knowledge can not be valuable; but it has different purposes than context-independent knowledge (Young & Muller, 2013), a knowledge that is supposed to support learners in transcending their everyday experience, to achieve a broader and more coherent understanding of what the social and natural worlds are made of. Offering learning opportunities for the acquiring of theoretical/conceptual knowledge in formal education is also an issue of *social justice*. It is an issue of social justice because Powerful knowledge can empower students to “alter the properties and potentials of our environment.” (Young & Muller, 2013, 3) and “provide learners with a language for engaging in political, moral and other kinds of debates” (Young, 2008b, 14) and this is something that should be an entitlement to all learners (Young & Muller, 2013, 231). Indeed, the author of this thesis argues that sustainability issues do need students who know how to influence the environment so that it becomes more sustainable and students who have theoretical/conceptual knowledge (‘language’ in Young’s (2008b) words) that they can use when engaging in political and moral questions related to these issues. If formal education does not support students in learning Powerful knowledge, they might not be able to participate in society as citizens on equal terms (Young, 2008b). Therefore, investigating the Powerful knowledge of importance for the formal curriculum can, based on Young (2008b) and Young and Muller (2013), be argued to be an issue of defining knowledge that can empower students to act and change the world, and in the context of this thesis, towards sustainability. Powerful knowledge is therefore one of the concepts that this thesis is investigating in relation to the sustainability curriculum in higher education.

In the two sections that follow, the author will describe the two other theories that are utilised in the thesis, Powerful knowings and Powerful regional knowings. These concepts, besides also aiming to highlight knowledge of essence in formal education, have an idea of ‘empowerment’ embedded in them, i.e. the idea that acquirers Powerful knowings and Powerful regional knowledge will be empowered to participate in societal debates and influence society and the environment (Carlgren, 2020, 2023; Shay and Steyn, 2015).

Powerful knowings

Carlgren (2020) argues that Young and Muller (2016, 2019), attempt to illustrate that Powerful knowledge is not confined only to theoretical/conceptual knowledge (‘know-that’), but also involves a form of practical knowledge (‘know-how’). However, Carlgren (2020) argues that that their attempt is not entirely successful since they have not been able to articulate how both theoretical/conceptual and practical knowledge are important when the formal curriculum is aimed at empowering. For Carlgren

(2020), it is important that practical knowledge is formulated as part of the concept of knowledge itself in Powerful knowledge. A widening of the understanding of knowledge, which recognises that knowledge is both theoretical/conceptual and practical, better supports Powerful knowledge as a curriculum principle and the capacity-building project of Powerful knowledge, i.e. how the understanding and knowing certain knowledge can contribute to the empowerment of students (Young, 2008b; Young, 2013; Young & Muller, 2013). Therefore, Carlgren (2020) suggests that of importance in formal education is that students learn ‘knowns’ (theoretical/conceptual knowledge) and develop their ‘knowings’ (a form of practical capability knowledge). Importantly though, Carlgren argues that that learning ‘a list of knowns’, without connection to a context and an activity of some form where the knowns can serve a purpose, is not meaningful. What is capacity-building for students in education is when practical knowledge is ‘developed in a transaction with the specific knowns’ (2020, 332).

Thus, for Carlgren, the capacity-building, i.e. the empowering potential of formal education involves learning of both theoretical/conceptual and practical knowledge. Of essence is that the theoretical/conceptual and practical knowledge is ‘subject-specific’, meaning that they are specific to different subjects and not general (Carlgren, 2020, 2023). Theories and practices are learnt by studying subjects (Carlgren, 2023, 2020) and Carlgren (2020) calls these ‘subject-specific knowns’ (theoretical/conceptual knowledge) and ‘subject-specific knowings’ (practical knowledge, capabilities). Powerful knowledge can according to Carlgren (2020), be equated with ‘subject-specific knowns, but Carlgren also formulates the concept of ‘Powerful knowings’ which are subject-*specific* capabilities. Importantly, Powerful knowings are dependent on or relate to the depth of theoretical/conceptual knowledge in a subject or discipline that someone has acquired (Carlgren, 2020, 331-333). To explain what characterises Powerful knowings, Carlgren asserts that:

A knowledgeable individual has not only acquired a substantial amount of knowledge but also certain ways of thinking, formulating questions, seeking and evaluating answers, and so forth. This expertise is largely implicit and tacit; partly embedded within the activities where knowledge is applied, and partly embodied. (2023, 14, author’s translation)

Powerful knowings, in other words, are implicit and tacit, and developed in the process of becoming knowledgeable of theories/concept, which typically happens when people study academic disciplines (Carlgren, 2023). It is Carlgren's (2020, 2023) theory of Powerful knowings that this thesis will make use of in investigating implicit/tacit capabilities that can be developed while studying different subjects. The rationale behind using Carlgren’s (2020, 2023) concept is as earlier argued, that it posits that capabilities, competencies and skills are learnt simultaneously as students study the

theoretical/conceptual knowledge of disciplines, and not in separation. For example, the general competence of ‘problem-solving’, to define and address different problems, does not look the same in every subject. It is a very different process to solve a problem in engineering and in psychology. It typically requires theoretical/conceptual knowledge from these subjects to be able to even define and address the problem. Thus, general competencies cannot be argued to be as easily transferable between different subjects and problems (Carlgren, 2023), and some empirical research (see e.g. Kemp & Seagreaves, 1995; Moore, 2011, Duncan, 2007) that has tried to investigate transferability and if and how competencies are discipline connected or general, has confirmed this argumentation of Carlgren (2023). Other scholars have also argued in the same manner as Carlgren; competencies come to best use when they are connected to disciplinary theoretical knowledge foundation (Barrie, 2004, 2006; Green, 2009; Hyland, 1993; Sadler, 2013). In addition, there has also been a scholarly discussion around the theoretical grounding of general competencies themselves, i.e. that their characteristics and boundaries vis-à-vis other competencies are not satisfactory defined, resulting in theoretical unclarity which can create problems when applying them (Hyland, 1993, 2006; McPhail & Rata, 2016; Muller & Young, 2014). Thus, Carlgren's (2020, 2023) theory of Powerful knowings, together with the research just accounted for, forms the basis for why it is important to research and identify the more subject-based capabilities that could be part of the sustainability curriculum in higher education, something that is missing in the research in the sustainability competencies perspective (see literature review).

However, this thesis needs to elaborate on whether Carlgren’s (2020) Powerful knowings are possible to conceive of in an interdisciplinary topic such as sustainability as well, given that the focus in this thesis is the sustainability curriculum. Carlgren seems open to such an endeavour, given that they state that educational aims, where the author argues that one such aim could be to educate on/for sustainability, can ‘‘(...) affect knowings (...) and provide the specific knowings with a certain nuance’’ (2020, 333). This quote supports the author in assuming that Carlgren (2020) believes that, for example, a sustainability focus and aim of a curriculum can influence what is regarded as Powerful knowings of importance for such a curriculum. In other words, if learning about and how to tackle sustainability issues is the educational aim of a sustainability curriculum, which it arguably is, then the Powerful knowings in such a curriculum will be about building capabilities in students to approach and tackle sustainability issues. Thus, in this thesis, the author wants to investigate what such Powerful knowings can be in disciplines *and* sustainability as an academic field, since it is an important field for the sustainability curriculum with its own set of ideas and practical knowledge (see e.g. Clark & Dickson, 2003; Kates et al., 2001; van der Leeuw et al., 2012), that are learnt while studying the

theoretical/conceptual knowledge of those disciplines and fields. Therefore, the author in this thesis theorises that Carlgren's (2020, 2023) Powerful knowings can be found in academic fields, and that they thus can be referred to as 'subject- and field-specific capabilities'⁴, which involves both disciplinary capabilities (subject-specific) and sustainability capabilities (field-specific). This means that the author tries to see if Powerful knowings can, apart from being tied to subjects, also can be tied to fields, by letting academics discuss this matter and try to define such knowledge from the academic field of sustainability.

Next, the author will describe the third concept used in this thesis, namely 'Powerful regional knowledge'. Powerful regional knowledge is a development of Powerful knowledge in the sense of a shift away from a very strong disciplinary connection, i.e. that Powerful knowledge is only to be found in academic disciplines (Muller & Young; 2019; Young; 2008a, 2008b, 2009, 2013; Young & Muller, 2013). It is important to use this concept in this thesis since the sustainability curriculum is of focus, a curriculum that is, as earlier said, interdisciplinary and therefore not tied to specific disciplines only. Can Powerful knowledge, although its strong disciplinary connections, also be found in interdisciplinary fields such as sustainability? By making use of scholarship, which will soon be described, on Powerful knowledge in the case of professional, vocational and interdisciplinary curricula, the author believes that it is. This scholarship is often founded on the work of Bernstein who has theorised about the development of 'fields' in higher education and calls this process 'regionalisation of knowledge' (2000, 9-10), where 'singulars' (disciplines) are recontextualised into 'regions' (larger units of singulars). To the author's best knowledge, the field of sustainability has not been regarded as an example of a 'region' in research. However, in this study, the author theorises that sustainability as a field indeed qualifies and the reason for this will soon be described. However, Bernsteins (2000) work will first be described.

Singulars, regions and the regionalisation of knowledge

Bernstein (2000) argues that during the 20th century, restructuring of knowledge took place in society and academia alike. 'Singulars', inwards looking disciplines (such as physics, biology, history) were, historically, the knowledge-producing entities in academia with their own discourse (Bernstein, 2000, 9). However, the structuring of knowledge changed and led to a 'regionalisation of knowledge', a process where singulars, were recontextualised into 'regions'. Regions are larger units consisting of singulars that are combined and they 'operate both in the intellectual field of disciplines and in the

⁴ As is visible in the operationalisation of Powerful knowings into questions/areas for discussion for the focus groups (see method), the author asks for capabilities from the participants' 'disciplines' and not 'subjects'. The reason for this was that the author believed that 'disciplines' would make more sense to the participants.

field of external practice'' (Bernstein, 2000, 9). Examples of regions are, according to Bernstein (2000, 9), engineering, architecture and other subjects or fields. Importantly though, regions are regulated both by disciplines and external actors who are both stakeholders in the knowledge-producing processes.

Importantly for this thesis, the author believes that it is possible to argue that sustainability as an academic field is an example of a 'larger unit' where different singular disciplines are recontextualised into a region; sustainability, and where knowledge external to academia is used and co-produced between academia and external actors as a result of transdisciplinary processes. In such recontextualization processes, negotiation of which disciplinary knowledge to include in the region takes place (Bernstein, 2000, 8-10). In the case of sustainability as an academic field, this means that knowledge from academic disciplines relevant to sustainability as a topic is discussed and decisions are taken upon which knowledge that is important to include in the regional sustainability curriculum. This knowledge is also combined, integrated and created into something new, which scholars in sustainability science have pointed to (see e.g. Clark & Dickson, 2003; Kates et al., 2001, 641; Komiyama & Takeuchi, 2006). This makes it possible to assume that there exist knowledge specific to the region of sustainability, or sustainability as a science, that has developed from the merging of different disciplinary knowledge and inclusion of external perspectives, that could be important for students to learn, which therefore has to be considered for the sustainability curriculum. Importantly for this thesis, research (see e.g. Annala, 2022; Muller 2009; Niemelä, 2021) has investigated whether this form of regional knowledge can also share properties with Powerful knowledge as expressed by Young (2008b) and Young and Muller (2013). Shay and Steyn (2015) have made an important contribution that can act as a foundation for this research in theoretically formulating Powerful knowledge in regions, 'Powerful regional knowledge'. The author wants to contribute to the need stressed by the scholars mentioned above since sustainability as an academic field can be seen as a region, and since there probably exist important knowledge in that field that could be part of the sustainability curriculum in higher education. Therefore, it is 'Powerful regional knowledge', besides Powerful knowledge and Powerful knowings that the author will try to define for the sustainability curriculum. Thus, what now follows, is an account Powerful regional knowledge as a concept that captures empowering theoretical/conceptual knowledge of regions/fields.

Powerful regional knowledge: theoretical formulations

Shay and Steyn (2015, 140-141) argue that Powerful knowledge in the case of regions is connected to and defined by an increase in conceptual and contextual complexity. Shay and Steyn's argument applies to vocational/professional curricula. However, the author, in line with Annala (2022) believes

that the same argument can be applied to interdisciplinary curricula, such as the sustainability curriculum. Conceptual complexity refers to the degree to which the curriculum becomes conceptually complex in that it involves theoretical/conceptual knowledge from different disciplines that are also integrated and combined. Contextual complexity is about the degree to which the different cases, problems and tasks in an interdisciplinary curriculum are contextually complex, creating a need to have knowledge that can be used for solving particular, contextual problems. Shay and Steyn (2015, 141) argue, from the perspective of the vocational curriculum, that teaching and learning connected to such a curriculum are focused on increasingly complex, ill-defined, open-ended real-world problems for students to engage with, which thus requires students to have more contextually and conceptually complex knowledge, to be able to tackle them. In the context of sustainability, such problems are often called 'Wicked problems' (Grint, 2010).

The author of this thesis wants to claim that, given the interdisciplinary nature of sustainability, that integrates concepts, theories and methods from the social and natural sciences as well as the arts and the humanities (Clark & Dickson, 2003; Kajikawa, 2014; Komiyama and Takeuchi, 2006; van der Leeuw et al., 2012), sustainability programmes based on the field of sustainability should be programmes, at least in theory and at the curriculum level, which have conceptual complexity as formulated by Shay and Steyn (2015). It is more difficult to confidently state that these programs have contextual complexity since Shay and Steyn (2015) seem to point to contextual complexity in the sense of an increase in particularity and specificity with regards to different problems that are tackled in the regions studied. Indeed, scholars have argued that sustainability as a field deals with local, regional and global processes (Clark & Dickson, 2003; Kates et al., 2001; Fang et al., 2018), which can be seen as problems on different scales, where the particularity and specificity that Shay and Steyn (2015) highlight might be more applicable for regional and local processes than global ones. Still, the author believes that sustainability programmes and their curricula have the potential to be organised around an increase in contextual complexity regarding the sustainability problems that students work with. Sustainability problems in their nature, typically involve multiple natural, social and economic components, parameters and factors, and thus can be argued to be examples of problems that in many cases might require very particular contextual knowledge to be tackled. Because of this potential, it is interesting to investigate the potential 'Powerful regional knowledges', following Shay and Steyn's (2015) definition, that academics consider to be important for the sustainability curriculum. Is it possible to conceive of Powerful regional knowledge in the case of the sustainability curriculum, a form of Powerful knowledge with a high degree of conceptual and contextual complexity?

In the next part, the author will account for theoretical contributions to Powerful regional knowledge and elaborations on the concept that is of relevance to this thesis.

Powerful regional knowledge: theoretical contributions

In order to further legitimise the argument that Powerful regional knowledge can and should be studied in relation to the sustainability curriculum, the author will now account for two scholarly contributions on the topic and highlight their argumentation as to why Powerful knowledge can and should be conceived of in an interdisciplinary curriculum.

Niemelä (2021) and Clegg (2016) have contributed to the definition of Powerful regional knowledge. Niemelä's (2021) research has been dedicated to seeing how interdisciplinary curricula can be designed while at the same time keeping Powerful knowledge as a curriculum principle, while Clegg (2016) discusses the possibilities of formulating regional (Bernsteinian and more broadly conceived) knowledge outside of the academy that has the characteristics of Powerful knowledge. Niemelä's (2021) research centres on a different research problem than the problem of focus in this thesis because they are more interested in investigating the *practical designing process* of an interdisciplinary Powerful knowledge curriculum, while this thesis focus is to try to *define* Powerful knowledge for such a curriculum. The fact that Clegg's (2016) research looks into the possibility of other actors than academics defining Powerful regional knowledge, makes it different from the purpose of this research but is nevertheless important to describe since it supports the argument that it makes sense to use Powerful regional knowledge when investigating the sustainability curriculum, which will be visible in the discussion chapter.

Niemelä (2021) lists two different reasons why disciplinary boundary crossing, as formulated by Young and Muller (2010) and Muller (2009), might be needed for the curriculum and how it can lead to Powerful knowledge. First, there are 'epistemological reasons', which are actualised when the understanding of interconnected and complex societal issues, such as climate change or social inequality, requires that students achieve knowledge from various disciplines, and see how these pieces of knowledge are connected to be able to tackle the issues. Secondly, there are 'educational reasons', which are about the development of a holistic worldview, in a Humboldtian sense, the development of students as people in the world, something that can be achieved when students are learning specialised knowledge from various disciplines in an integrated rather than fragmented manner (Niemelä, 2021, 365-366). This learning is a form of "inner formation [that] also enables the formation of the outer world according to the will of a person" (Niemelä, 2021, 365), in other words, acquiring this knowledge supports the person in affecting the world.

Further, Niemelä (2021) argues that it is possible to both maintain and cross disciplinary boundaries in an integrated (interdisciplinary) curriculum and at the same time achieve ‘curriculum coherence’ as stressed by Muller and Young (2019). Muller and Young (2019) argue that curriculum coherence is essential for Powerful knowledge, because Powerful knowledge cannot be acquired by students if topics and concepts in the curriculum are not structured and sequenced appropriately. By leaning on empirical evidence and by giving examples, Niemelä argues that curriculum coherence is possible also for the interdisciplinary curriculum and gives the example that when these curricula have core subjects acting as the ‘ spine of the curriculum to which other subjects are connected’ (2021, 370), it could be a way of achieving Powerful knowledge by letting disciplinary boundaries remain. In all examples provided, they however show that it is not an easy process, but a process that requires deep and deliberate thinking, something that cannot be left to teachers alone but has to be worked on when the written curriculum is developed (2021, 368).

Clegg (2016) raises the question about whether Powerful regional knowledge can be created in domains beyond academia, given that knowledge for regional curricula is, according to Bernstein (2000) created by academia and actors external to academia alike. They ask whether Bernsteinian and more broadly conceived regional Powerful knowledge can be generated outside of specialised communities of knowledge, as defined by Young and Muller (2013). When raising this question, Clegg is (2016) clear that they want to investigate knowledge-forming processes that lead to regional knowledge that have the characteristics of Powerful knowledge as formulated by Young (2008a, 2008b, 2009, 2013), Young and Muller (2013) and Muller and Young (2019). Several cases are provided by Clegg (2016) that support the argumentation that actors external to academia have contributed to Powerful regional knowledge. Among the examples are The Women’s Health movements’ which have provided many valid and reliable knowledge claims with regards to women’s health, autonomy and childbirth (465) and other social and environmental movements that are clearly connected to ‘parent-disciplines’ and base their propositions for change on scientific facts and argumentation but still act outside of academia (468). In connection, Clegg argues that:

The relationship between curriculum development in newer environmental sciences, for example, and the social movements that have undoubtedly driven their popularity, if not necessarily their knowledge base, requires exploration. (2016, 468)

This argument raised by Clegg is, of course, of particular relevance for this thesis since the focus is the sustainability curriculum.

Summary of theoretical framework

In this section, the author will summatively account for the theories that are part of the theoretical framework, Powerful knowledge, Powerful knowings and Powerful regional knowledge and their respective components.

First, building on Young (2008b, 2009, 2013), Young and Muller (2013) and Muller and Young (2019), Lambert and Marsden (2014, 7) and Chapman (2019, based on Young, 2014), Powerful knowledge refers to theoretical/conceptual, specialised, objective, reliable, systematic, context-independent knowledge produced in academic disciplines by academic experts in specialised knowledge communities that is/are important to include in the formal curriculum because it empowers learners to engage with political and moral societal debates and influence society and the environment. Secondly, based on Carlgren (2020, 2023), Powerful knowings refers to embodied, tacit/implicit capabilities that are learnt while studying academic subjects, disciplines or fields that is/are important to include in the formal curriculum, for the same reason as for Powerful knowledge. Thirdly, Powerful regional knowledge (Shay & Steyn, 2015) refers to theoretical/conceptual knowledge with the same characteristics as Powerful knowledge but with a higher degree of conceptual and contextual complexity, that is/are important to include in the formal curriculum, for the same reasons as Powerful knowledge and Powerful knowings.

Limitations with theoretical framework

In this thesis, the author uses Powerful knowledge, Powerful regional knowledge and Powerful knowings as curriculum theories of knowledge to define what could constitute important components for the sustainability curriculum in higher education. In the introduction and in the theory chapter, the reasons for using these theories to be able to define such components have been elaborated. However, it is important to also consider possible limitations of using these these theories to approach this matter.

It is clear that Powerful knowledge, which is the overarching theory that has led to the development of Powerful regional knowledge and Powerful knowings, stipulates that it is knowledge produced in academic disciplines that is important for the formal curriculum (Young, 2008b; Young & Muller, 2013). With that said, other forms of knowledge are not completely disregarded in the theory as forms of knowledge; but they should not inform the formal curriculum. This is because the formal curriculum should give all students the potential to acquire Powerful knowledge, context-independent knowledge that can move them beyond their everyday experiences and allow them to learn knowledge that they are not guaranteed to learn outside of the educational system (Young, 2008b, Young &

Muller, 2013), which can be seen as a social justice aspect of Powerful knowledge. This aspect of Powerful knowledge is important for this thesis since it argues that defining theoretical/conceptual academic knowledge, together with practical knowledge that is tightly connected to academic disciplines or fields (that could also practically implicate the sustainability curriculum in higher education), is of essence if students studying sustainability are going to have the ability to counter scientific scepticism around sustainability issues, participate in societal debates around them and influence the world in a sustainable direction.

Nevertheless, it is possible to argue that there can be other ways of tending to social justice and to prepare students to debate and influence society and the environment through the curriculum. For example, with regards to social justice, Rudolph et al. argue, (2018) it is important to discuss the historical colonial legacies of Western academia and its disciplinary knowledge production (a history that Powerful knowledge arguably has developed from) that according to them can be seen as a ‘project of ruination’ in ‘which other kinds of worlds, knowledges, existences and cultures are actively refused and ruined’ (Rudolph et al., 2018, 26). Rudolph et al. (2018) speak here not only about the process of creating disciplinary knowledge but also how the hegemony of knowledge produced in Western academia has contributed to the refusing and destroying of other knowledge systems. According to Rudolph et al. (2018), disciplinary academic knowledge is important, but its inclusion in the curriculum should be combined with learning about the historical process that led to its creation. This is crucial to promote social justice as an important goal in formal education. Thus, in using PK as an overarching framework to define what could be important curriculum components for the sustainability curriculum, one risks to end up with different suggestions of curriculum components (theoretical/conceptual/practical knowledge) that seem to be ‘scientifically neutral’, but whose development are tied to historical social injustices that are the result of the production of those components. The author is aware of this potential problem but still wants to state that it is also possible that the knowledge that becomes defined when using Powerful knowledge also involves, in the knowledge itself, theoretical knowledge of how injustices are formed or practical capabilities that can be used to tackle such injustices.

In addition, the PEI-knowledge perspective accounted for in the literature review can be seen as a critique of Powerful knowledge, where the argument is that the formal curriculum, the sustainability curriculum in this context, should be opened up for the inclusion of other ways of ‘knowing’ (Jimenez and Kabachnick, 2023; Robertson, 2016) and forms of producing knowledge (co-creation) (Morgan, 2012) than the purely academic. Indeed, if the aim is to define knowledge that can support students in influencing society towards sustainability, which is what this thesis, among other things, sets out to do,

then the PEI-knowledge perspective could possibly also have been used. Jimenez and Kabachnick (2023) together with Robertson (2016) are probably right that there exists knowledge in indigenous or local communities that students could learn and use in working with sustainability issues. However, since the aim of this thesis also is to shine light on a form of knowledge that the author argues has been neglected in research about the sustainability curriculum in higher education, theoretical/conceptual and practical capabilities that can be found in academic disciplines and fields and that is created by academic communities, then it is not entirely clear if the PEI-knowledge perspective can assist that process. Importantly though, this is not to say that there does not exist knowledge in such communities that has the characteristics of Powerful knowledge. For example, Clegg (2016) whom this research also accounts for and relates its findings to, has shown that it does.

Method

The method's chapter lays out the study's sampling process, the method for data collection, how the material was analysed and brings up the study's limitations. In addition, the study's ethical considerations are also part of this chapter.

Research design

This research uses qualitative research design as an overarching framework because it seeks to understand and engage with what academics consider could be important Powerful knowledge, Powerful regional knowledge and Powerful knowings for the curriculum of sustainability master's programmes in higher education. As Bryman (2012, 380) asserts, qualitative research is about understanding how participants see the social world. Translated to this thesis, it means that of interest is what academics think about the topic in question. As will be described later in this chapter, the thesis will use focus groups as the method for data collection to be able to engage with the research question.

Sampling

Sampling processes and forms

To be able to answer the research question, two parallel sampling processes were conducted; sampling of master's programmes and sampling of participants. The reason for starting the sampling process with sampling of master's programmes in sustainability was that the author could then from these programmes find participants for focus groups that were actually researching sustainability as an academic field and that were also involved in planning and teaching of sustainability education in

higher education. Being an active researcher in sustainability together with having a planning and teaching role, the author believed would make it possible to create focus groups with participants who had something productive and significant to say about the research topic.

Thus, the sampling of master's programmes took place first and was followed by the sampling of participants who were connected to one of the sampled programmes. Both of these processes relied on 'purposive sampling' and 'convenience sampling' (Bryman, 2012, 201). Purposive sampling was performed in different stages of the sampling process and acted as the main guiding sampling method for the study. The sampling of master's programmes and participants needed to have, as Bryman writes 'direct reference to the research questions being asked' (Bryman, 2012, 416). In other words, the research question of what Powerful knowledge, Powerful regional knowledge and Powerful knowings that academics consider could be of importance for the curriculum of sustainability master's programmes, theoretically directed the author towards specific master's programmes and participants. Thus, theory to a large degree impacted the sampling processes, which will soon be described.

Convenience sampling was used because the thesis's author has particular access to the context of the study. The author works at a Swedish university and has been involved in curriculum planning and teaching of courses, which made it easier for them to access and grasp the context quickly by using their experience and knowledge about how the Swedish higher education system is organised. Moreover, the author speaks Swedish, which made it easier to get in touch with some of the participants for the study. Even though English was the language used during the focus groups, participants sometimes needed clarifications in Swedish around concepts or questions discussed.

Sampling of master's programmes

The sampling from the broader domain of 'Swedish master's programmes in sustainability' was supported by criteria (see below) developed out of definitions of 'Sustainability science' and reflected the concepts of Powerful knowledge, Powerful regional knowledge and Powerful knowings, so that the sampled programmes made it possible to investigate these theories. The reasoning behind the sampling process will now first be described, followed by a section describing how the sampling was conducted in practice.

First, after looking at several prominent definitions of sustainability science, it was possible to discern some common features in them. The author looked at these definitions, that reflected the field of sustainability science, to develop criteria for the selection of master's programmes. For this thesis, which investigates Powerful knowledge, Powerful regional knowledge and Powerful knowings concepts that are about academic theoretical knowledge and academic capabilities, it was important to

select programmes that reflected the essence of sustainability science as an *academic* field. In other words, programmes with a clear ‘academic focus’. Indeed, it was of essence that the programmes, to the extent that was possible for the author to discern, engaged with academic knowledge and academic capabilities. Otherwise, it would have been challenging to investigate the concepts in relation to the curriculum of such programmes. Thus, the selection of programmes was based on their representation of sustainability science as a field (see criteria below that were used) and their integration of academic knowledge and academic capabilities, as described in the available program descriptions and program syllabi on their respective websites.

The sampling criteria that were developed for the sampling of master’s programmes were thus that they are 1) run at a Swedish higher education institution and integrate academic knowledge and capabilities, which follows from ‘convenience sampling’ and ‘purposive sampling’ as two sampling methods used in this thesis, 2) multi/inter-disciplinary and integrates concepts/theories/methods from the natural and social sciences, arts and humanities in the curriculum for understanding complex interactions between nature and society (Clark & Dickson, 2003; Clark 2007; Fang et al, 2018; Kates et al., 2001; Komiyama & Takeuchi, 2006; Kajikawa, 2014; Shrivastava et al., 2020), 3) Transdisciplinary, i.e. involves (societal) participation and collaboration (Fang et al., 2018; van der Leeuw et al., 2012; Lang et al., 2012, Yarime et. al, 2012), 4) focus on global, regional, local processes related to sustainability (Clark & Dickson, 2003; Fang et al., 2018; Kates et al., 2001), 5) focus on north and south perspectives and processes related to sustainability (Clark & Dickson, 2003; Fang et al., 2018; Jerneck et al., 2011) and 6) Problem- and solutions-oriented (Clark, 2007; Fang et al., 2018; Komiyama & Takeuchi, 2006; van der Leeuw et al., 2012).

The first stage in the practical part of the sampling process included visiting the webpage ‘www.studera.nu’, which is a Swedish website where all courses and programmes offered by Swedish higher education institutions are listed. The term ‘hållbar*’ (eng: ‘sustainable’) was put in the search bar and the asterisk ‘*’ was used to expand the search to include all programmes that had some variation of the word ‘hållbar’ in their title. The search was then filtered on ‘programmes’, which meant that courses were excluded, and ‘master’s programmes’, which meant that programmes on all other levels were excluded.

The search resulted in 78 unique master’s programmes. From there, the author went on to check each programme’s website, with a focus on each programme’s general description and programme syllabus, and compared these with the criteria that were set up for the sampling of master’s programmes. Since this thesis turns to programmes that should reflect the core of sustainability science and are of clear

'academic focus', programmes that either in their description or syllabi, could be interpreted as having a *specific* sustainability focus, such as 'sustainable digitalisation', 'sustainable tourism', 'education for sustainable development', were excluded. This exclusion resulted in seven master's programmes. However, the author knew about two more master's programmes that could match the developed criteria that did not appear in the search. Hence, these were added, resulting in a total amount of nine programmes.

From the cohort of nine programmes, two programmes were sampled. The reason for this was partly due to the fact that the scope of this thesis is limited in terms of time, so the time the author had for conducting the study did not allow the inclusion of all programmes in the study. In addition, the author could not discern that many master's programmes with a clear academic focus, which was important for this study, and thus decided to choose the two programmes that most clearly matched the developed criteria for sampling of master's programmes. Importantly, the focus in this research is not to arrive at results that are generalisable to the 'bigger population' of all master's programmes with such a focus, but to investigate what academics *consider could be* Powerful knowledge, Powerful regional knowledge and Powerful knowings to include in the curriculum of sustainability programmes in higher education. Thus, the thesis is occupied with seeing how academics reason about and discuss the issue of these forms of 'knowledges' in relation to such curricula, rather than arriving at a definite generalisable result on the topic. In sampling two programmes, the author could then involve voices from participants of different disciplines in investigating and discussing empowering theoretical/conceptual and practical knowledge for the sustainability curriculum. Another reason as to why only two programmes were sampled was that the author quickly got in touch with possible research participants from these two programmes, and thus decided to seize the opportunity to move on quite quickly to the empirical data collection. Indeed, the author tried to choose two programmes that, to the best of the author's understanding, included somewhat similar content as was possible to discern from the information available about the programmes on their respective websites. In addition, both programmes chosen were situated at research-heavy universities, and are universities that are often described as being comparable in terms of their history, organisation of research and education etc, which the author believed would make it possible to generate more data. Indeed, an advantage of focusing on only two programmes, with similar characteristics, is also that it enables a concentrated and focused comparison.

Some key facts about the sampled master's programmes that are important to share for the sake of transparency are relate to the programme's courses and themes covered, as was available for the author to discern from the programmes' websites and programme syllabi. Programme 1 included the courses

Introduction to Sustainable Development (5 credits), Sustainable Development: Worldviews and Visions - a Seminar Series (5 credits), Our Natural Resources (10 credits), Society and Environment (10 credits), Futures Studies: Exploring Sustainable Futures (5 credits), Environmental Assessment (5 credits), Sustainable Development: Worldviews and Discourses - a Seminar Series (5 credits), Internship for a Sustainable Development (15 credits), Energy, Water and Food (15 credits), Interdisciplinary Practice (15 credits) and Degree Project E in Sustainable Development (30 credits). In addition, the following themes are highlighted in the programme description: Complex problems facing humanity and the planet, Sustainable futures, Sustainable development, Theory and practice related to natural resources, society and the environment, and Energy-water-food. As for Programme 2, these were the courses part of the programme syllabi: Earth Systems Science, (7.5 credits) Social Sciences and Sustainability (7.5 credits), Methodology for Sustainability Science (7.5 credits), Sustainability Science (7.5 credits), Politics of Sustainability (7.5 credits), Geographies of Sustainability (7.5 credits), Economy and Sustainability (7.5 credits), Methods and Tools - from Knowledge to Action (7.5 credits), Master thesis (30 credits) and several elective courses, Gender and Sustainability in Theory and Everyday Life (7,5 credits) and Sustainability and Global Health (7,5 credits), Resilience and Sustainable Development (7,5 credits), Sustainability and Popular Culture (7,5 credits), Energy and Sustainability (7,5 credits), Water and Sustainability (7,5 credits), Social Movements and Sustainability (7,5 credits) and Sustainability and Inner Transformation (7,5 credits). In addition, themes that appear in the programme description of Programme 2 are: Sustainability challenges from a local to global level, Combining both social and natural science perspectives, Skills necessary to deal with complex sustainability challenges and strategies for sustainable pathways.

In the next section, the sampling of participants from the master's programmes to the focus groups will be described.

Sampling of participants

After selecting two master's programmes, participants were sampled. Criteria were also set up for sampling participants (see below). The criteria relied heavily on the concept of Powerful knowledge, the overarching concept that informs this thesis. The reasoning behind the sampling process will now first be described, followed by a section describing how the sampling was conducted in practice.

Importantly, the participants in the study had to be part of 'specialised knowledge communities' (Young, 2014, Young & Muller, 2013, 244), connected to the topic of sustainability. As described earlier, these communities typically consist of 'academic experts' who develop theoretical/conceptual knowledge in a discipline or a field (Chapman, 2021, Young, 2014). Young and Muller (2013)

describe these ‘academic experts’ as being people who conduct research in academic communities in various disciplines and fields who together continuously deliberate the best possible explanations for things or phenomena in these disciplines or fields, i.e. the Powerful knowledge in them (Young & Muller, 2013). In this thesis, it was important that the selected participants were part of such a community in two different ways; in the role of an academic who researches together with others and in the role of a teacher and curriculum planner belonging to a group who together work with a master’s programme in sustainability.

Thus, the academics sampled had to, besides teaching, either be conducting sustainability-connected research and be involved in a research group(s) or regularly attend events and be part of discussions around sustainability research arranged at their higher education institution. The idea was that such criteria would ensure that the academics that were chosen were having a connection to ‘specialised knowledge communities’ and sustainability research.

Secondly, for this thesis, the idea of a ‘specialised knowledge community’ was broadened. This broadening is based on the argument that being part of a group that teaches and designs the curriculum entails discussing, evaluating and deliberating what is important to include in such a programme, with respect to academic knowledge and academic capabilities from disciplines and the academic field of sustainability. In that way, when such people are involved in planning and teaching in a master’s programme, they are judging ‘bestness’ of knowledge (Young & Muller, 2013, 263) and try to ‘distinguish the best proposition [of knowledge] from other contenders’ (Young & Muller, 2013, 236), which is typical for specialised knowledge communities.

The decision to include academics who had had a teaching role⁵, and not exclusively academics employed as researchers, could be criticized. This is because researchers may be considered to be closer to the specialised knowledge communities defined by Young and Muller (2013) than teachers since they usually spend more time researching, and thus have more time to take part in different specialised knowledge communities. However, in the case of this thesis, it was also important that the participants had knowledge and experience of being teachers who have insight into curriculum planning and knowledge about the translation of academic knowledge produced in research to the curriculum of educational programmes, in this case master’s programmes. Without such knowledge or experience about the particular context of master’s programmes, such as knowledge about the ‘level of

⁵ For clarification purposes, it is important to note that not all academics were employed as teachers at their respective universities. For the thesis, it was enough if the academics had had ‘the role’ of a teacher in the master’s programme and had been part of the curriculum planning.

difficulty', sequence of introducing theories or concepts and pace of their introduction (Young, 2009, 151; Young, 2014, 199), essentially the re-contextualisation (Bernstein, 2000, 9) of academic knowledge that could be part of such programmes, it is probably more difficult to evaluate and decide upon which Powerful knowledge, Powerful regional knowledge and Powerful knowings that is of significance for the curriculum of these programmes. A criteria was also formed to include such aspects just mentioned. Overall, it is possible then to state that the author had to strategically choose participants for the study, to be able to investigate the research question (Esaiasson et al., 2017, 332-333).

The criteria set up for the sampling of participants were that the participants had to be 1) part of a research group that conducts sustainability-connected disciplinary research or regularly attends events and discussions around sustainability research at their higher education institution, which follows from Young and Muller's idea (2013, 244) about the specialised knowledge community, 2) involved in a specialised knowledge community in the role of a teacher and curriculum planner for a master's programme in sustainability, which follows from the same idea stated above.

Followingly, the practical sampling process was conducted in several steps. The author visited the webpages of the two sampled master's programmes and identified academics that were teaching in the programmes. The sampling criteria just described guided this process. The author also aimed to find participants with diverse disciplinary backgrounds and teaching areas, to create an as interdisciplinary group as possible and as much insight into various aspects of the master's programme as possible. All possible disciplines or teaching areas could not be covered in the creation of the focus groups, but they were still somewhat diverse with regards to teaching areas, disciplinary backgrounds and research areas that were represented in them. Some key facts about the participants in the two focus groups will now be given.

Focus group 1 involved four participants (P1, P2, P3 and P4). P1 was teaching about human development and environmental impact, natural resources and systems thinking, had their disciplinary background in ecology and was researching resilience assessment, environmental policy and ecosystem management. P2 was teaching and supervising in the master's thesis course, had a disciplinary background in biology, forestry and ecosystem services and was researching ecosystem services, biodiversity policy and public participation. P3's teaching area was in society and the environment, systems thinking and ecology, they had a disciplinary background in ecology and was researching citizen science, digital innovation and nature conservation, and community ecology. P4

was teaching in environmental assessment and impact, had a disciplinary background in hydrology and was researching hydrology, agricultural systems and water use.

Focus group 2 involved three participants (P5, P6 and P7). P5 was teaching geography and sustainability, resilience and sustainability, earth systems science, in the thesis course and supervised, had a disciplinary background in geography and was researching resilience, coupled environmental and social systems, geospatial analysis and rivers and land use. P6 was teaching systems thinking, thesis course and supervised and energy and plant politics, had a disciplinary background in political science, environmental studies and sustainability science and was researching energy systems, justice, climate politics and green transition. P7 was teaching colonialism and sustainability, 'Pluriverse' as social theory and politics and sustainability, had a disciplinary background in law, environmental studies and sustainability science and was researching political ecology, environmental politics and territory and decoloniality.

Moreover, after identifying academics with diverse backgrounds, the author sent out information about the study together with an invitation to join a focus group that would discuss the topic of academic knowledge and capabilities of importance for Swedish master's programmes in sustainability. A first contact was made with some academics who agreed to participate, who then helped the author get in touch with their colleagues. In that way, the selection of participants also became a form of snowball sampling (Bryman, 2012, 424).

After the author had found enough participants to form focus groups, they sent out a consent form (see appendix) and information about Gothenburg University's policy on the processing of personal data. The for the study important characteristics of the participants are listed in table 5 and 6. In order to meet the demand for confidentiality the names of the participants have been anonymised.

In the following chapter, the data collection process using focus groups will be described.

Data collection

Focus groups

This study uses focus groups as the method for data collection, and the main reason for this will now be explained. Bryman (2012, 504) asserts that focus groups relate to the sociological theory of 'symbolic interactionism'. Foundational to that theory is that understanding of things or phenomena derives from social interactions between people, not from individuals in isolation. The focus groups used in this study can be seen as 'specialised knowledge communities' (Young & Muller, 2013, 244), where participants socially interacted to reach an understanding of the issues they were asked to

discuss. Thus, the choice of method for data collection was related to one of the theoretical underpinning in this thesis, namely that powerful knowledge is developed in interactions between members of such specialised communities. The author's idea was that the focus groups would be a form of a simulation of a 'specialised knowledge community' who could discuss, agree and disagree on what they believed could be important Powerful knowledge, Powerful regional knowledge and Powerful knowings for the sustainability curriculum of master's programmes in higher education.

In using focus groups, the researcher is interested in the ideas, thoughts and viewpoints of the participants, both as individuals and as a group (Bryman, 2012, 503). However, in the case of this thesis, it is important to note that of interest were the ideas, thoughts and viewpoints of the participants in their role as *academics* in a specialised knowledge community. In that way, the idea was that of focus for the participants was to discuss issues with such a lens, which was also clarified for the participants beforehand. Moreover, when conducting focus groups, it is important to allow participants to discuss issues by arguing, counter-arguing, and building on each other's ideas so that the 'whole becomes greater than the sum of its parts' (Caillaud et al., 2022, 5). Therefore, the questions that were discussed (see appendix) were rather openly formulated to create space for such an interactive discussion.

Focus group 1 was held on March 6, 2024, and consisted of four members. Focus group 2 was held on March 15, 2024, and had three participants. Caillaud et al. (2022, 11) argue that small focus groups can support a more in-depth discussion and that they are more appropriate when participants are very engaged with the topic. This reasoning was applied to this study and the groups were kept relatively small. Indeed, the participants needed to be actively engaged in the topic of the research as this was thought to be necessary for them to be able to provide answers to the questions asked during the focus group.

Both groups were held online, each one for 90 minutes using a video communications platform. There are some reasons why the author decided to hold the focus groups online. First, it was convenient for the participants and the moderator both time- and travel-wise as well as economically, to participate in and conduct the focus group online. The author could also, by deciding to keep the focus groups online, access participants who were geographically distant from the author, but who were important for the research since they worked with a master's programme that the study wanted to use as its context to gather participants from. Secondly, the online format was also thought to ease the focus group experience for participants that might be more quiet and shy, personal characteristics that the author could not know of beforehand. However, the online format could also of course have the

opposite effect on participants, which is why this is also discussed in the section of limitations of the study.

Moreover, in practice, the author of the study moderated the group which started with an introduction of the study, clarification of practical matters and a short introduction round where the participants presented themselves. All these aspects were important to cover in order to make the focus group run smoothly. Moreover, the audio of the focus groups was recorded after consent from the participants. The author chose to only record the audio because of most interest for the study was what the participants were saying and discussing, not so much how they were interacting verbally or non-verbally. Of course, the last aspects could potentially be of interest, but in the choice between also video-recording the participants' conversations, considering the potential added value it could contribute to the study, and the preservation of participants' integrity, the decision was made to only capture the audio. The audio material from the groups was stored on the author's personal computer and will not be distributed.

Operationalisation of research question and focus group guide

This research investigates Powerful knowledge, Powerful regional knowledge and Powerful knowings in relation to the curriculum of master's programmes in sustainability. A summary with definitions of these concepts is provided in the theory chapter. As described in this summary, Powerful knowledge, Powerful regional knowledge and Powerful knowings are together concepts that aim to capture the theoretical/conceptual and practical capability knowledge that is/are important to include in the formal curriculum because it empowers learners to engage with political and moral societal debates and influence society and the environment (see Carlgren, 2021; Shay & Steyn, 2015; Young & Muller, 2013; Young, 2008b). Since the focus of the thesis is to investigate Powerful knowledge, Powerful regional knowledge and Powerful knowings of importance for the sustainability curriculum, the author had to make use of the just referred author's ideas of how theoretical/conceptual knowledge and practical capability knowledge from disciplines and the academic field of sustainability can empower students, but with the sustainability curriculum in mind, a curriculum that aims to contribute to students theoretical/conceptual learning about sustainability issues from different disciplines and in an integrated manner, and how to tackle them (see e.g. Clark, 2007; Fang et al., 2018; Komiyama and Takeuchi, 2006). Thus, when formulating questions for the focus group, the author decided to formulate questions that steered the participants to define disciplinary theoretical/conceptual knowledge, theoretical/conceptual knowledge from the academic field of sustainability, disciplinary implicit/tacit capabilities and implicit/tacit capabilities from the academic field of sustainability, that is

important for the sustainability curriculum, in this thesis of master's programmes, because it can empower students to influence the world towards sustainability.

The operationalisation of the concepts into focus group questions will now be described. To investigate Powerful knowledge from disciplines, the author operationalised the concept into the focus group question "What theoretical/conceptual knowledge from your disciplines is important for the curriculum of sustainability master's programmes because it can empower students to influence society towards sustainability?". To investigate Powerful regional knowledge from the academic field of sustainability, the author operationalised the concept into the focus group question "What conceptually and contextually complex theoretical/conceptual knowledge from the academic field of sustainability is important for the curriculum of sustainability master's programmes because it can empower students to influence the world towards sustainability?". To study Powerful knowings from disciplines the author operationalised the concept into the focus group question "What implicit/tacit capabilities from your disciplines are important for the curriculum of sustainability master's programmes because they can empower students to influence the world towards sustainability?". Lastly, to investigate Powerful knowings from the academic field of sustainability, the author operationalised the concept into the focus group question "What implicit/tacit capabilities from the academic field of sustainability are important for the curriculum of sustainability master's programmes because they can empower students to influence society towards sustainability?" During the focus groups, the questions were reformulated and adjusted to the setting (see focus group guide in appendix). The discussion became the empirical material that was analysed, discussed and used to answer the research question.

Method for data analysis

In this section, the method and process for data analysis of the study's results will be presented. It is important to note that the analysis was not linear but more circular, where the author approached the material, wrote down some findings, analysed it and then approached the same material again. The reason behind this was to gain an as clear understanding as possible of the research material (Hennink, 2014, 129).

After the focus groups had been conducted, the audio from the focus groups was transcribed into text. The author then put the text into a free software for qualitative analysis called QualCoder. In the software, the author made and used different analytical categories to code the material and highlighted interesting aspects of the material. The study's research question and the connecting concepts that are investigated in the study and summarised in the theory chapter, were kept in mind during the whole

coding process. Thereby, the focus was to look at the material with these concepts as lenses. Four analytical categories connected to the concepts were developed to approach the material. These were 1) disciplinary theoretical/conceptual knowledge that can empower students to influence the world towards sustainability (Powerful knowledge), 2) conceptually and contextually complex theoretical/conceptual knowledge from the academic field of sustainability that can empower students to influence the world towards sustainability (Powerful regional knowledge), 3) disciplinary implicit/tacit capabilities that can empower students to influence the world towards sustainability (Powerful knowings) and 4) implicit/tacit capabilities from the academic field of sustainability that can empower students to influence the world towards sustainability (Powerful knowings).

In the 'Results and analysis' chapter of this thesis, the result is organised under several themes that lay out the participants' thoughts and ideas with regard to the concepts of Powerful knowledge, Powerful regional knowledge and Powerful knowings. In that way, this presentation represents a thematical analysis (Bryman, 2012, 579-581) of the empirical material that in this study was performed with the support of the analytical categories listed above. The result of the empirical investigation, i.e. the focus groups discussions, is laid out side-by-side and thus considered together rather than compared, even though the author sometimes briefly comments on similarities or discrepancies between individual participants or the groups.

Furthermore, of main focus of the data analysis was to highlight and analyse substantive statements from the participants that were found in the material. In that way, 'what' was discussed and said was more important than 'how' this was discussed and said, even though interactions between the participants were also sometimes taken into consideration in order to more clearly report the research results. After all, interactions between participants in a focus group add richness and nuance to the result that is, at times, important to describe in order to make a fair representation of the results (Hennink, 2014, 153).

When the coding of the focus groups' material was finished, the author began the process of presenting the results coherently. 'Coherence' in this thesis refers to presenting the results in a way that makes it possible to see the tight connection between results, analysis and the research question. Important and for the research question relevant aspects raised by the participants were then synthesised under each theme, where each of them contributed to developing a comprehensible answer to the research question. Hennink argues that synthetisation is a useful structure when a "research question presents distinct topics or when focus group data respond to a defined research question" (2014, 141), which is the case in this thesis where three specific concepts, Powerful knowledge,

Powerful regional knowledge and Powerful knowings are central in the research question. In addition, an essential part of the synthetisation process was to find out *how* the participants discussed the different themes since that could affect how the author could interpret and draw conclusions from *what* they said. As mentioned earlier, focus groups are used when the aim is to capture how participants as a group, through interaction, understand a specific topic (Bryman, 2012, 504). In other words, the author wanted to see if it was possible to discern agreements or disagreements between the participants concerning what they defined as Powerful knowledge, Powerful regional knowledge and Powerful knowings. However, importantly, the aim was not to define or arrive at a common group narrative under each theme, but more to highlight how the group interaction developed. This was highlighted by, e.g. describing how participants built upon each others' statements and by describing if they agreed or disagreed with each other.

Moreover, to show how the author has interpreted the 'raw material', and how different statements from the participants assisted the author in providing an answer to the research questions, quotes from participants are extensively used and reported in the results and analysis chapter. The aim was to increase the study's legitimacy by showing how the author interpreted the statements and the conclusions that the author drew from them. It was also used to show that how the findings and conclusions were grounded in the data (Hennink, 2014, 165-166).

Limitations and research quality

Using focus groups as a method for data collection has limitations. There can be many factors that can have an effect on the interaction in a focus group (Hennink, 2014, 163). In the case of this thesis, some factors are of essence to highlight. In addition, the author will under this heading also discuss limitations concerning the data analysis and relate Hammersley's (1992) research quality criteria to this research.

First, as mentioned, the focus groups were held in a video online environment, which could have affected the flow of interaction between the participants and how comfortable participants felt with discussing in such an environment (Bryman, 2012, 663-667). However, it is difficult to judge how much the online environment impacted the discussion since there is no result of physical focus groups with the same group to compare the results with. Nevertheless, as stated in the results section, at times some participants were much more active than others, which naturally had an effect on the data that was available to collect. Another aspect that impacted on the data collection was the challenge to, in an online environment, collect facial expressions of participants during the discussions of the questions, which are arguably also important and collectable data in qualitative research since they can

be important information in the interpretation of the results (Bryman, 2012, 667-68). Some facial expressions, such as nodding, were collected, but naturally, not all were covered, which impacted the quality of the empirical material. Arguably, the online environment of the focus groups also lost a kind of 'personal touch', something that can be seen as important for people to be able to express their thinking openly. This is typical for focus groups in online environments (Bryman, 2012, 658). However, as Bryman states, if the topic is of interest to the participants, then this personal atmosphere might not be as important (2012, 667) and the author argues, and draws the conclusion from the focus group interactions presented in the results and analysis section, that the participants thought the topic was relevant and interesting. Moreover, important to mention is that the focus groups consisted of members of different titles of service at their respective universities, where some had higher academic degrees or positions than others, which is a power dimension that was present and possibly impacted the discussions.

It is also important to account for any possible moderator impact on the focus groups' interactions. As a moderator, the author kept time and offered clarifications regarding the questions discussed, but tried to stay in the background and let the conversation of the participants be in focus, which can be easier to do when having focus groups rather than individual interviews where the researcher typically has to be very engaged (Esaiasson et al. 2017, 330). To not steer and affect the conversation too much, the moderator relied heavily on the focus group guide for that matter and developed questions that would as much as possible speak for 'themselves'. The questions were also sent out to the participants beforehand, so that they could prepare themselves, and have a chance to ask for clarifications. Some participants asked for clarifications and this was important information for the author, since that helped them reformulate some of the questions in the guide.

The advantages of focus groups in comparison to, for example, individual interviews can also be seen as shortcomings, and vice versa. In using focus groups, the researcher naturally has the advantage that they can and some argue should (Krueger and Casey, 2015) collect the group interaction, in other words, how the group interacted with each other and if and how they shared thoughts and how much they deviated in their perspectives since that can affect the possible conclusions that one can draw from the discussions (Hennink, 2014, 162-163, Caillaud et al., 2022). However, a disadvantage with focus groups is at the same time the possibility that some participants do not speak as freely about the questions as they would have if they were interviewed separately. This could have been the case in this study too, and therefore it is important to reflect about it. However, since the author was interested in how academics as a specialised knowledge community defined and discussed Powerful knowledge, Powerful regional knowledge and Powerful knowings, which follows from the theory of how such

knowledge is generated, it was important to stick with focus groups as a method, since potential group effects could also be seen as a result in itself.

The main drawbacks when it comes to the data analysis in terms of research quality is subjectivity that comes with data interpretation. There can be many nuances to a material that the researcher is not picking up, which naturally impacts the analysis and results reported. The author considered the use of clear analytical categories as an important tool to limit subjectivity, but at the same time, data analysis in qualitative research is never fully without bias. Another way of limiting biased subjectivity was to use the Qualcoder software to keep the data in order and stick to the analytical categories.

It is also important to discuss the quality of this research from a broader perspective in terms of criteria that are often applied to assess research. Typically, quantitative research is assessed from the aspect of reliability, meaning the degree to which it is possible to reproduce the research and receive the same results, and validity, the degree to which the researcher measures what they aim to measure by for example the method that they apply (Bryman, 2012, 390). Bryman argues that transferring reliability and validity to the context of qualitative research can be complicated because of the different nature of these forms of research (2012, 390-397). As an example, they argue that reliability, to be able to reproduce research and receive the same results is difficult to 'achieve' in qualitative research since data is collected from social settings and people, which are not static (Bryman, 2012, 390). They thus suggest alternatives to validity and reliability, and account for Hammersley's (1992) 'subtle realism', which is a position in the assessment of research quality that is underpinned by the idea that social realities are not only in the minds of humans, but exist 'out there' and can be accessed by the researcher, but that the researcher, at the same time, is always representing or constructing the world in conducting research. One can thus never be entirely sure that a representation of the world by a researcher is 'true', but it is possible to validate the truthfulness by looking at the evidence that supports the representation of the world the researcher is making. The subtle realism position fits well with the social realism perspective that underpins the theories investigated in this thesis (see theory), and thus the author will now reflect upon the research quality of this research using Hammersley's (1992) criteria of 'validity' and 'relevance'.

Validity according to Hammersley refers to the degree to which an 'account about the empirical world', in the case of this thesis, the conclusions the author of the thesis draws from the empirical material collected, are plausible and credible and how much evidence that is backing such an account (1992). Importantly, what the participants argue and state during the focus groups in this study can not be used to say something about how *all* groups of similar kinds would have responded to the questions

in focus during the focus groups. At the same time, focus groups also works particularly well when the idea is to map and gather different ways of approaching issues (Esaiasson et al., 2017, 331), in this case for example what could be Powerful knowledge for a sustainability curriculum, and to generate ideas around this topic, which was what the author planned that the participants in the focus groups would do. With the results of this thesis, the author has thus only started the process of investigating the 'could' with respect to this topic and has thus initiated a research debate around it. That said, the author is not able to draw any general conclusions based on the empirical material which is indeed very limited. However, the actual conclusions that are drawn based on the data that is available, the author believes are plausible and credible. The author has tried to consistently, through the reporting of the research results, show the evidence, through for example quoting, that is backing the accounts made and why it is interpreted in a specific way.

Relevance, on the other hand, is about the research topic's importance in the research area it is situated and how the research might benefit actors who are part of the context that is of focus in the research (Hammersley, 1992). The author of the thesis has tried to, in the problem formulation, describe why the topic in this thesis, is important to investigate in the research area of the sustainability curriculum in higher education and believes this is one way to meet the criteria of relevance. At least, readers of this thesis will, by this description, be able to judge the relevance for themselves. In addition, the author believes that the results of this thesis can be of at least some practical use for academics who are developing sustainability curricula in higher education, since it says something about possible components to include in such a curricula.

Ethical considerations

The Swedish Research Council (2023) states that ethics in research is about the researcher's relationship to the subjects (participants) in the research and to the task of conducting the research. The author has taken several ethical measures when it comes to the researcher's relation to the participants in this study, all in line with the Swedish national guidelines of 'God forskningssed' (eng: Good research practice) (The Swedish Research Council, 2017). The first measure taken was that the author sent out information about the study to the eventual participants, so that they received information about the study before they agreed to participate in it. In that way, it was completely transparent what they, if they agreed, agreed to get involved in. Another measure taken was that the participants who agreed to participate in the study received a consent form to sign that included ethical aspects, such as what forms of data would be collected, the opportunity for participants to withdraw their participation at any time, and more (see consent form in appendix). This consent form served as a

form of an ethical framework that the participants and the author of the thesis agreed upon together. A third measure taken was giving out information to the participants about the processing of personal data (GDPR). After this was sent out and the participants had agreed to participate, the author also reported that they were processing personal data as part of their thesis work in Gothenburg University's record for processing activities. Moreover, the author also anonymised the participants in the study with regards to name and workplace to meet the demands of confidentiality among the participants, although some background information of them has also been given because of its importance for the interpretation of the research result. Also, during the actual research the author also regularly checked-in with the participants to see whether everything was OK and reminded them about the possibility of withdrawing from participating.

When it comes to the relationship between the researcher and the task of conducting research, the author has tried to adhere to the All European Academies (ALLEA) 'Code of Conduct for Research Integrity' (2023, 5) which highlights four principles for 'good research practice'. These include 'reliability', in the sense that the research is of good quality in terms of design, methods, how resources are used and analysis conducted (ibid). In terms of reliability, the author has aimed to choose a research design and method that fits the research question and thus contributes to research quality. With regards to how resources are used and analysis conducted, the author has, for example, aimed to give a fair and thorough account of the theories that are used in the thesis and how the theory has been operationalised into analytical categories to use when approaching the data.

The second principle is 'honesty' and refers to transparency and fairness concerning the stages in the research process, i.e. from the development of the research idea to the pursuement of it and then the reporting and communicating about it (ALLEA, 2023, 5). The author of the thesis clearly presented the research idea to the participants through the information letter and also described it more in detail when meeting them during the data gathering. The idea was to be as transparent as possible with regards to my intentions with the research, so that the participants also had a chance to deny participating if they felt that they would not be able to contribute. Also, the author has in the thesis overall aimed at, as detailed as possible, describe how each step in the research process was conducted, from problem formulation to the reporting and discussing of the results, and what the basis of different assumptions and interpretations are.

The third principle, which is about 'respect' for people, society and environments that are directly involved or affected by the research (ALLEA, 2023, 5), has also been considered. In being clear about the research purpose towards the participants in the research and giving them the chance to withdraw

their participation at any time during the whole research process and in ensuring their confidentiality through anonymisation, the author has aimed at showing respect towards them. In addition, the problem formulation of this thesis rests on the notion that Powerful knowledge, Powerful regional knowledge and Powerful knowings are tied to social justice (Young, 2008b; Young and Muller, 2013; Carlgren, 2020), in the sense that students in formal education should have the chance to acquire the most reliable knowledge at hand, to be able to influence their own life, have their voices heard in debates about society and influence the future lives of others by being able to based on this knowledge work towards sustainability. In that way, it is possible to say that this research project in itself has ‘respect’ for people and the environment at its core. Nevertheless, the author is well aware that there exist many different visions of *what* knowledge is empowering for people, and *what* knowledge that can contribute to sustainability (see e.g. PEI-perspective in the literature review). It is possible that scholars representing the PEI-perspective (e.g. Jimenez and Kabachnick, 2023; Rudolph et al., 2018) would regard the work in this thesis as hindering the ‘epistemological struggles’ taking place as a counteraction against the forms of knowledge that are investigated in this thesis. The author has tried to show respect for the forms of knowledge brought up in the PEI-perspective by as truly as possible account for the perspective in the thesis.

The fourth principle put forward by ALLEA (2023, 5) is ‘accountability’ for the research during the whole process, its afterlife and its societal impacts. The author adheres to this principle since they have throughout the whole research, although under the auspices of Gothenburg university and with support of the supervisor, been responsible for the research and will continue to be.

Results and analysis

In this chapter, the author presents the results and analyses them with the support of the theoretical framework. As described in the methods chapter, the concepts investigated in this thesis are in this section working as ‘themes’ under which the result from the focus groups is organised. At the end of the chapter, a summary of the whole result is also presented.

Theme 1: Powerful knowledge from disciplines

During the discussion of this theme, some different disciplinary theoretical/conceptual knowledge were raised by the participants in both focus groups as examples of Powerful knowledge that could be included in the curriculum of master’s programmes in sustainability in higher education. With regards to focus group 1, P1 and P3 who have a background in ecology mentioned the concept of ‘systems thinking’ as an empowering knowledge for students, which they saw as a concept related to the

discipline of ecology. It was considered to be empowering because it could support students to “ [...] think a little bit more like ecologists, helping them to think more like systems thinkers and to see the big picture” (P1) and to see “what [...] the connections [are] [and] the web of entanglements that we are part of.” (P3). P1 points here to knowledge from ecology and since they mention that it can be empowering if students learn to think like ecologists, the author argues that it is possible to make the interpretation that they refer to theoretical/conceptual knowledge of ecosystems, which indeed is what many ecologists study. It seems as if P1 believed that systems thinking as a theoretical/conceptual has connections to the understanding of ecosystems. Additionally, Since P3, who has a background in ecology, here points to students understanding the ‘connections’ and ‘web of entanglements’, the author believes it could be that they are also referring to a form of understanding of the world that is important to the discipline of ecology, that could support students in understanding the natural (and perhaps also social worlds) in a more holistic way, which can be seen as a form of Powerful knowledge, by understanding ‘connections’ between different entities in these worlds and realise that they, as humans, are also part of the ‘web’ of these natural worlds and (social worlds). This more holistic way of understanding the world, seems to be the for the students empowering aspect of ‘systems thinking’ and understanding the ‘connections’ and ‘web of entanglements’ according to P1 and P3. P4 seemed to agree that ‘systems thinking’ and seeing the connections between different entities is important and empowering for students but instead discussed this from the point of view of different academic topics of relevance for the sustainability curriculum in saying that “I think it's important to show the linkages between different topics and prepare them [students] for life” (P4). Even if it seems like P4 is here pointing to a form of Powerful knowledge in that they describe it as preparing students for life, which is similar to what Young (2008b) and Young and Muller (2013) stress concerning the empowering aspect of Powerful knowledge, it is not possible for the author to discern what this knowledge is made up of. In addition, P2 agreed with this discussion by P1, P3 and P4 by saying that:

I can shortly just say I agree with all you said about these connections and systems and you know when you talk about sustainability, you cannot talk about just small individual piece. I mean you can and it's easier to put things into small boxes, but it's much more important that students can see that elements of the system are really connected in different ways (P2)

From this quote, it is possible to interpret P2 as being a bit critical towards students just understanding ‘parts’ of sustainability questions, through for example understanding smaller pieces of disciplinary theoretical/conceptual knowledge. It seems as if they believe that it is more important that students understand connectivity between entities of, for example, a sustainability problem, and that this is

important empowering knowledge for students. Therefore, from the author's perspective and by building on the understanding of Powerful knowledge as theoretical/conceptual knowledge produced in academic disciplines (Chapman, 2019; Young 2008b; Young and Muller, 2013), it is not really possible to say that knowledge about 'connectivity' between things is a form Powerful knowledge. Focus group 2 did not discuss the concept of 'systems thinking' and other forms knowledge that is about understanding the connections between entities as a form of Powerful knowledge. As will later be visible under theme 4, they perceived systems thinking instead as a form of Powerful knowing coming the academic field of sustainability, rather than from ecology as P1 and P3 of focus group 1 argued. At the same time, this is not a surprising result given that the participants in focus group 2 did not have a background in ecology.

Moreover, P3 from focus group 1 discussed theoretical/conceptual knowledge about gender, power and discourses as a form of Powerful disciplinary knowledge that could be of importance for students to be able to influence the world towards sustainability. P3 stated that this knowledge is powerful for students to 'realise what is really going on' (P3), that it is important to understand how power works and underlying power issues and dynamics when working with sustainability issues, because of their connection to power in various ways. This statement and reasoning by P3 was not picked up by the other participants in focus group 1, but P7 in focus group 2 lifted a similar Powerful knowledge in arguing that important and empowering theoretical/conceptual knowledge from the social sciences is sometimes forgotten when technological and natural sciences solutions to sustainability questions are discussed. P7 said that, in the case of for example the building of dams, people living in those areas are negatively affected because in building them:

[...] there is an immediate claim to land, right? It's an undetermined claim to land, but it is it's a claim to space. If we build them. More like a claim to water, I would say. And the land that gets drowned. And in the social sciences we are like the mosquitos, like always flying around this saying like this is bigger [...] What about this? What about that? It's more complex. Of course it works. But we go back to certain social theories that will allow a more complex understanding. (P7)

P7 is here describing how social sciences knowledge can be a Powerful knowledge for students in that it complements a more technical, natural sciences understanding of the building of specific infrastructure. It can be argued to be empowering because using social sciences makes it possible to ask critical questions about such projects and how they affect nature and people living in the area, and P7 thought this to be important for students to be able to influence the world towards sustainability. However, P7 did not highlight specific theories from the social sciences that could be used to approach

such issues through critical questions but was more referring to how theoretical/conceptual knowledge from the social sciences, in general, can be a form of Powerful knowledge for students. In addition, in raising need to ask critical questions with regard to infrastructure projects' effects on land-ownership, water access and people, the author interprets P7 as discussing issues of power, which was also raised by P3 in focus group 1.

P6 from focus group 2 agreed when P7 was discussing social sciences knowledge as a form of Powerful knowledge and highlighted social theory as ‘‘really empowering because it makes you understand that the problems we have are not so much natural science-based’’ (P6) but instead political. Thus, learning social theory can, according to P6, empower students to understand that sustainability problems have different stakeholders with different interests, which is why sustainability problems are sometimes not tackled in time despite much natural science evidence that the problems exist, together with knowledge about technological solutions that can contribute to solving them.

Another Powerful knowledge that was mentioned by P3 in focus group 1 was theoretical/conceptual knowledge from political science. P3 said that students need to understand

‘‘what actually is happening. So what are the processes that lead to decision making and and here I think sustainability science is lacking a lot of capacity, but that capacity sits in different fields and that is why I'm relatively uneasy to ask the question what sustainability science itself can offer. Insights into [...] political science as being one [important knowledge]’’. (P3)

P3 here argues that there is important Powerful knowledge coming from the political sciences that is not always highlighted as important in sustainability science, but that it is important that students learn to be able to influence the world towards sustainability.

Another important aspect that emerged during the discussion in both focus groups was the importance of students' learning more scientific aspects of sustainability problems, such as scientific principles, knowledge of numbers and scales concerning sustainability issues. For example, P2 in focus group 1 said that ‘‘of course you need the scientific base and you need to know what's going on, but you can also balance it with these positive examples of action that is being done or could be done, I think’’ (P2) and that it is important to translate these theoretical/conceptual scientific aspects of sustainability problems ‘‘into what it actually means in the real world’’ (P2). Thus, it seems as if P2 see an importance in learning theoretical/conceptual knowledge about the components of sustainability problems from a scientific perspective, which can be seen as a form of Powerful knowledge, but that

this knowledge at the same time has to have a real-world connection and application. To highlight this reasoning further, P2 said that:

When it comes to empowering, I just immediately thought that I want to give students real-life knowledge. It's good that students get all the background theories, concepts, approaches and so on, but it's not enough. I think it has to be very practical. So it's [about] what is really happening on the ground [...] real-life examples, case studies working with specific projects. (P2)

In this quote, it is possible to sense a wish for the students to learn about 'the real world' that exists outside academia, not just academic theories and concepts. The author interprets this as P2 considering it to be empowering for students if the theoretical/conceptual knowledge can be applied in some way. They are also discussing the importance of 'real-life examples', 'case studies' and 'specific projects' as potentially empowering for students to be able to influence the world towards sustainability. This form of knowledge is difficult to categorise as theoretical/conceptual disciplinary knowledge in the form of Powerful knowledge as Young (2008b) and Young and Muller (2013) see it, given that it is knowledge that derives from outside of academia.

Arguably, participants in focus group 2 were a bit more positive towards students learning this form of theoretical/conceptual disciplinary academic knowledge and did not put it in relation to 'real-life knowledge' as P2 from focus group 1 did. For example, P6 stressed the importance of students' gaining: "knowledge that puts stuff into perspective so that you learn 'that corresponds to that' and [...] that you have a measure for things" (P6) and that this was something that they believed is "dependent on academic knowledge [...] of real knowledge of numbers [...] and understanding the connections between things and understanding the relations between things" (P6). Moreover, P6 discussed how tackling problems is dependent on an understanding of their scale in comparison with problems and that this understanding helps students being able to judge and analyse whether solutions posed to problems are efficient or not. P6 said that "I mean, can you tackle a problem if you don't understand it? If you don't understand the scale of it, can you tackle it then?" (P6) and argued that without this kind of knowledge, students might 'swallow messages' from governments and companies about, for example, green transitions. P5 agreed and argued that sustainability teachers need to "alert the numbers [for students] [...] [and get their] eyes open to like what the situation actually is" (P5). This stressed importance of students' learning numbers and scales to understand what the 'situation actually is' can be seen as P5, similar to P6, highlighting a form of disciplinary theoretical/conceptual knowledge Powerful knowledge about the world of importance to students. This knowledge could,

however, be interpreted as coming both from natural and social sciences disciplines, since neither P5 nor P6 specified in which disciplines these ‘numbers’ or ‘scales’ should come from.

In continuing the discussion by P6 and P5, P6 however added that they doubted whether knowing theoretical/conceptual knowledge about numbers and scales concerning sustainability issues would empower or disempower students in working with sustainability, and thus doubted whether this could in fact be seen as a Powerful knowledge, but concluded that students ‘need to learn to be uncomfortable’ (P6), i.e. meaning that it is important that students learn true ‘unpolished’ knowledge about sustainability problems and their components. P5 continued on similar notes in saying that:

“ [...] you know how how messed up Earth system processes have become. But I then I looked at that as if, like, maybe that knowledge could sort of spur some anger in the students and actually empower them [...] (P5).

In other words, P5 is here pointing to how knowing about the sustainability problems connected to the earth system processes could, through the anger that knowledge generates, empower students to influence the world towards sustainability. P5 also argued “that there is some knowledge, powerful knowledge coming from geography that can prescribe solutions that are effective” (P5) can be seen as empowering knowledge for students since it supports them in getting theoretical/conceptual knowledge about how to influence and offer solutions different sustainability challenges.

On another note, P7, who has a background in law studies, argued that:

the law is in the end a very powerful knowing, because people who understand the law [...] are able to navigate things and anticipate social outcomes because the law has so much power in determining social outcomes (P7)

P7 was here discussing the law as empowering theoretical/conceptual knowledge in that learning the law can support students in understanding how problems they see in society are governed by and sometimes the result of juridical processes. When law is properly understood, it gives students a lens or a framework that can be used to navigate the work with sustainability issues. P6 agreed and gave the example that when ‘people are resisting a small power line, a pipeline locally [...] you can't do that without any knowledge of the law.’ (P6) In other words, the law was by P7 and P6 seen as an empowering disciplinary theoretical/conceptual knowledge that can enable students to act with regard to sustainability problems. P5 was not very active in this discussion but did not oppose the suggestions.

Connected to the question of action and sustainability, P7 said that “the separation between legality and morality is very useful in terms of action” (P7). P7 argued that this conclusion can be reached when the law is understood and analysed from a theoretical/conceptual social sciences perspective. When pursuing sustainability transformation, individuals may violate laws, but are doing it because it aligns with sustainability values or the aim of the sustainable society (P7). This means that, according to P7, the law only says what individuals are allowed to do, not what they *should* do, and this understanding is, according to P7 essential for students studying sustainability to gain. They concluded by saying that “when we touch sustainability [...] I think that the question of legality and morality is literally the question of law and sustainability”. Thus, P7 argued that understanding the law through the perspective of social sciences is a Powerful knowledge of importance for students.

In sum, during the discussion of theme 1 both focus groups together raised several examples of theoretical/conceptual knowledge from different disciplines, Powerful knowledge, that they considered as empowering for students to influence the world towards sustainability and that could be included in the curriculum of master’s programmes in sustainability in higher education. Considered together, these were ‘systems thinking’, ‘gender, power and discourses’, knowing how ‘social sciences and social theory can support in asking critical questions towards natural sciences and technical solutions to sustainability problems’, ‘scientific knowledge of principles, numbers and scales related to sustainability issues’, knowledge from ‘political science’, ‘geographical knowledge’, knowledge about ‘earth system processes in relation to sustainability’, the knowledge of ‘separation of law and morality’ and ‘juridical knowledge about the law’.

Theme 2: Powerful regional knowledge from the academic field of sustainability

When this theme was discussed, P1, P2 and P3 from focus group 1 again, like during the discussion of theme 1, pointed out the importance of students gaining knowledge about how different ‘systems’ work and affect each other. The concept of ‘socio-ecological frameworks’, which is seeing society and ecosystems as a big common system, was defined by P1 as coming from sustainability science and that empowers students because it “gives students a tool they can work with in any situation that involves anything to do with biology, humans, economies and so on” (P1) and a concept that could be included in the curriculum of sustainability master’s programmes in higher education. In other words, this concept can be empowering because it entails theoretical/conceptual knowledge from different disciplines, and integration of this knowledge to better understand social-ecological systems, which is why this concept can be seen as conceptually complex as described by (Shay & Steyn, 2015). An additional interpretation that can be made is that understanding the concept can also support students

in working with varied social and ecological sustainability contexts and solving problems connected to these. Arguably, this also makes the concept contextually complex (see Shay & Steyn, 2015). P2, also from focus group 1, agreed with P1 and added that it is important that students “get tools to analyse the system in some way and (that) can be relevant for social-ecological systems” (P2). In connection, P3 said that:

“empowering to students [...] is getting more of an overview of the complexity [...] and realise that there are no easy fixes [...] that realisation [...] gives them a more stable platform, I think, to think about sustainability questions” (P3)

Thus, P3 sees the ‘complexity’ of sustainability issues as a theoretical/conceptual knowledge from the academic field of sustainability, a form of Powerful regional knowledge, that can empower students to influence the world towards sustainability and that could be included in the curriculum of sustainability master’s programmes in higher education. Understanding complexity can guide students in their approach to sustainability questions, where simple solutions often do not exist. This suggestion by P3 can be seen as an extension of the discussion between P2 and P1 about social and ecological systems. However, P3 did not more clearly formulate what they saw as components of ‘complexity’. Nevertheless, if complexity is interpreted as a state where different components are present and interact with regard to different contextual and particular sustainability questions, it is possible to argue that complexity in this case can be seen as a form of conceptually and contextually complex theoretical/conceptual knowledge, a Powerful regional knowledge.

Participants in focus group 2 also discussed the complexity of sustainability problems as a form of Powerful regional knowledge, but was relating this complexity more to sustainability problems interdisciplinary character and transdisciplinarity as a process. In this discussion, P5 raised that they consider knowing that tackling sustainability requires interdisciplinary thinking is knowledge in itself which is part of the field of sustainability, that could be empowering for students in working towards sustainability. In explaining this, P5 said that

“In sustainability [...] we accept that we need both sides of the coin. We need the [...] natural sciences and we need the [...] social sciences to tackle these challenges, and I guess that’s a type of knowledge that comes from the field of sustainability science” (P5)

Thus, P5 sees knowing that sustainability problems need the involvement of knowledge that comes from across disciplines, as a form of theoretical/conceptual knowledge coming from the academic field of sustainability. P6 continued by saying that “transdisciplinary work is maybe really a knowledge not only a knowing, but knowing would be the way how to do it. But the knowledge that

there's value in this [is the knowledge]'' (P6). P6 thus regarded that knowing that sustainability problems need a transdisciplinary approach, as a theoretical/conceptual knowledge coming from the academic field of sustainability.

Arguably, the knowledge about sustainability problems' interdisciplinary character that was discussed by participants in focus group 2, can be seen as a form of conceptually and contextually complex theoretical/conceptual knowledge, a form of Powerful regional knowledge as formulated by Shay and Steyn (2015). This is because one can argue that to be able to truly understand that these problems have such characteristics, one needs to understand what different theoretical/conceptual knowledge from different disciplines can bring to such an understanding, i.e. for example what theories and concepts that are needed from the natural sciences, the social sciences and the arts and humanities, what those theories entail and how they contribute to a more conceptually complex (interdisciplinary) understanding of sustainability problems. Whether this knowledge of sustainability problems' interdisciplinary character can also be related to contextual complexity is more difficult to say. Moreover, if knowing that sustainability problems needs a transdisciplinary approach is regarded as knowledge in itself, as P6 argued, it is possible to say that this knowledge can be an example of contextual complexity with regards to Powerful regional knowledge (Shay & Steyn, 2015) since it can involve an understanding that collaboration with external actors and their contexts is necessary to tackle sustainability issues. However, it is difficult to judge whether this knowledge can be seen as conceptually complex.

Moreover, P4 from focus group 1 mentioned 'Environmental communication' as a Powerful regional knowledge that is part of the academic field of sustainability and that is important for students to learn to be able to influence the world towards sustainability, and that could be a constituent for sustainability master's programmes in higher education. P4 said that students need "the language to talk to [people] if you really want to cause a change, to talk to politicians, engineering companies [...] translating academic knowledge, environmental communication."'. Indeed, if environmental communication is seen as a concept that includes both knowledge from environmental studies, and communication studies (which includes knowledge about how to speak with different societal actors and stakeholders in their respective contexts), it can be seen as a conceptually complex theoretical/conceptual knowledge that integrates knowledge from different disciplines (see Shay and Steyn, 2015). It can also be seen as contextually complex in the sense that the concept also includes knowledge about how to adapt communication depending on the context (see Shay and Steyn, 2015).

Interestingly, during the discussion of this theme in focus group 1, it was observed that some disciplinary theoretical/conceptual knowledge that had been discussed in relation to theme 1 reappeared. Thus, the group did not always make a clear distinction between theoretical/conceptual knowledge from different disciplines, and conceptually and contextually complex theoretical/conceptual knowledge from the academic field of sustainability. It is possible to interpret this result in at least three ways. First, it could be that the participants of focus group 1, in their role as teachers and curriculum planners in a master's program in sustainability, did not consider their disciplinary knowledge to be as important. Another explanation can be found and related to the criticism expressed by some participants about the formation of disciplines and their boundaries together with how academic knowledge is produced, which was perceived as hindering the development of more sustainable societies (P1, P3). As an example P1 said that:

When we go to university, we're taught not to think in terms of patterns and intuitions. We're taught to think very strictly in terms of knowledge developed through deterministic methods. So, partly we have to encourage students to unlearn some of that and to learn that there are very different ways of learning and understanding. (P1)

In other words, P1 here expressed a need for students to unlearn the ways in which university education has taught students to understand the world and how to create knowledge about it, to make space for other ways of knowing and understanding the world. Indeed, if the production and organisation of academic knowledge are viewed as obstructing progress towards sustainability, it is not surprising that some participants do not consider the learning of disciplinary theoretical/conceptual knowledge to be empowering for students to create a sustainable world.

A third possible explanation can be found and related to the idea P2 elaborated on several times and that is described under theme 1, namely that knowledge that is empowering for students is knowledge that can be used in practice in real life situations. Naturally, if knowledge that can be applied in real-life is put in opposition to disciplinary theoretical/conceptual knowledge, an explanation for that can be that one does not see a potential in using this type of knowledge outside of academia, in real life. This view was exemplified when P2 said that "It is good with academic knowledge, but then you end up in the real world" and that "university education should prepare people for real life [...] because you will encounter different people, different situations".

When focus group 2 discussed this theme, disciplinary knowledge also came up again, but from another perspective when P6 said that they thought it was challenging to:

[...] pinpoint any academic knowledge that's specific to sustainability. I think that there is knowledge that we draw on that is very much defined in the disciplinary terms where it comes from, and that would be, for example, the natural sciences, political science. (P6)

P6 is here discussing how the academic field of sustainability is interdisciplinary, it draws on disciplinary knowledge from different disciplines, and that it is therefore a bit hard to define theoretical/conceptual knowledge from this field. Both P5 and P7 agreed with this statement.

Concludingly, 'Powerful regional knowledge's' that were defined during the discussion of this theme as empowering knowledge for students and as knowledge that could be included in the curriculum of sustainability master's programmes in higher education were, altogether, 'socio-ecological frameworks', 'complexity' and 'environmental communication'. It was not entirely clear if the knowledge that 'sustainability problems are interdisciplinary in their character' and the knowledge that tackling 'sustainability problems needs a transdisciplinary approach', which was discussed by focus group 2, could be considered as forms of Powerful regional knowledge since the author argues that they did not live up to both criterias of the concept, namely the increase in conceptual and contextual complexity of theoretical/conceptual knowledge (Shay & Steyn, 2015)

Theme 3: Powerful knowings from disciplines

The participants in focus group 1 did not mention any specific implicit/tacit capabilities, Powerful knowings in line with Carlgren (2020, 2023), from their disciplines that they considered important for the curriculum of sustainability master's programmes in higher education and as empowering for students in order to be able to influence the world towards sustainability. As described under theme 2, participants in focus group 1 expressed some hesitation and criticism towards theoretical/conceptual disciplinary knowledge, where it was argued that students need to 'unlearn' how this form of knowledge is produced to be able to see the benefit in other forms of knowledge and that students need knowledge that can be applied in real situations (where they were not so sure whether theoretical/conceptual knowledge from disciplines always could be). Arguably, these could also be what explains why participants in focus group 1 could not define any disciplinary Powerful knowings.

However, participants in focus group 2 discussed different Powerful knowings from their respective disciplines that they thought could be included in the curriculum of sustainability master's programmes in higher education because it can empower students to influence the world towards sustainability. First, P5 identified problem identification, problem quantification and being able to measure problems as capabilities they had developed by studying geography. Although such skills might not only be learnt in geography, they can still be interpreted as implicit/tacit capabilities that are

developed while simultaneously learning theories and concepts of the discipline, in this case geography, and can therefore be seen as a form of Powerful knowings in line with Carlgren (2020, 2023). P5 said that learning these skills “gives this implicit competency of being able to measure and formulate environmental problems” (P5) and gave the example that if a dam is built and “suddenly all the fish downstream start dying, geographers can come in [...] and start to measure things”. In other words, geographers can use a form of geographical capability in tackling a specific sustainability problem, and P5 thought of this as potentially empowering for sustainability students since such capabilities can be used to understand mechanisms and problems in the environment in quantitative terms and formulate solutions to those problems. P6 and P7 seemed to agree that such more quantitative capabilities are empowering together with more qualitative ones.

When P7 in focus group 2 started to think about implicit/tacit capabilities that are possible to develop when studying the discipline they originated from, law, P7 argued that such capabilities from law do not necessarily empower students to influence the world towards sustainability, and gave examples of how they can contribute to the opposite if they are not connected to sustainability values. In the case of the law discipline, P7 believed that it is values that guide whether a tacit capability can be empowering for students to influence the world in a sustainable direction. P7 said that implicit/tacit capabilities from the law discipline can be used to “displace [people] to annihilate them, to starve them. These very same [capabilities] can be used in any kind of way” (P7) and added that they thought it is “[...] values in the end, what makes us, you know, use our [capabilities] for a particular thing.” (P7).

P7’s arguments resonated with P6 but were also questioned by them, which affected P7’s thinking about the matter:

P6: My question then is, are values sufficient, to change the world towards sustainability? I think that's not the case. So you do need to have a bunch of tools to actually take your values to have an impact on the real world [...] In a way, you are very, very right. Without the values, it is meaningless and potentially destructive if we are aiming for sustainability. But I also think that just having the values is not sufficient [...] you can run around as a hippie and [talk about your values].

P7: exactly.

P6: [...] and this is going back to what you said earlier, your knowledge as a lawyer [...] really empowering, right?

P7: yes, right.

P7 and P6 reached a somewhat common understanding of how implicit/tacit capabilities from different disciplines that could be important for the curriculum of sustainability master's programmes in higher education because it can empower students to influence the world sustainably, in this case how knowledge of the law can support such a process. At the same time, they both agreed that capabilities *and* values are important for students.

P6 then continued on the same topic of disciplinary implicit/tacit capabilities and said that in their studies of various disciplines, it has been important for them to learn to think and approach problems through lenses that are developed when studying specific disciplines, such as economy, law, and social science. These 'disciplinary lenses' have supported their understanding of sustainability problems, from different angles and have been used to offer solutions to them (P6). To exemplify, P6 said that:

It has been immensely empowering for me to be able to think like an economist [...] to think like a lawyer [and like] social scientists [...] and you can only see the limitations in thinking if you bring some thinking to the table in the beginning [...] I think any kind of thinking that people bring to the table is valuable to bring this further because you [...] understand how other people think'' (P6)

P6 thus indicated that there are some specific disciplinary 'thinkings', which can be seen as implicit/tacit disciplinary capabilities that are developed through the study of different disciplines, that could be seen as contenders for the sustainability curriculum of master's programmes in higher education because they can be empowering for students to influence society towards sustainability. Moreover, it is also possible to interpret that P6 regards using different ways of thinking as potentially empowering for students since it can highlight limitations in one's own thinking and contribute to a more complex understanding of sustainability issues. In addition, P6 also said that in the case of sustainability, the thinking has to be connected to values to be empowering (P6).

In sum, during the discussion of this theme, 'problem identification, quantification and being able to measure sustainability problems', together using different 'disciplinary lenses' to approach sustainability problems, were suggested to be implicit/tacit capabilities that are developed in studying different disciplines, and can thus be seen as examples of Powerful knowings (Carlgren, 2020, 2023) that, when learnt, can support students in influencing the world towards sustainability and could be included in the curriculum of sustainability master's programmes in higher education. These were defined by focus group 2. As earlier said, it was not possible to discern any Powerful knowings mentioned in focus group 1's discussion.

Theme 4: Powerful knowings from the academic field of sustainability

In discussing this theme, P2 from focus group 1 argued that studying the field of sustainability can contribute to the formation of the implicit/tacit capability of open-mindedness among students. The capability develops by studying sustainability as an academic field. In discussing the capability, P2 said that:

You know, it's not. You don't teach it. It's just develops because you are teaching something in some way. So for me, when it comes to sustainability, this kind of skill could be becoming more open-minded to ideas and discussions and being able to communicate with very diverse groups and peoples with different opinions. We are getting in our society more and more polarised, and I think it's very important that during their study. Students learn how to navigate polarizations and not end up on one or the other extreme, but be able to in some way communicate, even if there are big differences in opinions. (P2)

P2 here points to what could be seen as a Powerful knowing in line with Carlgren (2020, 2023) that can be developed when studying sustainability. The Powerful knowing can be called 'open-mindedness' and has to do with the ability to be open towards diverse ideas and people that come together in sustainability and P2 thought this could be an important Powerful knowing to include in the curriculum of sustainability master's programmes in higher education. P6 in focus group 2 discussed a rather similar capability, referred to their own experience and said that when studying sustainability you can develop the:

[...] knowing that we that we need to take away the blinders, that we need to draw on disciplines because the problems that we're dealing with are extremely complex, they're wicked problems [...] I always used to say I can do everything, but nothing properly and I think [studying sustainability] has been really, really powerful for me because I was able to understand the arguments of the people [of different disciplines]. (P6)

Thus, when studying sustainability, the author interprets that P6 means that when meeting knowledge and people from different disciplines and to be able to effectively solve complex sustainability issues (wicked problems), then you learn to be more open towards different disciplines' ways of perceiving sustainability issues since that can support problem solving. This, P6 believed, could be a capability that could be included in the curriculum of sustainability master's programmes in higher education that is empowering for students. Indeed, it could be argued that this is a form of Powerful knowing as described by Carlgren (2020, 2023) from the academic field of sustainability that can be described as the capability of 'engaging in interdisciplinary work and collaboration to tackle sustainability issues' since it is possible to develop it when studying sustainability. Indeed, this is, as said, very similar to

the capability of ‘open-mindedness’ stressed by P2 in focus group 1. However, P1 discussed this more from the perspective of openness and being able to communicate and understanding different ideas and that it can hinder polarisation between people and ideas, whereas P6 elaborated more on how openness can contribute to the ability to draw from different disciplines in actually tackling sustainability issues in practice.

In connection, P6 from focus group 2 also argued that in studying sustainability, students can develop not only an understanding of arguments from different disciplines but also learn to see the wider picture through systems thinking. This was considered an especially important implicit/tacit capability that you learn “ [...] implicitly because of the things you look at, the problems you look at, the problems that you engage with, the solutions that you come up with” (P6) when studying sustainability, that could be included in the curriculum of sustainability master’s programmes in higher education because it can empower students in influencing the world in a sustainable direction. Thus, the ability to see the ‘wider picture through systems thinking’ can also be argued to be a Powerful knowing in line with Carlgren (2020, 2023).

Moreover, P1 in focus group 1 argued that by, for example, engaging in a wide sustainability scholarship, that brings up other ways of knowing about the world than the traditional academic Western way of knowing, and by collaborating in a transdisciplinary manner with actors and stakeholders outside of academia, students can develop the empowering and for the curriculum of sustainability master’s programmes in higher education important implicit/tacit capability, a form of Powerful knowing, in line with Carlgren (2020, 2023), of ‘unlearning’ the strict thinking about what knowledge is and how it can be learnt that is part of a traditional university education. When engaging with such sustainability scholarship and when collaborating with those external actors, students ‘learn that there are very different ways of learning and understanding (about) our relationship with other people and with nature [...]’ (P1). P2 here added that that was what they meant by being open-minded by saying that open-mindedness is about “learning that there are different ways of seeing things or talking about things” (P2). P3 agreed and said that academic knowledge is just one form of knowledge, and that “knowledge flows from many practices” (P3).

Lastly, P7 in focus group 2 brought an additional perspective to the discussion when referring to their background in studying sustainability science and the implicit/tacit capabilities they saw developing from that that they thought could be important for the curriculum of sustainability master’s programmes in higher education and empowering for students. They argued that their studies enabled them to develop their capability to think about justice and sustainability, which they believed to be an

important component of sustainability. As an example, the capability of understanding and navigating the difference between which ‘world you want to change and whose world do you want to change, and how’ (P7) was something important that was not explicitly taught, but appeared ‘in between the lines’ (P7) in the sustainability courses they took. Thus, being able to think about justice in connection to sustainability can be interpreted as P7 referring to a form of Powerful knowing (Carlgren, 2020, 2023) since it is more of a hidden, implicit capability that is learnt while studying sustainability as a topic.

The different Powerful knowings (Carlgren, 2020, 2023) from the academic field of sustainability that emerged during the discussions in focus groups 1 and 2, and that could be important components for the curriculum of sustainability master’s programmes in higher education because they can empower students to influence the world towards sustainability, can concludingly be referred to as the capability of being ‘open-minded’, to ‘engage in interdisciplinary work and collaboration to tackle sustainability issues’, to be able to ‘unlearn Western academic knowledge and its production processes’ and to be able to ‘think about justice and sustainability’.

Summary of results

To enhance the availability of the results, they will now be briefly summarised. This thesis raises the research question of what Powerful knowledge, Powerful regional knowledge and Powerful knowings do academics consider could be important for the curriculum of sustainability master’s programmes in higher education. In this thesis, the ‘academics’ were teachers and curriculum planners of two Swedish higher education master’s programmes in sustainability. The results shows that the Powerful ‘knowledges’ that these academics considered could be important for the curriculum of these master’s programmes are, together, ‘systems thinking’, knowledge about ‘gender, power and discourses’, knowledge about how ‘social sciences and social theory can support in asking critical questions towards natural sciences and technical solutions to sustainability problems’, ‘scientific knowledge of principles, numbers and scales related to sustainability issues’, knowledge from ‘political science’, ‘geographical knowledge’, knowledge about ‘earth system processes in relation to sustainability’, the knowledge of ‘separation of law and morality’ and ‘juridical knowledge about the law’. In addition, the Powerful regional knowledge that could be important was, altogether knowledge about ‘socio-ecological frameworks’, ‘complexity’ and ‘environmental communication’ and it was, as earlier said, not entirely clear if the knowledge that ‘sustainability problems are interdisciplinary in their character’ and the knowledge that tackling ‘sustainability problems needs a transdisciplinary approach’ could be considered as forms of Powerful regional knowledge (see theme 2). Moreover, the Powerful knowings

from disciplines that the academics considered could be important for such a curriculum were the abilities of ‘problem identification, quantification and being able to measure sustainability problems’ and using different ‘disciplinary lenses’ to approach sustainability problems. These were defined by focus group 2 and it was not possible to discern any Powerful knowings mentioned in focus group 1’s discussion. Lastly, the Powerful knowings from the academic field of sustainability that the academics considered could be important for the curriculum of sustainability master’s programmes in higher education were the capabilities of being ‘open-minded’, ‘engaging in interdisciplinary work and collaboration to tackle sustainability issues’, ‘unlearning Western academic knowledge and its production processes’ and ‘thinking about justice and sustainability’.

In the next section, the implications of this result will be discussed.

Discussion

In this discussion, the author will first critically reflect upon the results of this thesis in relation to the method and the theoretical framework. The main focus will here be on the use of focus groups to explore the research question, the connected sampling processes and the utility of the theoretical framework’s three concepts in investigating the important components for the curriculum of sustainability master’s programmes in higher education. Then, the author will discuss how the by the academics identified Powerful knowledge, Powerful regional knowledge and Powerful knowings can be understood in relation to previous research on the topic of this thesis, namely research about what can be seen as important components for the sustainability curriculum in higher education.

Critical reflection on method, sampling and theoretical framework

In the method chapter, the author laid out an argument meant to support the use of focus groups as the method for collecting empirical material for this thesis. Indeed, the main reasons for choosing focus groups was that the author was interested in what academics of different disciplinary backgrounds, who have in common that they are teachers and curriculum planners of master’s programmes in sustainability in higher education and research sustainability issues, together considered could be important theoretical/conceptual and practical components for the curriculum of such programmes. Thus, the author was interested in both possible theoretical/conceptual disciplinary knowledge (Powerful knowledge), which the author believed that academics with *diverse* disciplinary backgrounds that joined a focus group could consider, and possible theoretical/conceptual knowledge from the academic field of sustainability (Powerful regional knowledge) that those same academics could elaborate on given that they were involved in a sustainability master’s programme and were also

researching sustainability. In addition, since sustainability is a science and an issue that scholars have argued involves and needs practical knowledge to be effectively dealt with (Clark, 2007; Fang et al., 2018; Komiya and Takeuchi, 2006; O’Byrne et al, 2015; van der Leeuw et al., 2012; Wiek et al. 2011, 2012, 2016), the author also choose to let these same academics discuss what they perceived as possible disciplinary and sustainability Powerful knowings of importance for the curriculum of such programmes. In addition, the author believed that investigating the research problem with the support of focus groups would ‘simulate’ ‘specialised knowledge communities’ of academics, as described by Young (2014) and Young and Muller (2013) ,which these authors see as the communities from which Powerful knowledge stems through academic peer-review and deliberation, what Carlgren (2020, 2023) also argues is the case for Powerful knowings, although they also relate the development of Powerful knowings to the actual process of becoming knowledgeable of theoretical/conceptual knowledge of different disciplines. Thus, the author believes that they have argued why they strategically sampled *academics* with characteristics just mentioned for the focus groups, and not considered other actors for discussing considering Powerful knowledge and Powerful knowings for the sustainability curriculum in higher education. However, the author could not, following the theoretical framework, argue that Powerful regional knowledge is defined by academics only, since scholars who have discussed it have described it as developing out of collaboration between academia and external actors or stakeholders (Bernstein, 2000; Clegg, 2016). Indeed, conceiving of Powerful regional knowledge for the sustainability curriculum was a new endeavour that had not been practised in research before, but which the author theorised could be possible to do since some scholarship (Niemelä, 2021) has argued that it could be conceived of for interdisciplinary curricula, which the sustainability curriculum is an example of. Nevertheless, it is still essential to reflect upon how the use of focus groups affected the results of this research. In connection, the sampling process for the focus groups will also be considered.

In sum, both focus groups could identify different ‘Powerful knowledge, Powerful regional knowledge and Powerful knowings that they thought could be important to include in the sustainability curriculum in higher education because of their empowering potential. This is visible in the section that summarises the result. Some similar knowledge was identified across the two groups. For example, the importance of student’s learning ‘scientific knowledge of principles, numbers and scales related to sustainability issues’ was identified in both groups as being an important Powerful knowledge (see theme 1), but at the same time not by all participants in both groups. In addition, some knowledge in the form of Powerful regional knowledge was defined commonly in one group, such as knowledge of ‘socio-ecological frameworks’ (see theme 2), but was not defined as important in the

other group. Also, individuals separately identified Powerful knowledge, Powerful regional knowledge, Powerful knowings from disciplines and Powerful knowings from the academic field of sustainability, which were not questioned by the other participants. This, however, was not a surprise given that it naturally is challenging to question the importance of some disciplinary knowledge from a discipline that you are not familiar with. Hence, in essence, this result suggests that a very diverse set of components was altogether suggested to be important for the curriculum of sustainability master's programmes in higher education, which makes it difficult to arrive at a general conclusion regarding the, from the academics' point of view, important theoretical/conceptual and practical knowledge for such a curriculum. This result indeed reflects the result from earlier research about the wide divergence in different higher education sustainability programmes theoretical and practical knowledge (O'Byrne et al, 2015). However, general conclusions could, independently of the result, not be drawn in the first place, given the limited empirical material that, at least partly, was the result of convenience sampling of two Swedish master's programmes in sustainability and snowball sampling of participants from these master's programmes. It could well be that relevant empirical material could have been gathered from other sustainability master's programmes in Sweden, or internationally and that other sampled academics would have been better suited to discuss the questions central to this research. All these limiting aspects have to be kept in mind in the light of interpreting the results of this research.

At the same time, it is also possible to say that this was not what was intended with the research in the first place, even though it of course could have gained from including other master's programmes, additional focus groups with academics from an even more diverse set of disciplines or follow-up interviews with individual participants. The intention was to let academics share their views on important components for the curriculum of master's programmes in sustainability in higher education, and thus contribute to the initiation of a research debate where empowering theoretical/conceptual and practical academic knowledge is defined and discussed in relation to such a curriculum. The author argues that this debate now has to continue by, for example, including more disciplinary and sustainability representatives in such a debate, given the sustainability topic's interdisciplinary character. Indeed, further research might also consider whether using interdisciplinary focus groups to define such knowledge is a preferred procedure, or *if disciplinary focus groups* instead better fit the purpose of defining theoretical/conceptual disciplinary knowledge and subject-specific capabilities for the sustainability curriculum, since such groups then can focus on defining how each of their disciplines can contribute to the sustainability curriculum. At the same time, such a process would also come with limitations concerning the ability of academics of the same

discipline to appreciate and understand other disciplines' contribution to a sustainability curriculum, which is where interdisciplinary focus groups, like the ones used in this thesis, perhaps still have an advantage. Nevertheless, both Muller (2009), Annala (2022) and Niemelä (2021) have argued that achieving 'curriculum coherence' with regards to an interdisciplinary curriculum is a very challenging, time-consuming and complex process that can not be left to teachers alone, but has to be dealt with at the level of curriculum design (which can of course, and often does in the case of higher education, include teachers). This, together with the results of this thesis, leads the author to suggest that if the sustainability curriculum of master's programmes in higher education should be aimed at ensuring that students, in a coherent manner, have the chance to acquire Powerful knowledge, Powerful regional knowledge and Powerful knowings, then higher education institutions have to allocate a considerable amount of time and resources into the design of the curriculum of sustainability master's programmes in higher education.

Moreover, it is important to critically reflect upon the theoretical framework deployed in the study. In other words, to discuss the utility of using Powerful knowledge, Powerful regional knowledge to consider and define important theoretical/conceptual knowledge from disciplines and the field of sustainability, and Powerful knowings to define and consider subject-and field-based capabilities for the curriculum of master's programmes in sustainability in higher education. It is important to note that these concepts were, as described in the method chapter, operationalised into questions for the focus groups to discuss. The author aimed at an operationalisation that as much as possible captured the essentials in these concepts, but, of course, it is always a possibility that questions formulated in another way could capture the concepts in greater detail. It is thus important to keep in mind that the way the author operationalised the concepts into questions for the focus groups, naturally affected the discussions that emerged in the groups.

Using Powerful knowledge to define theoretical/conceptual knowledge from different disciplines worked rather well for focus group 2. They could all give examples of theoretical/conceptual knowledge, from disciplines they had studied, that they believed could be empowering for students to influence the world towards sustainability and that could be components for the sustainability curriculum. Nevertheless, of course, this does not mean that this defined knowledge should be seen as the only contenders with regards to theoretical/conceptual knowledge for the sustainability curriculum. In having different disciplinary backgrounds, the participants in focus group 2 could sometimes not challenge or build on each other's ideas, something that could have contributed to a decrease or increase in the legitimacy of the mentioned theoretical/conceptual knowledge. The suggestions of

Powerful knowledge that came up under the discussion in focus group 2, must be further researched in order to judge their relevance for the curriculum of master's programmes in sustainability.

Focus group 1 also defined some Powerful knowledge from the various disciplines they had studied, but were also a bit hesitant towards defining disciplinary theoretical/conceptual knowledge of importance. Indeed, participant P1, P3 and P2 seemed to be a bit critical towards such forms of knowledge and argued that of most importance when it comes to the sustainability curriculum, to be empowering for students, is that sustainability is looked at from a systemic level, to see how different elements of sustainability issues are connected and that students learn real-life examples. This result reflects arguments in earlier research about 'systems-thinking' as a key sustainability competence (Brundiers et al., 2021; Redman & Wiek, 2021; Rieckmann et al., 2012; Wiek et al., 2011) and research in the PEI-knowledge area about the need for more everyday contextualised knowledge (Morgan, 2012; Robertson, 2016). Criticism was also raised towards academic knowledge as hegemonic and its production processes that some participants in focus group 1 believed to hinder students learning other ways of understanding the world (see theme 2), which can be connected to the criticism expressed in the PEI-knowledge perspective, especially by Jimenez and Kabachnick (2023) towards the inability of Western knowledge production to solve sustainability issues and from an epistemological perspective by Rudolph et al. (2018) who stresses colonial tendencies in academic knowledge production. This result is indeed interesting since it highlights a challenge with using a concept that captures disciplinary empowering knowledge to investigate theoretical/conceptual knowledge of importance for an interdisciplinary curriculum, a curriculum that some, in the case of this thesis participants in focus group 1, might envision as a curriculum that should not deal that much with disciplinary knowledge. However, the author then raises the question of how sustainability students in such a case will be able to, without learning some important defined disciplinary theoretical/conceptual knowledge, fundamentally understand sustainability issues on a theoretical/conceptual level.

Secondly, as seen in the discussion about Powerful regional knowledge from the academic field of sustainability that the academics considered to be important for the curriculum in question (theme 2), it was difficult for some participants to define such knowledge. For example, P6 thought it was challenging to define Powerful regional knowledge from sustainability, since they believed that sustainability is a science that draws from many different disciplines, and thus considered it to be difficult to think about theoretical/conceptual knowledge that is specific to sustainability. Participants P5 and P7 in the same focus group as P6 also discussed how the knowledge that sustainability issues are interdisciplinary in their character, together with the knowledge that sustainability problems need

to be tackled in a transdisciplinary manner, could be seen as theoretical/conceptual knowledge from the academic field of sustainability. The author of this thesis analysed these statements and concluded that this mentioned knowledge does, as far as the author could understand, not live up to both the conditions set by Shay and Steyn (2015) for Powerful regional knowledge. At the same time, participants in focus group 1 defined some Powerful regional knowledge that they believed came from the academic field of sustainability, 'socio-ecological frameworks' and 'environmental communication', which the author analysed and concluded that they could be seen as such forms of knowledge. Therefore, this result nevertheless suggests that the author's idea of using Powerful regional knowledge to define contextually and conceptually complex theoretical/conceptual knowledge from the academic field of sustainability can not yet be completely disregarded and that further research can dedicate time to that matter. In addition, it may well be that other actors than academics, who are invested in the sustainability issues have to be involved in such a process, given that Powerful regional knowledge is typically defined by academia and actors external to academia alike and in collaboration (Bernstein, 2000; Clegg, 2016; Shay and Steyn, 2015). Suggestively then, academics can in such a collaboration be more responsible for defining the more conceptually complex knowledge, whereas the external actors, with their more contextual knowledge from day-to-day practice, can define the more contextually complex knowledge. Together, this could then merge into examples of Powerful regional knowledge that could be considered for the curriculum of sustainability master's programmes.

As for the concept of Powerful knowings, the author was not able to discern any defined disciplinary ones from focus group 1's discussions. This result resembles the result from the same group's discussion on Powerful knowledge from disciplines, where they expressed criticism towards disciplinary thinking in relation to sustainability issues (see discussion above). The same interpretation can thus be made here; they did not consider disciplinary capabilities as very relevant or empowering for students who study sustainability, which can be connected to this expressed criticism. Therefore, it is in place to raise the question of whether disciplinary capabilities are relevant to include in the curriculum of sustainability master's programmes. However, at the same time, the results from focus group 2 regarding what they considered as Powerful knowings from disciplines, stand in contrast to the discussion in focus group 1. They mentioned several Powerful knowings from disciplines they had studied that they considered could be empowering for students and brought forward the idea that these disciplinary Powerful knowings, in the case of the sustainability curriculum, could be connected to sustainability values. In other words, that they can be coupled with such values so that the knowings can be effectively used when working with sustainability issues, i.e. used for sustainability purposes

(see theme 3). The author argues that this is an interesting suggestion in that disciplinary Powerful knowings are then regarded as valuable and as potential contributors to the sustainability curriculum, which complements earlier research (Brundiens et al, 2021; Redman & Wiek, 2021; Rieckmann, 2012; Wiek et al. 2011) on important practical knowledge for such a curriculum. It is, indeed interesting and relevant for further research to investigate the somewhat ‘hidden’ or ‘underused’ potential of disciplinary Powerful knowings, to see how they can contribute to the empowerment of students in working with sustainability problems based on a solid theoretical/conceptual knowledge base and capabilities connected to it.

Powerful knowings was also used as a concept in this thesis to define implicit/tacit capabilities coming from the academic field of sustainability. It was rather useful to use this concept for such an aim. Participants of both focus groups identified Powerful knowings from that field that they thought could be empowering for students and that could be included in the curriculum of master’s programmes in sustainability. Among them was the capability of being ‘open-minded’ defined in focus group 1 and to ‘engage in interdisciplinary work and collaboration to tackle sustainability issues’ (see theme 4). It could well be that the academics found it easier to define Powerful knowings from the academic field of sustainability since this was a topic they had in common; they were all researching sustainability and involved in a sustainability programme and could therefore support, collaborate and question each other more in this case, than when they discussed the questions that had a more disciplinary focus. This result is promising for future research since it seems like it is possible to investigate and define capabilities that are tied to the learning of the subject matter (theoretical/conceptual knowledge) (Carlgren, 2020, 2023), in this case, sustainability as a topic, that can be components in the curriculum of sustainability master’s programmes. It is also promising because this result points to an opportunity for students to, if these programmes incorporate such knowings into their curricula, to acquire very powerful capabilities, that are different from the ones defined in the sustainability competencies perspective competencies (Brundiens et al, 2021; Redman & Wiek, 2021; Rieckmann, 2012; Wiek et al. 2011), because they, in comparison to the sustainability competencies, the author argues, rest on a solid, more defined knowledge foundation of the fundamentals of sustainability issues. This could allow students to powerfully combine capabilities and theoretical/conceptual knowledge when tackling sustainability issues.

Next, the author will discuss how the identified Powerful knowledge, Powerful regional knowledge and Powerful knowings in this thesis can be understood in relation to earlier research on important components for the sustainability curriculum in higher education.

Powerful knowledge, Powerful regional knowledge and Powerful knowings for the sustainability curriculum in higher education

In formulating the research problem for this thesis the author argued that research about the sustainability curriculum in higher education has identified important key sustainability competencies (Brundiers et al, 2021; Redman & Wiek, 2021; Rieckmann, 2012; Wiek et al. 2011), pedagogical and didactical arrangements (Barth et al., 2023; Lotz-Sisitka et al., 2015; Sinakou et al., 2019; Van Poeck et al., 2019) and PEI-knowledge (Morgan, 2012; Jimenez & Kabachnick, 2023 Robertson & Tsang 2016; Robertson, 2016; Thomas, 2020) for such a curriculum but has not been engaged with defining important theoretical/conceptual knowledge from academic disciplines and sustainability as an academic field, or subject- and field-specific capabilities that can be found in different disciplines and sustainability as an academic field, that could serve as constituents for such curriculum. The author also argued that it is essential that such knowledge and capabilities are defined for the sustainability curriculum since they have the potential to empower students to influence the world towards sustainability (Young, 2008b; Young & Muller, 2013). Therefore, this thesis aimed to define such theoretical/conceptual knowledge together with subject- and field-specific capabilities.

As becomes visible, academics who together discuss and deliberate knowledge in a specialised knowledge community, which the author has argued that the focus groups in this thesis are examples of, can define Powerful knowledge, Powerful regional knowledge and Powerful knowings that could be of importance for sustainability programmes in higher education. The author argues that although it is not possible to draw any general conclusions from the result of this thesis, the results still contributes to highlighting and consider components for the sustainability curriculum that previous research has not dedicated effort into seeking out. It is in place to argue that the application of Powerful knowledge, Powerful regional knowledge and Powerful knowings to define important theoretical/conceptual and practical components of the sustainability curriculum, is an endeavour that stands in stark contrast to other approaches that have been used in previous research on key sustainability competencies (see Wiek et al. 2011, 2016; Brundiers et al. 2021; Rieckmann, 2012) and PEI-knowledge (Robertson and Tsang 2016; Jimenez & Kabachnick 2023; Morgan 2012; Thomas 2020). Overall, the author argues that these approaches are connected to very different visions about the knowledge of importance for the formal sustainability curriculum, and thus the empowerment of students in influencing the world towards sustainability. The contrasts between these approaches will now be discussed, as a way to highlight the relevance of the research that has been conducted in this thesis.

Powerful knowledge, Powerful regional knowledge and Powerful knowings mirrored against 'key sustainability competencies' for the sustainability curriculum

As earlier said, Wiek et al. (2011, 204) was clear on the critical need to identify and operationalise key sustainability competencies into learning outcomes (2016) to design successful academic programs in sustainability. The key sustainability competencies suggested by Wiek et al. (2011) and refined by Wiek et al. (2016), Rieckmann (2012) and Brundiers et. al (2021) are developed to serve as 'reference frameworks' for the development of sustainability programs. While the author of this thesis with the support of Young and Muller (2013, 2016, 2019) and Carlgren (2020, 2023) argues that practical knowledge, which can have the form of competencies, can be or is important for the formal sustainability curriculum, this can not be all there is for a sustainability curriculum. The proponents of key sustainability competencies, the author argues, fail to define what constitutes 'knowledge' in addition to motives, skills, and attitudes (Wiek et al., 2011, 204; Brundiers et al., 2021, 15; Rieckmann, 2012, 12) in their definition of competencies. In addition, in their vision of 'successful academic programs', theoretical/conceptual knowledge that, the author with the support of Young (2009, 2013, 2008a, 2008b; Young & Muller, 2009, 2013) argues is of essence to contribute to their success, and therefore set out to define by letting academics in focus groups discussing this matter, is not considered in their work. As a result, it is possible to interpret this as a downplaying of the role of theoretical/conceptual knowledge, if we assume that it is that form of knowledge they point to in their definitions of competencies. This, the author, with the help of Young (2009, 2013, 2008a, 2008b; Young & Muller, 2009, 2013) argues can be problematic if students are to become empowered to influence society towards sustainability. After all, how can they engage in debates, problem solutions and sustainability work if they are not basing this engagement on the best possible knowledge at hand, the Powerful knowledge, that can be found in the various academic disciplines (Young & Muller, 2009, 2013) and Powerful regional knowledge, which the author with the support of Annala (2022) and Shay and Steyn (2015) argued could be found in sustainability as an academic field. Indeed, the author tried to formulate this knowledge by engaging relevant academics of various disciplines and who had in common that they researched sustainability as an academic field and were involved in a sustainability master's programme.

One way of still rightfully acknowledge and not downplay the need to include practical knowledge components in the sustainability curriculum, a curriculum that many times rests on sustainability as a science, which is a science that regards sustainability problems as needing both theoretical/conceptual *and* practical conceptual knowledge to be tackled (see e.g Clark, 2007; Clark & Dickson, 2003; Kates

et al., 2001; Komiyama & Takeuchi, 2006; van der Leeuw et al., 2012), was in this thesis to make use of Carlgren's (2020) theory of Powerful knowings. Practical knowledge as Powerful knowings, which Carlgren (2020) refer to as subject-specific capabilities, and this thesis chose to call subject-and field-specific capabilities, develops through the study of theoretical/conceptual knowledge of disciplines or fields, they are "developed in a transaction with the specific knowns" (Carlgren, 2020, 332). Someone who is knowledgeable is according to Carlgren someone with a considerable amount of theoretical/conceptual knowledge in specific disciplines or fields and who has implicitly developed capabilities of "thinking, formulating questions, seeking and evaluating answers" (Carlgren, 2023, 14, author's translation) concerning these disciplines and fields. Thus, in Powerful knowings, practical knowledge is tightly related to specific theoretical/conceptual knowledge, which the author would argue that the proponents of key sustainability competencies discussed above have not put effort into formulating or specifying for their competencies. Therefore, as briefly touched upon above, using Carlgren's (2020) Powerful knowings in this study has contributed to defining capabilities, or 'competencies' that are connected to the theoretical/conceptual knowledge bases of disciplines and fields. Indeed, some empirical research also confirms this to be a fruitful way of perceiving competencies; the development of competencies or capabilities for an individual depends on the individual also having a theoretical knowledge-base to 'hook' these capabilities and competencies onto (see e.g. Halliday, 2000; Willingham, 2008; Smith, 2002; Tricot and Sweller, 2013; Duncan, 2007). In the case of sustainability, this would mean that students having theoretical/conceptual knowledge about sustainability is imperative if they are going to be able to successfully use capabilities to engage with sustainability problems (a form of knowledge which the author has tried to define by using Powerful regional knowledge). This knowledge can be in the form of disciplinary-tied knowledge (Powerful knowledge) or more conceptually and contextually complex knowledge from the interdisciplinary field of sustainability (Powerful regional knowledge), because not all sustainability problems look the same, even though they might share characteristics. They require different theoretical/conceptual knowledge of disciplines and sustainability as a field, depending on their complexity, character, context, functions etc, and this knowledge is not defined in the sustainability competencies perspective. As an example, in defining 'integrated problem-solving' as a key sustainability competence, Wiek and Lang (2016) are referring to integrated problem-solving of 'sustainability problems'. However, the author believes that we can not assume that all sustainability problems look the same in their composition, which is why it can be argued that sustainability competencies might not be the only important components to include or suggest for the sustainability curriculum in higher education if students are going to be empowered in their work with sustainability issues. Because of their difference in composition, and if to be empowered, this thesis argues with

Carlgren's (2020, 2023) assistance that students need to also learn theoretical/conceptual knowledge from different disciplines and sustainability as an academic field on which they can base their integrated problem-solving competence. By using Carlgren's (2020, 2023) ideas, we can instead suggest that a proper understanding of the sustainability problems composition is required in order to be able to use capabilities to tackle them. This is also why the author commenced this thesis by suggesting that theoretical/conceptual knowledge about sustainability problems needs to be defined for the sustainability curriculum, so that the practical knowledge of capabilities that are also needed to tackle sustainability issues can be used in an effective way. The by academics defined Powerful knowledge and Powerful regional knowledge in this thesis are contributing to that process.

Powerful knowledge and Powerful regional knowledge mirrored against PEI-knowledge for the sustainability curriculum

It was argued above that previous research has taken different approaches than this thesis in the process of defining what could be important components for the sustainability curriculum in higher education, and that these approaches are connected to diverse visions regarding such a curriculum, and resultingly also the empowerment of students in influencing the world towards sustainability. The PEI-knowledge perspective accounted for in the literature review is, in general terms, one approach that differs from the one taken in this thesis. However, the author also wants to point to some results of the thesis that can be said to be more in line with the PEI-knowledge perspective. That said, the author will first describe the contrasts between some of the Powerful knowledge and Powerful regional knowledge identified by the academics in this thesis and PEI-knowledge, and then move over to discuss similarities. Powerful knowings will also be briefly touched upon in relation to one interesting result from one of the focus groups.

One Powerful knowledge that was defined by participants was 'scientific knowledge of principles, numbers and scales related to sustainability issues'. In considering the first mentioned Powerful knowledge, participants pointed to a form of knowledge that is 'scientific', i.e. numbers, scales and scientific principles that have been produced in various natural sciences and social sciences disciplines. Arguably, it is this form of, and the hegemony of this form of knowledge that is critiqued in the PEI-perspective, given its focus on the sustainability curriculum making room for 'the lived experiences of learners' that could form more place-based contextual knowledge and an 'epistemology of multiplicity' (Morgan, 2012, 633-634), everyday, local and culturally situated knowledge (Robertson, 2016) and indigenous knowledge about how to live sustainably (Jimenez & Kabachnick, 2023). The vision for the sustainability curriculum in the PEI-perspective can be argued to be a curriculum that involves more knowledge components that are to be found outside of academia, with

more contextual and everyday features rather than e.g. context-independents, systematicness (Chapman, 2021, 9, based on Young, 2014) and is created by other forms of communities than the specialised ones suggested by Young (2013). Here, it must be noted that the author is not taking the position that such knowledge can in no case be important for the sustainability curriculum in higher education, or that such knowledge can not have the features of Powerful knowledge. There could be instances where engagement with PEI-knowledge as part of the sustainability curriculum enriches students' learning and empowers them. In addition, there could be cases where knowledge formed outside of academia qualifies as Powerful knowledge, such as in the examples given by Clegg (2016) who discusses how knowledge-creation processes in social movements share characteristics with the systematic knowledge production in academic communities, and that it has contributed to the knowledge-base of academic disciplines. In such cases, there is, if we take Young (2008b) and Young and Muller's (2013) perspective, no need to discuss whether the knowledge should be included or not. In addition, knowing about different variants of knowledge, and engaging with cases where such knowledge contributes to the understanding of local sustainability problems, how they have affected local populations and what they see as solutions forward can also be important for the sustainability curriculum, not at least to develop traits such as empathy, respect, the ability to listen and to be able to collectively with local actors tackle their local sustainability problems⁶, abilities that also Wiek et al. (2011) and Brundiers et al. (2021) stress. Indeed, the by the academics identified Powerful knowing of the ability to 'think about justice and sustainability' can also be related to the abilities just highlighted, although the academics were more considering this Powerful knowing as something that comes from sustainability as an academic field and thus can be developed by studying that field. Nevertheless, if we adhere to and understand this through the perspective offered by Young (2008b) and Young and Muller (2013), which is what this thesis seeks to do, it is not such forms of knowledge that should be seen as the *essentials* in the formal curriculum, if it is going to be empowering for *all* students, and to move them beyond their everyday experiences (Young, 2008b, 13-15). Students gain knowledge from everyday experiences in the course of everyday life, through for example engagement in local communities, clubs, NGOs or else, and the formal curriculum of higher education institutions must therefore provide access to knowledge that is most often, but not exclusively, found in academic disciplines (Young & Muller, 2013). Again, that said, the author does not completely disregard that knowledge in the form of Powerful knowledge can be developed in such communities; that depends on how such knowledge-building processes look. Of course, there is for example culturally and institutionally situated knowledge in such communities that can be useful, that has been developed

⁶ Such abilities are possibly similar to Wiek et al's. (2011) 'normative competence' or Brundiers et al's. (2021) 'intrapersonal competence'.

from experience and of ‘trial and error’, and that in that sense can be seen as systematic, which is one feature of Powerful knowledge (Chapman, 2021, 9, based on Young, 2014). However, Young (2008b) and Young and Muller (2013) would still probably regard this as knowledge dependent on the context of that community, which is why it cannot serve as a base for the formal curriculum.

Moreover, it is also important to highlight that some forms of knowledge proposed in the PEI-perspective, such as local, place-based (Morgan, 2012) and culturally situated knowledge (Robertson, 2016) and arguably also indigenous knowledge about how to live sustainably as proposed by Jimenez and Kabachnick (2023) shares features with the Powerful knowledge perspective as formulated by Shay and Steyn (2015) and can thus, in theory, be seen as contenders for the sustainability curriculum as they define Powerful regional knowledge as conceptually and contextually complex theoretical/conceptual knowledge. Arguably, the forms of knowledge from the PEI-perspective just mentioned seem to point towards an increase in contextual complexity given its focus on local, place-related and knowledge that is culturally or institutionally situated in societal organisations or groups. In connection, it is interesting to mention that the knowledge that ‘sustainability problems need a transdisciplinary approach’ that was stressed by participants in focus group 2 and that the author analysed and argued could be an example of a Powerful regional knowledge that lived up to the criteria of contextual complexity as formulated by Shay and Steyn (2015), could perhaps be seen as one example of a knowledge that comes close to knowledge that is proposed in the PEI-knowledge perspective. This is because it is a knowledge that necessarily involves an appreciation for external actors ideas, and possibly also the adoption of them for tackling sustainability issues, given that the knowledge is about understanding and knowing that such problems need transdisciplinary collaboration to be dealt with. However, as also stressed in the results and analysis chapter, it still has to be researched whether this knowledge can also be regarded as conceptually complex and if it simultaneously shares the features of Powerful knowledge (Chapman, 2021, 9, based on Young, 2014).

Another interesting result to raise concerns one Powerful knowings from the academic field of sustainability that was mentioned by focus group 1, which speaks to the need to include more PEI-knowledge in the formal sustainability curriculum. Focus group 1 considered the ‘unlearning of Western academic knowledge and its production processes’ as one Powerful knowing that could empower students to influence the world towards sustainability. In that way, they highlighted what scholars of the PEI-knowledge perspective stress, i.e. that to tackle sustainability challenges, through the curriculum, knowledge that comes from other communities and processes than the academic has to be included in the sustainability curriculum. Morgan (2012) discusses an ‘epistemology of

multiplicity’, and one participant in focus group 1 said that teachers have to, through the curriculum, ‘encourage students to unlearn some of that [that knowledge is only developed through deterministic methods in academia] and to learn that there are very different ways of learning and understanding.’ (P1). Possibly, it is such a Powerful knowing of ‘unlearning’ mentioned by focus group 1 that can support students studying sustainability to see the benefits with PEI-knowledge in relation to sustainability issues. It is also important to note that the academics, in this case, pointed to a Powerful knowing that is implicitly developed when studying the academic field of sustainability. This is arguably not a surprising result given that the PEI-knowledge perspective has been central in the research about the sustainability curriculum in higher education and has thus probably been adopted and included as important ingredients for the sustainability curriculum by educational programmes in higher education, which is then also why participants in focus group 1 suggested it to be an important one.

Powerful knowings as ‘key sustainability competencies’?

Two Powerful knowings from the academic field of sustainability identified in this thesis, the capability of being ‘open-minded’ and the capability to ‘engage in interdisciplinary work and collaboration to tackle sustainability issues, are in line with earlier research about ‘key sustainability competencies’ (Wiek et al., 2011). Indeed, it is possible to state that these two capabilities have similarities with the ‘Interpersonal competence’ (the ability to collectively develop, facilitate and encourage research about and solving of sustainability issues) proposed by Wiek et al. (2011, 207-211). The focus groups stressed the importance of students learning how to work with people from various disciplines, with different motives and ideas, in tackling sustainability issues, including the jargon and discourse of different disciplines, which is why these Powerful knowings indeed seem to share characteristics with Wiek’s competence. However, the Powerful knowings raised by the academics were capabilities that are developed implicitly by studying the academic field of sustainability, and this is not how Wiek et al. (2011) portray their sustainability competency. As earlier argued, Wiek et al. (2011) have been more engaged in defining a set of sustainability competencies that can serve as reference frameworks for programme developments, rather than discussing how such competencies are learnt through the study of theoretical/conceptual knowledge (Carlgren, 2020, 2023) to be found in sustainability as an interdisciplinary field and what theoretical/conceptual knowledge that then needs to be included in the curriculum for such competencies to come alive.

Conclusion and recommendations

This thesis argued that previous research on the sustainability curriculum in higher education has mainly been concerned with defining ‘sustainability competencies’ (Brundiens et al., 2021; Kishita et al., 2018; Redman and Wiek, 2021; Rieckmann, 2012; Salovaara et al., 2019; Wiek et al., 2011), pedagogical and didactical arrangements suggested suiting sustainability education in HE (see e.g. Barth et al., 2023; Lotz-Sisitka et al., 2015; Sinakou et al., 2019; Van Poeck et al., 2019) and PEI-knowledge (Morgan, 2012; Jimenez & Kabachnick, 2023; Robertson & Tsang, 2016; Thomas, 2020) that could serve as essential components of such a curriculum. In light of this research, the author argued that research on the sustainability curriculum in higher education has not engaged in defining theoretical/conceptual knowledge that can be found in different academic disciplines, Powerful knowledge (Young, 2009, 2013; Young & Muller, 2013; Muller & Young, 2019), or Powerful regional knowledge (Shay & Steyn, 2015) that the author argued could be found in sustainability as an academic field. In addition, the author argued that previous research has not defined subject-or field-specific capabilities, a form of practical knowledge that is implicitly developed by the close study of an academic discipline or field (Powerful knowings) (Carlgren, 2020, 2023). Engaging in a process of defining these missing pieces, the author, with the support of (Young, 2008b; Young & Muller, 2013; Chapman, 2021, 9) argued is essential if the sustainability curriculum in higher education is going to be empowering for students studying it. This is because acquiring knowledge of the forms just mentioned is important for understanding the ‘fundamentals’ of sustainability issues and to give students the opportunity to learn theoretical/conceptual and practical knowledge that, because of its characteristics, can have socially equalising effects for them (Chapman, 2019, 9; Young, 2008b; Young and Muller, 2013). Moreover, the author argued that it is important because of this knowledge’s elevated role in society (Bell, 1973; Stehr, 1994; UNESCO, 2005), and because it can support students in tackling scientific scepticism, among other things, that question the scientific base of climate change and other sustainability problems (see e.g. Augé, 2022; Davies & Mah, 2020; Hawkins & Chinn, 2023; Lubicz-Zaorski et al., 2023; Oswald & Bright, 2022).

The results of this thesis are the definition of several Powerful ‘knowledges’ from academic disciplines, ‘Powerful regional knowledge’s’ from the academic field of sustainability and Powerful knowings both from disciplines and the academic field of sustainability, that could serve as components for the sustainability curriculum in higher education.

If further ESD-research finds it convenient to use Powerful knowledge, Powerful regional knowledge and Powerful knowings, as concepts to define the for students empowering essentials that should be

part of the sustainability curriculum in higher education, the author suggests that such research start with involving an increasing amount of disciplinary representatives, from the natural sciences, social sciences and arts and humanities alike, and representatives from the academic field of sustainability in such matter. The rationale behind this suggestion is that sustainability is a field that deals with complex problems that need the involvement and knowledge from all academic disciplines. The author also suggests that further research dedicate time into further developing the idea of utilising Powerful regional knowledge as a concept to define the important and empowering complex knowledge that can be found in sustainability as an academic field and at the same time consider which actors external to academia that should be part of the process of elaborating on that knowledge.

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Appendices

Appendix 1 - Focus group questions guide

About knowledge

1. What academic knowledge from your disciplines is important for the curriculum of sustainability master's programmes because it can empower students to influence the world towards sustainability?
2. What academic knowledge from the field of sustainability is important for the curriculum of sustainability master's programmes because it can empower students to influence the world towards sustainability?

About implicit/tacit capabilities/competencies

3. What implicit/tacit capabilities/competencies from your disciplines are important for the curriculum of sustainability master's programmes because it can empower students to influence the world towards sustainability?
4. What implicit/tacit capabilities from the field of sustainability are important for the curriculum of sustainability master's programmes because it can empower students to influence the world towards sustainability?

Appendix 2 – Information letter about the study

Information about the project

'Powerful Knowledge in Swedish Master's Programmes in Sustainability'

Project Overview

I am a student enrolled in the Master's Program in Education for Sustainable Development at the University of Gotenburgh. Through the project titled 'Powerful Knowledge in Swedish Master's Programmes in Sustainability,' my objective is to investigate what could constitute 'Powerful Knowledge' within the curricula of Swedish master's programs in sustainability. 'Powerful Knowledge,' as defined by scholars such as Wheelahan (2007), Young (2008; 2009, 2013), and Young and Muller (2013) and Young and Muller (2019), refers to academic, scientific, and disciplinary/interdisciplinary knowledge generated by groups of researchers. According to the theory, students who comprehend and acquire Powerful Knowledge are better equipped to influence the world, as this knowledge enables a deeper understanding of it. This makes it intriguing to explore Powerful Knowledge in the context of master's programs in sustainable development since these programs aim to educate students to understand sustainability issues and use that understanding to positively impact society sustainably.

In addition, the study explores the concept of 'Powerful Knowings' proposed by Carlgren (2021). This idea aims to identify the disciplinary/interdisciplinary capabilities or competencies that are important for students to learn if they are going to impact society. I aim to investigate this idea in relation to

which capabilities or competencies could be integrated into master's programs to equip students with the skills needed to work towards sustainability.

The research project is under the auspices of the University of Gothenburg.

Implications of Your Participation in the Study

If you choose to participate, it will involve your engagement in a 90-minute online focus group conducted via Zoom. Preparation for the focus group includes familiarizing yourself with the information about the study provided to you in advance and reviewing the (preliminary) questions that will be discussed during the focus group (see appendix).

Personal information, such as your name, job title, or workplace, will not be disclosed as part of the study. Only the project manager (Lovisa Håkansson) and the other participants in the focus group will be aware of your involvement.

Information on Study Results

You will have access to the study results when the project manager (Lovisa Håkansson) shares the final study with you. The study, upon completion, will be published in the electronic archive of the University of Gothenburg's library (www.gupearchive.gu.se), where it will be searchable.

Voluntary Participation

Participation in the project is entirely voluntary. You can choose to withdraw at any time, and there is no obligation to provide a reason. If you decide not to continue participating, please inform the project manager using the contact details provided below.

Contact Information for Project Responsible

Lovisa Håkansson Eksoppsvägen 43, 75646 Uppsala

Tel: 0707671192, Email: lovisa.hakansson@uu.se

Appendix

Examples of questions to be discussed in the focus group

The following questions are preliminary but aim to capture the essence of the topics and issues to be discussed during the focus group.

- What academic knowledge from your disciplines can empower students to influence the world towards sustainability?
- What academic knowledge from the field of sustainability can empower students to influence the world towards sustainability?

- Are there any implicit/tactic capabilities/competencies from your disciplines that are important for students to learn, to be able to influence society towards sustainability?
- Are there any implicit/tactic capabilities/competencies from the academic field of sustainability that are important for students to learn, to be able to influence society towards sustainability?

Appendix 3 - Consent form

Consent Form

Powerful Knowledge in Swedish Master's Programmes in Sustainability

I _____, agree to participate in the research project titled 'Powerful Knowledge in Swedish Master's Programmes in Sustainability', conducted by Lovisa Håkansson who has informed me about the research project.

I have received, read and kept a copy of the information letter concerning the project. I have had the opportunity to ask questions about this research and I have received satisfactory answers. I understand the general purposes, risks and methods of this research.

I consent to participate in the research project and the following has been explained to me:

- the plan, purpose and methods of the research
- the research may not be of direct benefit to me
- my participation is completely voluntary
- my right to withdraw from the study at any time without any implications to me
- what I am expected and required to do
- whom I should contact for any complaints with the research or the conduct of the research
- I am able to request a copy of the research findings and reports
- security and confidentiality of my personal information

In addition, I consent to:

- audio recording of any part of or all research activities
- publication of results from this study on the condition that my identity will not be revealed.

Name: _____ (please print)

Signature:

Date: _____