FACULTY OF EDUCATION
DEPARTMENT OF PEDAGOGICAL CURRICULAR AND PROFESSIONAL STUDIES

LEARNING FOR THE FUTURE IN CROSS-SECTOR COLLABORATION:

EXPLORING THE POTENTIAL TO ACCELERATE EDUCATION FOR SUSTAINABLE DEVELOPMENT IN UNINTENDED LEARNING PLATFORMS

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Programme/course:	S2ESD ESD700
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Supervisor:	Maria Svensson
Examiner:	Sverker Lindblad

Abstract

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Aim: This study aims to investigate whether and how Swedish cross-sector collaborations for preparedness and regional development may beyond their operational function contribute to the development of competencies identified as crucial for addressing future challenges.

Theory: The theoretical framework builds on transformative learning theory, the UNESCO (2017) framework for sustainability competence and futures literacy (Vinnova, 2024). This interdisciplinary framework allows the study to connect informal learning processes in professional settings to previously identified competence needs for sustainable and resilient societies.

Method: A qualitative research design was applied, and semi-structured interviews were conducted with 11 professionals from public and private sector organizations, all engaged in cross-sector collaborations. The material was analyzed through directed content analysis, using the sustainability competencies as predetermined coding categories to identify patterns of learning described by participants.

Results: Findings indicate that several sustainability competencies were present to varying degrees in participants' reflections. Most prominent were collaboration, systems thinking, strategic, and anticipatory competencies, some of which align with the futures literacy concept. Moreover, a potential addition to the framework was identified and named community awareness. Results suggest that cross-sector collaborations can support informal learning and competence development relevant to future societal challenges, even when such outcomes are not explicitly intended.

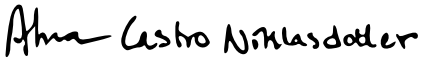
Foreword

This thesis was written as part of the master's program in Education for Sustainable Development at University of Gothenburg, during the spring term of 2025. It has been a valuable and thought-provoking process, through which I have had the opportunity to explore the intersection of cross-sector collaboration and education in a time when resilience and competence for the future are more important than ever.

The idea for this thesis originated through the Wexsus pilot project, where I was introduced to the County Administrative Board of Västra Götaland and their ongoing work with civil preparedness. I am sincerely grateful to my contact person at the County Administrative Board, Dea Ternström, for opening doors to relevant professionals and generously supporting the research process. I would also like to extend heartfelt thanks to all the interview participants, who took time from their important work to share their experiences and reflections with me.

A special thank you goes to my supervisor, Maria Svensson, for her insightful guidance, constructive feedback, and invaluable encouragement throughout the project. I am also thankful for the inspiration from fellow Wexsus students and project organizers, who have offered valuable perspectives along the way. Last but not least, I want to thank my mom, dad and sister for their endless support.

I wish to end by acknowledging the broader purpose that has guided this work: the need for innovative approaches to learning in all sectors of society. I hope this study, even in the smallest way, can contribute to that ongoing effort.



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Introduction

In the 2030 Agenda for Sustainable Development, future competence needs are highlighted. As seen in SDG 4.7, it is stated we should by 2030 "ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development" (UN, 2015, p. 17). Rieckmann (2018) argues that individuals must become "sustainability citizens" in order to fully grasp the complexity and uncertainty of global and local sustainability challenges. He underscores the need for the right competencies and advocates for transdisciplinary and collaborative pedagogies to achieve them. Didham and Ofei-Manu (2018) similarly emphasize that the practical implementation of an education for sustainable development benefits from multi-stakeholder, participatory, and collaborative learning partnerships that foster solution-building and innovation. In addition, Singer-Brodowski (2023) highlights the potential of unintended learning platforms, suggesting that contexts focusing on sustainable development can also foster informal learning among participants.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) has, in connection with SDG 4.7, published policy documents providing practical guidance for the implementation of education for sustainable development, also referred to as ESD. These documents are intended to support decision-makers, educational institutions, and other stakeholders worldwide in integrating ESD into both formal education systems and broader societal contexts. One such document outlines specific learning objectives and, drawing on relevant research, proposes a framework of key competencies considered essential for contributing to sustainable development. Another emphasizes the urgent need to accelerate the implementation of ESD and to fundamentally rethink what, where, and how we learn, in order to meet the global goals. It explicitly encourages both individual and collective action at local, national, and global levels (UNESCO, 2017; UNESCO, 2020).

Sweden has committed to the global strategy for sustainable development and, accordingly, supports the advancement of education in this field. At the same time, collaboration across

organizational and sectoral boundaries has become a well-established and increasingly emphasized approach among Swedish public authorities and other stakeholders for addressing complex societal challenges. Collaboration across sectors is a vital tool used for both civil preparedness and regional development in Sweden, with shared responsibility serving as a guiding principle (MSB, 2021; MSB, 2024; MSB, 2025; Nikkanen et al., 2024; VGR, 2021). Williams (2024) in alignment argues that to build resilient communities in practice, the key tool is collaborating across sectors. She asserts that systemic change requires partners. Each sector has its strengths and limitations in impact and engagement, meaning no sector can tackle challenging times on their own (Williams, 2024), a point further underscored in SDG 17, target 17.17, set out to encourage and promote effective partnerships between public, private and civil society (UN, 2015).

Becker and Smith (2018, p. 2) define cross-sector collaborations as "alliances of individuals and organizations from the nonprofit, government, philanthropic, and business sectors that use their diverse perspectives and resources to jointly solve a societal problem and achieve a shared goal". Regarding complex challenges, they present two options: either to simplify our view of the world or to broaden our own perspectives to better match the complexity at hand. In terms of problem-solving, one can either focus on a small, isolated part of the issue, or engage a sufficiently wide range of actors to address the challenge in an adequate and meaningful way. In relation to today's pressing issues, they argue that we too often choose the former path, when in fact the nature of these challenges calls for the latter (Becker & Smith, 2018).

There are indications that Sweden has begun to embrace this more systemic and collaborative response to complex societal challenges. This is reflected in both national policy and regional practice, where cross-sectoral collaboration is increasingly emphasized as necessary conditions for building resilience and advancing sustainable development (MSB, 2021; MSB, 2024; MSB, 2025; VGR, 2021; Vinnova, 2024). The organizations involved in cross-sector collaborations are also among the primary target groups of the international ESD policy documents. Both public and private sector actors are expected to integrate the SDGs into their operations, aligning national efforts with global sustainability agendas (UN, 2015).

And although efforts are being made, the Swedish Innovation Agency Vinnova (2024) has recently highlighted the urgent need to invest in skill development for societal preparedness, emphasizing foresight and futures literacy as national strategic competencies. These future-oriented skills, closely aligned with previously mentioned key competencies suggested within ESD, are seen as essential for navigating uncertainty and enabling long-term sustainable transitions. In alignment with UNESCO's call to rethink where and how learning happens, Vinnova advocates embedding such competencies beyond conventional education systems (UNESCO, 2017; UNESCO 2020; Vinnova, 2024).

This convergence between policy goals and collaborative practice points to the need for closer examination of the learning potential within such networks. Notably, research suggests cross-sector collaborations do present opportunities for learning (Arya & Salk, 2006; Berlin & Carlström, 2015; Borell & Eriksson, 2013; Nikkanen et al., 2024; Rutty & Rutty, 2012; Sorensen et al., 2019). From the perspective of ESD, this opens the possibility that such collaborative environments could be strategically leveraged to support the implementation of ESD, in line with UNESCO's (2020) recommendations of rethinking and accelerating learning. However, while CSCs are often recognized as spaces for learning, there is less clarity about *what* participants learn. Investigating the nature of this learning is therefore essential if CSCs are to be understood and potentially developed as informal platforms for advancing ESD.

In the context of multiple challenges – ranging from environmental degradation to geopolitical tensions – resilience building is not only a critical necessity but also represents a unifying objective. Resilience can broadly be understood as the capacity to adapt to change while maintaining the ability to continue progressing. In a social context, it refers to the ability of communities to endure and recover from various forms of stress, whether environmental, social, economic, or political (Stockholm Resilience Centre, n.d.). Both cross-sector collaborations and ESD can hence be understood as tools for enhancing resilience, and among the learning objectives for ESD are, for example, that learners become "able to co-create an inclusive, safe, resilient and sustainable community" (UNESCO, 2017, p. 32).

As we are approaching the year of 2030, this study seeks to explore potential intertwined solutions for advancing the SDGs. Several platforms suitable for ESD, where individuals can

acquire the knowledge and skills needed for the future in collaboration with others, may already be in place. Existing cross-sector collaborations, pursuing enhanced preparedness or regional development, might both provide a platform for and benefit from such learning processes, as learning could in turn contribute to the networks' objectives. In other words, ESD could enhance the resilience-building efforts of communities, and collaboration contexts may offer suitable platforms for such education. The capacity for future-oriented learning may represent a valuable, though often overlooked, dimension of these collaborations (UNESCO, 2017; Singer-Brodowski, 2023; Didham and Ofei-Manu, 2018).

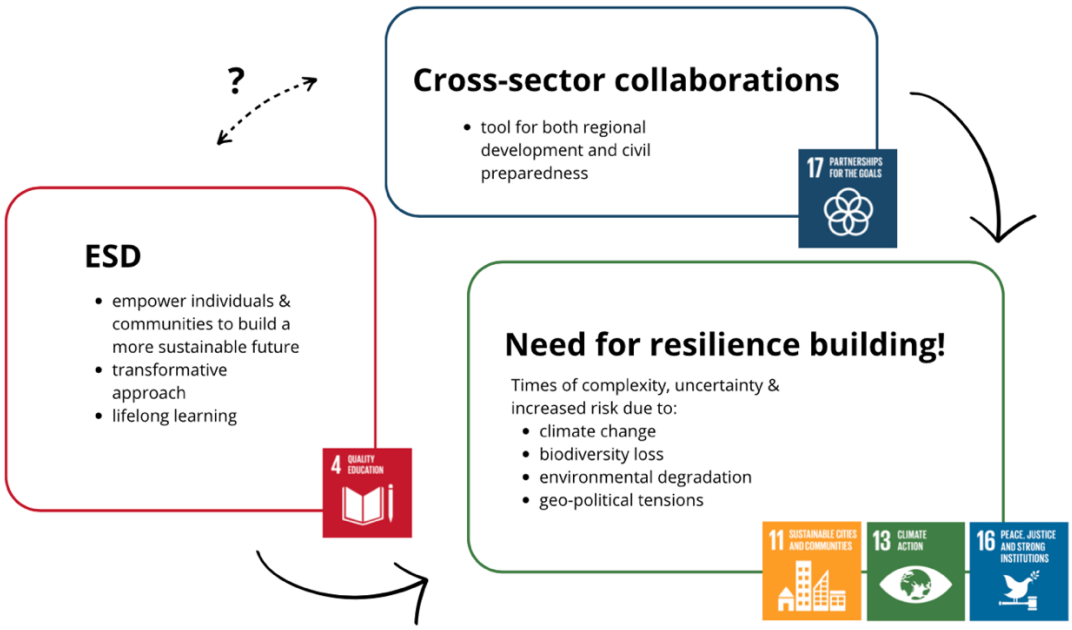

Figure 1. *Illustrating the area of interest with a question mark representing the potential gap in previous research. Numbered boxes represent related SDGs.*

Figure 1 illustrates the conceptual relationship between ESD, cross-sector collaborations, and resilience building, as established in the preceding discussion. The interrelation between ESD and cross-sector collaborations, and their potential to mutually reinforce resilience efforts, seem to remain insufficiently explored. To the author's knowledge, despite increasing recognition of the role of cross-sector partnerships in Sweden, their potential as informal learning environments for future competencies remains relatively underexplored, especially in relation to ESD.

This study therefore explores learning within Swedish collaborations across sectors, contributing an additional perspective by using education for sustainable development as a lens. Could collaborations designed to meet future societal needs also nurture the competencies required to navigate them? And as international and national policies increasingly emphasize the importance of learning for sustainability and preparedness, it becomes critical to examine how these frameworks are realized in everyday practice. By investigating learning within cross-sector collaborations in connection to future-oriented skills, this study not only explores the intersection of ESD and the highlighted collaboration form, but also contributes to bridging the gap between policy ambition and lived experience in the Swedish context. Specifically, it seeks to investigate the learning that participants in Swedish cross-sector collaborations perceive, particularly in relation to skills identified as crucial for the future.

Purpose and Research Questions

The purpose of this study is to explore the potential role of Swedish cross-sector collaborations as platforms for learning competencies needed in the future, which will be explored through the perspective of participants in those cross-sector collaborations. Building on a framework of education for sustainable development, it investigates whether and how cross-sector collaborations may contribute to skills identified as crucial for addressing future challenges. By further emphasizing foresight-related competencies in alignment with Vinnova (2024), the study aims to contribute to a deeper understanding of the educational potential of cross-sector collaborations and their possible role in supporting capacity building for resilience.

In doing so, the study seeks to generate insights that may support the further development of collaborative practices or strengthen their perceived value, potentially positioning competence development as an additional incentive for cross-sector engagement and strengthening resilience building. The following research question guides this study.

RQ: *In what ways do cross-sector collaborations contribute to sustainability-related competencies, and which specific skills are enhanced?*

Previous literature

In this section, previous research relevant to the purpose of this study is presented. To understand how cross-sector collaborations could function as platforms for ESD, the section begins with the more in-depth account of education for sustainable development. Next, it presents a review of previous literature on learning in cross-sector collaborations in general. It then narrows the focus to individual learning within a more specific resilience building collaboration context: disaster preparedness collaborations, as these articles were identified as the most concrete accounts of individual learning in collaboration with other sectors. Next, research is presented that suggests a shift from disaster preparedness toward resilience-building, where learning is seen as a key method – research that further emphasizes the connection between disaster preparedness, sustainable development and learning. Finally, the threads are brought together, and a research gap is identified.

Scopus was used to search for literature on this topic, where cross-sector collaboration and education for sustainable development were initial search words. After limited relevant findings different combinations of search words for cross-sector collaboration and learning or competence development were used, with and without sustainable development as an additional search word. Documents were scanned by title and abstract, with attention to year of publication and number of citations. Additional central research was found through recurring cited sources and reference lists. In addition, central documents to the field of ESD were included to provide an overarching background to the area of research.

Education for Sustainable Development

In the adoption of the 17 goals in the 2030 Agenda for Sustainable Development, the importance of education moving forward was underscored. SDG 4, set out to achieve inclusive and equitable quality education and promoting lifelong learning opportunities for all, has the distinctive feature of being both an SDG in itself and a key enabler for all the 17 SDGs (UNESCO, 2020). SDG 4 serves, thus, both as a final objective and as a tool for reaching broader sustainability outcomes. Leicht et al. (2018) assert that target 4.7: Education for Sustainable Development, as previously introduced, is recognized for being among the most

ambitious and challenging under SDG 4, and argues the support for ESD has gained considerable momentum in recent years. In alignment, Wals and Benavot (2017) mean education and lifelong learning play an increasingly central role in responding to the global environmental crisis and broader sustainability challenges. Their statement refers to education in the broadest sense, including "all forms of formal, non-formal and informal education and training that equip individuals and institutions in the public, private and community sectors to effectively respond to pressing environmental challenges", which further aligns with the idea of ESD as according to UNESCO (Wals & Benavot, 2017, p. 405; UNESCO, 2017). However, sustainability as defined in Agenda 2030 does not only address environmental challenges, at the core of the SDGs are the three pillars of social, economic, and environmental development and their interconnectedness (UN, 2015). Following this definition, ESD seeks to "promote the integration of sustainable development and the SDGs into education and learning, as well as ensuring the integration of education and learning into all activities that promote sustainable development and the SDGs" (UNESCO, 2020, p.15).

The more holistic view on sustainability is further an aspect that differentiates ESD from closely related educational traditions, such as environmental education – which could also be considered a predecessor to ESD. In environmental education, emerging in the 1960-1970s, the focal area was raising awareness and changing values drawing on information provided from experts, mainly within the field of natural sciences (Sandell et al., 2005; Wals & Benavot, 2017). Earlier pedagogic approaches emphasized specific environmental behaviors considered correct and necessary. Over time, the focus has shifted toward education that fosters autonomous, responsible, and reflective citizens, capable of making informed decisions and taking appropriate action. These two orientations are often described as the instrumental and the emancipatory approaches, respectively (Wals, 2012). In practice, they are not mutually exclusive and frequently coexist, which is also the case within ESD, although more closely aligned with emancipatory education. In short, instrumental approaches to education focus on promoting specific behaviors and technical skills to address pre-defined issues, often through expert-led instruction and policy-driven messaging. In contrast, emancipatory approaches work towards fostering critical thinking, reflection, and learner agency, enabling individuals to

navigate complexity and contribute to deeper societal transformation where solutions may be uncertain (Wals & Benavot, 2017).

So, to define ESD, it focuses on driving the transformative changes needed for sustainability by addressing both individual actions and the reorganization of societal structures. ESD promotes awareness, knowledge, and action to confront the root causes of unsustainable development and fosters a balance between economic growth and sustainability, but does not set out to provide fixed answers. By encouraging alternative values and addressing critical issues like poverty and vulnerability, ESD serves as a powerful tool for lifelong learning and local-level sustainability. It transcends traditional education forms, and engages organizations across sectors: civil society, private companies, and academia, in shaping impactful solutions for a more just and sustainable future (UNESCO, 2020). According to Leicht et al. (2018), ESD further serves as a critical tool for cultivating capacities that enable individuals to think and act sustainably, and all in all emphasizes interactive, transformative learning that equips individuals with critical thinking skills and values essential for sustainability. Certain competencies are identified as key, that empower individuals to act in a world of increased complexity and uncertainty. These are further accounted for in the next section of this thesis, but in short, they are described as cross-cutting, necessary for everyone, and relevant to all SDGs (UNESCO, 2017). This implies that ESD can develop competencies relevant for preparedness and resilience-building, being parts of SDG 11 and SDG 13, for instance. Described in a more general sense, one could say ESD develops competencies to meet the future.

There are other approaches aligning well with ESD, calling for similar solutions without naming it ESD. Sterling (2013) notes that many before him have suggested the need for a radical shift in ways of thinking, and holds more holistic, systemic and integrative thinking is needed when learning for the unknown. Building on social learning in relation to resilience theory, Sterling (2013) suggests a third-order learning where resilient learners capable of building sustainable systems are formed. He argues for the close relation between learning and sustainability and writes: “The former [learning] often emphasize critical reflection and autonomy, capacity building, and participation, whilst the latter [sustainability] emphasizes self-organization and self-renewal, community, and resilience. Both are essentially about process, emergence and

diversity, rather than about product, control and homogeneity. “Learning as sustainability” is the term used for this third-order approach, combining both instrumental and intrinsic educational views for a new paradigm of sustainable education, rooted in transformative learning (Sterling, 2013, p. 525).

Wals and Benavot (2017, p. 408) account for an “education for sustainability and environmental stewardship”, the latter being an idea encouraging “empowerment, local ownership, collaboration, transformation and resilience”. Wals and Benavot (2017) specifically mention learners should be provided the opportunity to become part of multi-stakeholder platforms with plurality in perspectives presented, as engaging with various viewpoints and working in collaboration supports identification of possible solutions. They conclude: “Not only does education shape values, behavior and worldviews, it also contributes to the development of competencies, skills, concepts and tools that can be used to reduce or halt unsustainable practices and build resilience in the face of environmental degradation and climate change” (Wals & Benavot, 2017, p. 410).

Similarly, Leicht et al. (2018) outlines pedagogical approaches that are essential in educating citizens toward understanding the complexities and uncertainties related to sustainability challenges, and acquiring competencies needed to think and act in accordance. They argue such education should be defined by a combination of approaches such as independent learning, active participation and collaboration, problem-based approaches, and both interdisciplinary and transdisciplinary perspectives. They highlight co-engaged learning environments where individuals get the opportunity to explore common concerns and collaboratively reflect on improved ways of understanding and taking action. Local communities are further emphasized as critical drivers of sustainable development. ESD supports this by ensuring alignment with local contexts, encouraging collective action for the common good, enhancing sustainability-related skills and competencies, facilitating cross-sector collaboration, and nurturing a sense of hope (Leicht et al., 2018).

No matter how desirable many of the aims of ESD are, it has been criticized for being both idealistic and insufficient in addressing deeper systemic issues. Kahn (2010) means education

is interrelated with culture and politics, making it difficult for it to serve as a truly transformative force against dominant unsustainable norms. From a critical theory perspective, scholars such as Kahn (2010), Dinker and Pedersen (2016), and Kopnina and Cherniak (2016) call for a more radical rethinking of education, one that includes the liberation of nature and non-human animals as central to sustainability. These critiques expose how education, including ESD, can inadvertently reproduce harmful structures and act as a form of social control. However, as McLaren (2015) suggests, some critical theorists distinguish between "schooling," which may reinforce social conformity, and "education" understood as a potentially emancipatory and transformative process. While acknowledging that ESD is inherently political and not without challenges, this study adopts a constructive interpretation of ESD grounded in the ambitions of the 2030 Agenda, where education is seen as a key driver in achieving the SDGs.

Cross-sector collaborations and learning

Cross-sector collaborations, cross-sector alliances, cross-sector partnerships and inter-sectoral partnerships, are some of all concepts used in the literature to describe cooperation across sectoral boundaries (Murphy et al., 2012; Rondinelli & London, 2003; Selsky & Parker, 2005; Waddell & Brown, 1997). As defined and argued by the non-profit organization the World Economic Forum, cross-sector collaborations are collaborations between businesses, governments, and civil society, essential for equitable and sustainable development (Williams, 2024). A common theme in multiple studies on the subject is that alliances across sectors, hereafter referred to as CSCs, enable tackling complex problems that one single organization or sector cannot address alone (Arya & Salk, 2006; Berger et al., 2004; Pavez et al., 2022; Pollock et al., 2019; Waddell & Brown, 1997).

Arya and Salk (2006) assert that alliances between for-profit and nonprofit actors, through for instance new perspectives and strengthened social capital, provide an organizational learning environment contributing to more effective corporate social responsibility initiatives that improve organizational practices for sustainable development. Arya and Salk (2006) hence frame CSCs as organizational learning platforms for societal development, while also suggesting we need better understanding of how different organizational structures can support

employees' ability to learn and apply the knowledge they have gained. In their focus on knowledge transfer between businesses and NGOs, governmental actors are nevertheless not included (Arya & Salk, 2006).

Several other studies, both conceptual and empirical, further support the view that learning is a significant element in CSCs (Ameli & Kayes, 2011; Arslan et al., 2020; Henry, 2024; Murphy et al., 2012; Pittz & Intindola, 2015; Pulido-Gómez et al., 2025; Reast et al., 2010). Murphy et al. (2012) for instance, present a concept for learning and innovation in the specific dynamic of cross-sector collaborations: the model of relational capacity for social innovation. Murphy et al. (2012) maintain their work can contribute in optimizing cross-sector alliances, as it highlights two critical processes essential for these collaborations. First, it stresses the importance of intentionally fostering relationships to bridge foundational knowledge gaps between partners. Second, it underscores the need to deliberately create routines and mechanisms that enable organizations to effectively integrate learning from cross-sector collaborations into their internal practices. In a more recent study, Pulido-Gómez et al. (2025) suggest mutual learning is required to sustain cross-sector collaborations over time. Mutual learning is a collaborative process where partners in CSCs work together to solve problems and share responsibilities, an approach that strengthens trust, commitment, and collective action. In the face of challenges, successful CSCs leverage mutual learning to adapt, rebuild trust, and sustain their efforts, avoiding a cycle of blame that could otherwise emerge (Pulido-Gómez et al., 2025). Arslan et al. (2020) and Henry (2024) further make contributions on CSCs in relation to the Covid-19-pandemic, highlighting adaptive learning for value creation in a crisis and suggesting partnerships across sectors serve as learning platforms in turbulent times, where learning does not merely occur through formalized processes but also unintentionally as a result of other activities.

Nonetheless, various contributions connecting the fields of cross-sector partnerships and organizational learning are of conceptual character (Arslan et al., 2020; Arya & Salk, 2006; Kohtamäki et al., 2023; Pittz & Intindola, 2015; Selsky & Parker, 2005) and empirical contributions are mainly qualitative studies confirming ideas in their particular contexts, providing indications without giving any overarching and general guidelines. This means that

discussing learning in Swedish CSCs, particularly in relation to sustainability competencies, requires further research in the given context.

Moreover, contrasting positive declarations regarding the effect of CSCs, are also researchers raising critique. For example, Ansell and Gash (2008) conduct a research review on collaborative governance in general, and finds challenges related to power imbalances between stakeholders, lack of commitment from public agencies and distrust hindering negotiation, which one can assume would also affect the contexts as learning platforms. Naturally, power imbalances should affect what perspectives dominate the dialogue, and distrust might affect the will to embrace other points of view. Another example is Reed et al. (2010) and their questioning of what social learning truly entails. Since a collaborative context can be equated with a social exchange, their critique is also relevant here, as they argue that there remains little consensus over the meaning or theoretical basis on social learning. They further note that claims often make little distinction between individual and wider social learning, and hold that the lack of conceptual clarity limits our capacity to assess whether social learning has occurred, and if so, what kind of learning has taken place and how.

In conclusion, previous research presents learning as a key factor in CSCs, mainly suggesting organizational learning occurs in such contexts. Simultaneously, the critique on social learning, although referring to a related discipline, seems to highlight a recurring pattern of vagueness regarding the nature of the learning being claimed also in the CSC literature. Further, what seems to remain understudied, in relation to future challenges and skills supply, is if and what sort of competence development takes place for individuals that participate in these kinds of collaborations. Deeper investigation of this, would partly address the critique of vague claims on the learning that occurs. To further explore the role of learning in CSCs in previous research, we will look at the specific application in disaster preparedness collaborations, as this presents an example where CSC research more explicitly approaches individual learning.

Learning in Disaster Preparedness Collaborations

Disaster preparedness collaborations are an example of CSCs intending to build resilience, in the sense of proactive risk reduction. Albeit in a limited number of studies, the learning effect of disaster preparedness exercises has been previously studied, exemplifying a very specific CSC context where research seems to agree that some sort of individual learning takes place (Berlin & Carlström, 2015; Borell & Eriksson, 2013; Rutty & Rutty, 2012; Sorensen et al., 2019). Rutty and Rutty (2012) for instance, argue that participation in a mass fatality exercise contributes to professional development for those who later respond to real incidents, not only through the development of practical skills related to equipment and infrastructure but also by fostering team integration, attitude formation, and awareness of emotional effects.

Borell & Eriksson (2013) on their hand, propose a theoretical framework for understanding and managing discussion-based crisis management exercises. Based on variation theory of learning, they highlight the experience of variation to achieve learning. Authors suggest that discussion can enhance individuals' learning, as being exposed to variation in scenarios, diverse perspectives, and interactive reflection, enable participants to develop adaptable crisis management capabilities (Borell & Eriksson, 2013).

Similarly, Berlin & Carlström (2015) explore whether participants perceive that collaboration exercises contribute to learning and usefulness in real emergency work. They reach the conclusion that exercises where participants practice collaboration have a perceived learning impact. However, Sorensen et al. (2019), using the same collaboration, learning and utility scale to study how perceived levels of learning change, demonstrate that perceived learning is highest among those with little previous exercise experience but then becomes lower and lower. Here, the effect of learning is hence presented to decrease over time. Sorensen et al. (2019, p. 130) hold the mere objective of collaboration exercises "is to strengthen collaboration between both organizations and individuals and to increase learning and usefulness", and thereby argue that exercises need to focus more on collaborative learning. To avoid the declining learning curve, they emphasize more focus on variation (aligning with Borell & Eriksson, 2013), improvisation and the unanticipated.

Following this, Nikkanen, Räsänen and Juhola (2024) have with a broader approach investigated cross-sector networks for regional disaster preparedness, where disaster exercises are part of the collaboration, from the perspective of adaptive governance. Adaptive governance is by the authors defined through a set of features that address complexity and uncertainty, and promote resilience. These sets of features are categorized as collaboration and networks; nestedness and polycentricity; learning and experimentation; and flexibility and adaptive capacity. This exploration arguably aligns well with O'Brien, O'Keefe, Gadema and Sword (2010), suggesting disaster management should move from being event focused toward being resilience building focused. Nikkanen et al. (2024) seek to contribute with practical implementation insights of adaptive governance in regional networks and results support that the regional preparedness networks studied do reflect many aspects of adaptive governance, primarily they facilitate collaboration and learning. The adaptive governance features identified that relate to learning are peer learning; learning from experience; and innovation, which all together help individuals get a holistic understanding of local preparedness, reveal areas for improvement and results in the development of better practices.

However, network participants interviewed also highlight perceived issues or limitations, such as lack of evident benefits for the organization and difficulties in measuring effectiveness which make investing resources hard to justify (Nikkanen et al., 2024). Additionally, neither Nikkanen et al. (2024), Sorensen et al. (2019), nor Berlin & Carlström (2015) delve deeper into the nature of perceived learning – does it lead to the development of new competencies? And further, could the learning be related to competencies needed in the future? Research in conclusion suggests several benefits with CSCs, but also highlights challenges. Tangible organizational outcomes are unclear, as well as actual learning outcomes. Moreover, the potential decline in learning over time among participants raises the question of whether the observed learning is confined to an initial interaction rather than indicative of an ongoing learning process.

From Emergency Preparedness to Resilience Building

O'Brien et al. (2010) argue for a new paradigm in disaster management, where learning methods are used to develop preparedness, and emphasizes a more holistic approach. The

authors conclude that increased uncertainty and complexity might make current disaster management insufficient and propose stronger emphasis on preparedness and resilience building in communities, to be better equipped to navigate and adapt to change. This is notable in the context of this study, as it underscores the relevance of connecting resilience building and learning. Differencing between emergency and disaster, in short as a threatening condition versus a serious disruption beyond coping capacity, O'Brien et al. (2010) hint that conventional disaster management might be able to handle the previous effectively but not the latter. A new thinking is needed to tackle the future, and this should be driven by social learning processes, where practitioners move from learning to do things better (single-loop learning) to learning to do things differently (double-loop learning). The starting point for re-conceptualizing into a new paradigm lies in a set of principles for pre-disaster planning, mentioning aspects such as shared responsibility, social learning and sustainable development.

These perspectives highlight the important connection between disaster preparedness and sustainable development, both of which share the common goal of building resilience, today and in the future. In a similar vein, Sterling (2013, p. 512) holds that "resilient systems need to be sustainable, whilst sustainable systems need to be resilient", formulating the idea that resilience building and sustainable development are interconnected societal aspirations. Viewing these principles as core elements for disaster preparedness, is in essence a method for moving from emergency preparedness to resilience building, and moreover many of the principles correspond with ideas in ESD.

Bridging Learning in CSCs and Future Competence Needs

While existing research highlights the role of learning in CSCs, the specific nature of competence development for individuals within these networks remains underexplored. Studies on disaster preparedness exercises (e.g. Borell & Eriksson, 2013; Rutty & Rutty, 2012) suggest that participation fosters professional development, yet the connection to sustainability competencies is largely absent. Similarly, Nikkanen et al. (2024) identify learning as a key feature of regional preparedness networks but do not examine whether this learning translates into concrete skills for addressing future challenges.

To address this gap, this study integrates CSC research with ESD theory. Applying an ESD framework of sustainability competence to collaborative networks can provide a structured way to assess whether these networks contribute to future-related competencies. If demonstrated, this would imply an additional collaboration value by advancing the SDGs, beyond issues already handled within the collaboration context. It would also contribute to previous research by concretizing the learning and connecting it to specific outcomes, and contribute to reduce the ambiguity surrounding the discourse on CSCs and learning. Further, this could reinforce the justification for investing time and resources in such collaborations, through added value, and potentially identify how learning can be improved. This study thus aims to investigate whether and how CSCs may contribute to skills identified as crucial for addressing future challenges, and the next section will describe the theoretical framework used to do so.

Theoretical framework

This research is situated at the intersection of CSCs and ESD, applying an ESD perspective to CSCs to explore learning in relation to sustainability. This section outlines the theoretical framework guiding the study. It begins by presenting the theory of transformative learning, which underpins the sustainability competencies framework, and then introduces the sustainability competencies framework with its eight key competencies that will be used in the analysis. Following this, an additional national framework for future competence, proposed by Vinnova (2024) and aligning with the global UNESCO framework, is presented to strengthen the connection between the theoretical framework and societal preparedness efforts in Sweden in particular.

These theoretical frameworks are selected as they offer competence-based guidelines grounded in both international and national policies, presenting competencies highlighted as critical for promoting sustainable development and preparedness. The global UNESCO (2017) framework is informed by transformative learning theory, which, as Leicht et al. (2018) argue, is central to how learning should be approached within ESD. The national framework developed by Vinnova (2024) provides local contextual grounding and highlights mindsets and capacities that closely align with the competencies identified by UNESCO. By combining the global

legitimacy of UNESCO's framework with the contextual relevance of Vinnova's, this study aligns with both global sustainability goals and Swedish policy suggestions on societal preparedness.

While previous research has acknowledged learning as a potential outcome of cross-sector collaborations, it has offered limited insight into the nature of this learning. The use of these complementary frameworks enables a more systematic exploration of how learning in CSCs relates to competencies identified as critical for future challenges. In doing so, the study investigates how CSCs may contribute to sustainability-related competencies and which specific skills are enhanced.

Transformative Learning Theory

Before speaking of competencies for sustainability, the transformative learning theory laying ground for most such work should be briefly introduced. Rooted in adult education, transformative learning theory emphasizes critical reflection, dialogue, and experiences to help individuals question their assumptions, broaden their perspectives, and develop more inclusive and adaptive worldviews (Mezirow, 1978; Mezirow, 1997). Transformative learning theory thereby offers a compelling framework for fostering the deep, perspective-shifting education necessary for addressing complex societal challenges. Rodríguez and Barth (2020) argue that transformative learning theory aligns well with ESD, as it encourages interdisciplinary approaches, critical reflection, and active engagement.

The connection between transformative learning and sustainable development is reinforced by others. Varela-Losada et al. (2022) support transformative learning theory as a vital element for progress toward sustainability and resilience, and Boström et al., write: "In order to break with unsustainable norms, habits, practices, and structures, there is a need for learning for transformation, not only adaption" (Boström et al., 2018, p. 1). They further account for a definition of transformative learning theory in relation to sustainable development, as a process that enables individuals to critically reassess their assumptions, shaping how they think, feel, and act. It involves not just acquiring knowledge but challenging underlying frames of reference, which include cognitive, social, moral, and emotional aspects. In the context of

sustainable development, transformative learning addresses both technical and social challenges, acknowledging value conflicts and structural constraints. It is a long-term, interactive process that can occur within or beyond existing institutions, fostering new interactions across societal levels and spheres. This perspective integrates scientific knowledge with a broader understanding of individual and organizational learning (Boström et al., 2018).

The focus on fostering open dialogue and collaboration in transformative learning theory matches the intended dynamics of cross-sector collaborations. Singer-Brodowski (2023) means one of the main benefits transformative learning theory can offer in improving sustainable development is to consider various spaces for communication and dialogue about sustainability transformations as potential learning environments. Contexts intending to strengthen sustainability in a location or within an organization will also lead to informal learning for participants, as well as in multi-professional networks. Singer-Brodowski (2023) therefore supports the idea that even collaborations with purposes other than learning should ideally create a learning environment that fosters critical thinking and the willingness to contribute to change among participating actors, consistent with transformative learning theory. This, of course, raises challenges in identifying where learning actually takes place and, more specifically, issues of accountability. Who within an organization holds the responsibility for ensuring that learning occurs? And what happens if it does not? Advocates of ESD might argue that addressing precisely this kind of ambiguity is part of the transformative shift that needs to happen. As will be discussed, there is a set of competencies that can help respond to this challenge.

Furthermore, Boström et al. (2018) stress that transformative learning within one context does not automatically imply a larger scale societal transformation, and suggests more research on how individuals and collective actors can develop reflexive capabilities that promote sustainable change and counteract the structural and cultural forces that impede such change. Varela-Losada et al. (2022) agrees that transformative learning theory for sustainable development needs further research and highlights skill development as essential for addressing socio-environmental challenges. This highlights, on the one hand, that learning is not a standalone solution to all problems, but rather should be understood as part of a broader set of

efforts. At the same time, it underscores the need to continue exploring transformative learning in relation to sustainability. A key intersection between these areas is the set of competencies identified as crucial for promoting sustainability, competencies that can be developed through transformative learning approaches, that are further explored below.

Sustainability Competencies

In alignment with Singer-Brodowski (2023), Giangrande et al. (2019) underscore non-formal learning, and primarily argue that individuals need to acquire key competencies, aligning with notions of transformative learning, to achieve the Agenda 2030 SDGs. The authors particularly address SDG 4.7: Education for Sustainability, recognizing the importance of ESD in the pursuit of global sustainable development.

Wiek, Withycombe and Redman (2011) present a highly cited framework of key sustainability competencies, in their case directed towards academic program development. Drawing on transformative learning as the approach to how learning takes place, they identify and integrate essential research contributions on sustainability competencies into a cohesive reference framework for sustainability. They argue that key competencies serve as a foundation for developing future change agents and for transparently evaluating student learning and teaching effectiveness in relation to sustainable development. An updated version of the framework consists of six key competencies for sustainability: systems thinking competence, futures thinking/ anticipatory competence, values thinking/ normative competence, strategic thinking/ action-oriented competence, collaboration/ interpersonal competence and problem-solving competence (Wiek et al., 2011; Wiek et al., 2015).

Rieckmann (2018) means their work successfully unites concepts within the field and thereby supports the discussion on competencies needed for the future but also highlights other research contributions and presents an alternative list of competencies, arguing international discourse on ESD generally agrees on them to be “of particular importance for thinking and acting in favor of sustainable development” (2018, p. 45). This list consists of eight competencies, previously introduced by Rieckmann in UNESCO (2017), as presented in Table 1. These competencies have not been central in formal education traditionally, but are suggested as vital

for the capacity to deal with complex challenges (Rieckmann, 2018). While Wiek et al. (2011; 2015) directly target the academic sphere, this framework is directed towards a wider group of learners beyond formal education, including actors across society at large.

Any choice of particular framework implies a limitation, but the competencies chosen to guide this study are the ones proposed by UNESCO intending for better consensus in the field, as a response to research ambiguity (Contreras-Arámbula & Sánchez-Cano, 2024; UNESCO, 2017). Since these competencies form part of a central policy document for the implementation of ESD (UNESCO, 2017), it is highly relevant to examine its applicability in a practical setting in order to explore its usefulness and relevance in a real-world context, especially as this does not appear to have been done beyond formal, in-school education settings in Sweden.

Table 1

Key sustainability competencies.

Competence	Definition
Systems thinking competency	The ability to recognize and understand relationships, to analyse complex systems, to perceive the ways in which systems are embedded within different domains and different scales, and to deal with uncertainty.
Anticipatory competency	The ability to understand and evaluate multiple futures – possible, probable and desirable – and to create one's own visions for the future, to apply the precautionary principle, to assess the consequences of actions, and to deal with risks and changes.
Normative competency	The ability to understand and reflect on the norms and values that underlie one's actions and to negotiate sustainability values, principles, goals and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions.
Strategic competency	The ability to collectively develop and implement innovative actions that further sustainability at the local level and further afield.

Collaboration competency	The ability to learn from others; understand and respect the needs, perspectives and actions of others (empathy); understand, relate to and be sensitive to others (empathic leadership), deal with conflicts in a group; and facilitate collaborative and participatory problem-solving.
Critical thinking competency	The ability to question norms, practices and opinions; reflect on one's own values, perceptions and actions; and take a position in the sustainability discourse.
Self-awareness competency	The ability to reflect on one's own role in the local community and (global) society, continually evaluate and further motivate one's actions, and deal with one's feelings and desires.
Integrated problem-solving competency	The overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive and equitable solution that promote sustainable development – integrating the above-mentioned competencies.

Note. Reproduced from Education for Sustainable Development Goals: Learning Objectives, by UNESCO, 2017, p. 10, and Competencies for Education for Sustainable Development, by M. Rieckmann, 2018, pp. 44–45. Copyright 2017 and 2018 by UNESCO.

According to UNESCO, these competencies are cross-cutting and relevant to all SDGs, they are to be understood as "transversal, multifunctional and context-independent". Moreover they are seen as crucial in advancing the SDGs and are "necessary for all learners of all ages worldwide" (UNESCO, 2017, p. 10). It is important to highlight that the development of these competencies does not in itself imply action for sustainability. They play a crucial role in interaction with values and motivation, as well as opportunities, which together can influence sustainable behavior (Rieckmann, 2018).

Another point worth highlighting is the simplicity and brevity of how these competencies are defined, where some might even be defined differently by others. Senge's widely cited definition of systems thinking for instance, being a conceptual framework in itself, that beyond "seeing wholes" also emphasizes "seeing patterns of change" and doing all of this over time rather than in a static situation (Senge, 1990, as cited in Randle & Stroink, 2018). Randle and

Stroink (2018) further account for systems thinking being used within multiple disciplines, with varying definitions. This illustrates how interpretations of the same concepts can vary in complexity and depth. UNESCO's definitions may be deliberately designed for accessibility, though some scholars might argue that it lacks sufficient conceptual elaboration. In this study, the selected frameworks' definitions are adopted intentionally, as a means of testing their applicability in a new, practice-based context. This choice reflects the broader aim to contribute research that is grounded in societal realities and practical use, rather than solely in academic theorization.

Plenty of researchers have drawn on UNESCO (2017) and Rieckmann (2018) since. A common factor, however, is using the framework in research focusing on different levels of education, or teacher education (e.g. Bertolini et al., 2024; García-Fortes et al., 2024; Günther et al., 2024). There is also research applying the idea of key competencies for sustainability to the professional sphere, such as Contreras-Arámbula and Sánchez-Cano (2024) investigating how competencies acquired by employers of legal workers in Mexico align with sustainability competencies. They find a general preference towards what they call technical skills, and conclude with a cautious recommendation for employers to consider desired behaviors in job applicants, emphasizing that competencies, including sustainable ones, should be measured through behavior rather than results. Another example is Muhonen et al. (2024), who connect ESD competencies to organizational human resource development as an important aspect of sustainable transition, although referring to resource development for personnel in higher education institutions particularly.

To the author's knowledge, the sustainability competence framework has not yet been applied to a professional collaboration network in Sweden. It is thereby relevant to test the framework in this context, as ESD builds on the principle of lifelong learning taking place in various contexts rather than being limited to in-school learning. This also becomes an exploration of unintended and informal learning, as suggested to have potential by Singer-Brodowski, who writes: "One of the main benefits transformative learning theory can offer for catalyzing and accelerating sustainability transformations is to view multiple spaces of communication and dialog about sustainability transformations as potential learning environments" (Singer-Brodowski, 2023, p. 14). That said, all collaboration contexts could be of interest to study. As

civil preparedness and regional development collaborations are current examples of collaboration contexts in Sweden where cross-sectoral involvement is emphasized, being clearly connected to Agenda 2030 and without focusing on competence development explicitly, they will serve as the initial focus for this research.

Futures Literacy

The Swedish innovation agency Vinnova, presents an additional framework specifically directed to a Swedish context in their rapport *Strategic Foresight for Innovation: International Insights to Address Sweden's Future Challenges* (Vinnova, 2024). To address future challenges effectively, organizations and decision-makers must strengthen their capacity for foresight, also referred to as futures literacy. The report suggests that societal preparedness in Sweden depends on actors investing in "skill development, interactive foresight processes, and purposeful strategic initiatives", and that proactively using foresight to plan will help develop strategies to prepare for uncertainties, across all sectors (Vinnova, 2024, p. 5).

According to Miller (2018), futures literacy is a concept used to define the understanding of anticipatory systems and processes. It is based on extensive research conducted in collaboration with various partners to explore how anticipation is applied globally in both theory and practice. Futures literacy serves as a tool to enhance individuals' and organizations' ability to imagine, prepare for, and shape possible futures by developing a deeper awareness of how the future is anticipated and used in decision-making (Miller, 2018). Drawing on the earlier mentioned new ways of thinking, called for by O'Brien et al. (2010) and Sterling (2013), futures literacy could be viewed as a concretization of what these new ways of thinking could look like in practice.

In alignment with UNESCO, Vinnova (2024) asserts individuals and organizations can boost their capacity for innovation, enhance preparedness for change, and devise adaptive solutions in dynamic environments, by becoming future literate. Developing futures literacy in society, involves embedding foresight practices into policymaking, education systems, and mechanisms for ongoing future analysis. Three interconnected ways of thinking central to this approach are presented: future thinking, systems thinking, and exponential thinking. The three ways of thinking represent the ability to embrace uncertainty and imagine alternative futures, see an

interconnected system rather than separate parts, and comprehend small trends could become impactful very quickly. Together, these form the foundation of what can be called futures literacy skills (Vinnova, 2024).

These ways of thinking overlap well with some of the key competencies for sustainability proposed by both Wiek et al. (2011; 2015) and Rieckmann (2018) within the field of ESD. Since they are specifically targeting the Swedish context that this study investigates, while directed towards potential unintended learning platforms (Singer-Brodowski, 2023) in its focus on businesses and organizations, they will be included as overlapping/complementary competencies within the theoretical framework of the study.

Table 2

Three types of thinking that help us understand and prepare for the complex challenges of the future.

Competence	Definition
System thinking competency	The ability to see the whole by understanding how interconnected parts influence each other, revealing patterns and relationships within a system rather than isolating individual parts.
Future thinking competency	The ability to embrace uncertainty and to explore and imagine alternative futures.
Exponential thinking competency	The ability to fully comprehend that something that is very marginal and or small today could become very prominent and impactful very quickly.

Note. Reproduced from *Strategic Foresight for Innovation: International Insights to Address Sweden's Future Challenges* (p. 12), by Vinnova, 2024. Copyright 2024 by Vinnova.

While the UNESCO (2017) sustainability competencies and Vinnova's (2024) futures literacy frameworks offer a valuable structure for analyzing learning in cross-sector collaborations, they

also present certain limitations. As briefly mentioned above, the frameworks are broad and relatively abstract, which can make it challenging to apply them consistently across diverse professional contexts. Some competencies, such as systems thinking, are defined in ways that differ across disciplines, potentially leading to varied interpretations. Additionally, as normative frameworks, they presuppose that the identified competencies are inherently beneficial and desirable, which may overlook context-specific needs or power dynamics within collaborations. Finally, the frameworks in themselves emphasize learning outcomes but do not directly address conditions that enable or constrain such learning. However, the conditions that provide relevant experiences for the development of these competencies are precisely what the present study seeks to further explore.

Director-General of UNESCO Audrey Azoulay's words on the importance of futures literacy will serve as the concluding remarks: "Evidence shows that people can change how and why they think about the future. Developing this capacity to imagine can be a powerful tool for catalyzing change today. Becoming more skilled at designing the systems and processes used to imagine tomorrow is an essential part of empowering women and men with the 'capacity to be free', as developed by Martha Nussbaum and Amartya Sen, to craft new approaches to more inclusive and sustainable development" (Miller, 2018, p. xxi).

Methodology

This section discusses the methodological approach chosen for the study. It outlines the research design and process, followed by considerations of research ethics and reflections on research quality. The section seeks to ensure transparency regarding methodological choices and acknowledge the study's limitations.

Research Design

Exploring CSCs through an ESD lens, this research seeks to gain in-depth insights into participants' perceptions of learning and potential development of future competence. A qualitative research design was selected to facilitate the analysis of meanings and interpretations, and to identify patterns in participants' lived experiences. As described in

greater detail below, the study follows a deductive approach tightly anchored in theory, striving to contribute with practical implications in the specific context of CSCs.

In line with Bryman (2016), semi-structured interviews were chosen as they are particularly suitable for research questions that seek to uncover detailed understandings of individuals' perspectives. Moreover, as Knott et al. (2022) propose, interviews are a method particularly appropriate for profound insight into individuals' experiences. This approach further allows for consistency across interviews while retaining the flexibility to explore emerging themes in greater depth.

The study primarily focuses on the region of Västra Götaland to generate locally grounded data reflective of the participants' unique cultural and contextual experiences (Knott et al., 2022). However, due to challenges in recruiting a sufficient number of participants within the limited timeframe, the sample was extended. Two interviewees from a national network plus two participants recruited for general experience from collaborating across sectors rather than a specific network, were also included. This expansion was partly a pragmatic solution, but also a result of snowball sampling, which led to the inclusion of participants with related, though not identical, experiences to those the study initially intended to explore. Moreover, the research initially intended to be more focused on preparedness networks in particular. However, as the snowball sample also led to individuals with experiences from regional development collaboration, these were also interviewed and similarity in experiences with preparedness networks resulted in broadening of the scope. Interviews were in summary held with people working in either the public or private sector with experience from CSC for civil preparedness or regional development, which drawing on Agenda 2030 could all be categorized as CSCs with connection to the SDGs and resilience building.

Wexsus Thesis Project

This master thesis was written as a part of a pilot project organized by Wexsus, a collaborative arena for sustainable development launched by Chalmers University of Technology, the University of Gothenburg and University West (Wexsus, 2024). The project connects master students from different disciplines interested in sustainability to societal actors in West Sweden, and are presented to their challenges or areas of interest. The study hence took its starting point

in a thesis case presented by the County Administrative Board of Västra Götaland, centered around the overarching theme of civil preparedness and resilience, which inspired the theme of this thesis. A very valuable asset for the research process has thereafter been a contact person at the County Administrative Board of Västra Götaland, who assisted in establishing the initial connections with interview participants.

Data Collection

Semi-structured interviews have in this research been conducted with 11 professionals. The interviews were conducted remotely using Google Meet or Microsoft Teams depending on participant preferences, except for one interview which was held in person as it was suggested by the interviewee and the geographical opportunity was available. Interview duration varied between 32 and 50 minutes and followed an interview outline based on recommendations from Knott et al. (2022). Four sections structured the conversations: form (creating contextual understanding), content (specifying *how* involved actors collaborate), learning (exploring perceptions of learning and usefulness for the individual), and futures literacy (asking participants to reflect on aspects of the concept). The full interview guide can be found in Appendix 2.

The interview guide included open-ended questions within each section, based on the research questions, drawing on the theoretical framework and taking inspiration from closely related studies (Berlin & Carlström, 2015; Nikkanen et al.,2024). The last section built on more direct questions regarding the three ways of thinking for futures literacy according to Vinnova (2024). Interviewees were in this section introduced to the three definitions and asked to reflect on the use of them within their experienced collaboration context and whether they got to practice these ways of thinking in the collaboration. This was done as interviews that encourage participants to bridge theoretical concepts with their practical experiences have a critical advantage for applied research according to Knott et al. (2022). In the context of this study, understanding what factors could contribute to futures literacy development benefits from participants' firsthand accounts on the concepts. These narratives reveal if and how individuals and organizations integrate them into their practices, offering rich insights into the real-world application of theoretical frameworks. Sustainability competencies as according to UNESCO

(2017) were not explicitly presented to interviewees, instead they were asked questions about what they perceived they have learned, and material was then interpreted using the sustainability competencies as a framework, as further accounted for below.

The interview guide allowed for flexibility to best suit each interaction (Knott et al., 2022), the concepts of future thinking, exponential thinking and systems thinking were however always introduced last to not risk influencing participants own reflections on learning with theory. Interviews were concluded with an ending question which allowed participants the opportunity to contribute additional reflections, should they wish to do so.

Participants were selected using purposive sampling, initially through criterion sampling (Bryman, 2016). With help from the previously mentioned gatekeeper at the regional County Administrative Board, initial contact was established with active members of cross-sector networks relevant to the study's focus. As Knott et al. (2022) highlights, this approach allows for rich insights from a smaller group of participants. Subsequently, snowball sampling was employed to identify additional participants with related experiences, mainly asking for other members in their collaborative networks representing another organization (Bryman, 2016). Due to difficulties with recruiting participants from the private sector within the limited timeframe, a national preparedness network found through public information sources was further approached following the purposive sampling strategy. This resulted in two interviewees with national collaboration experience which diverges somewhat from the local focus. The snowball sampling process also led to the inclusion of four participants involved in collaborations more oriented toward sustainable regional development rather than civil preparedness. However, as these individuals held similar roles, and the networks still represented a CSC context with potential to function as platforms for unintentional learning, they were included in the study. This slightly broader scope was also viewed as an opportunity to potentially identify differences or similarities between the somewhat distinct types of networks. In summary, the inclusion criteria were individuals who, in their professional roles, participate in cross-sector collaborations related to preparedness or regional development. Exclusion criteria were people working with preparedness or regional development without having CSC experiences.

As a result, among the eleven participants nine of them took part in five different preparedness or regional sustainable development networks. Four particular networks were represented from two different perspectives from involved actors representing different organizations. Two interview participants drew on more general collaborations experiences throughout their career. Most interviewees are public sector employees in Västra Götaland with different professional titles either at the County Administrative Board or at the region, one is a public sector employee in a different region, three are employees at private organizations and one is a rescue service professional. To illustrate the diversity of professional roles represented in the study, participants held positions ranging from development strategist and climate coordinator to emergency preparedness officer and asset manager. The majority of these roles can be characterized as operating at a strategic rather than an operational level within their respective organizations. Among the private sector participants, two represented companies in the energy sector, while one was in the food industry.

The ambition was a variety of experiences within the same sort of contexts, which was partly met. Still, the final sample is limited in several respects. First, ten out of eleven participants in the study are men, which is important to acknowledge as it may influence the perspectives represented in the data. Moreover, the public sector is overrepresented compared to the private sector. Both factors are the result of a combination of who agreed to participate in the study and whom existing participants referred through the snowball sampling process. In addition to this, the sampling strategy in itself presents limitations, as it is unlikely to provide a representative group of participants (Bryman, 2016). Recruiting through individuals' professional networks carries the risk of engaging with like-minded people who share similar experiences and perspectives. Despite this, regarding professional profiles, a diversity of backgrounds, roles, and initial viewpoints has been achieved within the relatively small sample, and this was specifically asked for when participants were asked to refer to an additional participant. Still, snowball sampling, as any choice of sampling, will affect the perspectives represented in the results.

Interviews were recorded and transcribed. Transcriptions were first obtained with help from an AI tool called Klang.ai and then revised and adjusted manually. When revising the material, the data analysis began with taking notes of first impressions and then continued in a more structured manner as described in the following section.

Data Analysis

A qualitative content analysis was conducted on the material, using a directed approach where initial codes were guided by theory on key sustainability competencies (Hsieh & Shannon, 2005). As Hsieh and Shannon (2005) explain, the qualitative content analysis examines language as communication, emphasizing both the content and the contextual meaning within the text. Through subjective interpretation, similar meanings are identified, and the material can be classified into different codes that represent patterns, thereby providing an understanding of a phenomenon. In this case, codes based on sustainability competencies according to UNESCO (2017) were initially used, an approach suitable when there is an existing theory undertaken to validate or develop. The directed approach is chosen as the study intends to apply the competency framework in a new context. This results in a structured and deductive research process drawing on predetermined categories derived from theory, as seen in Table 1.

The futures literacy concept presented by Vinnova (2024) was used as an overlapping framework, and the three ways of thinking presented in Table 2 were also considered in the analysis. These were however seen as components within the sustainability competencies they matched into respectively. When interviewees were asked directly about these ways of thinking, their answers were categorized into the sustainability competence categories accordingly. Examples of systems thinking referring to the Vinnova (2024) framework, were coded as systems thinking competency in the UNESCO (2017) framework as well. Examples of exponential and future thinking were coded as anticipatory competency.

A computer-aided coding process was conducted using Nvivo. The process involved categorizing the data according to the existing codes as well as identifying text that did not fit within these codes in order to analyze and potentially develop new codes or subcategories, in accordance with a strategy proposed by Hsieh and Shannon (2005). Eight initial codes

representing the eight sustainability competencies presented in the theoretical framework were used, and were then complemented with one code for context, one for collaboration improvement suggestions and one for an additional competence identified during the process. As all competencies and ways of thought are interrelated, parts of the material could fit in more than one category. In this study it was however decided to code material into one main competence respectively. The results are presented through a selection of quotes, all of which have been translated from Swedish to English.

Ethical Considerations

This study adopts the principle of informed consent as according to Bryman (2016), ensuring that participants are fully aware of the study's purpose, their role in the research, the duration of their involvement, and the voluntary nature of their participation. Informed consent was obtained using a form following the university guidelines, in which participants were explicitly informed that they can withdraw at any time without any consequences and were provided with clear details on how their data will be managed, stored, and utilized. Before each interview consent was also ensured for recording (Knott et al., 2022).

As Knott et al. (2022) suggest, potential harm resulting from the research must be carefully considered and minimized. As the study collects minimal personal data and focuses primarily on participants' professional experiences and perspectives, the risk of direct harm is considered to be low. This was also reflected upon during the course of the interviews, as none of the questions appeared to be received negatively or made participants uncomfortable, according to the interviewer.

Knott et al. (2022) argue the mere dynamic of interviews imply ethical challenges, as the conversation is driven by the researcher and held with an objective. By addressing power relations between researcher and participant, the intention is to create a democratic space for discussion, as emphasized by Amundsen and Msoroka (2021). A space that promotes mutual learning and reciprocity, enabling actionable insights that benefit both the researcher and participants in their professional roles. The approach not only supports learning but also encourages participants to critically reflect on their roles, aligning with the participatory and inclusive principles highlighted by Tikly and Bond (2013). These perspectives were taken into

consideration, and by aligning the qualitative interviews with a participatory approach it aspires to create a collaborative space for reflection in the interviews. This dynamic is suggested to allow both the researcher and the participant to engage in meaningful dialogue, potentially leading to new insights that emerge during the conversation (Bryman, 2016; Tikly & Bond, 2013).

Moreover, the local context presents challenges in guaranteeing complete anonymity. To safeguard participants' privacy, every effort is made to prevent any breaches of confidentiality. Identifying details such as interviewees names have been excluded, and descriptions of organizations and networks are used instead of names to maintain discretion. Still, it cannot be entirely ruled out that someone determined could identify which networks are being discussed. The County Administrative Board is explicitly mentioned as of great relevance to the study, and thereby it is also revealed that some participants are employees. However, it is a large organization. Moreover, a careful assessment was made concluding that no confidential information about either the individuals or the networks are disclosed in the study.

Research Quality and Limitations

Reliability and validity are established concepts for assessing research quality. Some argue them to be better suited for quantitative research as they could be defined as connected to measurement (Alvehus, 2023; Bryman, 2016). In short, quantitative research is designed for replicability independent of the individual conducting the research, and validity in the sense that the study measures what it purports to measure. Silverman (2009) however, holds these terms are not only a concern for quantitative research, and defines them as follows: Validity refers to truth, and regards the extent to which a study represents what it sets out to. Reliability refers to consistency of categorization, either by different or the same observer, on all relevant occasions. These are definitions that this study strives to fulfill to the greatest extent possible, given the conditions under which the research was conducted.

Qualitative research is further an interpretative process where the researcher has an active role, which Alvehus (2023) describes as a precondition and not a limitation, but it also opens for alternative ways of discussing research quality. Bryman (2016) accounts for trustworthiness as suggested by Guba and Lincoln (1985), including four principles for assessment: credibility,

transferability, dependability and confirmability. With these criteria, they criticize the stance that there is one absolute truth for social research to reveal, proposing the social world is more complex than objective truths.

Credibility refers to the extent that the interpretations presented by the researcher are reliable, and ways to ensure this are for instance by respondent validation or triangulation which briefly enables the researcher to double-check interpretations with participants or other researchers, or to use more than one method to ensure the credibility of results (Bryman, 2016). This was considered not feasible within the limited research process, partly due to the desire not to take up too much of participants' time. However, during the interviews, efforts were made to ensure that any ambiguities were clarified by asking participants to confirm perceptions or elaborate on statements. Furthermore, great emphasis was placed on the systematic and careful execution of the data collection and analysis processes to achieve the highest possible credibility. The coding was conducted twice at different times for optimal results, but by the same author of this study.

Transferability concerns demonstrating the unique characteristics of the phenomenon being studied and providing enough detail for others to assess whether the findings can be applied in other contexts or situations. The study is not designed to produce generalizable results, but rather to provide as comprehensive an understanding as possible. As such, the initial part of the interviews focused on providing descriptions of the context. These contexts are outlined in the study to allow recipients to form their own judgments about the potential applicability of the findings to other settings.

Dependability suggests the whole research process to be well accounted for through every phase in a comprehensible way, and preferably audited through peer revisions of how procedures have been followed. However, this criterion has not gained widespread adoption as a method for validation. Bryman (2016) suggests that this may be due to the demanding nature of the task for those asked to revise the research material. What can still be noted here is that the thesis writing process was carried out in close collaboration with a supervisor, who provided ongoing feedback. Additionally, the previously mentioned Wexsus project has provided another forum

for discussion with other students involved in the same process, who, although not acting as formal reviewers, have contributed valuable insights to the research process overall.

The last criteria proposed by Guba and Lincoln (1985) is confirmability, which should be one factor examined as part of the dependability principle, and refers to ensuring the researcher has acted in good faith and that personal values or preferences have not interfered with the conduct of the study. Evidently, conducting research as an independent investigator presents challenges in recognizing and mitigating personal biases and underscores the (always relevant) importance of transparency. However, these criteria are only one suggestion for assessing qualitative research among others (Bryman, 2016).

In conclusion, every effort has been made to clearly document the research process, allowing readers to form their own assessment of the study's quality through consistent transparency, as highlighted by Knott et al. (2022). By doing so, validity and reliability, as defined by Silverman (2009), are also addressed. Beyond the intention to thoroughly describe the research design and its implementation, this includes the interview questions being provided in the appendix. However, full transcripts and complete coding have been deliberately excluded to protect participant anonymity. Furthermore, in line with recommendations by Knott et al. (2022), reflexivity has been practiced throughout the research process, with ongoing reflection on how positionality, biases, and assumptions may have influenced both the interactions with participants and the interpretation of the data. Additionally, external input on the coding process was kindly provided by the thesis supervisor.

Finally, this study is primarily exploratory and hypothesis-generating in nature. The research design is not intended to produce generalizable results, but rather to examine specific contexts in relation to existing theory and to reflect on the insights that emerge.

Results

In this section, results from the analysis process designed to identify competencies enhanced through participation in CSCs, are presented. Guided by UNESCO's (2017) framework of eight key competencies considered critical for addressing future challenges, the interview material was coded into categories by finding alignments with the suggested competencies in

participants' experiences. Findings suggest that all participants experienced development of relevant skills from their collaboration experiences, with particular emphasis on collaborative, strategic, systems thinking, and anticipatory competencies. Notably, the latter two closely relate to the types of thinking for futures literacy as proposed by Vinnova (2024), indicating that participants have also practiced elements of foresight capacity through their involvement in CSCs. An overview of the full coding structure, including representative quotes with coding motivation, is provided in Table 3. To contextualize the findings, a brief overview of collaboration settings is then presented. This is followed by a thematic account of each identified competency, illustrated with interview excerpts. A potential addition to the framework is presented, and lastly a summary of the results including challenges and improvement suggestions for enhanced learning provided by participants.

Coding Table

Table 3

Coded excerpts within each category and description of meaning interpretation.

Competence	Example (translated)	Description	Number
Systems thinking competency	"But it's quite important, if it's a societal disruption, to also keep other people's perspectives in mind. Because in that way, you not only get the right expectations of each other, but you can also more easily find a common direction. Sometimes it can be that it's very complex legally how to handle an event. And then it requires having a holistic view." – 1.	Describes how gaining perspectives from other actors from collaborating, contributes to a holistic view crucial for handling complex challenges.	26
	"[...] it's quite typical of how this group is, as we meet there, that much of what we do is actually interconnected in the sense that it affects what we do, it affects someone else, who in turn affects a third, and so on [...] it all ties together." – 3.	Implies that collaboration contributes to the participants ability to recognize and understand interrelations with other actors and how they affect each other in a system.	
Anticipatory competency	"You can never predict the future. But an average of everyone's perspectives is often the best. [...] It's extremely important to explore different futures and reflect on them in a group, to	Explains how engaging with external actors predictions of the future and reflect together enables to further collaborate drawing on a compilation	22

	discuss and design forms of collaboration." – 10.	of anticipations which is better than a single one.	
	"[...] partly, I think you get a shared understanding of the problem. That's also something you work on. I mean, what scenarios can we expect? It's something where you share that picture, so you get some form of shared worldview. What do the challenges look like?" – 7.	Describes how potential scenarios are shared in collaboration to gain a better understanding for future challenges.	
Normative competency	"[...] we have made an agreement with, for example, the County Administrative Board regarding this issue now, to regulate the values in a good way so that nature interests are also taken into account, and that's something we are always trying to address to the extent that we can. [...] We have our task [...] at the same time, we try to do it in a way that benefits both the environment and other interests." – 3.	Illustrates a reflection on negotiating sustainability values as a result of collaboration with other actors, in this example the County Administrative Board.	8
	"If you're being kind, you could say that there is security in the public system. Everything takes quite a long time. And it should, in order for us to be sure that the right decisions are made and that they are well-supported when they are finally made. That's not the case in business. There, the pace is entirely different in terms of how quickly they want to see results. [...] It's important for us to adapt, but it's also important for us to explain to them that it might not go as fast as usual." – 5.	Illustrates a reflection on the organizational principles underlying actions, representing an enhanced normative understanding of structural implications.	
Strategic competency	"Then we have expertise in the form of municipal environmental management [...] there, as a rescue service actor, you get some form of decision support. Where should we focus our efforts? What should we prioritize first? If we don't have environmental expertise, we can't do it properly." – 4.	Demonstrates how collaborative engagement with environmental authorities helps the participant make strategic decisions taking more aspects into account.	27
	"That's why we found this middle management level. They're just the right amount involved. They know enough, they're sufficiently into the details to be aware, and still far enough up that they feel they have a mandate to	Describes how the best collaboration form was developed collectively to optimize collaboration leading to actions, exemplifying how strategic planning was improved.	

	compromise. And sometimes give in or find solutions, and also have some internal power to implement them. So I really think they are the key." – 8.		
Collaboration competency	"The understanding of different tasks, that we are governed by different regulations, and that it's something we may not necessarily like or think is good, but we need to understand what is guiding us and also to break it down, concretize, and clarify so that there isn't a situation where we talk past each other and create problems that perhaps don't actually exist." – 9.	Captures how collaboration leads to understanding and respecting other needs, which helps prevent misunderstandings.	52
	"The first thing is, of course, to be attentive and understand their situation and their problems and know what their role is? [...] Something that's very important in these meetings is that if you ask openly and say: Is there anyone who has anything to add? It doesn't work, instead, you have to ask everyone." – 2.	The participant reflects on how collaboration taught them to better foster inclusive dialogue, exemplifying empathic leadership and facilitating understanding of other perspectives and needs.	
Critical thinking competency	"It's not me, [name], who can decide on what we do at the County Administrative Board, I have to anchor one, maybe two steps each time. But that's also something we need to adapt to here. We need to understand that we need to speed up certain decisions that need to be made. So that we don't get dismissed, simply put [...] in business, people want to see results very quickly [...] there are definitely cultural differences that, as an authority, you need to adapt to in this collaboration." – 5.	Reflects how collaboration has led to the critical questioning of own organizations actions and limitations.	14
	" [...] because there, it's easy [...] to stick with it and perhaps handle other people's areas [...] you can be inspired by and remain critical of your own organization. Look a bit at the County Administrative Board and sometimes, quite bluntly, just take a step back. [...] Now let's drop it, because soon there might be a fire at the other end. And if we get stuck on things, we'll be second to the ball if something	Reflects how viewing other organizations ways of working can function as a benchmark and highlight potential shortcomings in one's own methods.	

	else happens." – 4.		
Self-awareness competency	“[...] just as one can think about the other organization and what their tasks are, and when you’re caught in a hamster wheel within your own organization, for example, you become a bit nearsighted. But in conversations with others, you also get an idea of how we are perceived by those sitting on the other side of the table, of course. So it's quite educational to have those eyes on you from an outsider, so to speak." – 9.	Illustrates how collaboration leads to self-awareness by understanding how others perceive you.	15
	"Yes, but it's perhaps that you can always get better, you know. [...] The outside world is also changing with a changing climate and everything that's going on now. So I believe it's a constantly learning process [...] The day you think you are fully trained, well, then you’re misinformed. You never are. There’s always something to tweak and improve." – 3.	Captures the essence of lifelong learning, shows openness to ongoing development and that one’s role and knowledge within that context is not fixed, implies an attitude of self-awareness.	
Integrated problem-solving competency	“But there was also operational collaboration between authorities and the industry, as well as between the municipality and the County Administrative Board. Sweden managed to be declared free from swine fever in record time compared to all other countries in the EU thanks to that collaboration. [...] it shows that if the authorities are prepared to help, be pragmatic, understand the situation, and have a dialogue with those who may be affected, then problems can be solved.” – 6.	Demonstrates a practical example of integrated problem-solving navigating several concerns simultaneously and reflects on learnings from that collaboration.	2

Cross-Sector Collaboration Contexts

Among the eleven participants of this study, nine of them represent five different collaborative contexts, and two represent more general experiences from collaborating with other sectors. Understanding the diversity of contexts strengthens the study’s insight into how learning experiences may vary, or not vary, across collaboration forms. What they all have in common are a variety of actors from different organizations with more than one sector being involved,

and a mutual purpose underlying the collaboration. Other than that, frequency and ways of working together differs. Some collaborations are described as mainly information sharing and others more as collective exercises or collaborative problem-solving, as exemplified below.

> "[…] where we together recognize the need to work more closely, maintain more frequent contact, and collaborate in order to meet the challenges that come with the electrification of society and the need for increased grid capacity […] This could involve mapping out different needs and ensuring that we have a shared understanding of needs to work from." – Participant 9.

Further, private actors are in some interviews only briefly mentioned initially, in others they are described as crucial collaborative partners. Participant 1 describes private actors as external actors only occasionally invited, while participant 5 means collaboration with companies is about understanding what is important for them to be able to continue conducting their business and sharing knowledge on working with preparedness measures with them. The main point in this conversation, was that as the private sector operating is crucial in a crisis, it is just as important to include them in strengthening preparedness.

Although a range of different collaboration contexts are represented in the material, several similar patterns in experiences from participating emerged during the interviews. This is explored further in the following section covering the sustainability competence framework.

Sustainability Competencies in Cross-Sector Collaborations

Systems Thinking Competency

Systems thinking competency represents "the ability to recognize and understand relationships, to analyze complex systems, to perceive the ways in which systems are embedded within different domains and different scales, and to deal with uncertainty" (UNESCO, 2017, p. 10). Or as Vinnova (2024, p.12) defines it: "The ability to see the whole by understanding how interconnected parts influence each other, revealing patterns and relationships within a system rather than isolating individual parts". Eight of the participants in the study spoke of how their collaboration experiences led them to be able to see and consider plural perspectives

simultaneously, or described an improved understanding of how parts influence each other. Material of this character was coded as systems thinking. In the example below, it is explained how all perspectives are necessary for reaching a way forward. In the analysis, this has been interpreted as an increased understanding for the importance of recognizing the different parts and their interconnection to deal with uncertainty, here being the "large transformation".

> "And of course, such large transformations require that all perspectives are included in a relatively short time and that everyone is expected to be pragmatic so that we reach a good way forward. […] if you don't take in others' perspectives, you probably won't be able to be part of the transition in any way. Because it really is about negotiating what is best for everyone." – Participant 10.

Expressions for an increased understanding of the relationships of different parts, and how they affect each other within a system, were also common reflections. Interviewee 3 for example described how collaborating with other actors reveal that things are "often more complex than you might think at first glance" (participant 3). In this case, the interviewee explained how the collaboration has implied better understanding for the complexity of issues, saying this was the most important lesson from collaborating. Participant 4 in a similar manner described networks as crucial for holistic thinking, and further argued it improves decision making by enabling to consider the whole system. These are good examples of material coded as systems thinking, where seeing "the whole", and the advantage or the need for doing so, is connected to the collaboration context and experience.

Moreover, worth mentioning is that when asked to reflect on systems thinking as defined by Vinnova (2024), two participants (6 and 10) lifted critical points of view regarding the concept and its occurrence. Both of them were among the three private sector employees. Participant 10 however still believed CSCs improved this capacity and participant 6 agreed collaborations contribute to the ability to make informed decisions, while saying the belief that one person can see the whole picture is an "illusion" (participant 10). Still, a majority expressed systems thinking as a part of their collaboration experiences, both before and after being introduced to the concept, although often in other words.

Anticipatory Competency

Anticipatory competency represents "the ability to understand and evaluate multiple futures – possible, probable and desirable – and to create one's own visions for the future, to apply the precautionary principle, to assess the consequences of actions, and to deal with risks and changes" (UNESCO, 2017, p.10). Within this competency the analysis has also integrated future thinking and exponential thinking as according to Vinnova (2024, p.12), as being two more concrete examples of anticipatory competency. Material interpreted as participants gaining new understandings regarding future scenarios in collaboration, and considering those scenarios within own ways of working, were coded as anticipatory competency. This is exemplified in the following excerpt from interview 1.

> "Those who have experience in an area can often tell you that this is our assessment of how this is going to unfold. And you might not have had any reasonable expectation of that if you hadn't been through this situation before. By working together in a group, both during actual events and in the preparatory phase, like in these meetings, the actors who have a good grasp of an area get to share how a situation is expected to develop [...] This makes your situational awareness more accurate in that way." – Participant 1.

This example shows how gaining insight into others' expectations on a development can improve one's own situational awareness, providing new ideas on possible and probable futures. Further, as seen in Table 3, some participants explained how sharing perspectives and scenarios with each other is a strategic way to form a common view of issues or challenges, which was also interpreted as evaluating possible futures to create visions. Moreover, participants were directly asked to reflect on future thinking and exponential thinking. Reflections differed, where some were more familiar with the concepts than others. Overall, it still reinforced the impression that multiple collaborative contexts provide opportunities to improve anticipatory competence, and some participants who had not done so earlier in the interview described how they collectively envision different scenarios to find solutions. The solution-oriented way of working that was expressed in some interviews, is also an example of

how one not only practices imagining possible or probable futures but also desirable ones, and finds ways to deal with future challenges in collaboration.

Normative Competency

Normative competency represents "the ability to understand and reflect on the norms and values that underlie one's actions and to negotiate sustainability values, principles, goals and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions" (UNESCO, 2017, p. 10). Signs that the collaboration would lead to this competence were less frequent in the material, still, examples did emerge. Material coded under this competence first hand reflected expressions that the collaboration has led to trade-offs between different values or understanding for such trade-offs. This is exemplified below.

> "There are a few different interests involved, that's what makes oil spill incidents complicated [...] For one thing, there are boundaries between municipalities, and there can be conflicting objectives as well [...] The oil has to go somewhere, and it can be directed to places where it will do the least harm. That might be in one municipality or another, and then you have to try to prioritize in some way. There can be differing opinions on how the oil should be handled. But I would still say that everyone ultimately wants the same thing, to prevent environmental damage above all. But then, of course, there are other interests too, like the tourism industry [...]" – Participant 6.

Further, expressions for an increased understanding of how underlying principles tied to either a private or public organizational form results in a certain type of behavior was also coded as normative competency. The competency was thereby interpreted to fit practical application in this particular context, as the original definition does not mention organizational values. Worth mentioning is the similarity to understanding other perspectives as within collaboration competency, a distinction has therefore been made between expressions of improved understanding and respect for others perspective, and, as in this case, expressions of understanding regarding structural differences that may be considered "normative". For example, how the structural setup of different organizations leads to different actions, for example in terms of decision-making.

Strategic Competency

Strategic competency represents "the ability to collectively develop and implement innovative actions that further sustainability at the local level and further afield" (UNESCO, 2017, p. 10). Accounts for collaboration exercises designed for joint problem-solving where among the quotes coded as strategic competency, as they described collectively developing innovative solutions with many actors represented. This was interpreted as situations where participants get the opportunity to practice strategic competence, as in this example, which was appreciated by the participant calling it "useful".

> "Then [name] threw up a challenge on the board: This is the starting point, what do you do? The groups were, in turn, mixed with different areas of expertise, from different organizations, so that they could practice solving a problem together. A fictional event. Really useful." – Participant 4.

Some participants further described how they often share examples of good practice within the group. This type of material expressed a willingness to share solutions, methods, or insights among actors, and was coded as strategic competency because it contributes to the collective development of actionable strategies. Learning from previous actions within the group was also coded as strategic competency, as this implies collectively refining their capacity to act more effectively in future situations. This reflects not only the implementation of past knowledge, but also a strategic learning loop where actors refine future responses together. Lastly, expressions for the need to have shared understanding in order to act effectively together were coded as strategic competency, as an example of coordinating action. To differentiate from closely related codes: expressions indicating a broader understanding of the whole and interrelations were coded as systems thinking, whereas expressions that emphasized the need for a common ground in order to move forward collectively were coded as strategic competency.

Collaboration Competency

Collaboration competency represents "the ability to learn from others; understand and respect the needs, perspectives and actions of others (empathy); understand, relate to and be sensitive to others (empathic leadership), deal with conflicts in a group; and facilitate collaborative and

participatory problem-solving" (UNESCO, 2017, p. 10). This resulted in the largest category in number of codes, and all 11 interviewees expressed some sort of collaboration competence development from participating in cross-sector collaborations. When asked about most important learnings or what skills they get to practice in their respective contexts, several answers were related to the understanding for other organizational needs or perspectives, or listening and being sensitive to other needs. These were recurring themes that emerged throughout the interviews, especially the understanding for each other, a good example of this being the excerpt below.

> "And we may not fully see what shapes the daily work and priorities of municipalities, regions, or county administrative boards. In a way, we need to approach and understand one another. These kinds of collaboration forums are really important for gaining exposure to each other's realities. And by taking part in such forums, you learn how others reason and how they think." – Participant 10.

Expressions for learning from others within the experienced contexts were also coded as collaboration competency, in accordance with "the ability to learn from others" as cited above. Several participants expressed the collaboration contexts implied learning new things or increasing knowledge. There were also examples of how participants practiced organization in the group, to facilitate collaboration. This sort of material, illustrating how collaboration was collectively being optimized, was also coded as collaborative competency.

Critical Thinking Competency

Critical thinking competency represents "the ability to question norms, practices and opinions; reflect on one's own values, perceptions and actions; and take a position in the sustainability discourse" (UNESCO, 2017, p. 10). Material coded into this category was mainly criticism of either organizational or collaborative practices, that have emerged from participants CSC experiences. Here, the important distinction from normative competence was a critical evaluation or reflection connected to different principles that emerged when getting to know new organizations. For instance, the quote below describes how meeting other practices or focal

areas, as a fast pace or more peoples-focused perspective, can lead to critical reflection on other views.

> "Reality catches up with a company very quickly. That's why it's refreshing to talk to people who run businesses, and get their perspective. Or someone working in social services who sees how people are actually doing. Yes, because what often strikes me is that people talk about things as if they weren't about human beings." – Participant 8.

Another group of quotes coded as critical competency where interviewees reflecting critically on the collaboration context and structural factors being a limitation for taking action, as insights emerging in the collaboration. These thoughts on structural barriers emerged in a few interviews, as in the example below from interview 9.

> "It also becomes clear what the limitations are for a collaboration. Because those do exist as well. As a public authority or as a public organization, you have your area of responsibility, so to speak. And even if you hide behind a collaboration organization or platform, you still can't go too far outside your mandate, so to speak." –Participant 9.

Self-Awareness Competency

Self-awareness competency represents "the ability to reflect on one's own role in the local community and (global) society, continually evaluate and further motivate one's actions, and deal with one's feelings and desires" (UNESCO, 2017, p.10). Coding into this category was characterized by expressions of collaboration leading to reflection on one's own role in relation to others and in relation to society. For instance, examples where understanding others was described as helpful in becoming more aware of oneself, referring to oneself in the organizational role. Further, understanding one does not have all the answers or solutions and must continue learning was also a recurrent idea interpreted as a form of self-awareness, as well as reflections on how new perspectives led to insights regarding own ways of working, being more related to personal characteristics. Below is one example interpreted as an evaluation of own actions in relation to others, thereby coded as self-awareness.

> "[...] that's probably what I've learned about myself and what I've practiced, and what helps in other situations, is that I've somehow lowered the threshold a lot when it comes to asking for help." – Participant 4.

Integrated Problem-Solving Competency

Integrated problem-solving competency represents "the overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive and equitable solution that promote sustainable development – integrating the above-mentioned competencies" (UNESCO, 2017, p.10). The last competency is in other words the ability to integrate all the other competencies. Only one participant provided a clear example of having practiced this competency, referring to two specific situations where dialogue with a regulatory body led to sector-wide solutions. This required navigating legal, logistical, and ethical concerns together, and one of the examples is provided in table 3. The limited amount of material coded under this category is further discussed in the following discussion.

Potential addition: Community Awareness Competency

References from interviews highlight the importance of people knowledge, such as understanding who to contact for specific issues, knowing individuals in different organizations, and fostering personal relationships that facilitate collaboration. These insights emphasize how networking, personal connections, and understanding the dynamics of individuals within organizations contribute to more effective decision-making and problem-solving in complex scenarios. This fits well within the broader description of the sustainability competencies, without having an evident belonging. I thereby suggest an additional competence: *Community Awareness Competency.* This competence could be understood as the ability to build and leverage social networks to enhance problem-solving and collaborative efforts. The community awareness competency focuses on the importance of knowing key people, their roles, and how to navigate diverse stakeholders effectively. It reflects the value of personal relationships in building trust and cooperation across various actors, both within and outside an organization. Community awareness could be seen as a subcategory, but as its tightly interrelated with various of the other competencies it may be most appropriate to view it as a distinct competency, corresponding to a kind of inverse self-awareness competency at the

community level. In Table 4, three example excerpts are presented with descriptions of why they are coded as community awareness.

Table 4

Quotes coded as community awareness competency and description of meaning interpretation.

Competence	Example (translated)	Description	Number
Community awareness competency	"That also created quite a lot of points of contact between different people. It naturally becomes easier to reach out, send an email, or call someone you have met. So that is an obvious advantage of this. That you lower the social barriers." – 6.	Emphasizes how building connections and having established contacts within a network makes communication smoother. By reducing social barriers, the participant highlights how familiarity with key individuals allows for more efficient problem-solving and faster responses in collaborative settings.	10
	"Knowing people is really important. I think all my colleagues would agree with that too. That you know a little bit about who you can ask about what. You know a little bit about what to expect from different authorities and different people. It's really important." – 1.	Illustrates the importance of knowing people within different organizations. Having a solid understanding of who to approach for specific issues helps navigate challenges more effectively. Community awareness enables the participant to anticipate how individuals and organizations will respond, facilitating smoother and more informed interactions.	
	"But in so many situations, collaboration is absolutely essential very early on, and finding that is incredibly time-saving if you get it right there. You make the right contacts early on then." – 4.	Highlights the critical role of early collaboration and forming the right contacts from the outset. Recognizing the value of early community engagement saves valuable time and enhances the ability to tackle challenges efficiently, underscoring how community awareness contributes to more timely and effective action.	

Summary

The analysis was conducted through carefully revising all material looking for whether what participants perceived they learned aligned with competencies considered as important for the future. Results show that among the 11 participants, all highlighted that they had learnt or improved at things that can be connected to one or more of the eight competencies. As seen in Figure 2, four competencies were most prominent; strategic competency; systems thinking competency; anticipatory competency and collaboration competency.

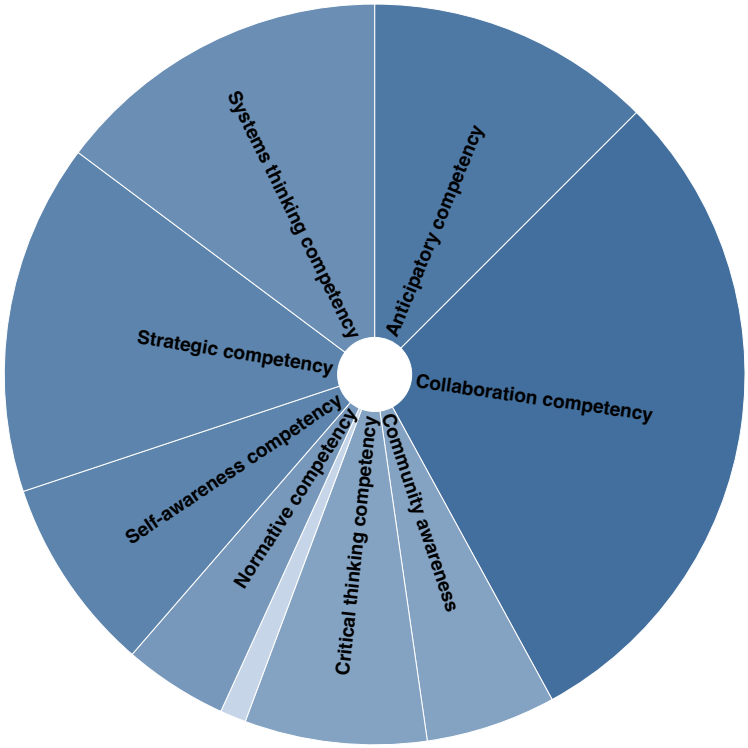

Figure 2. *Pie chart of coding results retrieved from Nvivo, sized by coding references and colored by items coded. Larger sections mean larger amount of coding and darker sections mean larger amount of participants represented in the coding. One section is untitled due to the small size, it represents interrelated problem-solving competency.*

Figure 2 also visualizes that other competencies, such as critical and normative, were less prominent. This could reflect what sort of dialogue and knowledge exchange that occurs within the studied contexts, where more conversational space might be directed toward covering different viewpoints on an issue than critically reviewing those viewpoints. Still, there are examples of experiences fitting into those competencies as well. Even a potential additional

competency appeared in the material. While limited in scope, clear examples emerged that were categorized as community awareness, as they did not evidently fit within the existing competency framework. The discussion elaborates more on potential explanations for the differing levels of presence among the competencies.

Participants were encouraged to reflect on challenges or limitations during the course of the interviews, and were asked how they believe learning can be improved in their given context. One recurring reflection was difficulties with prioritizing, either on an organizational level where other areas are prioritized, or on an individual level where, as one participant expressed it, everyone has other tasks, and few have the time or energy to be really engaged in the collaboration. At the same time, several participants described their collaboration experiences in a very positive manner and expressed strong belief for this way of working. This was interpreted as an enthusiasm for the multi-actor collaboration forms, and in some cases a sort of pride for participating in them. Other challenges that emerged where occasional difficulties in aligning working methods, knowing when to collaborate and when not to, and involving civil society or private actors. Regarding involvement of actors, it further became clear that although referring to their respective context as a cross-sector collaboration, few of the examples presented a large breadth of actors. Some experiences referred to by public sector employees described collaborations between governmental and regional actors, with private actor involvement being vague or lacking. Civil society appeared to be absent in all contexts, based on participants accounts for actors involved in their given context. Suggestions for improvement mentioned by participants where exercising more together (in the more preparedness related networks), improving knowledge integration, being more future-orientated and better mixing up actors involved to not risk getting stuck in fixed roles. Some participants also referred back to the foresight capacity concept presented and suggested it might be a good idea to explicitly incorporate the three ways of thinking.

Discussion

The result of this study suggests CSCs, by being spaces of dialogue and sharing of different perspectives, present an opportunity for participants to develop competencies identified as crucial for contributing to sustainable development and societal preparedness. This aligns with previous research saying CSCs are potential platforms for learning and contributes with new knowledge on *what* is actually learned in terms of specific competencies. Beyond adding value to the CSCs, these results give an example of how education for sustainable development could be accelerated in society, by highlighting new contexts for learning. A new competence appears in some of the interviews, suggesting skills beyond the current frameworks are perceived to be important and useful take outs from CSCs in practice.

In this section, these research results are further discussed. First in relation to the research question and the theoretical framework and then in relation to theoretical and practical implications. After that, limitations are accounted for followed by suggestions for future research.

Answering the Research Question

This study set out to explore whether and how CSCs in the context of Swedish preparedness and regional development, contribute to the development of sustainability competencies. To do so, the study initially asked: *In what ways do cross-sector collaborations contribute to sustainability-related competencies, and which specific skills are enhanced?* Drawing on frameworks from UNESCO (2017) and Vinnova (2024), the findings suggest that the studied collaboration contexts do function as informal learning environments where participants perceive the development of capacities aligning with what has previously been identified as key competencies for the future. This was mainly described as an effect of being introduced to new perspectives, getting to know other organizations and their ways of working, and gaining a more holistic view of interrelated parts when incorporating others' knowledge and points of view. The answer to the question would thereby be that by meeting and collaborating with others, individuals are introduced to new perspectives and experiences that contribute to the development of sustainability-related competencies. Most clearly and frequently observed, was the development of collaboration competency; systems thinking competency; anticipatory

competency; and strategic competency. Among these, systems thinking and anticipatory competency are the ones best aligning with the Vinnova (2024) framework, presenting types of thinking that help us understand and prepare for the complex challenges of the future. This implies the CSCs support development of competencies identified as important for sustainability by UNESCO (2017) and futures literacy as suggested by Vinnova (2024).

The four most frequently observed competencies, again, being collaboration; systems thinking; anticipatory; and strategic, may reflect the nature of the studied collaboration contexts. These settings often focus on preparing for future scenarios, organizing joint action, or aligning practices across sectors, which naturally might foster skills related to collective thinking and forward planning. Some participants expressed a strong future orientation, while others noted a lack of such focus, suggesting that the presence or absence of future-oriented discussions may influence the development of anticipatory competence. Strategic competency appeared most often in situations involving shared problem-solving or dissemination of best practices. Systems thinking, in turn, was enhanced through exposure to new perspectives and organizational logics, helping participants see interdependencies more clearly.

While these findings suggest clear links between CSCs and the development of certain sustainability competencies, others, such as critical thinking or normative competence, were less evident. This may be due to the limited opportunities for explicit critical thinking or value reflection within the studied collaborations. Alternatively, the interview questions and timeframe may have better captured some forms of learning than others. Still, it is reasonable to assume that different types of collaborations support different forms of competence development. For instance, preparedness contexts may emphasize rapid coordination and strategic thinking, while other initiatives might provide more room for critical and normative reflection. Without being able to draw any conclusions regarding what specific collaboration context benefits what competencies, these insights still highlight the importance of designing collaboration processes with attention to facilitating relevant types of learning.

Although differences in frequency, several examples of almost all eight competencies emerged in the material, plus one additional competency being community awareness which was

explicitly highlighted by some participants. There did not appear to be any clear differences in which collaboration context focus or sector the interviewees belonged to in relation to which competencies they perceived to have developed. One exception was that those working with a focus on preparedness provided more concrete examples of anticipatory thinking. Beyond that, differences seemed more related to how the collaboration was organized, such as whether the process effectively highlighted and integrated the perspectives of all participants. There might be individual differences, where other factors affect what experiences are perceived as valuable. One competency that was notably absent in the coding, with only two instances identified, was integrated problem-solving. This may reflect the inherent complexity of this competency, as it involves the integration of all other sustainability competencies, making it particularly difficult to capture in relatively short interviews. However, it can be reasoned that as individuals develop the other competencies, their capacity for integrated problem-solving should also improve.

Transformative learning theory has in this study been presented to include questioning of assumptions, broadening perspectives and developing more inclusive and adaptive worldviews as according to Mezirow (1978;1997) and suggested to align with ESD by Rodríguez and Barth (2020) due to its interdisciplinary approaches, critical reflection, and active engagement. The findings suggest that these aspects are indeed present in the studied contexts, although some more than others. According to the interview material, participation primarily led to broader perspectives and more inclusive worldviews, particularly within interdisciplinary settings and through active engagement. However, what remains unclear is the extent to which questioning of assumptions and critical reflection is actually enabled in these collaborations. If strengthened, these elements could potentially enhance the value of cross-sector collaborations as learning platforms. It is also relevant to reflect on the perspectives represented in these contexts, and in participants experience of more inclusive worldviews, which will be further discussed below.

Theoretical Implications

Previous research has implied that contexts of multiple actors from more than one sector can foster learning. This study contributes by supporting these claims, showcasing perceived learning in the investigated Swedish settings and, maybe most importantly, describe the nature

of that learning. Demonstrating that participants in CSCs highlight they have gained insights and competencies that correlate with future competence needs, contributes with a broadened understanding of the educational potential of CSCs and their role in competence development.

While previous research contributions exhibit a certain vagueness regarding the definition of learning, this study shows that there is more specific sustainability competence development potential in the investigated collaboration contexts, as participants gain relevant experiences through exposure to other perspectives. This aligns with previous literature suggesting new or diverse perspectives can provide learning (e.g., Arya & Salk, 2006; Borell & Eriksson, 2013; Wals & Benavot; 2017) and that learning can occur unintentionally (Arslan, 2020; Henry, 2024; Singer-Brodowski, 2023). It then extends these previous findings by investigating new contexts, Swedish CSCs for preparedness and regional development, and by connecting the learning to theory on sustainability competencies.

The findings reinforce the idea that ESD should not be limited to formal educational institutions, as there is potential in learning platforms beyond that. As UNESCO (2020) emphasizes the role of lifelong learning and non-formal settings, this study provides empirical support for broadening the application of ESD frameworks to professional, cross-sectoral environments, and gives a practical example of what such contexts could look like. Moreover, it presents a suggestion of how current frameworks on future competence can be applied and made relevant in new contexts.

Varela-Losada et al. (2022) calls for further research on transformative learning theory for sustainable development, specifically mentioning skill development as an essential factor. The present study underscores the need for exploring these themes, by suggesting competence development as a potential positive effect from participating in CSCs, emerging through elements of transformative learning. By connecting participant experiences in CSCs to aspects of transformative learning this study also illustrates how transformation may begin in practical, operational collaborations. This supports earlier calls (e.g., Boström et al., 2018; O'Brien et al., 2010) to consider learning processes within existing social systems as catalysts for sustainability transitions. It is important to remember, however, Boström et al. (2018)

emphasizing that transformative learning does not necessarily lead to societal transformation. Similarly, Rieckmann (2018) argues that sustainable action requires not only competencies but also supporting values and motivational drivers. Still, the development of specific competencies is widely regarded as empowering individuals to contribute to sustainable development (UNESCO, 2017) and to navigate uncertainty and complexity (Vinnova, 2024). Therefore, such learning is relevant to study, both as a component of broader societal transformation and in the context of building resilience.

The identification of anticipatory and systems thinking competencies in participants' experiences indicates that CSCs may contribute to building futures literacy in practice. This operationalizes futures literacy in Sweden beyond policy ambitions, suggesting it can be fostered organically in collaborative, problem-solving contexts. However, when introduced to the three types of thinking, few participants were familiar with them, and especially exponential thinking appeared difficult to grasp for some participants. Others agreed the collaboration context helped them think exponentially, as more eyes on something makes it easier to detect an issue early. Three participants further expressed it as explicitly useful being introduced to the three types of thinking, as it contributed to new reflections. One participant mentioned that it might have been beneficial to introduce the framework within the collaboration, in order to actively keep its underlying ways of thinking in mind. A majority of participants said that they were unfamiliar with this specific framework, and those who recognized one or two of the concepts had encountered them through other sources. Taken as a whole, this serves as a small-scale exploration of the practical application of the Vinnova (2024) framework. While further research is clearly needed to strengthen these insights, the findings nonetheless suggest a general lack of awareness and indicate potential value in introducing these ways of thinking more broadly, to increase future literacy both for individuals and in collaboration contexts.

Moreover, the study demonstrates the broad scope and overlapping categories of the UNESCO (2017) framework make it a somewhat challenging tool for evaluating learning. The partial visibility of certain competencies in this study raises questions about how comprehensively such frameworks capture informal learning outcomes, though this likely also reflects the broader difficulty of measuring learning in general, a point that will be revisited in the

discussion of limitations. Choosing a different framework for competencies, as the one presented by Wiek et al (2011; 2015), or adopting other definitions of competencies, would affect the results. It is possible that more comprehensive and concrete definitions of each competency could facilitate greater measurability in relation to learning outcomes, however, this cannot be determined without empirical testing. Future research might also explore whether additional competencies, such as the "community awareness" highlighted by some participants, should be included in evolving models of sustainability learning, or whether sub-themes could be developed to provide more concrete guidance.

The scope and scale of this study do not allow for any definitive conclusions regarding this additional competency, particularly not in terms of its future relevance. Nonetheless, the fact that participants perceived it as something they had learned and chose to emphasize suggests it may serve as either a complementary competency or a concretizing sub-theme. In this regard, integrating the Vinnova (2024) framework into the analysis was one way of making parts of the broader framework more tangible. Furthermore, just as learning objectives for all the SDGs are available through UNESCO (2017), although more suited for other contexts such as formal school teaching, an expanded and more context-sensitive articulation of sustainability competencies could enhance the usefulness of the framework in evaluating and improving sustainability-related competence development in professional settings particularly.

Finally, results correspond with findings from Nikkanen et al. (2024) saying regional preparedness networks facilitate collaboration and learning, while raising the possibility that this also applies to regional development networks and national preparedness networks. Further, this study offers insights into how learning within such contexts can be related to more specific competencies. Also, in accordance with what Nikkanen et al. (2024) found, participants perceive some challenges. In this case, mostly related to prioritising. However, Nikkanen et al. (2024) highlighted lack of evident benefits for participating organizations and difficulty in measuring effectiveness and thereby justifying investing resources. If competence development among participants can be demonstrated, it could potentially represent a more evident benefit for organizations and serve as an incentive for participation. Research of this nature, which explores the potential dual function of CSCs, arguably begins to address this issue. If collaborative networks, beyond fulfilling their operational purposes, also serve as platforms for

developing competencies needed for the future, this may constitute an added value for both individuals and organizations. These ideas already touch on practical implementation, as will be discussed in more detail below.

Practical Implications

This study contributes to a broader understanding of where and how sustainability competencies may be developed. These insights could point to a potential added value of collaborative networks, not only in terms of their operational outcomes but also as spaces for learning. In turn, this may offer an additional rationale for engaging in, prioritizing, and allocating resources to such initiatives, as CSCs may play an unintended but significant role in societal transformation by equipping professionals with the critical skills and perspectives needed for sustainability transitions.

Suggesting CSCs as platforms for learning, gives a concrete example of how to broaden the scope of ESD, and find ways to more creatively incorporate education into new contexts. In practice, this could be leveraged by more intentionally designing CSCs to include reflective or knowledge-sharing components that support learning. To do so, CSCs should beyond the act of sharing perspectives, encourage active engagement and critical reflection, facilitating a deeper transformative learning and supporting sustainability competence development.

This small-scale study would need to be expanded to support broader conclusions, but if the findings prove to be generalizable, they could inform both policymakers and organizational leaders when allocating resources or evaluating the wider impacts of collaborative governance models. Even now, however, insights from the studied material suggest that learning within collaborative contexts could be enhanced with relatively simple measures, such as ensuring that all perspectives are included, fostering an understanding of how they are interconnected, and provide opportunities to discuss potential future scenarios. By making better use of existing contexts, competencies that are essential for meeting future challenges could be developed or strengthened in a resource-efficient way, generating multiple benefits through one initiative. In relation to CSCs, an example of a concrete measure for improved learning is to dedicate time to reflection about competence development outcomes from the experience.

Limitations

It is important to acknowledge that results depend on participants' own reflections regarding learning and over all take outs from their collaboration experiences. This does not prove that learning has occurred in these contexts, it only represents participants stories of what they have gained from the collaborations. Some participants particularly mention other factors that have had similar effects, for instance having worked within different sectors themselves or learning from people with other roles and competencies within the own organization. It is in other words impossible to determine what different factors or combination of factors that have led to insights they account for. Still, it is relevant that they perceive the collaboration context have taught them new mindsets or skills, and that these can further be connected to competencies needed in the future (UNESCO, 2017; Vinnova, 2024).

Further, there are limitations in the representativeness of the study population. Only one participant is female, and only three are private sector employees. Although no obvious distinctions appeared between private and public sector employees, it would be interesting to see results from a more balanced study in terms of gender and sector representation. The same goes for more actors being represented, civil society was not included in any of the studied contexts and some had vague involvement of private actors, which made some contexts first and foremost a collaboration between diverse public sector actors.

And on the theme of representation, this study has framed cross-sector collaborations as contexts with multiple perspectives, which is true in comparison to not collaborating with other actors. Still, two related limitations are important to highlight. First, the difficulty in determining from the material whether it is specifically the cross-sectoral exposure that contributes to new learning remains. In some cases, it may be the collaboration with other actors, rather than the cross-sectoral aspect itself, that plays the most important role in the context. This would require more in-depth investigation. Second, while some perspectives are included in these contexts, multiple other perspectives are automatically excluded. Critical pedagogy theorists would for example argue all these collaboration contexts are highly human-centered, automatically diminishing other perspectives as animals and nature, because even if these themes are discussed they do not have representation (Dinker & Pedersen, 2016; Kopnina

& Cherniak, 2016). In the same vein, Tikly and Bond (2013) highlight the need for non-Western perspectives in research, suggesting efforts to engage diverse voices as much as possible is crucial. In the light of an inclusive pluralism, the investigated contexts in other words represent a very limited set of perspectives. Even with a less critical approach, some examples by interview participants introduced as CSCs could be argued to be the bare minimum of a CSC drawing on the initial definition, due to limited breadth of actors involved. If the objective is to involve multiple perspectives to jointly solve societal problems, it is important to reflect on what perspectives are invited to create the solution, and whose interests the resulting solutions ultimately serve.

Attention should moreover be drawn to the fact that the 2030 Agenda and the global sustainable development goals have also faced criticism, for instance concerning the emphasis on economic growth and the importance of private actors. In short, the agenda has among other things been criticized for reflecting neoliberalism to an extent that does not align well with actual sustainable development (e.g. Adams, 2020). To equate Agenda 2030 with sustainability is thus not an objective truth, but rather another choice made in the starting point of this study implying a limitation important to acknowledge.

In conclusion, this study has several limitations, and as previously noted, its design does not support generalizable results. However, generalizability was not the objective. Instead, the purpose was to gain deeper insights into the intersection of CSC and ESD, by qualitatively exploring specific CSC contexts. The findings may serve to generate new hypotheses and underscore the relevance of investigating this intersection. Suggestions for future research are outlined below.

Future Research Suggestions

Drawing on the present study, it would be relevant to explore and potentially strengthen the findings with a quantitative study allowing for generalizable results on sustainability competence development in Swedish CSC contexts. It would also be valuable to more clearly link competence development to specific contexts through longitudinal studies, in order to examine whether reported competencies actually develop within those settings, whether they

persist over time, and how they influence thinking and practice in the long term. In doing so, a more comprehensive field study could contribute with deeper insights into the actual content and dynamics of the meetings. Furthermore, to address the limitations regarding representation and perspective, future research could explore contexts that include a wider variety of actors and compare these with more traditional public–private sector collaborations, to assess their respective value as learning platforms. Lastly, it would be interesting to compare CSCs in which learning is actively facilitated with other initiatives more explicitly aiming to build sustainability competencies, such as online courses, to examine how learning is perceived and what approaches are most resource-efficient when it comes to upskilling employees. In parallel, further research on accessible and context-sensitive strategies for enhancing learning within CSCs would represent a highly valuable contribution to their practical development and to the broader integration of competence-building into collaborative governance.

Conclusion

In approaching cross-sector collaborations (CSCs) as potential platforms for developing competencies identified as important for the future, this research contributes with new knowledge on the nature and potential of learning in CSCs. A qualitative analysis of interviews with individuals engaged in CSCs suggests that these contexts – although not explicitly designed as educational spaces – offer meaningful opportunities to develop competencies aligned with education for sustainable development (ESD). Participants reported learning experiences closely aligned with the UNESCO sustainability competencies framework (2017), particularly in systems thinking, collaboration, anticipatory, and strategic competencies. Additionally, several reflections echoed the thinking modes associated with futures literacy, as defined by Vinnova (2024), especially systems and future thinking. These findings suggest that CSCs can function as informal learning environments supporting both professional growth and societal resilience by better equipping individuals. Ultimately, this serves as an example of lifelong learning, and addresses the call for accelerating ESD by identifying new contexts for its implementation.

By applying an ESD lens to CSCs, this study expands the understanding of their potential value. Beyond their operational role, CSCs may also serve as spaces for future competence

development. Notably, the research identifies a potential addition to the sustainability competencies framework, namely community awareness, underscoring the importance of professionals' ability to navigate complex actor landscapes when addressing local needs. This indicates that existing frameworks could be further refined by more systematically integrating CSC participants' experiences and their perspectives on which learning outcomes are most relevant to their professional roles. In either case, as the demand for future-oriented skills continues to grow, recognizing and leveraging the unintended learning potential of CSCs may serve to enhance both educational and societal outcomes. Accordingly, the study offers both conceptual and practical contributions, advocating for the integration of learning as a more intentional dimension in the design and evaluation of CSCs.

However, while participants appear to learn in dialogue, more specifically from sharing perspectives and knowledge with each other, critical thinking is a less prominent feature in these contexts. Transformative learning theory for sustainable development has been argued to require learning environments that foster critical thinking and challenge current frames of reference, which might be an area of improvement for learning for the future in CSCs.

Arguably, further research on accessible strategies for enhancing learning within CSCs would represent a highly valuable contribution to their practical development. Other future research suggestions are to build on these findings using quantitative methods and to explore the integration of ESD and CSCs through longitudinal studies. This could be done both in similar and more diverse contexts, examining also how a broader representation of actors influences learning processes.

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Appendices

Appendix 1: Participant Sample

Participant number	Organization type
1	Public
2	Public
3	Private
4	Public
5	Public
6	Private
7	Public
8	Public
9	Public
10	Private
11	Public

Information: This table shows participant number and what sort of organization they are employed at. All other information, such as gender, organization and particular collaboration context, is not shared to protect participants anonymity.

Appendix 2: Interview Guide (Translated from Swedish)

Form – Creating Understanding of Context

- Please describe the project/collaboration/network. What is the collaboration about? What is its purpose?

- Which actors are participating in the collaboration and what are their roles? What competencies are represented and why? / Is there a clear distribution of responsibilities within the group?

- Why are you involved? What was your role and how do you contribute?

- Is this collaboration different from others you've participated in that don't involve organizations from different sectors? How? / Why?

- Can you tell me more about the structure of the collaboration? (How is it organized? Where do you meet? How often and how many times? How long is intended to continue? Do the meetings follow a particular structure? Who initiates/hosts the meetings?)

Content

- Can you describe what issues you are working with?

- Can you give an example of how you approach your task as a group? In what way do different actors contribute? /How are different competencies expressed in the collaboration? In what ways?

- What similarities and differences have emerged regarding working methods/priorities/goals or purposes among actors from different organizations? /Are there other similarities or differences you would like to highlight?

Learning

- What is the most important thing you've learned from the collaboration?

- Do other people's perspectives contribute in any way to an expanded understanding for you? How? / Why? Can you describe such a situation?

- Is there anyone's perspective in particular that has given you new insights? Whose? Why?

- Have you encountered new forms of working methods? Can you describe a situation where you did, and how it affected you?

- Have you benefited from experiences from the collaboration in other contexts in your work? Can you give an example of a time when you benefited from or reflected back on the collaboration experience?

- Are there any particular skills you feel you're practicing through the collaboration? Which ones? How?

- Has your way of thinking about sustainability or future challenges changed through the collaboration? If so, how?

Foresight Competencies – Prompting

Introduce the concepts by either 1) showing a visual or 2) sharing them in the chat. Ask the interviewee to reflect out loud on the concepts one at a time in relation to the collaboration context. Then follow up with questions.

Futures Thinking: The ability to embrace uncertainty and to explore and imagine alternative futures.
Exponential Thinking: The ability to imagine how something that is currently very marginal/small can quickly become prominent and have a major impact.
Systems Thinking: The ability to see the whole by understanding how different parts are interconnected and affect one another, which helps us identify underlying patterns and relationships within a system.

- Are any of these three types of thinking used in the collaboration? Is it something you get to practice? In what way have these mindsets been concretely applied in the collaboration, and how have you perceived their significance?

- If yes: Do you feel that you have learned something from using these mindsets in the collaboration?

- If yes: Do you feel that the collaboration has enhanced your ability to apply the same mindsets in other contexts? Can you give an example?

Closing Questions

- Is there anything in the collaboration you think could have been done better to improve learning?

- Is there anything else you would like to add?