

Article

School Culture Promoting Sustainability in Student Teachers' Views

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Abstract: School culture includes values, principles, and criteria. It is an integral part of sustainability education, of which climate change education (CCE) is seen as a way to improve students' ability to take action to mitigate climate change. This survey aimed to investigate Finnish student teachers' views of factors important in implementing CCE in school culture and their abilities as teachers to promote CCE. Thirty-six student teachers wrote essays regarding the implementation of school culture and responded to a questionnaire concerning their ability to act as climate change (CC) educators and the challenges they identified in teaching and learning about it. Inductive content analysis was used to study the essays. In student teachers' answers, six themes to implement in school culture were identified: elements, work community, teacher's impact, students in the centre, actors outside the school, and challenges. The student teachers highlighted challenges, such as views that deny CC and challenge the transformation of school culture to support sustainable development. The suggested ways to support CCE in daily school life that were very concrete, such as recycling and food education. Student teachers found their own ability to act as climate educators to be relatively good. They identified challenges, especially in motivating students to learn about CC and to participate and take action towards a climate-friendly lifestyle. Students' conflicting attitudes, values, and beliefs related to CC, reinforced by their inner circle, were seen as challenges in teaching and learning about CC. Despite these challenges, transforming a school culture to support CCE should be the goal of every school.

Keywords: climate change education; educator; school culture; work community; teacher's impact; inductive content analysis

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1. Introduction

School is not just a context for “spontaneously running learning processes” [1] or the immediate learning in social intercourse and direct dealings with diverse aspects of everyday life [2]. A school is a community of students, teachers, experts, administrators, and other staff members whose main purpose is the education of students and providing support for both students and staff.

The term school culture does not have a single definition and is used, for example, to understand the school's ethos, school climate, school code, or the school's operating culture [3]. School culture is one of the indicators of organisational effectiveness and the quality of the school. The quality of school culture affects the quality of the overall way of life in school. In this study, the term school culture is understood according to Fullan's [4] definition as the guiding beliefs and values evident in the way a school operates. It includes norms, rituals, and school traditions [5] and can be used to encompass all the attitudes, expected behaviours, and values that impact how the school operates. The kind of

school culture that prevails in a school is central to sustainability and sustainable development.

According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO), the difference between the two concepts is that sustainability is a long-term goal towards a more sustainable world, whereas sustainable development (SD) implies the processes used to reach this goal [6]. Sustainability can be taking into account a paradigm for thinking about the future in which ecological (environmental), economic, and societal considerations are balanced in the pursuit of an improved quality of life [7]. SD is a process of change that improves the livelihoods of present and future generations without compromising the Earth's carrying capacity [8].

In these times, when climate change (CC) is turning into a climate crisis and climate disasters are increasing both in frequency and severity [9], a crucial question regarding education is how education can support SD. Transformative education is seen as a way to develop students' awareness of themselves and their environment [10]. It emphasises the teaching of skills that promote personal and social transformation, the pursuit of harmony with the environment rather than its control, and a mental and emotional relationship with the environment that includes respect for ecological systems [11]. In sustainable discussions, transformative education is seen as a way to promote change in the thinking and action of individuals and cooperation between stakeholders. In this study, transformation is understood as described by Filho et al. ([12], p. 289) as "a process of questioning and redefining one's frames of reference, experiences and assumptions to generate new meanings and new visions of future". Transformativeness is included, for example, in the following paradigms for teaching SD: 'education for sustainable development', 'sustainable education', and 'sustainability education'.

Education for sustainable development (ESD) is a holistic and transformational, life-long learning process that aims to enhance the cognitive, social, emotional, and behavioural dimensions of learning [13]. It seeks to balance human and economic well-being while considering cultural traditions and the sustainable use of the earth's natural resources. Key issues affecting ESD include globalisation, the rise of an information and knowledge society, the consideration of various cultural traditions, and the need for the inclusion of marginalised groups and perspectives [14].

Sustainable education, in contrast, means a change in educational culture based on critical awareness and the theory and practice of sustainability. At the heart of education are three dimensions of sustainability that are balanced and interlinked to attain and sustain human ecological, social, and economic well-being [15]. Sustainable education thus refers to finding sustainable solutions to environmental, social, and economic problems through education [16]. It is a concept that challenges both formal and non-formal educational sectors to actively participate in the creation of environmental, social, and economic programmes that improve the quality of life, increase empowerment, and respect interdependence [17].

Sustainability education is an interdisciplinary, collaborative, experiential, and potentially transformative process of creating a space for enquiry, dialogue, reflection, and action about the values and goals of sustainability [18]. In this study, we use the term sustainability education (SE) because it emphasises interdisciplinarity and student-centred methods. Interdisciplinarity integrates environmental, economic, social, and political issues [19]. Previous studies, e.g., [20,21], have shown that active teaching and learning methods increase students' interest in and knowledge of sustainability.

From the perspective of sustainability, CC is a key issue. Sea levels are rising, and ever more frequent natural disasters, such as cyclones and tropical storms, are threatening people's homes and livelihoods. CC threatens the stability of socioecological systems around the world, and its mitigation requires social change [22]. Education is considered to be an "essential element for mounting an adequate global response to climate change" ([23], p. 3). It can increase resilience by "helping populations understand and address the impacts of climate change, and by encouraging the changes in attitudes and behaviors

needed to help them address the causes of climate change, adopt more sustainable lifestyles ... as well as to adapt to the impact of climate change" ([23], p. 3). Therefore, climate change education (CCE)—as a part of SE—has a key role to play in supporting students to understand the phenomenon of CC and its causes and consequences and to take action to mitigate CC [24]. It prepares students to face the effects of CC and guides them towards a more sustainable lifestyle. When responding to ethical and political climate change issues, geography educators are also called on to use interdisciplinary, participatory, and effect-driven approaches [25]. These views are at the core of this study.

The implementation of SE and CCE in Finnish schools varies considerably, even though the curriculum is the same for everyone. School culture correlates with teachers' attitudes regarding the importance of implementing SE and CCE in their schools. According to the principals, the biggest obstacles to the realisation of SD are the school's operational capacity and operating conditions [3].

School culture and students' sociocultural school experiences influence students' prosocial and environmentally responsible behaviour [3], as well as their academic performance [26]. Understanding the views of student teachers—the future teachers and builders of school culture—on CC(E), a sustainable future, and SD is very important and worthy of study. The aim of this study was to produce knowledge of Finnish student teachers' views on their role in shaping school culture to implement CCE as part of SE. No previous studies on this topic have been carried out in Finland.

2. Literature Review

2.1. School Culture

Deal and Peterson ([27], pp. 2–3) stated that there is no single universally agreed upon "best definition of school culture." According to them, school culture is comprised of "Unwritten rules and traditions, norms, and expectations that permeate everything: the way people act, how they dress, what they talk about, whether they seek out colleagues for help or don't, and how teachers feel about their work and their students" [27]. Deal and Kennedy [28], in contrast, emphasised the shared values and beliefs that closely knit a community together. Hargreaves [29] looked at the definition on an individual level as a lens through which participants viewed themselves and the world. Recently, Melesse and Molla [26] established their definition as the beliefs, perceptions, interpersonal relationships, attitudes, and written and unwritten rules that shape and influence all school activities.

The integrated model of culture describes school culture as being comprised of four different dimensions: (I) Professional Orientation, (II) Organisational Structure, (III) Quality of the Learning Environment, and (IV) Student-Centred Focus [30,31]. Professional Orientation involves the professional lives of the teachers [30,31]. It includes a teacher's attitudes, beliefs, and practices and one's own and other persons' ideas about teaching, studying, and learning in specific circumstances and contexts [32]. The ability of a teacher to organize teaching–learning situations and his or her role in organizational learning also play a role in shaping school culture [33]. Thus, the circumstances and context affect, in addition to the teacher's previous teaching and learning experiences, his or her conception of teaching and other activities in the school and thus school culture. Organisational structure includes the type of leadership that exists at the school [30,31]. It is a frame of reference that supports employees in achieving goals in the most efficient and productive way [34]. At the school, it helps and streamlines operations, improves decision-making, and establishes and maintains relationships with parents and other educational actors. It also gives room for creativity and improves teacher performance as well as student academic performance [35]. A learning environment is a system where learning takes place and where students are at the centre [36]. It includes all of the physical surroundings, psychological or emotional conditions, and social or cultural influences affecting the growth and development of a student [37]. The quality of the learning environment is influenced by

both students [30,31] and teachers [36]. The relationships between students and the teacher affect how their attitudes and actions interact and the extent to which learning is promoted. Student-centred focus is concerned with assessing the extent to which the needs of individual students are met by the school's programs, policies, rituals, routines, and traditions [31].

School culture and the perceptions of the teaching staff affect the daily life of the school and how sustainability and SD are taken into account in teaching and learning. It can be positive or negative [38]. A positive school culture enables and supports the development and progress of school members, while a negative culture disables and/or hinders progress. A positive school culture is characterised, for example, by the reflection of the mission and values of the community, and a shared vision and high expectations go a long way towards achieving a school's mission [39], collegial and collaborative relationships and opportunities for collective problem solving and sharing experiences [4] and responsibilities [39], productive staff relationships, encouraging leaders and decisions based on verified information [40], clear expectation of positive behaviour and commitment [41], and confronting challenges [29]. It also contributes to professional development, togetherness, support and partnership, recognition of success, and transformational leadership [5]. Negative school culture, in turn, is characterised by negative interpersonal relationships, indifference, and students' non-involvement in decision-making, emphasising failure and lack of togetherness [5] and contributing to a low level of collaboration, passivity, pessimism, frustration, negative attitudes towards teaching and learning (cf. [42]), and lack of clear sense of purpose and energy [40]. Inappropriate communication and antagonism [38] are also typical features of negative school culture.

2.2. Climate Change Education (CCE)

CCE is seen as a way to improve students' ability to take action to mitigate CC [43]. CCE refers to education focusing on the causes and consequences of CC. It aims at developing reflective and critical thinking, increasing awareness of global interconnectedness, and encouraging action towards a climate-friendly lifestyle [44–46]. Kagawa and Selby [47] argued that CCE is interdisciplinary and multidisciplinary in nature. Multidisciplinary means that knowledge of various individual sciences is needed. Interdisciplinarity, however, incorporates elements from a variety of disciplines and integrates environmental, economic, social, and political issues [48]. Thus, CCE also includes global climate justice education. The educational response to CC needs to be both local and global, and the CCE needs to be a social and holistic learning process.

The problems caused by CC can be approached through the school's educational tasks by applying Biesta's [49] theory of the qualification, socialisation, and subjectification domains and looking at the challenges associated with them from CCE's perspective. According to Reid [50], in the context of CCE, the qualification domain provides participants with the knowledge, skills, and dispositions that empower them to 'do something.' However, Lehtonen et al. [46] pointed out that active agency can only be learned in practice. Thus, learning experiences on how to mitigate CC, for example, on local and global levels, are important. In the socialisation domain, the norms and values prevailing in society can be studied [50], for example, by examining opportunities for individual and community action related to climate change mitigation [46]. In the subjectification domain, students' initiative and responsibility are supported, for example, by developing an understanding of how the challenges of CC affect the realisation of justice and choices in one's own and others' lives [50]. Reflection on embodied experiences and emotions and intuitive knowledge are useful resources for rational thinking and learning. Reflecting with intuition can connect us to deeper questions of human needs, desires and wishes, values, and identities [46].

In Finland, curricula for basic education (primary and lower secondary education) and upper secondary education form a continuum in which education at one level is built

on the previous level. CCE is emphasised especially in the biology, geography, and environmental studies of basic education, as well as in the biology and geography of upper secondary schools and in the subject area of SD and global responsibility [51–53]. In biology education, the effects of a changing climate on life on Earth are studied, and an in-depth understanding of the phenomena is supported. Geography teaching supports the understanding of climate issues and problem solving, for example, through the holistic understanding and spatiotemporal analysis of natural and societal processes and their interactions, as well as through learning the principles and practices of spatial planning. In the context of both subjects, students' skills in mitigating CC and building a climate-friendly world are practiced. In the most recent curriculum document [54], CC is connected using a multidisciplinary approach to language studies, other natural science subjects, philosophy, and ethics.

Two models are designed to facilitate the planning of CC-related teaching: the bicycle model [39] and the problem-centred process model [54]. In the bicycle model, the aspects of CCE are described as wheels (knowledge and thinking skills), frame (identity, values, and worldviews), chains and pedals (action to curb CC), saddle (motivation and participation), brakes (operational barriers), lamp light (hope and other emotions), and handlebars (future orientation). The problem-centred process model supports teachers in outlining the wide multidimensionality and comprehensiveness of CCE. In these models, knowledge and thinking skills form the basis of CCE. By making room for real world-oriented goals, subjectification, and collaborative learning, CCE can be seen as part of SE.

2.3. Sustainability and Sustainability Education

The heart of sustainability lies in ethical issues [55] relating to ecological/environmental, economic, and social sustainability [56]. In terms of ecological sustainability, the primary goals are to reduce the use of non-renewable resources, to preserve nature's generative capacity and ecological values, and to generally improve the condition of the environment. Important challenges of ecological sustainability are slowing down climatic changes to a level endured by ecosystems, securing biological diversity and the sustainable use of natural resources. Economic sustainability means growth, which is balanced in both its content and quality, which is not, in the long run, based on indebtedness or destruction of resources. In sociocultural sustainability, the aim is to secure the transfer of prerequisites of welfare from one generation to another and to equip society with the skills and knowledge required to meet the challenges of SD, thereby also generally improving social well-being. These dimensions are complexly interrelated [7].

The basis for SD is that people alter their thinking and behaviour. This requires that we overcome 'systems blindness' and begin to 'think sustainably'. Sustainable thinking involves constantly considering the natural environment and other people, today and in the future, when we plan, make decisions, and act [57]. When promoting understanding and solving today's social, economic and environmental problems, formal education (from pre-school to higher education), informal learning (learning outside of a structured curriculum), and non-formal learning (involuntary and an inescapable part of daily life learning) could be crucial to sustainable behaviour and activities in reality [58,59].

To promote sustainability locally, regionally, and globally, the United Nations (UN), including the UN Department of Economic and Social Affairs, started to develop sustainable development goals or global goals (SDGs) at the beginning of 1990. The final document, *Transforming our World: The 2030 Agenda for Sustainable Development* (called *Agenda 2030*), with 17 SDGs at its core, was adopted at the UN Sustainable Development Summit in September 2015 in New York [54]. Education as an SDG is perhaps more than ever a priority to ensure that students are able to develop appropriate and rapid responses based on input to the SDGs. The most centred SDGs in this study are SDG4, called 'Quality education,' and SDG5, called 'Gender equality.' The former focuses particularly on ensuring inclusive and equitable quality education and promoting lifelong learning opportuni-

ties for all. The latter stresses gender equality, stating, ‘Gender equality is not only a fundamental human right, but a necessary foundation for a peaceful, prosperous and sustainable world’ [60].

Originally, SE was based on an ecological orientation. Ecological orientation means that the sustainable use of natural resources must also be considered when promoting justice and improving quality of life and well-being. Over the years, SE has expanded to cover ethical, social, and transformative issues [61], such as life, liberty, and personal security, social and ecological justice and solidarity; and the search for alternative solutions to social, economic, and political problems. Today, it is seen that SE should include innovative pedagogy that supports students’ understanding of social reality [62]. Teaching and learning should be based on values and be holistic [63], systemic, and cross-disciplinary [64] in planning and implementation processes. Crucial values are respect, trust, participation, community, justice, participatory democracy, openness, and critical reflection. The core goal is a critically important ‘learning about learning’ process that directly affects opportunities for a more sustainable future for all.

The key competencies for sustainability can be understood as transversal, multifunctional, and context-independent [65]. They represent what citizens who work to achieve sustainability will particularly need to deal with today and the future’s complex challenges. They are relevant to all SDGs and enable individuals to relate the different SDGs to each other—to see ‘the big picture’ of the 2030 Agenda for Sustainable Development [66]. The key competencies represent cross-cutting competencies that are necessary for all learners of all ages worldwide. Thus, teachers should be able to master the issues concerning the key competences for sustainability and apply their knowledge in teaching situations. According to Brundiers and Wiek [67], knowledge dimensions include content knowledge, methodological skills, communication skills, collaborative teamwork, participant engagement, project leadership ability, continuous learning ability, and self-care. By fostering sustainability competencies [68,69], it is important to steer education in a global direction to achieve social justice for present and future generations while respecting cultural diversity. At the local level, teaching should favour a variety of formal, non-formal, and informal learning to accelerate the implementation of sustainable solutions [59].

SE is lifelong learning and an integral part of a quality, comprehensive, and transformative education concerning content, environment, and learning outcomes, as well as pedagogy [70]. In addition to environmental issues, the interaction between society and the environment is at the core of teaching, studying, and learning processes. SE can be seen as an instrument of empowerment that inspires individuals and society to adopt sustainable lifestyles for the benefit of present and future generations [61].

School culture and teachers ultimately influence the importance of promoting sustainability in schoolwork [3]. For SD issues, such as global CC, facts are typically uncertain, values are in dispute, stakes are high, and decisions are urgent [71]. The concepts of SD and SE are difficult both for teachers and students to understand [72]. This makes teaching and learning challenging [73]. Thinking and open discussions surrounding interdisciplinary systems can be seen as ways to teach and learn about sustainability issues and CC mechanisms. Systems thinking is the ability to understand the world as a complex system in which everything is related to everything else [74]. It helps identify the interrelationships within the systems of entire systems and different biophysical and social factors in a given environmental context [15]. Systems thinking is a way of thinking that allows a person to understand their role from a holistic perspective. Open discussions in dialogical learning situations offer encounters in which teachers and students learn from each other and together construct pathways for a sustainable future. Hope, courage, and trust are strengthened through embodied, shared experiences [46].

3. Study Design

3.1. Research Questions

Previous research [3,75] has shown that school culture and teachers ultimately influence how SD is promoted in a school. As the views of Finnish student teachers on CCE as part of sustainability education (SE) have not been studied, our aim was to find out their views on the factors that are important in implementing CCE in school culture, and their views on their own ability to promote CCE. Determining the views of student teachers is important, as each student teacher will affect the school culture in one or more schools during their future careers. The results will be used to develop the CCE in teacher education.

The research was guided by the following research questions:

SQ1. What issues do Finnish student teachers see in the formation of a school culture that promotes CCE regarding sustainability?

SQ2. In what ways would Finnish student teachers build a school culture to promote SD/SE?

SQ3. How do Finnish student teachers view their own abilities to act as climate educators, and what challenges do they see in it?

3.2. Participants and Settings

This study is part of a larger study in which a larger group of students participated in the research [75]. For this study, we only included the participants who studied to become teachers. The number of participants (subsequently called student teachers) was 36, comprising 20 subject student teachers (SSTs) with different majors and 16 primary school student teachers (PSTs) (Figure 1). The gender distribution was uneven (29 women and 7 men), following the general gender distribution of teachers in Finland (cf. [75]). In Finland, the admission of studies is usually aimed at a more experienced applicant instead of a younger one, so the age of starting students is quite high [76]. In this study, the age range varied between 20–46 years old. The majority (61%) of the student teachers were up to 25 years old, and the age range of the rest was rather even. This means that some of the student teachers have been in upper secondary school in different decades, and their education has been based on very different curricula.

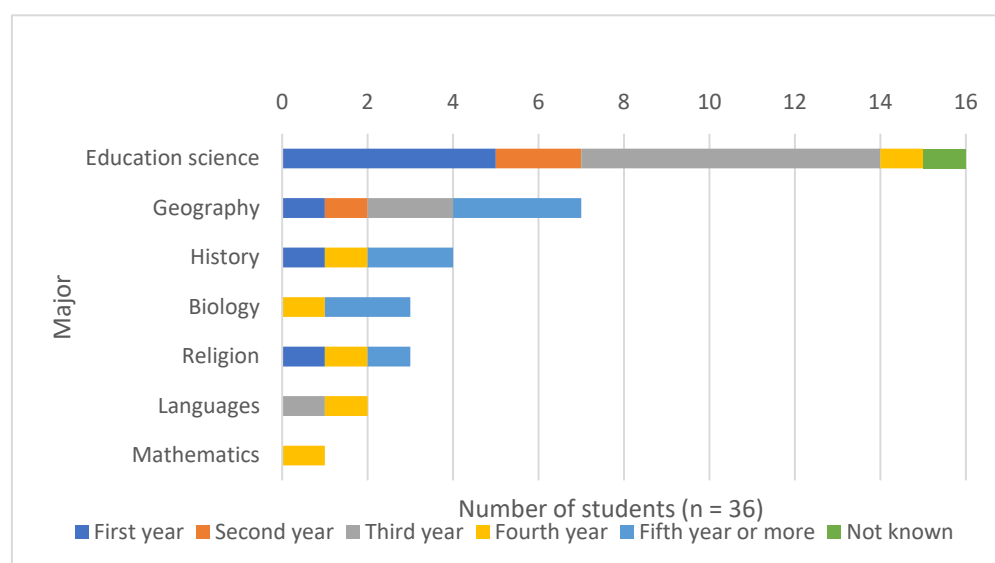


Figure 1. Major and study year of student teachers who participated in this study.

All participants attended a “Climate change education and sustainable development” course (3 ECTS units) in late autumn 2019. The course theme was CCE as part of

SE. The aims of the course were recognising the importance of the ecological, sociocultural, and economic dimensions of CCE in schools, learning multidimensional information related to CC, and supporting the development of thinking skills concerning CC issues. At the beginning of the course, the student teachers answered a research questionnaire, and in the middle of the course, they were asked to write an essay about school culture supporting CC teaching and learning. All participants gave permission to use their responses to the questionnaire in the study, and 24 of them also gave permission to use their essays.

3.3. Questionnaire and Essay

The student teachers filled out an online research questionnaire (Webropol Survey tool 3.0) at the end of the first course meeting after the lecturer introduced the CCE bicycle model [45]. One of the researchers introduced the aims of the research, gave basic instructions on how to open and answer the online questionnaire, and oversaw the completion of the survey. The student teachers used 8 to 24 min to complete their responses.

The questionnaire was designed using the CCE bicycle model as a framework. It consisted of background questions and both open- and closed-ended questions related to the student teachers' views on CCE in upper secondary school. It was emphasised to the student teachers that the research focused on their views rather than on their knowledge or experiences. In this study, only responses to the last four questions were used. These questions focused on the student teachers' own ability to act as climate educators and the challenges they identified in CCE.

In this study, the role of the questionnaire was merely to provide background information on the target group of the study, and the main emphasis was on the essays. The student teachers' views on the challenges of CCE were utilised to deepen the examination of the results of the essay analysis. Therefore, the methods of analysis and results related to the questionnaire are presented after those related to the essays.

After the lecture "Climate change and culture in connection to sustainable development" the student teachers were asked to write the essays. The assignment was:

"The school culture determines what things are considered important in the school and how the school's everyday practices are formed [3]. Consider and describe how you, as a teacher, would build a culture of supporting climate change (CC) teaching and learning in rural and urban schools in the future."

In the general guidelines of the course, the use of references in essays was encouraged. However, much of the essay used as research material is based on the student teacher's own thoughts and experiences rather than references. These student teachers' own thoughts are presented in this study. The student teachers were given two weeks to respond to prepare a two- to three-page essay with standard word-based settings (1.5-line spacing, Times New Roman 12), and 24 essays with, all together, 49 pages of written text were analysed.

3.4. Analyses

The essays were analysed by using data-based content analysis [77,78]. Researcher triangulation was an essential part of our analysis process. Our research team consisted of one graduate student and three experts in biology and geography education. Two members of our research team are also experts in sustainability education and experienced teacher educators and researchers.

The analysis was carried out in three stages: (1) Data reduction (the relevant expressions were written in a simpler form, and expressions were reduced to observations, which were reduced to fewer findings); (2) Clustering (the findings were grouped, and a heading was created for the groups to describe all the reduced terms it contained) and creating preliminary descriptions of the phenomena under study; and (3) Abstraction [77].

In this final stage, the information arising from the data was conceptualised. Throughout the analysis process, it was observed that the path to the original data was preserved.

First, all material, including the views and ideas of the student teachers, were considered exactly as presented in the essays, and the analysis units were determined based on the research questions (Table 1). Subsequently, all the text components that were not content-bearing or were only repetitive or explanatory expressions were removed. The content-bearing parts of the text were transposed to a uniform stylistic level. In the reduction phase, the content-bearing paraphrases with identical or similar referents and similar statements were combined to form one reduced expression. Based on the reduced expressions, the following themes were raised: participation, communality, an example shown by the teacher and as a large group, and various concrete actions or means to promote SD.

Table 1. An example of reducing and clustering written material (Essay 6).

Original Text	Reduced Expressions	Themes
Another natural continuum to a theme day at school would be practical involvement for students as well as staff. We could come up with our own ideas and take responsibility for how our school changes its school culture.	(a) Practical participation (b) Students to come up with ideas and take responsibility (c) Staff to come up with ideas and take responsibility	(a–b) Students' participation and involvement (c) Teachers' participation in work community

In clustering, the reduced expressions were copied and moved to a separate file. In this stage, as well as earlier in the analyses, the material was processed one essay at a time. Thus, sub-themes were formed. No overlapping sub-themes were created, and reduced expressions were placed in sub-themes where they fit perfectly. In this phase, significantly more sub-themes emerged, as it was necessary to divide the previously created sub-themes under several headings. The titles of many of the sub-themes also became more descriptive or concise.

There were 64 sub-themes (see Appendix A). The material contained a variety of different approaches and observations about constructing school culture, and these were considered as comprehensively as possible in the study. The material consisted of a wealth of sub-themes that appeared in the essay of only one student teacher. There were also sub-themes that almost all student teachers highlighted. Qualitative research does not aim to create an average or a generalisable truth based on the data; rather, individual views differing from the general view are as important as a view that seems to be generalisable [78]. The purpose of this study was to determine the variety of views and ideas of student teachers, and not so much what the most common views were in this research group.

Concrete actions to achieve a more 'ecologically sustainable school' sub-theme consisted of eight reduced expression groups. For this sub-theme, the material was quantified, and the number of student teachers who mentioned each group was indicated. This sub-theme was seen to answer the second research question (SQ2): In what ways would Finnish student teachers build a school culture to promote SD/SE? The sub-theme '*Sustainable development in school life*' was discussed in connection with research question 1 (SQ1), which emerged very strongly from the material. The school curriculum was seen to cover the day-to-day activities of the whole school to such an extent that the sub-theme could not be included in any of the formed themes. Therefore, it was treated separately.

In the clustering stage, the sub-themes were grouped in the abstraction stage according to who the active actor was and what the object of doing so was. At this stage of the analyses, the sub-themes were grouped on the basis of the observations that emerged during the clustering, i.e., who is the actor and what is the object of doing. Based on this idea, six basic themes emerged: elements influencing the school culture ('*Elements*'), work community and school culture ('*Work community*'), teachers' impact on students and teaching

(‘*Teachers’ impact*’), students in the centre of school culture (‘*Student in the centre*’), the relationship of non-school actors to the school culture (‘*Actors outside the school*’), and challenges in constructing a school culture promoting CCE/sustainability (‘*Challenges*’). In addition, one holistic theme ‘*SD in daily school life*’ was found.

The responses to the questionnaire were analysed partly qualitatively and partly quantitatively (Table 2). The results based on the closed-ended question were presented in a graph summing up the student teachers’ self-assessment of their ability to address the different aspects of CCE (SQ3). The analysis of the written answers to the open-ended questions included both theory-guided and inductive content classifications and, to some extent, quantification. The main aim was to identify challenges most commonly attached to aspects of CCE, as well as to teach and learn about CC (SQ3). The results of these classifications are presented with simple graphs.

Table 2. Analysis of the responses to the questionnaire by question.

Question	Type of Data	Analysis Method
Q1. Assess your own skills as a climate educator in relation to different aspects of CCE.	Eight aspects listed; ability assessed with nine-point Likert scale from very weak (=1) to very good (=9)	Visualisation of the frequency of choices classified into three categories: weak (1–3), moderate (4–6), and good ability (7–9)
Q2. Which aspects of CCE do you find most difficult to address in teaching? Why?	Free-form text based on the answers in Q1	Both theory-driven (aspects of CCE) and inductive content classification
Q3. What factors make it difficult to teach about CC?	Free-form text	Both theory-driven and inductive content classification
Q4. What factors can make it difficult to learn about CC?	Free-form text	Both theory-driven and inductive content classification

The reliability of the analyses was based on the stages of the data-based content analysis; they were carefully documented, allowing the origin of each conclusion to be traced from the data. This improved the reproducibility and reliability of the study [79]. Since the essay analyses were conducted by one researcher, the interpretation of the topic could affect the results of the qualitative study. Efforts have been made to reduce the impact of the interpretation on research results through systematic data processing, repetition of work stages, and regular documentation of work stages. Although objective research has been done during the research process, the researcher’s subjective experiences and perceptions still play a role in the reduction of expressions. Utilising two different types of the data collection (essay and questionnaire) adds to the reliability of the study. The foundation of the analysis on the questionnaire was designed in the earlier stage of this study process, and the methods’ description and results can be found in Yli-Panula et al. [75]. As the student teachers were filtered from the original data, and only a few questions were included in this study, all analyses for the responses to the questionnaire were repeated with the original data. The original thematic classes were used as a foundation, but they were refined and reduced, since not all the contents were found in the answers of student teachers. Due to the reduced size of the data set, the level of detail could also be increased. All classification decisions were thoroughly discussed with the whole group of authors.

4. Results

4.1. Issues Related to School Culture Promoting CCE Regarding Sustainability (SQ1)

4.1.1. Main Themes Revealed from the Data

Based on the data, six basic themes and one holistic theme were found to be important in implementing SE and CCE in the school culture (Figure 2). More detailed information on the themes is provided in the paragraphs below.

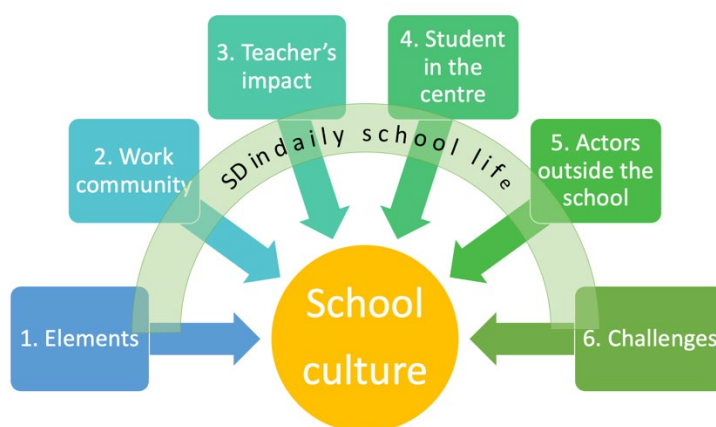


Figure 2. Issues related to school culture promoting climate change education for sustainability were divided into six basic themes identified from the essays. The theme ‘SD in daily school life’ was distinguished as its own theme, as it was seen as addressing school activities from a more holistic perspective than other themes. (SD = sustainable development).

4.1.2. Elements

The first basic theme ‘*Elements*’ consisted of 14 sub-themes that described issues influencing the school culture (Appendix A, Table A1). The 14 sub-themes included permanent factors, adaptation to the school community, and the process of school culture. First, permanent factors included issues that cannot be affected by students, such as the location of the school, budget, local culture, students’ backgrounds, the national curriculum, and the level of education. In addition, the values of teachers and the involvement of the whole school community in building an operational school culture were mentioned as elements influencing school culture. By ‘the whole school community’, the students referred to the school staff, the students, and their parents. Second, ‘Adaptation to school culture’ consisted of those community issues that can be seen as the basis for building a school operational culture. These sub-themes were involvement of the whole school community for a culture of action, the formation of community values, collaboration in the community, and an open atmosphere for discussion. The student teachers stated that every member of the community has an impact on community values, although the school community has the greatest responsibility for determining values. The communality was seen as an important factor in building school culture. According to the student teachers, an open discussion atmosphere should exist in the classroom between the teacher and the students, and at other levels, in collaboration between school and home and among school staff, as well as throughout the school community. An open discussion atmosphere was seen as a prerequisite for students and teachers to have the opportunity to create a sustainable school culture. In an open discussion atmosphere, students are encouraged to share their concerns and sorrows with adults. Third, ‘Process of school culture change’ included sub-themes related to the school culture itself. The student teachers believed that the change in school culture was a slow, step-by-step process based on anticipatory thinking. This reflects the student teachers’ views on the nature and adaptability of the school culture. In the future, society was seen to have an important role as a starting point for

changing and building school culture. There were many similarities in the responses of SSTs and PSTs. However, the issues of the first basic theme, *'Elements,'* were more numerous in the essays of the SSTs than in those of PSTs.

4.1.3. Work Community

The second basic theme, *'Work community,'* was formed around the interaction among the teachers and between the principal and the teachers. According to the student teachers, the school culture was built primarily in the work community under the leadership of the principal. The principal was seen to play a central role as a builder of the school culture, as the quote below explains.

"Usually, the principal alone has the biggest impact on the direction the school culture is heading. As a teacher, I would be the first to turn to the principal, who can outline the broad lines and issues important to the school together with the faculty" (Essay 8).

The principal, as a school leader and intermediary between the school and the municipal decision-makers, was felt to play a key role in changing the school culture supporting SE and CCE. According to the student teachers' views, changing the school culture without the involvement of the principal would be difficult. The role of teachers was also considered important in the development of the school culture to support CCE.

Regarding SE and CCE, the continuous evaluation and development of the school culture and common frameworks in the work community were considered important. The commitment of adults and the continued support of a work community were seen as prerequisites for development work. According to the student teachers, the school culture should be consciously and effectively modified, creating goals together and breaking down goals into sub-goals and into the level of everyday actions. The student teachers also thought that the initiation of the teachers into school action and into SD and continuing education could be ways to achieve the goals of SE and CCE.

Teachers' values and perceptions of CC were seen to have a direct impact on students' values and classroom practices. Teachers' personal reflection on their own values and activities was therefore considered fundamental, as was CC-neutral teaching. The material also highlighted ways in which an individual teacher can influence the construction of the school culture and the appearance of SD in school life, such as a climate-friendly class trip destination, inspiring other teachers to take part in climate events.

The student teachers considered the involvement of teachers in the work community a prerequisite for the formation of a functioning school culture. Cooperation between teachers was considered important. The student teachers felt it was important that the teachers collaborate with each other and agree on the importance of topics related to SD and CCE. According to the student teachers, an individual teacher can also influence school culture, as seen in the following quote:

"The opportunities to influence climate change education and learning alone stop at the door of our own classroom, but there is an opportunity among the whole school community to extend the new culture to the whole school and possibly even to homes and local communities" (Essay 4).

Thus, the teachers themselves were seen to be strongest as part of a prosperous work community where school culture could be developed together. The school culture was also defined in relation to the teacher from perspectives where the teacher was seen as more separate from the culture of action and the work community. According to these definitions, the teacher must follow the school culture, but it is up to them to decide how to implement it in their class. Again, the teacher was seen as having the opportunity to influence the school culture.

In the essays, SSTs presented more versatile issues concerning work community themes than did PSTs. They considered the relationship between the work community and the work culture through their own influence on the school culture and through the involvement of teachers. Based on their views, teachers and the principal were seen as

creators of a culture of action. School culture is built collectively in the work community, although the opportunities for action and the influence of an individual teacher are considered limited. The PSTs discussed the school culture and work community from the perspective of the individual teacher rather than from the perspective of the work community as a whole. PSTs considered that the role of the teacher as a promoter of SD and CCE in school is important, and the teacher should become familiar with SE and CCE. PSTs defined the relationship between the teacher and the school culture in such a way that teachers themselves decided how to implement the school culture in their own class, but they still had to follow the issues defined in the common school culture.

4.1.4. Teacher's Impact

The third basic theme, '*Teacher's impact*', describes the issues that affect students and teaching. It was very diversely represented in the essays. According to the student teachers, the behaviour and means of the school staff and especially the teachers regarding SD and CC were very important. The development of the students' relationship to nature including nature education and motivation for environmentally friendly activities were seen as an important part of a sustainable school culture. According to the student teachers' views, students could be motivated to do environmental activities by rewarding the desired behaviour, emphasising the importance of everyday activities, and increasing students' involvement. A nature trip or the possibility of sharing one's own ecological act with others were also considered a means of motivation. As a mediator of school values, the teacher was seen as having a conscious goal of influencing students' values and attitudes. Addressing climate anxiety was seen as an important responsibility for the teacher. The means to curb climate anxiety were to teach factual knowledge while maintaining hope and to reflect on active citizenship and inclusion in decision-making with students.

A variety of connections were identified between SE/CCE and teaching. Theme days were seen as an important part of teaching SD, although alone they were not enough to build a sustainable culture. The integration of SE and CCE in teaching was seen as crucial, i.e., it cannot be left only to a practical school culture. Student teachers felt that utilising the school's immediate environment and nature in teaching would help create a school culture that supports ideas for SD and CC mitigation. PSTs mentioned that trips and visits are good teaching methods in CCE.

The student teachers also considered how CCE should be implemented. It was important for a teacher to conduct teaching sensitively and to promote students' mental well-being. Taking care of the students' mental well-being was also seen as a central aspect in creating a school culture of SD. It was hoped that teachers would spread hope in connection with tackling climate anxiety and the teacher should encourage students to look to the future with hope. CCE was seen as particularly important in upper secondary school, where young people became more independent and took more responsibility for their own decisions.

Concerning teachers' impact on students, SSTs highlighted tackling climate anxiety, an optimistic attitude towards the future, and the importance of CCE in upper secondary school.

4.1.5. Student in the Centre

The fourth basic theme, '*Student in the centre*', included specifically the sub-theme student's participation and encouraging action. Many student teachers saw participation as, for example, listening to students' suggestions and opinions and providing opportunities for participation and decision-making. In addition, activities in school student unions were seen as a form of participation concerning SD, and unions with a special focus on SD and CC could be created. One student teacher wrote (Essay 7):

“In my opinion, the participation and influence of students in the sustainable development of school activities through student organizations is an important aspect of the school’s operating culture.”

In another sub-theme, active citizenship and civic engagement, the student was at the centre of the school culture. According to student teachers’ views, active citizenship should be practiced at school. Influencing school decisions was seen as part of active citizenship at school as well as student-centred activities as part of SE and CCE. Considering the students’ own interests and ideas was seen as motivating the students to think deeper and work creatively. Student-oriented CCE was perceived to start in their immediate environment, as one student teacher verbalised it:

“Especially with primary school students, it is useless to go and talk about global emissions problems or waste rafts. They need to discuss with them about actions, that they themselves can influence through their own actions, right here and now. Student-based climate education starts in the student’s immediate environment and takes into account the students’ own interests” (Essay 10).

Students should have the opportunity to familiarise themselves with a new school culture, and students’ values should be considered in developing the school culture. When introducing the new school culture regarding SD and CC, adults such as school staff should discuss new practice and ways of working and their rationales with students. Consideration of the students’ set of values was felt to be important in promoting the students’ growth into an environmentally conscious person.

In contrast to other basic themes under the fourth basic theme, *“Student in the centre,”* and under the fifth basic theme, *“Actors outside the school”*, described below, the PSTs presented a wider variety of ideas than SSTs in their essays. PSTs emphasised the importance of student orientation, considering students as introducing a new working culture and utilising sensitivity in implementing CCE. SSTs pointed out that, in all activities, a teacher should consider students’ values.

4.1.6. Actors Outside the School

The fifth basic theme, *‘Actors outside school’*, included cooperation between school and home, as well as cooperation with other actors outside school and school visits. The school–home collaboration was seen as supporting the building of a school culture. Conflicts between action and behaviour between school and home were seen as problematic and uncomfortable. Student teachers also considered ways to encourage students to act sustainably at home.

“These are issues which students are also asked to do at home: keeping phones out of the charger unnecessarily and unplugging the charger when not in use.-The same applies to the above-mentioned aspects of food loss and other material loss: it is not sustainable if there are completely different practices at school and at home in these matters... Students should not be encouraged to instruct their parents on climate issues but should be given the tools to discuss matters with their parents” (Essay 19).

Non-school actors refer to all kinds of associations, organisations, and companies with which the school can cooperate; for example, various non-governmental organisations emerged from student teachers’ essays. Trips from the school to a wastewater treatment plant or a farm, for example, were also considered to promote SD. Cooperation between schools was seen as an opportunity to get to know different living environments. Many student teachers considered inviting visitors to the school in their essays. There were no meaningful differences between the essays of SSTs and PSTs on this basic theme. When considering actors outside the school, the PSTs highlighted the role of visitors in the CCE.

4.1.7. Challenges

The sixth basic theme, ‘Challenges’, included the student teachers’ views on potential challenges in CCE, in changing the school culture, and in changing the school culture to support SD. Negative attitudes and behaviour towards CC in students’ homes were seen as a potential challenge. This was believed to be more common in rural areas than in cities.

“I come from rural area, I have a strong impression that people who have a job e.g., concerning motor vehicles or a large part of their livelihoods e.g., agriculture, have a strong sense of denial or even hatred for those who try to slow it down. Therefore, teaching about climate change in rural areas may be more challenging, as there may be attitudes towards the whole subject in children’s homes” (Essay 1).

From the point of view of the SSTs, the training of PSTs was seen as insufficient for organising CCE. In their essays, SSTs felt that the responsibility for CCE would fall on the responsibility of biology and geography subject teachers in secondary schools. Changing school culture was perceived as difficult, especially for new teachers in the work community. Change requires commitment and purposefulness, and the further away the school culture is from the desired goal, the more difficult it is to achieve a culture that supports SD. In their essays, the student teachers noted that SE and CCE also appeared to be easily left behind by other activities in the school.

4.1.8. Sustainable Development in Daily School Life

The theme ‘SD in daily school life’ was distinguished as its own theme, as it was seen as addressing school activities from a more holistic perspective than other themes. According to the student teachers, SD should be strongly reflected in everyday school life, not only in teaching or theme days. This also means that teaching or an SD plan of the school should not conflict with the daily routines of the school. The various approaches to SD should be integrated into routines and should be easy to participate in. To change the school culture to support SD, everyday climate actions were seen as imperative. School practices were considered to promote a value base to act and support CCE. According to student teachers’ views, school culture is formed and created in everyday life, which is why everyday practices and routines were seen as so important.

4.2. Ways to Create the School Culture to Promote SD/SE and CCE (SQ2)

Concrete actions to promote ecological sustainability in schools were seen as the primary means of creating a school culture for SD. Almost every student teacher mentioned some concrete ways in which ecologically SD and environmentally friendly activities could be integrated into school life. Only four student teachers did not mention specific everyday actions in their essays. There were nine major groups of concrete means, in addition to which there were a few individual mentions. The groups were recycling (in 16 essays), food education [13], economical use of materials [11], saving electricity [8], ecological mobility [7], recycling [5], tackling littering [3], responsibility for school procurement [3], and water saving [2]. In their essays, SSTs mentioned concrete ways to achieve more ecologically sustainable schooling 27 times, while PSTs mentioned these 40 times. The concrete means that one individual student teacher mentioned in their essay were the support of the domestic, the usefulness of handcrafted products, natural materials in the arts, and raising money for charity.

Mentions of recycling included acquiring recycling containers for school premises, teaching students how to recycle, and making recycling meaningful to students. Food education was seen also as an important way to achieve ecological SD in schools. Many different means were proposed to reduce food waste, such as discussing the subject with students, familiarising them with the stages of food production, thus increasing students’ appreciation of food, and various practical arrangements, such as limiting the amount of food taken at one time. Student teachers also considered increasing the proportion of vegetarian, vegan food organic, and local food in school meals.

The sub-theme of the economical use of materials includes all mentions of saving materials used in schools. Reducing the use of paper by limiting copying and printing was the most frequently mentioned means of saving materials at school. In addition, some mentions were made of obtaining recycled books, sparing notebook work, and the sustainable use of school equipment, such as exercise equipment, so that they last a long time. Saving electricity was frequently mentioned.

Ecological mobility such as walking or cycling was suggested in the essays for both teachers and students, especially concerning school trips. However, many student teachers pointed out that travelling to school by bus or school taxi should not be frowned upon, as families have different situations, and the length of travel to school limits their options. According to student teachers, walking on school trips, for example to a swimming pool, should also be favoured instead of taking a bus.

Ideas related to recycling and litter were further refined through examples. The utilisation of recycled materials in teaching was mainly mentioned in connection with arts and crafts subjects. According to the student teachers, recycled materials in music can be used to build various scrap instruments. Intervention in littering was approached from two different perspectives. The first was to condemn littering at school and its surroundings. Second, the collection of rubbish with students from the school environment or during trips was also mentioned. According to the student teachers, responsible procurement should be reflected in all major purchases, starting with pencils, and the goods purchased by the school should also be produced responsibly and sustainably. The last concrete method to achieve ecological schooling that emerged in several essays was to save water. None of the student teachers justified or explained water saving in more detail.

In addition, there were individual mentions of the following topics: favouring domestic production, proper use of handicrafts, use of natural materials in arts, and fundraising for charity. Favouring domestic production means teaching consumption and emphasising the preference for Finnish products at school. The proper use of handicrafts was seen as important for avoiding wasting materials. The use of natural materials in art was thought to reduce consumption. Raising money for a good cause came up in connection with various projects that could be carried out with students at school. Fundraising was expected to make students feel that they could make a difference.

4.3. Student Teachers' View of Their Own Ability to Act as Climate Educators and the Challenges They See in CCE (SQ3)

The student teachers found their own ability to act as climate educators relatively good, but there was some variation between the assessed aspects (Figure 3). They felt the greatest certainty in developing thinking skills related to CC. Additionally, increasing and structuring knowledge, awareness of barriers hindering action, and connecting CC to identity, values, and worldview, were considered rather easy to address. Action-based aspects included encouraging action against CC, increasing motivation and participation, and guidance for future divided opinions. The most difficult aspect to address was increasing hope and dealing with the variety of emotions related to CC.

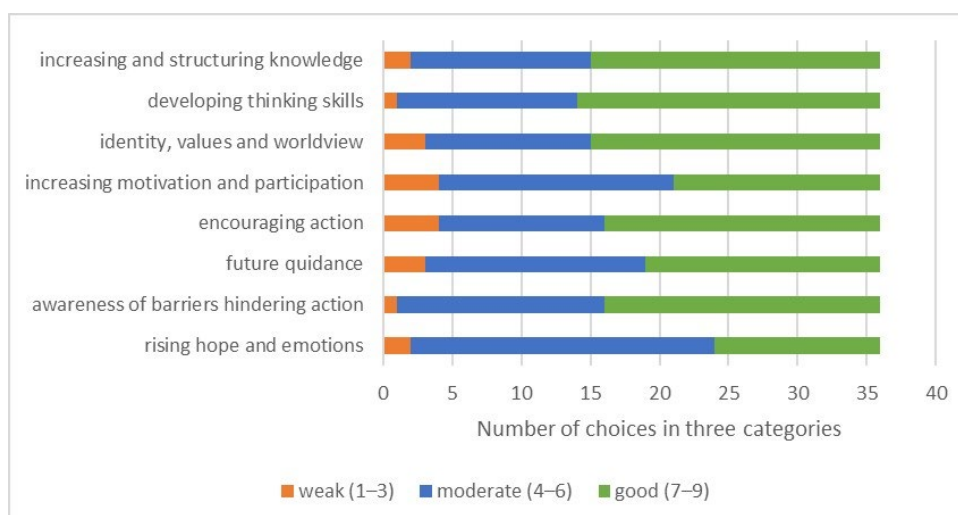


Figure 3. Student teachers' ($n = 36$) views of their own ability to address various aspects of climate change education (aspects based on the bicycle model).

When asked about the most difficult aspects to address in teaching, the student teachers mainly referred to one or more aspects of CCE but also suggested difficulties not related to these aspects (Figure 4).

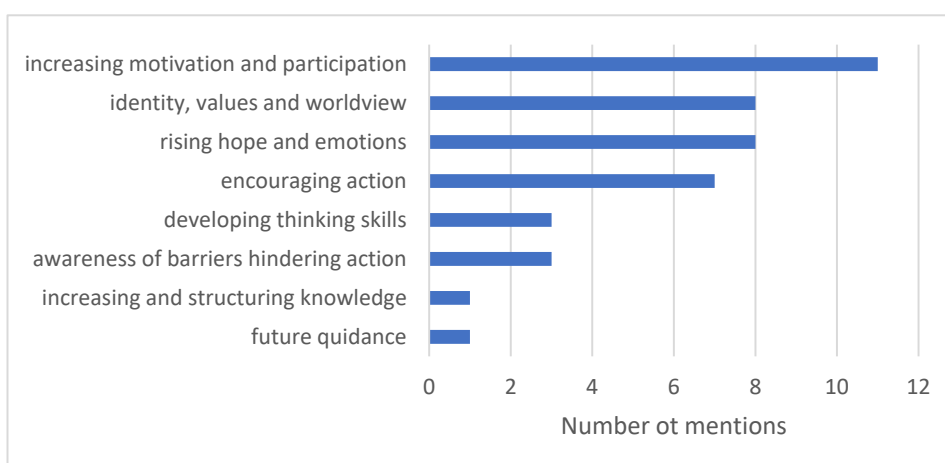


Figure 4. Most difficult aspects of climate change education to implement in teaching. The aspects could be identified from 32 responses, and more than one aspect could be found in some responses.

Increasing motivation was mentioned in 11 responses, and the difficulties were associated with students' general motivation to study and interest in climate issues. Values were the second most mentioned issue, and in particular, conflicting or divergent values (between teacher and students or among students) were perceived as challenging. Some student teachers felt that the whole aspect "identity, values, and worldview" was too big to handle or too vague to grasp. Increasing hope or dealing with emotions was mentioned frequently as difficulties. Many of the student teachers highlighted their own hopelessness and anxiety, as well as the generally grim atmosphere created by the media. One did not feel comfortable including any discussion about emotions in teaching. There were many different factors that the student teachers found to hinder encouraging action against CC, such as lack of concrete tools for teaching or ways to put knowledge into practice, lack of students' willingness to act, negative attitudes of the students' families, or weak empowerment of the individual. The blaming attitudes of some advocates of a green lifestyle were also seen as negative.

The remaining aspects gained less attention and had a variety of justifications. The willingness to develop thinking skills was considered individualistic, and the transformative thinking required in making real changes was seen as very difficult to teach. In relation to the awareness of barriers, one was worried about increasing students' anxiety, and one thought that taking up barriers also requires offering solutions that might not be easy to find or implement. Increasing and structuring knowledge was considered difficult if the subject was too general (e.g., languages).

The student teachers also listed other challenges in CCE, such as how to remain value-neutral and, at the same time, guide students in the "right" direction, and how to digest and critically assess the flow of information and focus on the essentials. Some took up the fact that teachers should know their students in order to succeed in the variety of aims of CCE.

The factors student teachers found to cause challenges in teaching about CC were mainly related to the attitudes and values of the students and their inner circle, including families and friends (Figure 5). All together, 20 of 36 student teachers mentioned these challenges and referred more specifically to climate change denial, a negative attitude towards climate discussion, indifference, consumption orientation, and selfishness. The second most common topic (10 mentions) was the need for media criticality or, more generally, the critical assessment of the reliability and relevance of data and information related to CC. The student teachers were worried about false news, as well as about the ability of teachers and students to distinguish relevant and reliable information. General feelings of inadequacy, or more specifically lack of knowledge or competence to teach about CC, were mentioned several times (7 mentions). CC was also seen as too broad and complicated a phenomenon to be adequately or comprehensively taught in the context of one subject. Many student teachers [7] mentioned resources, mostly time, as a difficulty in CCE. There are ambiguous goals in all subjects and only a restricted time to teach. Additionally, dealing with different emotions or climate anxiety was mentioned in several responses (7 mentions) but mainly without clarification or further contextualisation. The mentions of discouragement may be connected to anxiety, but the mentions [3] here were associated with a lack of workable solutions (to CC), hopelessness about the current situation, or lack of individual empowerment. Other difficulties mentioned [3] were related to politics and decision-making, to overemphasising CC in society, and to unclear responsibilities related to teaching about CC.

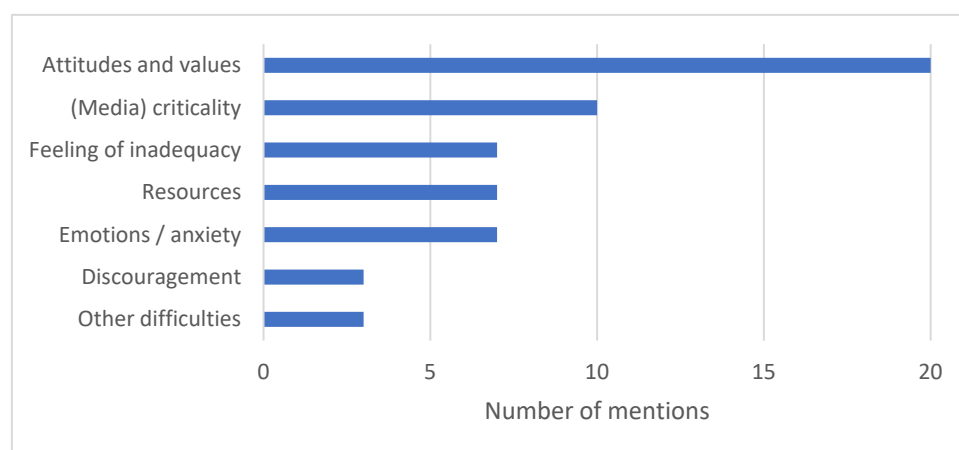


Figure 5. Factors that cause challenges in teaching about climate change.

The last question was related to the factors that cause difficulties in learning about CC (Figure 6).

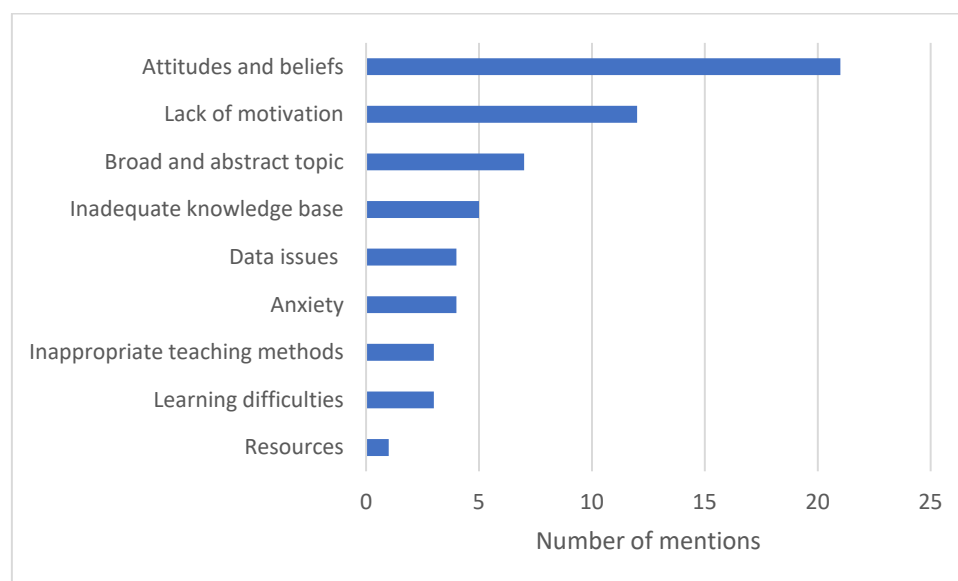


Figure 6. Factors that cause difficulties in learning about climate change.

Similar to the difficulties in teaching, students' attitudes and beliefs related to CC were identified as a main cause of hampering learning about CC (22 mentions). These attitudes were thought to be partly connected to a lack of motivation or interest in CC (12 mentions), and CC as a broader topic was considered to be distant to the students, not part of their everyday lives, and not a topic they would like to prioritise. The third most frequently mentioned thing was CC itself as a phenomenon (7 mentions). It was seen as too broad and abstract a topic with long lists of viewpoints and difficult concepts, and the student teachers mentioned (5 mentions) that the students might not have a strong enough knowledge base to study such a broad and complex topic. Additionally, the quality and quantity of data were seen as problematic (4 mentions). The data issues were mainly associated with false data and news, as well as fragmented and unstructured information. Only a few mentions were related to inappropriate teaching methods or learning difficulties (3 mentions of each). The methods to teach about CC were seen as rather boring, and the learning difficulties were associated with difficulties in perceiving and structuring large entities and poor media literacy. Resources were mentioned only once in this context.

5. Discussion

This study focused on student teachers' views on the factors influencing the construction of school culture to promote CCE and SD. In the study, the following six basic themes were highlighted in student teachers' answers: *'Elements'*, *'Work community'*, *'Teacher's impact'*, *'Students in the centre'*, *'Actors outside the school'*, and *'Challenges'*. In addition, the holistic theme *'SD in daily school life'* was found.

Schoen [30] divided the school culture into four areas: (a) professional orientation, leadership, and management; (b) teaching; (c) learning; and (d) student-centred activities—how the student's needs are considered at school [30]. The same thematic areas can also be found in the views of the student teachers in this study but structured differently. The basic theme *'Work community'* that emerged in this study can be placed in the areas of professional orientation and leadership and management. The basic theme *'Teacher's influence on the student and teaching'* can be placed in the areas of teaching and learning. *'Student in the centre'* was the only theme to be found directly in Schoen's [30] division under the title student-centred activities. In this study, the basic theme *'Student in the centre'* covers the central role of the student in the school culture. The result supports Schoen's [30] division. The basic themes *'Elements'*, *'Actors outside the school'*, and *'Challenges'* were not

reflected in Schoen's division. In contrast, in Schoen's division, leadership and management, that is, the activities of the principal, play a much more significant role than in the results of this study. The student teachers pointed out that the role of the principal is significant as a builder of the school culture. The central role of the principal has also been identified in previous studies in connection to school development and transformative leadership [80,81]. Saloranta [3] confirmed the importance of the principal in implementing sustainability education in schools. The student teachers did not specify the activities of the principal in much detail. According to Salumaa [82], principals were, on average, more eager to change the school culture than teachers. These studies emphasise the importance of the principal as a driver of change in school culture. According to Loukola [83], the commitment of the school leader or principal to transformative leadership and the definition of responsibilities are paramount.

The elements influencing the school culture were, for example, the formation of common values in the school and the values of teachers. According to Launonen and Pulkkinen [84], values are reflected in the school on three levels: the culture of action, interaction, and the content of teaching. In student teachers' views, the teacher values appear at all of these levels, and according to student teachers' views, not just teachers' values but also the values of the school should be reflected in these levels. Therefore, the values must be considered in the daily life of the school to promote SD (e.g., concrete ways to achieve a more ecologically sustainable school life) in the activities of the staff and in teaching. One of the important issues raised by the student teachers was the participation of students. However, the student teachers did not specify what they meant by participation. There were a few mentions of the activities of the Environment Committee and of listening to the voices of the students for the development of the school and school culture. This shows that at least some of the student teachers understood and appreciated participation and collaboration. These issues are important for achieving and maintaining sustainability [18]. A school can nurture active citizens precisely through its participation culture [85]. According to Hahn [86], the more conversational and open the school is to students, the readier students are to influence society. For a participatory culture to develop, students need space, meaning a time and place available to them for participatory purposes [35,85]. Additionally, the student teachers felt that an open atmosphere of discussion was important in building a culture of action. An open discussion atmosphere promotes the emergence of a community spirit [87], which is also one of the factors promoting SD highlighted by student teachers. In addition, the formation of common values emerged from the students' writings, although the means of creating common values were hardly defined. Ronkainen [88] stressed that values should be concretised and reviewed regularly when developing a community operating culture.

Values were raised among several themes, especially in the basic theme '*Teacher's impact*.' Launonen and Pulkkinen [84] revealed that a teacher can create a growth environment in a school where the students can be "spoken by values," as a result of which personal values develop. This perspective was not directly raised by the student teachers, but the teacher was seen as an important actor in implementing the common values of the school and enabling students to act on them. Student teachers believe that teachers should also consider students' values. This idea was supported by Reid [50], who stated that the norms and values prevailing in society influence school culture. According to the student teachers, the teacher was not as active and influential as in Launonen and Pulkkinen [84]. The student teachers saw the teacher as an example and a follower of values but not as a significant developer of great value experiences and values. A non-ecological commute (e.g., using one's own car) was mentioned as incompatible with the SE and undermining the teacher's credibility. Student teachers did not present any reflection on the teacher's relationship with nature, but the need to develop the students' relationship with nature was identified. Even though the student teachers highlighted the importance of the values and open discussion in their essays and in their responses to the questionnaire, they also found it difficult to handle conflicting values and worldviews.

School culture has been found to be promoted by positive issues, such as a collaborative working environment and opportunities for problem solving and sharing experiences, while negative factors, such as hurrying, can hinder or prevent the development of school culture (e.g., [4,89]). In the basic theme '*Students in the centre*', student teachers considered the participation and involvement of students important in creating a sustainable culture. For this to be possible, the learning environment must allow the student to be at the centre of his or her learning [36]. Additionally, in Henderson and Tilbury [90], the involvement of the whole school in SD projects was found to be an important factor in increasing sustainability in the community. Student teachers mentioned a few techniques to increase student involvement, one of which was student union activities. According to the Finnish National Agency for Education [51], student union activities and SD activities can promote cooperation and interaction. Opportunities for democratic dialogue and participation must be created [51], which is exactly what student union activities can offer. Student teachers' findings were supported by the study of Lehtonen et al. [46], which presented that active agency can only be learned in practice when the activities can take place in the real world outside the school and hence support a sustainable school culture. However, in their responses to the questionnaire, student teachers identified increasing motivation and participation as the most difficult aspects of CCE to teach. They felt that negative attitudes or indifference among students made it difficult to involve them. They also assessed their own ability to address motivation, participation, and dealing with emotions in teaching as weaker than their ability to address other aspects of CCE. In the essays, participation was strongly linked to social sustainability, of which education and training were important aspects. Education and training can create the conditions for understanding the significance and effects of one's own activities [91], which involve active citizenship and civic education. Experiencing the issue on one's own also supports students' initiative and responsibility [50].

Under the basic theme '*Actors outside the school*', student teachers brought up the collaboration between home and school as important in building a school culture that supports sustainability. This result is in line with the study of Rautiainen [87], who determined that investing in cooperation between home and school is the best way to achieve a community school culture. The idea of transferring school culture from school to home also emerged in this study, which works best if the school-home collaboration works well. A child's attitudes and values often form early on, and the home plays a major role in shaping them [92]. Indeed, the values of home and school may differ, emphasising the importance of an open dialogue and collaboration. In the responses to the questionnaire, the student teachers repeatedly mentioned that they find the conflicting views about CC and CCE originating from students' homes and their inner circle hampering teaching and learning about CC and the pursuit of sustainability.

In the view of student teachers, for example, local organisations or local food producers can support the creation of a sustainable operating culture. Visitors from various quarters were also thought of as having an impact on promoting SD. Hearing different experiences and perspectives regarding sustainability issues can be seen to increase discussion and critical attitudes towards prevailing thought patterns. Awakening a critical attitude towards general consumption habits and thought patterns is one of the goals of climate education [44,45].

The basic theme '*Challenges*' included only a couple of ideas concerning the formation of a school culture that supports sustainability and CCE. The challenges of CCE were seen by SSTs as being due to a lack of knowledge and skills of PSTs to deal with CC, which, in turn, was seen as a result of inadequate training for organising CCE. In their essays, they felt that the responsibility for CCE would fall on biology and geography subject teachers in secondary schools. This study did not reveal student teachers' doubts about their own skills or perceived shortcomings in their own education. Instead, the previously mentioned view of the lack of skills of PSTs from the perspective of SSTs emerged. The result thus differs for SSTs from a previous study by Yli-Panula and others [93], which showed

that the majority of SSTs did not receive sufficient information about sustainable pedagogy in their studies. In their responses to the questionnaire, student teachers were somewhat worried about the quality of data related to CC and the teachers' and students' skills in critical media literacy and their ability to focus on the essential information. Some of the student teachers also mentioned the complexity and scale of SD and CC, and they saw the feeling of inadequacy or lack of competence of the teachers as causing difficulties in teaching about CC. However, they still assessed their own competence to be relatively good. One of the challenges, according to student teachers, was that changing the school culture to support sustainability was found to be more difficult the greater the difference between the prevailing and desired school culture. According to Arola [94,95], the development of a school culture is a change in established practices that can easily create tensions. Indeed, many of the student teachers pointed out that a culture of action should develop gradually over time.

The work community played an important role in constructing school culture according to student teachers' views. Thus, at least the existence of a collegial and collaborative school culture has been noticed among student teachers, which refers to positive issues of school culture [4].

However, it was also pointed out that changing the school culture is difficult due to the permanence of the old school culture or joining the school's work community as a new member. According to Rautiainen's research [87], student teachers' conceptions revealed that they make little effort to influence the school culture but adapt to the tradition of the Finnish school. This may not have emerged in this study due to the fact that, in the essay assignment, the student was placed directly in an active role without being asked further whether they felt that they could influence the school culture, and the topic of sustainability could have had an influence. In the responses to the questionnaire, there were only scattered mentions related to the teachers' contribution in changing the school culture. Lack of time or other resources, lack of workable solutions, and lack of individual empowerment were mentioned a few times but merely in the context of teaching. In a previous study by Yli-Panula and others [48], Finnish student teachers expressed an interest in participating in sustainable decision-making in schools; thus, the willingness to participate and involvement in the work community in school exists. The role of the principal was seen as significant in terms of a change in the school culture, which is in line with Saloranta's [3] study, according to which the principal acts as a pedagogical and financial enabler for ESD.

6. Conclusions

This study aimed to determine Finnish student teachers' views on the factors that are important in implementing CCE in school culture and their views on their own ability to promote CCE.

In this study, we found six basic themes in student teachers' answers: *'Elements'*, *'Work community'*, *'Teacher's impact'*, *'Students in the centre'*, *'Actors outside the school'*, and *'Challenges'*, and one holistic theme *'SD in daily school life'*. All themes emphasised professional orientation, leadership, and management, teaching and learning, and student-centred activities concerning SE and CCE.

We understand that the main lesson of this study is related to the challenges related to the implementation of transformative change in school culture and sustainability education. This is a complex task with particular difficulties, such as understanding the concepts of sustainable development, sustainability, and transformative education in different institutions. Additionally, the school culture differs across schools, and pedagogical concepts are expressed in various ways due to different traditions and cultural backgrounds.

To the best of our knowledge, no previous studies on this topic have been carried out in Finland. Understanding the views of student teachers—the future teachers and builders of the school culture—on CC(E), sustainable development, and a sustainable future is very

important and worthy of study. From a practical point of view, we hope that our study at least provides ideas on how to use the results that could promote transformative change and sustainability aspects in teaching to develop curricula in SE and CCE.

As for the trustworthiness of the study [96], the design and implementation of the study were negotiated among the researchers throughout the research process. In order to ensure the reliability of the analysis process, researcher triangulation was an essential part of our analysis process. The study procedures were carefully documented to review and verify the data throughout the study. The data analysis was carried out carefully, and the researchers discussed the analysis process together. The results were also compared with those of previous studies.

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Appendix A

Table A1. Results in relation to school culture concerning the essays written by student teachers. (Main themes refer to the result chapters and sub-themes to the more detailed contents of each theme).

Main Theme	Sub-Themes
<i>1. Elements</i>	Sustainability aims and the school curriculum, location of the school, school budget, city/municipality, students' background, local culture, school grade, teachers' values
1.1 "Permanent" factors	
1.2 "Adaptation to school community"	Involvement of the whole school community for a culture of action, formation of community values, collaboration, open conversation atmosphere
1.3 "Process of school culture change"	Pace of change in school culture, anticipatory thinking for the future school culture
<i>2. Work community</i>	Collaboration of the teachers; familiarising of the teachers; own influence in the work community; opportunities for the teacher alone to influence; teacher involvement; the role of the principal, teachers, and principal of the school as creators of school culture; teachers' personal reflection on their own values and activities; building a culture of action in the work community; a teacher as a promoter of sustainability in school; values of the school
<i>3. Teacher's impact</i>	Exemplary school staff for students, developing the student's relationship with nature, motivating students with environmentally friendly activities, influencing students'

	values and attitudes, theme days and short campaign, climate education and sustainable development in education, exploitation of nearby nature, art as a tool for climate education, utilisation of school environments, global education, entrepreneurship education, class trips/excursions, climate education in sensitive ways, taking care of the student's mental well-being
4. Student in the centre	Active citizenship and civic engagement, student orientation, taking students into account in introducing new ways of school culture, consideration of the student's world of values
5. Actors outside the school	Cooperation between home and school, cooperation with actors outside the school, visitors to the school
6. Challenges	Combating climate change, challenge in changing the school culture, challenges of creating a school culture to support SD (sustainable development), challenges in CCE (climate change education)

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