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Geography Teachers and Climate Change: Emotions About Consequences, Coping Strategies, and Views on Mitigation

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It has been indicated that teachers' emotions about climate change and their views on mitigation influence their instruction and students' engagement in mitigation actions. The aim of the study is to explore Finnish secondary geography teachers' emotions about the consequences of climate change, their strategies for coping with these emotions, and their views on climate change mitigation. Inductive content analysis of data collected through individual interviews (N = 13) was performed. The teachers used emotion-focused, problem-focused, and meaning-focused strategies to cope with negative emotions. They ascribed responsibility for mitigation to politicians and individuals. Commonly, the teachers took elementary actions to reduce their impact on the climate. Only part of the teachers realized that they could contribute through teaching. With the ultimate aim of promoting students' engagement in climate change mitigation, guidelines pertaining to education that targets teachers' emotions, coping strategies, and their views on mitigation are presented.

Keywords: climate change education, global warming, in-service teachers, secondary school

INTRODUCTION

The research community has concluded that climate change represents an urgent threat to human and natural systems (The Intergovernmental Panel on Climate Change, IPCC, 2014a) and that an effective and immediate response to climate change is required to prevent hazardous human interference with the climate system (IPCC, 2014b). IPCC has highlighted the necessity of countries, companies, communities, and individuals worldwide to participate in climate change mitigation, which is defined as human intervention to reduce the sources or enhance the sinks of greenhouse gases. On the basis of the scientific perspective on climate change, represented by the IPCC reports, the first-ever global agreement on limitation of global temperature rise was adopted at the Paris climate conference in December, 2015 (United Nations Framework Convention on Climate Change, 2015). The Paris agreement can be seen as a milestone marking the starting point for collective, serious efforts to tackle

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climate change.

In Finland, and other countries in Northern Europe, climate change has resulted in strong warming, especially in winter, as well as in increases in annual precipitation and in extreme river discharges. For example, windstorms, algal blooms, invasive species, plant diseases and vector- and food-borne diseases are likely to become more frequent in this region as a consequence of climate change (IPCC, 2014a). The Finnish government has recognized the threat that climate change represents and carbon neutrality by 2050 has already been an aim for the Finnish energy and climate strategy for several years (Ministry of Employment and the Economy, 2013). However, thus far, public inactivity in the face of climate change has been prevalent in Finland (Finnish State Administration's Steering Group for Climate Communications, 2015) as in other countries (Norgaard, 2011).

Researchers have argued that educational institutions have subsidized the collective inability to act on climate change by failing to teach responsibility and engagement (Saylan & Blumstein, 2011). Both Finnish (Lehtonen & Cantell, 2015) and international researchers (e.g. Anderson, 2012; Bangay & Blum, 2010; Fahey, 2012; IPCC, 2014b; Saylan & Blumstein, 2011) consider education an untapped opportunity to combat climate change. According to these researchers, the ultimate aim of climate change education (CCE) should be to effect personal change and societal transformation with positive impact on the climate. Likewise, as a mitigation strategy, the Paris agreement calls for improvements in climate change education (United Nations Framework Convention on Climate Change, 2015).

In order to meet researchers' and politicians' demand for development of CCE, it is important to have insight into teachers' perceptions concerning climate change. A previous study has indicated that teachers' emotions about climate change influence their instruction (Lombardi & Sinatra, 2013), and it has been shown that if teachers have solution-oriented views, the generation of corresponding views among students is facilitated (Ojala, 2015a). This study of Finnish geography teachers' emotions about the consequences of climate change, their coping strategies, and their views on climate change mitigation is intended to provide guidance on the development of education of in-service and pre-service CCE teachers.

Emotions about and coping with the climate threat – an educational perspective

Emotion researchers tend to adopt a broad view on emotions, as evident from the commonly used definition of an emotion as an individual's conscious or unconscious appraisal of an event in the environment, which involves several subcomponents such as subjective feelings, cognitive and physiological changes, and action tendencies. The emotion is experienced as positive if the situation is evaluated as supportive of one's own concerns, and as negative if the situation is evaluated as suppressive (Frijda, 1986). Previous studies show that secondary school students generally experience negative emotions, such as worry, fear, sadness, guilt, anger, and helplessness, about climate change (Boyes et al., 2014; Chhokar et al., 2012; Ojala, 2010; Pettersson, 2014). Students' negative emotions might be induced by corresponding emotions of teachers, and they may result in disengagement from the climate issue (Ojala, 2015a). However, to the author's knowledge, there are no published studies focusing on teachers' emotions about the consequences of climate change, up to now.

To handle negative emotions, or cope with threats, people use different kinds of strategies. Lazarus and Folkman, who developed a well-known coping theory (1984), distinguish between two ways of coping: First, emotion-focused strategies are about soothing and getting rid of negative emotions. For example, denying and de-emphasizing the threat are emotion-focused strategies. Second, problem-focused

strategies concern strategies to do something about the problem causing the negative emotions. Examples are planning and taking action to solve the problem. A third main way of coping, meaning-focused coping, has been described by Park and Folkman (1997). Meaning-focused coping involves strategies whereby one acknowledges the threat but develops a positive perspective and activates positive emotions. Such strategies are particularly important in situations that cannot be easily remedied (Folkman, 2008). Secondary school students have been shown to use all these three main ways of coping with negative emotions concerning climate change (Ojala, 2010, 2012a, 2012b; Pettersson, 2014). Problem-focused and meaning-focused coping are positively related to students' pro-environmental behaviour, whereas students who de-emphasize the seriousness of climate change behave less pro-environmentally (Ojala, 2010, 2012b, 2012c).

The Finnish Climate Panel has recommended that CCE pays attention to emotions (Lehtonen & Cantell, 2015), and Roeser (2012) has argued that communication about climate change should consider emotions as a basis for moral reflection and motivation for a climate-friendly lifestyle. Teachers need to listen to and consider students' emotions about climate change. Through verbalizing and discussing emotions that students experience with respect to climate change, those emotions can be transformed into criticism and aspiration for change (Ojala, 2013a). When discussing and handling emotions in the classroom, which has not been done thus far according to students (Pettersson, 2014), the teachers' own emotions are essential. Likewise, the teachers' strategies for coping with their own emotions about the consequences of climate change are important, because there are indications that students' coping strategies are influenced by teachers' coping strategies (Ojala, 2015a). As a prerequisite for success in promoting problem-focused and meaning-focused coping by students, teachers themselves need constructive strategies to cope with their emotions about climate change (Ojala, 2012a, 2012b, 2015a).

Views on climate change mitigation – an educational perspective

Young people of today will be decision-makers and actors in society at a time when drastic mitigation measures are required. Therefore, it is important to strive for engaging the youth in climate change mitigation. In agreement with that ambition, CCE teachers need to depict united efforts to mitigate climate change as important and productive, since previous studies have highlighted that students' willingness to act is promoted by perceived relevance of climate change mitigation and by belief in themselves and other societal actors to change the status quo (Hermans & Korhonen, in press; Ojala, 2012c, 2013b, 2015a). A study by Grahn (2011) has shown that teachers find climate change mitigation necessary and consider politicians and individuals responsible, but more detailed literature about teachers' views on climate change mitigation in general is, to the authors' knowledge, not available.

In the efforts to engage the youth, modelling of sustainable behaviours by teachers is considered a motivational tool with great potential (Chawla & Flanders Cushing, 2007; Redman, 2013; Saylan & Blumstein, 2011). Worryingly, it has been indicated that pre-service teachers are unaware of their own role in climate change mitigation (Lee, Chang, Choi, Kim, & Zeidler, 2012), and their willingness to perform mitigation actions that can involve personal inconvenience is limited (Ambusaidi, Boyes, Stanisstreet, & Taylor, 2012; Ratinen, 2013). If the same applies to teachers, their potential as role models for climate-friendly behaviour may be reduced. However, research about teachers' views on their own role in climate change mitigation is scarce.

Current study

First, the study aims to fill a gap in the literature about teachers' emotions and coping strategies regarding climate change. A motive for the study is the position in CCE ascribed to emotions and coping strategies, and indications of the impact of teachers' emotions and coping strategies on instruction and on students' engagement in climate change mitigation. Second, the study is intended to provide insight into teachers' views on climate change mitigation, which are relevant because of their connection to students' willingness to engage in mitigation.

In Finland, in both the current and the reformed national curricula, geography is the subject that deals explicitly with climate change (Finnish National Board of Education, 2004, 2014). Geography teachers in grade 7–9 are considered to shoulder most of the responsibility for CCE in compulsory school, and therefore, they were selected as respondents in this study. The purpose of this qualitative interview study is to explore Finnish geography teachers' emotions about the consequences of climate change, their strategies for coping with these emotions, and their views on climate change mitigation. The following research questions are addressed:

1) What are geography teachers' emotions about the consequences of climate change and what strategies do the geography teachers use to cope with these emotions?
2) What are geography teachers' views on climate change mitigation in general?
3) What are geography teachers' views on their own role in climate change mitigation?

METHOD

The study applies a phenomenographic research design. In phenomenography, the aim is to study the different ways in which people perceive a phenomenon in the world around them (Marton, 1981). The purpose of the current study is in line with that aim.

Participants

Geography teachers (N = 13) handling classes of grades 7–9 from all Swedish-speaking areas of Finland[1] were selected as respondents in this study. Selection of teachers from schools situated in localities of different sizes further contributed to achieving maximum variation from the viewpoint of enhancing transferability of the results (Merriam, 2009). To ensure the participants were familiar with the climate issue, teachers that had been teaching geography to grades 7–9 for the past three years or more were selected. In addition to geography, all teachers taught biology, and a few of them taught chemistry as well. All teachers that were asked agreed to participate in the study. The teachers' profiles are summarized in Table 1.

Data collection

To establish the content validity of the manual for semi-structured interviews, pilot interviews were conducted with two geography teachers who were not included in the final sample. The pilot interviews resulted in clarifications of the wordings of a few questions. Interview manual questions relevant to this study first clarified the teachers' individual profiles (Table 1). These questions covered the respondents' age, education, years of duty as geography teacher, participation in in-service training in environmental education or climate change, and leisure activities. Interest in environmental issues and subjective understanding of the climate issue were inquired using five-point scales from 'very interested' and 'very good' to 'very

uninterested' and 'very poor'. Second, the teachers' emotions were probed using a question worded 'Which emotions do you experience when you think about the consequences of climate change?' On account of the obscurities linked to the interpretation of direct questions about coping (Lazarus & Folkman, 1984; Park & Folkman, 1997), the teachers' coping strategies were instead examined based on the interview questions as a whole. As recommended by Lazarus and Folkman (1984), the coping strategies were explored utilizing the teachers' statements about their thoughts, feelings and acts in specific contexts brought up during the interview. Third, the following questions investigating the teachers' views on climate change mitigation in general were asked: 'Is climate change mitigation necessary?', and 'Is mankind responsible for mitigating climate change?' If the respondents answered in the affirmative, the following questions were asked: 'Who is responsible?', and 'How can climate change be mitigated?' Fourth, the teachers' views on their own role in climate change mitigation were inquired using the question 'Do you think you personally can do something for the good of the climate? If the respondents answered in the affirmative, the following questions were asked: 'What can you do?', 'What do you do?', 'Do you consider you have a climate-friendly lifestyle?', and 'What motivates you to that?' Moreover, follow-up probes were used to fill out the answers to the primary questions.

The interviews were individual and the average interview length was 45 min. The interviews were audio-recorded and transcribed verbatim. After 13 interviews, it was estimated that saturation (Merriam, 2009) was achieved because additional interviews did not contribute any new information.

Table 1. Teachers' profiles

	Ida	***Dan***	***Liv***	***Ann***	***Leo***	***Fia***	***Jim***	***Moa***	***Per***	***Eva***	***Ulf***	***Tea***	***Rut***
Gender	♀	♂	♀	♀	♂	♀	♂	♀	♂	♀	♂	♀	♀
Age	30	35	38	39	42	43	43	46	56	57	58	59	61
Qualification as geography teacher	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Duty as geography teacher (years)	5	8	10	13	14	13	12	6	30	31	34	32	12
In-service training in environmental education	No	No	No	No	No	No	No	No	No	Yes	No	No	No
In-service training about climate change	No	No	No	No	No	No	Yes	No	No	No	No	No	No
Leisure-time activities related to nature	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes
Subjective interest in environmental issues*	5	5	4	4	3	4	4	4	5	4	5	4	5
Subjective understanding of the climate issue**	4	4	4	4	4	4	4	4	5	4	5	4	4

*Note. Modified from Author (year 2). ♀ = female, ♂ = male. * 5 = very interested, 4 = fairly interested, 3 = neither interested nor uninterested, 2 = fairly uninterested, 1 = very uninterested. ** 5 = very good, 4 = fairly good, 3 = neither good nor poor, 2 = fairly poor, 1 = very poor.*

Data analysis

To achieve a condensed and broad description of the teachers' emotions and views, inductive content analysis (Elo & Kyngäs, 2008) was employed. First, the transcripts were read carefully to make sense of the data. Then, the data was imported into NVivo10 and open coding was performed. The resulting nodes were compared for similarities and differences, a process which resulted in classification of the nodes into categories. In the process of abstraction, data from the different categories were compared and broader main categories were created by merging similar categories. Concepts from the existing literature were used in the final labelling of main categories. In the case of the teachers' coping strategies, the whole analysis was theory-based, or, more exactly, it was based on the coping theories by Lazarus and Folkman (1984), and Park and Folkman (1997).

For ensuring reliability, the data was constantly compared with the categories and cross-checked using a second coder. The intercoder agreement was 99 percent. The diverging items were discussed until agreement was reached. The quotations used for presenting the results were translated from Swedish to English by the researcher and checked by a bilingual person. Unessential sounds and reiterations of words were removed from the quotations to improve readability.

RESULTS

Geography teachers' emotions about consequences of climate change and their strategies for coping with these emotions

The teachers experienced negative emotions, namely worry, annoyance, guilt, and helplessness about the consequences of climate change. The strategies used by the teachers to cope with these emotions were emotion-focused, problem-focused, and meaning-focused. An overview of the teachers' emotions and coping strategies is given in Table 2. Within the main categories, the categories are ordered from the one with contents most frequently brought up by the teachers to the one with contents least frequently brought up. The same applies to all subsequent tables.

Table 2. Teachers' emotions about the consequences of climate change and their strategies for coping with these emotions

		Ida	*Dan*	*Liv*	*Ann*	*Leo*	*Fia*	*Jim*	*Moa*	*Per*	*Eva*	*Ulf*	*Tea*	*Rut*
Emotions	Worry	•	•	•	•			•	•			•	•	•
	Annoyance	•	•		•	•	•	•	•	•				
	Guilt			•					•					
	Helplessness		•								•			
Coping strategies	Emotion-focused	•			•	•	•			•	•	•	•	
	Problem-focused		•	•					•					•
	Meaning-focused		•					•	•					•

Worry about the consequences of climate change was common among the teachers. Typically, the teachers felt not more than moderately worried. They worried for other people or for nature, but not for their own sake. The teachers felt worried for future global populations as well as for their own descendants. Exposure to reports on the consequences of climate change was mentioned as worry-triggering. In the following quotations, Liv, Tea, Ulf, and Dan describe worry when asked what emotions they experience when thinking about the consequences of climate change.

Liv: Well, to a certain extent some kind of insecurity and fear of what it might be like in the future. […] Will the food for the whole, well, Earth, suffice when you consider it globally? […] Will there be enormous streams of refugees and will diseases spread? […] Sometimes one thinks more about it sometimes one thinks less about it. I don't lose my night's sleep because of it.

Tea: Well, for my own sake I'm not afraid or so, but I do think, for example, about my grandchild. […] Nobody knows exactly what's going to happen, but we know roughly where we're heading. […] But I would want him to have a beautiful world.

Ulf: I'm concerned. […] What will the consequences be for Finnish nature, and, of course, also for the whole global nature?

Dan: I'm worried. […] Most often, it comes to one's mind when one sees yet another thing about some big climate catastrophe that has happened somewhere in the world or some news item that affects oneself.

At the thought of the consequences of climate change, some teachers experienced *annoyance* with various actors' reactions. Teachers felt annoyed with the public's, companies', nations', and politicians' inactivity in climate change mitigation, as exemplified below in the quotations of Fia and Ida. Some teachers, like Ida, attributed their annoyance to the inequity in that other species or people in developing countries or future generations will suffer from the consequences of today's consumer society. Per stood out from the rest of the teachers, in that he was annoyed with the IPCC, which he thought was acting like a religious leader in telling people they are sinners and have to follow the leader to save the world.

Fia: May one say that people are stupid? Yeah, but in fact we really are. We know what's happening, but still one doesn't do anything about it.

Ida: They should come to an agreement at these meetings and not just sit there feeling good and not doing anything. […] If one thinks about the USA, how dependent they are on their cars, […] one couldn't go anywhere without a car and having a bike was completely, well, impossible. […] It was like "Jeez, are you going out on the street, can you use your legs?" […] Animals, plants, and such can't influence anything, can they? Then it's not fair that they die out because we keep driving our cars.

Per: In religious groups they always have a leader, who leads these groups of people in the sort of right direction, and people are sinners […] and then they have to do penance. And in this climate change discussion, it's like the same analogy, some know better and the large crowds, they have sinned, they sort of cause climate change, and they shall then follow this leader and the leader shall thus make things right and the world would be saved. It's more like religion than natural science.

Interviewer: Okay, interesting, then who is this leader?

Per: Bert Bolin started it in the seventies in Sweden. [Bolin was the first chairman of the IPCC.]

The teachers who experienced *guilt* felt bad about their own lifestyle. The guilt was related to awareness of the fact that they could do more for the climate, as the following quotation of Moa shows.

Moa: I feel like a villain at times and that is, sort of, because one thinks about it.

Interviewer: When do you usually get these feelings of being a villain?

Moa: I would say I get the strongest awakenings from the students. […] There was […] a boy and a family who came and said that "We decided last year, we really had three cars in the family […] and you know we decided that when we move to the city, we won't have any cars anymore". […] Then one feels oneself a little like, okay, but I do still have a car.

Helplessness was associated with the feeling one cannot make a difference. Eva felt her age was an obstacle. Dan felt helpless regarding collective climate change mitigation.

Eva: One feels a little powerless. And it's something that just happens, there is nobody asking me, and then when one thinks about, for example, rain forests and such things, one feels "Well, I can't do anything". […] No I can't. I don't belong to that generation.

Dan: Sometimes, it really feels a little hopeless when one reads that once again important decisions have been postponed or dropped, for example, when they have been discussed at worldwide climate conferences, because it would be so very important that they could come to an agreement there. […] There is not much one can do.

Many teachers used *emotion-focused strategies* to cope with their emotions about the consequences of climate change. De-emphasizing the consequences of climate change concerned statements that the threat is exaggerated, and that climate change is distant or will not affect the own region. For example, Leo and Ann made such statements. Ann also expressed that she avoided thinking about the consequences of climate change. Per was alone to completely deny that the current climate change is human induced, and to claim that discussions about the consequences of climate change are irrelevant.

Leo: I don't think it will affect us here in Finland so much. If it gets warmer, it doesn't matter.

Ann: Many times I think they maybe exaggerate about everything. […] Everything that's not direct, that one doesn't have right in front of oneself, it's hard to really imagine. […] Maybe in some way, one doesn't really want to think about it.

Per: I am a sceptic. I don't believe in this anthropogenic explanation. […] One cannot draw such simple conclusions [as the IPCC has]. Nature is always more complicated. […] It's the course of nature. […] Life on Earth will not disappear. That is the fact and everything else is unimportant.

To handle negative emotions about the consequences of climate change, some teachers used *problem-focused strategies*. In all these teachers' statements, there were connections between negative emotions and actions the teachers mentioned taking individually or together with their families. In Liv's case, guilt led to a decision to change her leisure-time travelling habits. Dan experienced helplessness in collective climate change mitigation, and as a coping strategy he instead focused on individual mitigation actions he was able to take.

Liv: We have stopped making weekend trips to Paris or London because it doesn't feel good really, but instead one tries to find something to do more locally.

Dan: Sometimes, it really feels a little hopeless when one reads that once again important decisions have been postponed or dropped. […] But then one realizes that at least one can try to do one's own share. […] Individually, I try to, for example, I have traded my old car for a low-emission one. The emission level was one of the most important factors for me.

The third main coping strategy used by teachers was *meaning-focused*. Teachers who employed meaning-focused coping felt worried about the consequences of climate change, but tried to see the situation in a positive light. Jim was one of the teachers who, while acknowledging the problem, were optimistic about the chances of solving the problem. For Moa, sources of positive emotions were her own success with realizing a climate-friendly lifestyle in her family and engaging her students in

climate change mitigation. Rut had consciously turned her negative emotions into positive ones, both for her own and her children's well-being, as well as to be able to motivate her students.

Jim: It is difficult to reverse a trend […] and the question is if there is enough time. […] But things usually work themselves out, so probably this will as well. It is not really, really bad. One has to believe that it will be all right.

Moa: Everything you get used to, will do. […] And I really think we [her family] have done quite well after all, in many ways. […] Sometimes, they [the students] may come and tell you "You know, we have done this" […], and then it's like WOW!

Rut: I have tried to teach myself to see everything more positively. It's also difficult to live when one is too negative. But I don't think one should shut one's eyes to it. […] I have also thought regarding the students that one can't be too negative with them, because if they are supposed to fight for the environment, they have to experience it in a positive way. And then, it was maybe with my own children too, that I wanted them to experience it as positively as possible.

Geography teachers' views on climate change mitigation in general

All teachers agreed that climate change mitigation is necessary and that mankind is responsible, with the exception of Per, who considered human influence on climate is negligible and, consequently, mitigation is neither necessary nor possible. The other teachers ascribed responsibility for mitigation to individuals and politicians. Major-economy nations were pointed out by some teachers. The mitigation strategies that the teachers mentioned fell into two groups: those concerned with contextual factors and those concerned with motivational factors. Contextual strategies, as described by Steg and Vlek (2009), are targeted at changing the external context. Changes in physical, technical and organisational systems may alter the availability and quality of sustainable behavioural alternatives, and changes in legal regulations and pricing policies may alter the costs and benefits of behavioural alternatives. Motivational strategies, on the other hand, do not aim to change the external context, but they target individuals' motivation to engage in pro-environmental behaviour (Steg & Vlek, 2009). The teachers' views on climate change mitigation in general are summarized in Table 3.

Commonly, the teachers considered *individuals* and *politicians* to bear joint responsibility for climate change mitigation, while a larger share of the responsibility was ascribed to politicians. The rationale for assigning a larger share of the responsibility to politicians was their decision-making power. Jim was one of the teachers with that view. Moa was the only teacher to, with reference to democracy, express that citizens are responsible for decision-making. The following quotations present Jim's and Moa's answers to the question about who is responsible for climate change mitigation.

Jim: Well, it's after all us humans; we all, everybody who consumes. But it's those who are the leaders, those who are politicians, they have additional responsibility because they can steer the direction in which the society is going.

Moa: Well, it's the people themselves, of course. It's all because we have a democracy, so there must be a democratic decision.

Major-economy nations were held particularly responsible by some teachers, who argued that those who have caused the problem and have economic resources should contribute the most to mitigation. Especially, USA and China were pointed out, and it was argued that Finland's responsibility is smaller because its large forests partly balance out its carbon dioxide emissions. In contrast, Liv used the first person in her wordings and explicitly held her own region responsible for climate change mitigation. The following excerpts show Leo's and Liv's reasoning about who is responsible for climate change mitigation.

Table 3. Teachers' views on climate change mitigation in general

		Ida	*Dan*	*Liv*	*Ann*	*Leo*	*Fia*	*Jim*	*Moa*	*Per*	*Eva*	*Ulf*	*Tea*	*Rut*
Responsibility	All individuals	•	•	•	•		•	•	•			•	•	•
	Politicians	•	•	•	•		•	•	•		•		•	•
	Major-economy nations	•	•	•		•		•			•	•		
Strategies	Technology	•	•		•	•		•				•	•	•
Contextual	Carrot and stick policy	•	•	•	•			•	•		•			•
	International agreements	•	•		•		•		•				•	•
Motivational	Attitude changes		•				•	•	•		•		•	•
	Consumer behaviour changes					•		•	•				•	•
	Information			•			•		•				•	

Leo: I must say the USA because they have the greatest environmental influence in the whole world, don't they, and, above all, this kind of needless environmental influence in the form of enormous waste of energy and resources.

Liv: I clearly consider Western Europe and the USA, we who have started this fossil-fuel-based economy. We should definitely have to do our share. We can't prevent the development of others now just because we have been well off and managed to destroy.

A contextual strategy for climate change mitigation frequently discussed by the teachers was development of and transition to climate-friendly *technology*, typically renewable energy. A stricter *carrot and stick policy* was asked for. Moreover, the teachers emphasized the importance of *international agreements* to reduce greenhouse gas emissions and criticized climate conferences for being fruitless. In addition, an international agreement on birth-rate control was wished for. In the following quotations, Jim and Ulf discuss technology, Dan and Liv carrot and stick policy, and Ann and Moa international agreements as answers to the question of strategies for climate change mitigation.

Jim: In Finland, we can influence through building more and more of these wind turbines. […] It's much about transition to flow energy, about removing the energy resources that are based on energy sources in the Earth's crust.

Ulf: One should clear exhaust from carbon dioxide or completely avoid using processes that emit carbon dioxide. […] Then, to further start absorbing carbon dioxide from the atmosphere and so is, of course, much more difficult; easier, of course, to reach the sources of emissions.

Dan: One only wishes, for example, that the decision-makers would introduce more carrots to live climate-friendly, both when it comes to taxation things and so on. Because right now, such things are, unfortunately, not terribly good in any way. […] It seems as if some percentage of the population will do things voluntarily, but to engage the majority, I think it must be profitable to act in a climate-smart way.

Liv: From the politicians, there must be those restrictions, rises in price, and regulations.

Ann: There have been a lot of attempts with these climate panels and decisions and conferences, and, of course, all countries have to take part. […] It would be so important to get this organization working. […] Finland has always been good […] but the USA, for example, is a country which has not always signed these agreements. So it's all about international cooperation and making all those big ones who waste the most to contribute.

Moa: I think we should have some birth-rate control applicable to all countries. […] If we could reduce the world population by one-third, it would be very rewarding, because then, the burden on our planet would be smaller.

In addition to contextual strategies, the teachers also discussed motivational strategies. Teachers who talked about *information* mostly used a line of reasoning in which they connected information and raised levels of awareness to *attitude change*. A few teachers continued the reasoning by linking attitude change, in turn, to *consumer behaviour change*, whereas most teachers discussed one or two components in the knowledge-attitude-behaviour entirety. The following quotations demonstrate how when asked about the strategies for climate change mitigation, Liv brought up information, Jim attitude change, and Leo consumer behaviour changes, whereas Moa concisely tied them all together.

Liv: Through information so that everybody is aware of it.

Jim: The only way to mitigate climate change is through attitude change. […] People have to realize that we can't live in a consumer society where consumption, sort of, increases all the time.

Leo: Above all one should, I think, reduce the waste of energy. One should, sort of, use energy reasonably. Why does one have to use cars that consume 20 litres [of petrol] per hundred [kilometres] when one can drive a car that consumes, for example, 6, 7, 8 litres [of petrol] per hundred [kilometres]? That is an absurd amount of waste. And they do a lot of extra flying. […] They should stay at home.

Moa: By having reliable results in black and white, I also think that you can make people understand things in another way. That you should not, sort of, beautify anything. And from there, further reflect on what is wrong and do something about the errors. […] Just by changing one's habits; one can't do that overnight, but this is also something that has to be done gradually.

Geography teachers' views on their own role in climate change mitigation

The teachers mentioned a variety of actions they used as strategies to mitigate climate change at the individual level. An exception was Per, who did not think climate change can be mitigated and, thus, did not take any actions. The teachers' actions included those with direct and indirect impact on the climate. As defined by Jensen and Schnack (2006), direct actions contribute directly to solving the environmental problem, and indirect actions contribute by influencing other people to take action. Most teachers stated they took direct impact actions that were categorized as elementary, that is, actions that might not require personal sacrifices. Deliberate lifestyle choices to reduce one's own impact on climate, on the other hand, were less common among the teachers. Some teachers brought up teaching as a strategy they used. No other actions having an indirect impact were mentioned.

The teachers' motives for taking actions to contribute to climate change mitigation were categorized according to Kollmuss's and Agyeman's (2002) description of primary and selective motives. Primary motives refer to larger motives that are altruistically or socially based. They allow engagement in whole sets of behaviours,

e.g. pro-environmental behaviour. In this study, a sense of responsibility and a desire to be a role model were the primary motives. Selective motives are more immediate and they influence specific actions. Selective motives are based on one's own needs, e.g. saving time and money, being comfortable. In this study, own financial position and own health were the selective motives. The teachers' strategies for climate change mitigation and their motives for taking action are summarized in Table 4.

Table 4. Teachers' views on their own role in climate change mitigation

			Ida	*Dan*	*Liv*	*Ann*	*Leo*	*Fia*	*Jim*	*Moa*	*Per*	*Eva*	*Ulf*	*Tea*	*Rut*
Strategies	Direct impact	Elementary actions	•			•	•	•	•			•	•	•	
		Deliberate lifestyle choices		•	•					•					•
	Indirect impact	Teaching	•	•		•				•		•	•		
Motives	Primary	Sense of responsibility	•	•	•	•	•	•	•	•		•	•	•	•
		Desire to be a role model	•	•		•				•				•	•
	Selective	Own financial position					•							•	
		Own health												•	•

E*lementary actions* that the teachers reported taking included recycling, turning off appliances when not in use, using washing machines only when full, and favouring locally produced provisions and products without unnecessary packing material. Commonly, the teachers who took these elementary actions also questioned the relevance of said actions for climate change mitigation. Ida and Leo, as quoted below, are examples of teachers whose actions were categorized as elementary.

> *Ida:* I always turn the TV off […], and I pull out plugs and things when I don't use them, and so on. And I wash the laundry at lower temperatures. […] I'm sure there are things one could do much better. After all, I could certainly commute more often with a colleague than I do now. Maybe one could sit a few hours extra at work instead of thinking that I'm going home at one o'clock. […] One could certainly recycle more items than we do […], but after all, what I can do is quite limited.
>
> *Leo:* Nowadays, I try to think before I buy or use energy resources and so on. Then, there is always a matter of what mood I'm in and what it's all about. If I buy, for example, toothpaste, I do, of course, choose a tube of toothpaste that does not have a thousand packings and plastic around it; instead, one can take one that is already like a tube, it doesn't need millions of packings.
>
> *Interviewer:* Is there anything more you could do?
>
> *Leo:* What could that be, well, it could be eating more low-energy food so to say, but at the same time, I think that if one can't have good food, one can just as well lie down and die.

Teachers whose actions were categorized as *deliberate lifestyle choices* took long-term actions that could be considered to involve some personal sacrifice. Examples include using smaller or more energy-efficient cars, refraining from travelling by car or by plane, considerably lowering in-door temperature at home, and shortening

showers. The following quotations of Moa and Rut exemplify deliberate lifestyle choices.

Moa: I traded my American car for a small [make of car]. That is a big change. […] In the winter, we use a low temperature. […] In the kitchen, when one comes down in the winter, it is 14–15 degrees [Celsius]. We certainly use woollen socks. I don't think it's any problem. […] We don't shower, maybe three minutes in the mornings, not so much more than that; they [the children] are used to it, because they have seen me doing it the same way. […] And re-using all kind of things.

Rut: I don't have a car. […] If there are buses, I use them. […] I walk, cycle, and so. I don't understand those who have to take their cars everywhere. […] I never bought a microwave oven. I don't have a dishwasher and such things. I think I do well without them.

Some teachers brought up *teaching* as a way for them to do something for the climate. Ulf was a teacher who said supplying information without trying to influence students is important. Other teachers, for example, Dan, saw teaching as a way to contribute significantly to climate change mitigation by influencing future consumers.

Ulf: Of course, as a teacher, I have the possibility that I do think is quite important to try to inform and maybe not directly influence, because one shouldn't do that, perhaps. […] But in any case, inform and mediate knowledge and information about the whole thing.

Dan: Yes, I can. Especially, a teacher who's teaching these issues, that person's attitudes have a much larger pervasive force, because one talks about it with young people who are on their way to becoming consumers themselves, and so on. So, it's very obvious that by trying to influence attitudes and setting a good example, one can clearly influence more than most other people.

All teachers who took any type of actions to contribute to climate change mitigation had *sense of responsibility* as a primary motive. This sense of responsibility was ethically grounded because the teachers talked about morality and wanting to do their share. The teachers mentioned responsibility to nature or future generations, and in some cases, own children. *Desire to be a role model* was brought up in relation to students and the teachers' own children. In the following quotations, Dan and Ulf talk about sense of responsibility, while Ann and Tea talk about desire to be a role model, when asked what motivates them to contribute to climate change mitigation.

Dan: I think that I have a moral responsibility as a human being to as little as possible destroy the Earth on which I and future generations will live.

Ulf: It's the concern for the environment. […] The future of nature, we might say.

Ann: To set an example, and as a teacher, one also wants to be a role model.

Tea: One can't say that one should live like this or one should think about the environment unless. You can't tell others unless you do so yourself.

The selective motives *own financial position* and *own health* were brought up by some teachers. They explicitly expressed that their motives for cycling or walking, growing own vegetables, and using wood for heating were egoistic, as the following quotation of Tea shows.

Tea: It's not because I think about the climate, but more because I think about myself. I try to get exercise, in other words, cycle or walk as much as possible. For example, I never take the car to the school unless it's pouring down. But then I think more about my daily exercise. […] I use quite a lot of wood for heating in order to reduce the electricity costs.

DISCUSSION

The results of this qualitative study cannot be generalized in a statistical sense, but as Merriam (2009) argued, what is learned from a certain situation can be transferred to similar situations encountered subsequently. In short, this study has shown that

the Finnish secondary geography teachers experienced negative emotions about the consequences of climate change. They commonly used non-productive emotion-focused strategies for coping with these emotions, and to some extent more constructive problem-focused and meaning-focused strategies. As a rule, the teachers considered politicians and individuals responsible for climate change mitigation, and they touched upon contextual and motivational mitigation strategies. Commonly, the teachers took elementary actions to reduce their own impact on climate, and their primary motives for taking mitigation actions were sense of responsibility and desire to be a role model. However, the results indicate that the importance of CCE as a mitigation strategy and their responsibility as teachers were not quite clear to these respondents. In the following section, the results are discussed according to the research questions.

The negative emotions about the consequences of climate change expressed by the geography teachers, namely, worry, annoyance, guilt, and helplessness, have been noted among pre-service teachers (Ambusaidi et al., 2012; Hestness, McGinnis, Riedinger, & Marbach-Ad, 2011; Hufnagel, 2015) and students (Ojala, 2010; Pettersson, 2014) as well. It is worrying that the teachers' experienced negative emotions to a large extent, considering that negative emotions among teachers can be a source of students' negative emotions and disengagement from climate change mitigation (Ojala, 2015a). The connection between teachers' negative emotions and students' disengagement may be mediated through instruction because it has been indicated that teachers' emotions about climate change can influence their instruction (Lombardi & Sinatra, 2013), and it has been shown that students' willingness to take actions to mitigate climate change is related to their views on CCE (Hermans & Korhonen, in press). Also, there are indications that students' coping strategies are influenced by their teachers' coping strategies (Ojala, 2015a), and in this study most teachers, unfortunately, utilized emotion-focused strategies like de-emphasizing, avoiding or denying the threat. Such strategies have, in studies with students, been shown as negatively related to pro-environmental behaviour (Ojala, 2010, 2012b, 2012c). On the other hand, problem-focused and meaning-focused strategies, which some teachers in this study used, have been reported to positively predict pro-environmental behaviour among students (Ojala, 2010, 2012c, 2012b, 2013b).

The teachers' view that individuals and politicians bear responsibility for climate change mitigation is shared with their students (Hermans & Korhonen, in press) and upper-secondary geography teachers (Grahn, 2011). The teachers in the current study ascribed to politicians a larger share of the responsibility, and as the teachers in Grahn's study (2011), they opined that major-economy nations should especially be considered responsible. Similarly, the IPCC (2014b) states that income and capacity are relevant when deciding the amount of responsibility different parties should assume. However, compared to the IPCC's (2014b) attribution of responsibility not only to individuals and politicians but also to organizations and actors in a variety of sectors and levels, the teachers' views on responsibility appear narrow. The teachers touched upon a few of the contextual and motivational strategies for climate change mitigation that have been pointed out by the IPCC (2014b), namely, technology, carrot and stick policy, international agreements, information, attitude change, and consumer behaviour change. Strikingly, none of the teachers brought up education of students when asked how climate change can be mitigated in general. Neither did they mention teachers or educational institutions as bearing responsibility for mitigation. This is in sharp contrast to researchers' emphasis on the importance of education for climate change mitigation (e.g. Anderson, 2012; Bangay & Blum, 2010; Fahey, 2012; Saylan & Blumstein, 2011).

The primary motives underlying the teachers' mitigation actions were sense of responsibility and desire to be a role model. Primary motives are connected to engagement in sets of behaviours (Kollmuss & Agyeman, 2002) such as climate

change mitigation. Nevertheless, a great number of other internal and external factors influence behaviour (Kollmuss & Agyeman, 2002), which explains why the teachers' engagement in climate change mitigation was rather modest despite their primary motives. Commonly, the direct impact actions the teachers reported taking were elementary, as has been reported in the case of their students (Hermans & Korhonen, in press) and pre-service teachers (Ambusaidi et al., 2012; Ratinen, 2013). When asked about their personal actions to contribute to mitigation, only part of the teachers mentioned teaching. No other indirect impact actions were brought up. Taken together, these results raise the question of how successful the teachers are in modelling sustainable behaviour to engage their students (Chawla & Flanders Cushing 2007; Redman, 2013; Saylan & Blumstein, 2011). Another question is whether the teachers understand the importance of indirect actions and direct actions not limited to those that do not cause any personal inconvenience or require any lifestyle change (IPCC, 2014b), in climate change mitigation.

As a response to several of the interview questions, the teachers criticized and expressed annoyance with politicians and international climate conferences for their failure to make decisions and agree on limitation of global temperature rise. The interviews were conducted before the Paris agreement (United Nations Framework Convention on Climate Change, 2015) was adopted, which may explain the teachers' criticism and annoyance.

Teacher groups with different engagement in climate change mitigation

In terms of the actions the teachers took to reduce their own impact on climate, the teachers fell into three distinct groups: those who did not take any actions, those who took elementary actions, and those who made deliberate lifestyle choices to contribute to mitigation. In this section, the characteristics of these three groups are described and related to each other, combining the research questions and drawing parallels to previous research.

Per differed from all the other teachers, in that he, based on his scepticism about human influence on climate, did not consider climate change mitigation necessary or possible and, accordingly, he did not take any actions to reduce his own impact on the climate. Likewise, students who deny climate change have been shown to be less likely to behave pro-environmentally (Ojala, 2015a). Per ranked his own subjective understanding of the climate issue as very good. Similarly, Kahan et al. (2012) have shown that adults with high degrees of scientific literacy are more likely to be sceptical about the seriousness of climate change than adults with a low degree of scientific literacy. On the contrary, poor subjective understanding has been shown to be a predictor of scepticism among students (Ojala, 2015b), whereas good subjective understanding of the climate issue has been established as a predictor of students' willingness to act (Ojala 2010, 2013b). Thus, it is possible that understanding of the climate issue has higher potential to counteract climate scepticism among young people than among adults.

It has been suggested that denial and subsequent inaction is promoted by the benefit of avoiding emotional and psychological complications that may arise from an awareness of one's own contribution to the problem (Norgaard, 2011), or, as results by Ojala (2012b) show, denial is not just a cognitive view of climate change, but a non-productive way of regulating emotions. In accordance with his denial, when asked which emotions he experienced when thinking about the consequences of climate change, Per only expressed annoyance with the IPCC acting unscientifically in leading people to combat climate change. The target of Per's annoyance is in line with studies indicating that mistrust in institutions is closely intertwined with scepticism (Hobson & Niemeyer, 2012; Ojala, 2015b).

The teachers who took elementary actions formed a heterogeneous group in terms of individual background factors such as gender, age, and years of duty as geography teachers. Like Per, they all rated their own understanding of the climate issue as good. Teachers in this group typically used emotion-focused strategies, in the form of de-emphasizing or avoiding thinking about the problem, to cope with their negative emotions about climate change consequences. These teachers shifted the responsibility for climate change mitigation to other nations and actors, and they questioned the relevance of individual actions. This tendency has also been seen among pre-service teachers (Lee et al., 2012) and students (Pettersson, 2014), and it can be defined as delegation (Kollmuss & Agyeman, 2002). Delegation has been described as a means to remove feelings of guilt and justify inaction (Norgaard, 2011), and people who delegate are seen as unlikely to take actions requiring personal sacrifice (Kollmuss & Agyeman, 2002), a line of reasoning that the results of this study support.

The third group of teachers made deliberate life style choices to contribute to climate change mitigation. While this group was otherwise heterogeneous in terms of individual background factors, all of the teachers in the group enjoyed leisure-time activities related to nature. Nature activities are relevant because they can give rise to personal appreciation of nature, which has repeatedly been found to be positively and substantially related to pro-environmental behaviour (overview in Otto, Kaiser, & Arnold, 2014). Similar to the teachers who took elementary actions, this group of teachers experienced negative emotions about climate change consequences. However, this group used more constructive strategies, in other words problem-focused and meaning-focused strategies, to cope with their emotions. Their actions, similar to those of the group of teachers who took elementary actions, were of the direct impact type. One exception was teaching, which some of the teachers in both groups brought up. However, the group of teachers who made deliberate lifestyle choices to contribute to climate change mitigation has, in contrast to the teachers who took no actions or elementary actions, in a previous study (Hermans, 2014) been shown to set as an aim for their CCE to make their students act. Similarly, results by Cheng and So (2015) indicate that primary teachers who engage in a pro-environmental lifestyle in private try to motivate their students towards environmental engagement.

IMPLICATIONS AND FUTURE RESEARCH

This study of geography teachers' emotions about the consequences of climate change, their coping strategies, and their views on mitigation has brought up aspects that may obstruct their opportunities to successfully contribute to climate change mitigation through instruction. Therefore, for CCE in Finland to best serve its purpose, which is to support climate-friendly behaviour and activities (Lehtonen & Cantell, 2015), education of in-service and pre-service geography teachers is suggested. Based on the results of this study and Jensen's and Schnack's (2006) description of the components of action competence, a framework for an educational programme for geography teachers, as well as other teachers engaged in CCE, is presented. This programme aims to develop CCE teachers' action competence as a prerequisite for successful promotion of students' action competence in terms of climate change mitigation.

First, the teachers' *insights* into the background to and consequences and mitigation of climate change is developed, which may, by extension, counteract climate scepticism among their students. Special attention is paid to the views on climate change mitigation. An understanding of the necessity of engagement by actors from a variety of sectors and levels, from local to global, through multiple contextual and motivational strategies (IPCC, 2014b), is promoted. It is highlighted that

elementary actions can serve as a starting point for engagement in mitigation, while lifestyle changes and indirect actions are required for sufficient change. Opportunities to contribute through indirect impact actions, as well as the key role of CCE in climate change mitigation (e.g. Anderson, 2012; Bangay & Blum, 2010; Fahey, 2012; Saylan & Blumstein, 2011), are brought up. An individual perspective is used to develop the teachers' understanding of their own role in and responsibility for mitigation, both in private and as teachers. While targeting the teachers' understanding of the importance of and responsibility and strategies for climate change mitigation, it is acknowledged that increased knowledge alone does not necessarily lead to pro-environmental behaviour (Kollmuss & Agyeman, 2002).

Second, the teachers' *commitment* is targeted. In other words, in focus are their motivation, drive and assertiveness to act in climate change mitigation in private and as CCE teachers. Because, in this study, the teachers who engaged most in mitigation had leisure-time activities related to nature, nature activities are recommended for cultivating a personal appreciation of nature and, thereby, commitment to mitigation. The positive relation between nature activities, appreciation and commitment has also been summarized by Otto et al. (2014). Teachers committed to a climate-friendly lifestyle and to mitigation through CCE have important qualities that help them inspire their students and engage them in mitigation actions.

Third, the teachers' *emotions and coping strategies*, as well as their *visions* are analysed and discussed. Having handled their own emotions and coping strategies, teachers are better prepared for supporting students in processing theirs. The Finnish Climate Panel recommends including emotions in CCE (Lehtonen & Cantell, 2015), and Ojala (2013a) has pointed out that by discussing negative emotions, they can be transformed into criticism and aspiration for change. The programme promotes problem-focused and meaning-focused coping strategies, which are positive predictors of students' engagement in climate change mitigation (Ojala, 2010, 2012b, 2012c, 2013b). To convey a positive message about climate change to their students, teachers need to have a solution-oriented outlook and a vision about a good life in the future world.

Fourth, the teachers gain *action experiences* by practicing climate change mitigation. Researchers have emphasized that for education to equip students with competence to considerably contribute to the mitigation of complex environmental problems, it is critical to provide students with the skills to take collective action and make an impact through influence on different organizations (Chawla & Flanders Cushing, 2007; Jensen & Schnack, 2006; Saylan & Blumstein, 2011). However, the results of this study show that the teachers' own action experiences are, except for teaching, limited to individual, direct impact actions. In line with these results are the results of a previous study with the same teachers, which showed that when these teachers tried to engage their students in climate change mitigation, they focused solely on direct impact actions (Hermans, 2014). Generally, too, environmental actions started in schools have tended to be almost exclusively on the individual, direct impact level (Jensen & Schnack, 2006). In conclusion, it is vital for teachers to practice taking collective, indirect impact actions, so that they, in turn, can create opportunities for their students to acquire corresponding skills.

To sum up, committed teachers with a broad view on and experience of climate change mitigation, and with constructive strategies for handling emotions about the consequences of climate change, have every chance of inspiring and engaging students, who will be decision-makers and actors in society at a time when drastic climate change mitigation measures are required. Based on the proposed framework for a teacher education programme, this study opens up the field for future intervention studies.

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Note

Together with Finnish, Swedish is a national language in Finland, and the Swedish-speaking minority is settled mainly in the coastal areas of western and southern Finland. The same national core curriculums (Finnish National Board of Education, 2004, 2014) apply to the schools for the Swedish-speaking and the Finnish-speaking students.

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