Emotions and values – a case study of meaning-making in ESE

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ABSTRACT
With an interest in the role of emotions and values in students’ meaning-making in Environmental and Sustainability Education a case study was carried out in a Swedish school-class with students, 12 years of age. During a six-week thematic group-work focusing environmental and sustainability issues related to food, the students were observed and interviewed in their daily school practice. The results are presented here through narrative reporting, and analysed with the use of Dewey’s theoretical perspectives on experience, distinguishing three phases in a process: a start, an activity phase and a closure. Martha Nussbaum’s theory of emotions is used to assist in the understanding of emotions and values. The study reports on active and independent meaning-making processes in students’ group work. The results provide examples of students’ meaning-making experiences and the role of emotions and values in them, indicating that more of values are formed and expressed in the concluding phase.

Introduction
Contemporary the issues of students’ learning of values in Environmental and Sustainability Education (ESE) is of importance to both teachers, activists and policymakers, and an area of concern for researchers, expressing differing views regarding e.g. ecocentric values and how to handle them in education (cf. Hart 2010; Jickling 2004, 2013; Jickling and Wals 2008; Johnston 2009; Kopnina 2012, 2014; Payne 2010). Of particular interest in this empirical study is the role that emotions play in students’ experiences and learning processes and how students form values. In the works of Dewey (1916, 1934, 1938) the experiences of individuals are decisive in learning, not least the ideas of experiencing being an activity (Dewey 1916), how experiences build onto one another (Dewey 1938), and that the character of experiencing is aesthetic (1934). Using the theories of Dewey, combined with the philosophy of Wittgenstein, Wickman and Östman (2002a, 2002b); Wickman (2006) and Öhman and Östman (2007) have developed a theoretical and methodological approach for empirical studies of students’ meaning-making in the fields of Science Education and Education for Sustainable Development (ESD). This present study draws on their studies and theory development regarding aesthetics in learning processes, but additionally also makes use of Martha Nussbaum’s theory of emotions (2001). The reason for this is that Nussbaum’s theory, with its focus on emotions and their relationship with values, provides an opportunity of new perspectives on emotions in learning and offers a refined conceptual tool for analysis of empirical studies of emotions and values.
Previous research

Earlier studies of students of varying age show that environmental and sustainability issues affect students’ emotions, values and ethical reflections (cf. Caiman and Lundegård 2013; Dillon, Heimlich, and Kelsey 2013; Garrison, Östman, and Håkansson 2015; Jickling and Paquet 2005; Lundegård 2008) and the importance of emotions is emphasised by Ojala (2012a, 2013). Lundholm, Hopwood, and Rickinson (2013) argue that emotional responses can present an obstacle for secondary and university students’ readiness to learn environmental content. In another study, based on a questionnaire for students aged 10–12 years, the students’ expressions of values and emotions relate positively to more complex understandings of ecological, economic and social aspects of sustainability (Manni, Sporre, and Ottander 2013). Furthermore, negative emotional responses, namely worry about climate change, can contribute to increased engagement with environmental issues by children and youth (Ojala 2012b). Further studies are needed to understand the relationship between students’ emotions in actual learning situations and the values they express.

Previous studies on the emotional aspects of learning about environmental and sustainability issues have used different theoretical starting points for interpreting data, which has considerably influenced results on the role of emotions in the investigated meaning-making processes. Tsevreni (2011) discusses how students’ experiences, emotions and perceptions rather than scientific knowledge matters in learning. Also Ekborg (2005) reports on the role of emotions and ethical dilemmas in supporting students’ learning in sustainability education. In studies where emotions are considered a challenge and a distraction (cf. Lundholm, Hopwood, and Rickinson 2013), the learning process is primarily viewed as an intellectual and cognitive process; whereas in psychological studies, emotions are considered a bodily reaction and a motivating force (positive or negative) in relation to the learning content (cf. Ojala 2012b). In responding to existing traditional views on learning Wals (2011) argued that ESE is different to other educational disciplines, i.e. being transdisciplinary, value-laden and socially transformative, and that the education system when dealing with ESE needs to re-evaluate its traditional dualistic view of cognition and emotion. Lundegård (2008) supported this in finding student’s dialogues on sustainable issues to be interwoven with self, values and the world. Thus, emotions can be understood within different theoretical frameworks, and this also relates to different understandings of the relationship between the cognitive and the emotional in how students learn.

Theoretical perspectives

Dewey’s educational philosophy has a holistic view on learning and knowledge, arguing against and seeking ways of avoiding the dualisms of earlier learning theories and philosophies (Dewey 1916, 1934, 1938). Of more recent studies, as already indicated, some have convincingly described the character and role of meaning-making processes in education from a pragmatic perspective and contributed to theoretical development (Öhman and Östman 2007; Wickman 2006; Wickman and Östman 2002a, 2002b). Wickman uses Dewey’s theory to argue for studies that empirically test and demonstrate the presence of aesthetic experiences in science education (Jakobson and Wickman 2007; Wickman 2006). In another study, based on Dewey’s theories, Öhman and Östman (2007) discuss continuity and change as central aspects of learning in moral meaning-making processes in sustainability education, where prior individual experience, interaction and communication with others play a considerable role.

In the process of learning, we create new meaning by action and reflection through an ongoing continuous cycle of transactions (Cohen, Walker, and Boud 1993; Dewey 1916, 145; Kolb 1984; Quay and Seaman 2013b, 65). Dewey uses the verb ‘to experience’ when describing this transactional process between active and passive elements, which he states can be divided into three continuous phases: an initial phase, an activity phase and a concluding phase (1916, 151; 1934, 57). Kolb (1984) further develops Dewey’s theory of experiential learning through his cyclic model involving concrete experience, reflective observation, abstract conceptualisation and active experimentation (33). Kolb also argues
that ‘Learning is the process whereby knowledge is created through the transformation of experience’ (38), also elaborated by Biesta and Miedema (2002).

This framework from Dewey with its focus on experience, of the relationships between experiences, and of different phases in meaning-making processes, form the overall framework for the understanding of learning in this article. We here also draw on the development of pragmatic theories in meaning-making mentioned above (cf. Öhman and Östman 2007; Wickman 2006).

However the studies mentioned above, as well as Dewey’s holistic agenda, do not, from our point of view, satisfactorily provide tools enough for analysing the role of emotions, why we have turned to the work Upheavals of Thought: The Intelligence of Emotions of Nussbaum (2001) for this. Dewey and Nussbaum critique an understanding of moral and ethics when these matters are understood as the application of universal principles and rules. That is, according to Nussbaum and Dewey, moral and ethics are understood through concrete contexts and human experience matters (Dewey 1916, 346–360; Nussbaum 2001, 19–88).

Foundational in Nussbaum’s philosophy, is that a person’s emotion has a particular object; secondly, the person has an intentional relation to the object; thirdly, from the point of view of the person certain beliefs are connected to the object as characteristic of this object in relation to the person; and finally, the intentional perceptions and beliefs directed towards an object express a value or a judgement of an object by the person in question (2001, 27–31). Together these aspects of an object for a particular emotion (an emotion such as grief, fear, love, joy, hope, anger, gratitude, hatred etc.) can be summarised as its ‘aboutness’, what gives an object a specific importance for a person, which is expressed in terms of evaluative judgements. For example, Nussbaum (2001) uses her mother’s death, to illustrate her argument. When faced with the eventual loss of her mother – Nussbaum focused her emotions (fear, love, grief) on her mother because of the importance of her mother in Nussbaum’s own life.

Given this starting point in her understanding of emotions, Nussbaum describes intellectual processes as complex, where emotions form an integral part, and she names these processes ‘cognitive-evaluative’ (2001, 23). In addition to more immediate feelings, emotions also include evaluative judgements i.e. emotion judgements. Upon discussing the difference between emotion judgements and value judgements, Nussbaum regards emotion judgements as ‘a sub-class of value judgments’ (2001, 30, n21). Emotion judgements differ from value judgements because they represent a person’s relationship to a specific object, i.e. the way this object is ‘loaded’ with importance by this person. Value judgements, can be without emotions. Values, ‘not the easiest definitional question in philosophy’ (Nussbaum 2001, 30, n21) are often notions of ‘what’s worth pursuing, what is a good use of someone’s time, what it seems good to do or attend to’ (2001, 30, n21). Value judgements are more general and do not have the ‘tight’ connection to a particular object that is associated with emotion judgements.

In this study, we used Nussbaum’s understanding of emotions and values to understand students’ meaning-making processes. Emotions and values are part of complex, coherent cognitive–evaluative processes, where emotions and values are not easily differentiated out from one another. But, the central aspect of emotions, as compared to values, is that emotions are ‘loaded’ with the importance of a person’s perceptions and beliefs which is connected to a particular object. Following from this, value judgements are general, connected to a specific situation, and resulting in more generalised conclusions.

**Aim and research questions**

The aim of this study is to investigate the process of students’ meaning-making, with particular focus on the role of the students’ emotions and values in their learning about environmental and sustainability issues. The research questions are:

1. How are students’ emotions and values expressed during meaning-making in group work?
2. What is the relationship between emotions and values in students’ meaning-making processes in the context of environmental and sustainability issues?
Methodology

The methodological choices of this study were done in line with Dewey’s epistemological theory; which argues that learning is situated, social, and building on individual experiences that take place over time (Dewey 1916). Aiming for more knowledge about how students’ emotions and values are expressed in a process of meaning-making, and the relationship between emotions and values, a methodological combination of a case study and narrative enquiry was chosen. Both a case study and narrative enquiry provide an opportunity to gather data from a specific learning situation and to focus on students’ experiences in meaning-making processes over a fixed time period (Flyvbjerg 2011; Webster and Mertova 2007; Yin 2014).

In this study we wanted to make it possible to pay particular attention to the circumstances under which the participating students expressed emotions and values in relation to environmental and sustainability issues. Choosing a methodological approach of a case study, aiming for a holistic view of the research object would have potential for a detailed description of the background and situation and provide a ‘thick description’ of the particular case (cf. Cohen, Manion, and Morrison 2010). Such a study contributes in depth knowledge about the case and the specific research questions.

Previous research has used narrative enquiry of individual experiences to examine student’s meaning-making in ESD and their development of action competence for sustainable development (e.g. Almers 2009). Narrative methodology is furthermore increasingly used in studies of educational experiences, where individuals’ experiences or individuals interacting with others (classroom stories), are reported as stories with unfolding complexities within teaching and learning (Webster and Mertova 2007). Before constructing a narrative, researchers collect stories from several data sources (Labov 2006) and use theoretical perspectives to guide their narrative perspective. In this study Dewey’s three phases (initial, activity and concluding) for interpreting meaning-making processes and Nussbaum’s definitions of emotion and value are used in conjunction with the case study and narrative methodological perspectives to structure the analysis and re-construction of the students’ meaning-making stories.

Selection and context of the case

In line with the requirements of a case study, regarding defined temporal and institutional boundaries (Cohen, Manion, and Morrison 2010), we conducted the study over the course of one school semester (autumn 2013) in a class of sixth year students (12 years old). The students attended a ‘School for Sustainable Development’ a status designated by the Swedish National Agency for Education. The school has about 150 students and is located in a northern Swedish city (population of 110,000).

During six weeks, the 13 students independently studied ‘Food, Human and Environment’ in groups of three or four, apart from whole class activities, such as watching films, conducting experiments and reading. The group work followed a set pattern: (1) each group chose a topic after an initial discussion with the teacher, (2) planned their work, (3) through various activities the group collected information and discussed their questions and (4) finally the group presented their work to the rest of the class, took a written test and filled in a project evaluation.

Data

We used a variety of methods to collect data to gain a thick description of the case. These included observations, field notes, reflective logs, informal conversations and audio-recorded individual and group interviews. Also written material, such as project evaluations, test scripts and digital presentations, were also collected (Table 1). The first author acted as a participant observer during regular school activities and collected the data. This was done with the purpose of getting a holistic picture from the ‘inside’ without becoming too familiar and hence avoids the probability of misinterpreting data (cf. Webster and Mertova 2007; Yin 2014). The daily logbook entries helped to observe this process and reflect over it. Being a participant observer also involves the developing of a respectful relationship with the studied
The researcher’s role changed during the study from an outsider position to that of being an accepted member of the class, although not being a substitute for the teacher.

The individual interviews with the principal, the teacher, and the students provide, together with participatory observations and informal conversations, the basis for the description of the school, class and teaching practices, i.e. in ‘setting the scene’ and producing the stories.

The qualitative data collection and preliminary analyses took place simultaneously during the semester, making the researcher’s field notes and reflective logs important data sources (cf. Webster and Mertova 2007). The researcher documented students’ actions and statements by taking field notes during observations and by writing reflective logs immediately after individual observations. Group interviews with students focused on the topic of their on-going group project.

**Analysis**

The first part of the analysis focused on finding episodes, (events and processes) where the students express emotion, emotion judgement, value judgement, or value in relation to environmental and sustainable issues (that is, the object). Central in our analysis was how emotion and emotion judgement have a more personal character and an expressed feeling component vis-à-vis the educational content in students’ sayings and reactions. An example of emotion judgement is when a girl chooses a specific environmental label because ‘the green frog is cute’. Value judgements and values are more generalised expressions and reactions; stating how things ought to be, ought to be done etc. These passages in the gathered material were marked with different colours, discussed and agreed upon among the authors.

Secondly a temporal analysis of the episodes was done based on Dewey’s epistemological theories which describe meaning-making structures in learning and teaching as transactional processes, in which action and response interact in an initial phase, an activity phase and a concluding phase (Dewey 1916). The researchers thereafter constructed narratives from the work of each group describing the students’ experiences based on interviews, observations and written material (cf. Webster and Mertova 2007). Finally through a comparative analysis of the five narratives, we highlighted similarities, differences and common structures in the meaning-making process (cf. Cohen, Manion, and Morrison 2010).

We deem we collected sufficient amount of data to describe meaning-making processes taking place within the class from all five observed groups. Comprehensive stories from the three more communicative groups are presented in the results section. Although not described in detail, the in-depth analyses from the two remaining groups are included in the overall interpretation of the results.

### Table 1. Empirical material.

| Empirical material | Amount | Notes |
|--------------------|--------|-------|
| Interviews         |        |       |
| Principal          | One interview | To describe context of school, class and teaching practice |
| Class teacher      | Two interviews | Organised by date |
| Observations and field notes | 18 days (74 h) | Shown in text |
| Reflective logs    | 18 logs |       |
| Interviews (audio-recorded and transcribed) | | |
| • Students, individual | 13 interviews | (S1–13) |
| • Students, group  | Five interviews | (G1–5) |
| Written material   | Three school documents | Empirical material not specifically presented in text. |
|                    | One lesson plan |       |
|                    | 13 test scripts |       |
|                    | Five project evaluations |       |
|                    | Five digital presentations |       |
Narrative reporting

The narrative analysis here aims to identify and describe turning points that advances the meaning-making process and causes the creation of new meaning (cf. Labov 2006).

In narrative analysis the term ‘setting the scene’ describes the background of an event, while ‘telling the story’ is used to describe what is happening during the event. ‘Analysing the plot’ is used to indicate that events are analysed on a more general level (Labov 2006). The students’ and teachers’ responses are illustrated by quotes from conversations and interviews and by excerpts from field notes from observed activities and events.

Ethical considerations

Conducting a case study requires an awareness of ethical responsibility and respect for the participants being studied in their daily practice. Before starting the project the students were given oral information about the study and they consented to take part. Due to their young age written consent to their participation was obtained from their parents, who also were provided with detailed information about the study. Repeatedly during the study the students were reminded that their participation in the study was voluntary, not least when interviews were to take place and sharing of written material was at stake. Once a student declined to be interviewed. Possible reasons for this were engagement in another task the student was eager to finish i.e. the student did not want to spend time on the interview. In general the presence of the researcher in this class during the days of observation we deem was a minor distraction to the work in the class not least since the researcher’s presence after the initial time lost interest to the students. The researcher became a ‘member of the class’. All the collected data were handled with confidentiality and the participants were kept anonymous throughout the analytical process and in reporting in line with the recommendations in Good Research Practice (Swedish Research Council 2011).

Results

Setting the scene

The teacher in the class has several years’ experience of ESD. The students in the class are at the time of the study in the borderland between childhood and maturity, where their play and jokes alternate with earnest and complex discussions. Below is a selection of excerpts from individual interviews, in which the students (S) reflect over their previous educational experiences and over sustainable development in general. There are infrequent examples of emotions and emotion judgements. The students’ stories mainly concern the environmental content that they associate with sustainable development:

… well, sustainable development is that we need to have a sustainable development, to save energy and be good to nature. I don’t know how it’s going because sometimes when I’ve been out with friends at night, lights are on and such. But it [sustainable development] means that you should save energy and you should take care of the environment and you shouldn’t, like, litter and stuff. (S9)

The students also describe global problems and environmental threats, such as anthropogenic global warming, environmental degradation and endangered species:

Well, if you look at the polar bears that live at the North Pole, so, yeah, if you travel by car a lot, then a lot of fumes are released, right, and clouds form, right, and there’s this thing around Earth and you just get more of it and then when the Sun’s rays fly in, like, on Earth, like they stay then, well they bounce on Earth, right, and then they can’t get out again, because of that thing that’s around Earth, the gas, and then the Sun’s rays stay in there and it gets so warm that the ice melts and then the polar bears can’t live anywhere, yeah like that … (S1)

The students provide evidence of having ecological insights, for example ‘Yes, if you destroy the ecological cycle then everything is destroyed’ (S9). They also highlight the importance of ecological processes in sustainability issues and link this to value judgements regarding waste of resources:

Well I think that it is important not to throw away food. It’s because it takes a lot of things to get food, right, quite a lot of effort that pollutes the environment and then if you just eat half the food and throw away the rest then it
turns into rubbish that litters even more and, as well, there are people that starve in the world, right, and then I think that you shouldn’t just throw away your food. (S11)

These quotes illustrate both the students’ knowledge and values about the concepts. For example, ‘I think that you shouldn’t just throw away your food!’ (S11) is a value statement. In the interviews, the students describe school activities related to local environmental protection initiatives and practical activities, such as rubbish collection days and recycling. They also mention international social activities, ‘and we are in contact with other countries and help children who are in need and have, then we have sustainability days sometimes’ (S4). School themes that, according to the students, have raised the topic of sustainability include endangered animals, environmental problems in the Baltic Sea, a closed glass jar microcosm, and arts and crafts with recycled materials. In addition to activities, the students recount in-class conversations and discussions about sustainability: ‘and then we have talked a lot about what this school stands for and what it does not stand for, that is, that you are sustainable’ (S11).

We interpret expressions such as ‘you are sustainable’ as the students perceiving sustainability to be a personal quality. The students’ accounts also indicate that discussions about the underlying reasons for different choices and actions have been based on environmental-friendly norms:

… mmm we often do that, where you’re supposed to throw things and that you should take care of things both outside and indoors because otherwise you’ve just wasted loads, for example if a spade breaks then you’ve wasted lots of plastic. (S7)

To summarise, in these reflections of previous school work, the students exhibit their knowledge of an interdisciplinary content and an awareness of courses of action in environmental and sustainability issues.

**Meaning-making – three stories**

Three different stories (G1–G3) are presented below to illustrate and investigate how meaning-making in sustainability issues is contextualized differently. In particular, we focus on the students’ emotions and values in relation to environmental and sustainability issues. The emotion judgements and value judgements of the three groups were more related to environmental and sustainability issues and less to the social process of the group work (compared to the other two groups in the class). The stories follow the general structure of the students’ group projects.

1. **Group project on diabetes**

   This project was initiated after one of the students told the class, with emotion, that she had a friend with diabetes and therefore knew something about the disease: ‘Well, it was my suggestion because one of my very best friends has diabetes and … I wanted to know a little more because I think it seems hard on her and so I thought that … ’ (G1). The other students in the group became interested and also wanted to know more about diabetes.

   The members of the group collaborated by discussing the content and their approach, by searching for information on the Internet and by preparing the presentation. They were pleased with the facts that they had found about the disease and how it should be managed, but they were uncertain about any links between diabetes and the environment or sustainability. However, when this question comes up in one of the interviews, one student responds with ‘I guess it doesn’t depend on any pollution or so but … I guess it’s because there is loads of fast food and weird compounds and such … ’, after which another student continues ‘Yes, there was this thing we saw on the Internet but we haven’t really thought about it … like in 1980, there weren’t that many that had diabetes but since then there are loads’ (G1). After a moment of silence they say ‘Well that’s not sustainable!’ (G1). This conversation illustrates how the students’ view on diabetes has changed from viewing the disease in isolation to seeing it as part of a larger societal problem. It also illustrates the moment at which the students change their view of sustainability as a concept and realize that not only pollution can cause problems for people, but so can unsustainable food consumption.
When the group presents their project, they share the information that they have collected about diabetes and serve treats that would be suitable or unsuitable for a diabetic as a way of illustrating their conclusions. Thus, in addition to recounting the collected factual information, the students also clearly express values by saying that it is bad and unsustainable to eat the wrong type of food. They argue that the problems with diabetes have increased in recent years as a result of unhealthy and unsustainable eating and encourage their classmates to keep this in mind.

2. Group project on environmental labelling
This group chose to focus on environmental labelling after two of the students were curious about the meaning of environmental labels that they had seen at home. One girl says that she was very fond of the label with the green frog, ‘Yes, so then I researched it, it is Rainforest Alliance. When I was little I thought it had a cute frog on it!’ (G2). Another student in the group says that she knew hardly anything about environmental labelling before the start of the project and that she had not given it much thought. It was clear that those students who had previous experience of the topic were more enthusiastic and engaged at the start of the group project, than those without any previous experience. The latter students were mainly interested in using the Internet to investigate an environmental label.

When the group project entered the activity phase, the students in this group worked individually with their different labels by searching for information on various websites and taking down interesting notes. During an observation of one such session the observing author (OA) notices a boy slumped over his computer. When asked how he is feeling, the boy mumbles ‘I just want to kill those people’. Since the boy is clearly upset, OA asks if something has happened. At the same time, OA catches a glimpse of the computer screen, on which a website by the World Wide Fund for Nature (WWF) shows images of endangered orang-utans. The boy quietly sits with his head in his hands and OA asks if the images are related to his work. He replies, ‘Ye-es, … yeah, you just want to … you don’t understand how they can …’. The conversation continues and later the student passionately describes how he has learnt many things about WWF and their work with endangered animals. This emotional event occurs in response to the online images and has a great impact on the boy’s continued work and after the event he continues to investigate the topic. He also shows the page with the images to a student from another group.

During the project presentation, the students relate the information they have collected about the different environmental labels, but they also express their own values, which they would like the rest of the class to share. They argue that everyone should choose environmentally labelled products because environmental labels guarantee that animals are unharmed in the production of the products, and that the products are better for humans.

3. Group project on sustainable food
This group’s choice of topic was initiated by a film watched by the class about a family with teenagers, one of the children becomes a vegan and tries to persuade the rest of the family to become vegan. At the end of the film, one of the students in this group is upset and loudly states, ‘Meat is tasty!’ He looks around the class for support, and a few students jokingly shout ‘Meat rules!’ The group continues the discussion about meat, and food in general. The question is raised as to whether there is something odd about KRAV-labelled and organic food which becomes the topic of the group’s project, ‘We want to show that organic and conventional food taste the same, in case someone thinks it’s something odd’ (G3). The group’s topic is controversial and group members have different opinions and values.

While searching for information, the students realise that they have chosen a broad topic so they discuss how to limit the scope of the project, yet still address their original question. They decide to bring in different teas and bake organic bread for the class to try. As part of the project, the group visits a shop to investigate organic products for their bread-making. Afterwards they comment that ‘It is going to taste the same but organic is more expensive!’ (G3). The boy who initially was sceptic of the group’s topic researches how tea is produced and the difference between organic and non-organic tea. Once, when reading on a website, he looks thoughtful and asks, ‘Are there teas that are toxic because they have been sprayed? Can you get ill if it’s not organic?’ Another student answers, ‘Yes, I think so!’. The group
continues to discuss whether organic herbal teas contain endangered plants and, if they do, whether organic tea is better than conventional tea. The students’ discussion raises many new questions about organic food and generates new emotions and ideas.

The class appreciates the group’s presentation, because they drink different types of organic tea and eat homemade organic bread. The students’ comment that ‘it’s tasty and not only good for you, but good for the environment too’. However, the topic causes some students’ concern because of organic food is more expensive, turning into a reflective conversation about the value of organic food and its costs that fails to reach consensus. The student presentation ignores the initial comment ‘meat is tasty’ and focuses on the sustainability of organically grown food.

**Analysing the plots, focusing on emotions and values in meaning-making**

The three stories illustrate students’ expressions of individual emotions and more general values towards sustainability. Our method of analysis (in which the students’ meaning-making processes are structured temporally, with an initial phase, an activity phase and a concluding phase) provides the structure for interpreting and analysing the meaning-making processes in the three stories. Each story contains a form of complicating action, or ‘turning point’, in the activity phase. These unpredictable actions and events (presented in detail below) alter the continual processes and move students’ towards the conclusions and meaning of the concluding phases. The three different stories follow the same meaning-making structure, although the context is specific to each story and each story has a unique turning point.

In the stories, emotions are expressed either in immediate response to current experiences (for example in connection with using the Internet, i.e. a digital artefact), or by sharing previous experiences with other students. Most of the meaning-making occurred in group discussions, and the students’ emerging values were interpreted as resulting from the meaning-making processes. Many of the students’ values focused on environmentally friendly and sustainable actions. We also found that the link between values and reflection was stronger in the concluding phase, that is, the values develop over time. The following section reports on each phase, in order to highlight similarities and differences between the three stories within the three phases.

**Initial phase**

Two stories included emotions based on previous experiences in the initial phase. In G1, students’ emotion and previous knowledge linked to a personal experience in the diabetes story (‘My friend has diabetes, I know a little about it and it seems hard’), while in the environmental labelling story (G2), emotion and personal recognition were linked to a symbol (‘I have seen environmental labels at home and I think the green frog is cute’). In contrast, the third story (G3, sustainable food) was initiated by a personal emotion judgement (‘Meat is tasty’) caused by an immediate response to a film. Thus, the analysis of the initial phase showed that students’ experiences of immediate, emotional and reflexive characters were important for the onset of the meaning-making process.

**Activity phase**

Analysis of the activity phase and its complicating event, or ‘turning point’, showed that the event and its consequences differed between the three stories. In the group project on diabetes, the insight that the increasing prevalence of diabetes in society is partly due to unsustainable food consumption led to a change and development of the students’ understanding from a personal and emotionally individual level to a more generalised value perspective. The insight was triggered by information that the students had found on the Internet and the reflective conversation that followed. In the analysis, this conversation, and its critical question about the potential environmental aspects of the illness, was highlighted as the complicating event that led to the making of new meaning.

In the group project on environmental labelling, the powerful and emotional images of orang-utans became the complicating event that strongly influenced the group’s work, the students’ meaning-making, and led to the development of the students’ values about consumption habits and choices. Thus, the
students’ emotional experience of the online images contributed to increased motivation for the task, and as a starting point for the development of the value judgements that the students later expressed during their project presentation.

In the group project on sustainable food, which started with an expression of a personal emotion judgement (‘Meat is tasty’), an online information search became the complicating event that affected the meaning-making process. Through their IT-based work, the students’ understanding of food as a concept changed from one solely based on properties of taste, to one that included environmental sustainability and personal health. Thus, the focus of the project changed from individuals’ taste preferences – to the environmental and health aspects of conventionally produced food. This event and the subsequent reflection resulted in a change in the students’ values towards food production, both for their own health and for sake of the environment. However, the students’ opinions on the tastiness and consumption of meat were unchanged. Instead, the meaning-making process increased the value dimensions associated with the question about sustainable food and its production.

**Concluding phase**
The analysis of the similarities and differences between the concluding phases of the three stories showed that the students, through their group projects, increased their knowledge of the content and created values relating to food, humans and the environment. In all three stories, the students’ value judgements were more frequent in the concluding phase, than in the two previous phases. By comparison, the initial phase contained more expressions of personal and emotion judgments. These results support that values are responses to specific events and are created by dialogical conversations and take their starting point in specific situations. In addition, the analysis also revealed personal conflicts of interest, as illustrated by the opposition between what tastes good (emotion judgement) and what is known to be more sustainable (value judgment). In the present study, these conflicts of interest were particularly noticeable in groups 1 and 3, whereas no such conflicts were apparent in group 2 (environmental labelling).

**Analysis in a temporal perspective**
Through the analyses of the three stories’ of students’ meaning-making, we have developed a model for describing the structures and relations (Figure 1).

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**Figure 1.** Model for emotions and values as part of meaning-making processes.
On the basis of our observations and interpretation of the process, our results show that the students’ experiences during the initial and activity phases mainly consisted of emotions, while their experiences were characterised by values during the concluding phase, that is, the occurrence of emotions was higher in the first two phases. Furthermore, our analysis suggests that the students’ values developed through reflection on immediate emotional experiences. The connection between emotion and value is illustrated by the wide right-facing arrow and the narrow arrow in Figure 1. The wide arrow represents the predominant interaction between emotion and value, as found in this study and shown in the three narratives. The narrow bidirectional arrow indicates a different type of interaction, in which the students’ emotions and values are parts of an integrated continuum and sometimes mutually influence one another. We also found that values based on previous experiences were important for the students’ expression of new emotions in some cases of meaning-making. The students in group 4 did not have any personal experience of their chosen topic (medicine and the environment), nor did they express emotions or values related to the topic during the activity or the concluding phase. Figure 1 summarises the study’s findings, namely, that students were more likely to have immediate emotional experiences in the initial and activity phase, and values were more frequent as the meaning-making processes developed through reflective experiences into concluding phases.

**Analysis of differences in meaning-making between current and previous school activities**

There was a clear difference in the expression of emotions and values between the students’ recounts of previous school themes and activities on sustainability issues and the direct observations made during the activities on the ‘Food, Human and Environment’ theme. The content of the current school theme was initiated by the students’ own personal experiences and interests, which meant that the students were more involved in the selection of topics. The students were clearly personally engaged in their own group project and they motivated their choice of topic because of its relationship to their own experiences.

The students’ recollections of previous school activities on sustainability issues also contained examples of engagement, but on a more general level. In interviews about previous activities, the students used words such as ‘they,’ ‘we,’ ‘everyone’ and the generic ‘you’ more frequently, than in the current activity, where, even during the initial phase, they used the word ‘I’ and emotional expressions more frequently. We interpret this difference in word usage as examples of the students expressing more emotions when they could relate to an activity because of previous personal experiences, than when the activity was based on more general sustainability issues. An additional factor that may have affected our results is that the students’ experiences of previous activities were of a reflexive character. Thus, the higher frequency of value judgements in the individual interviews about previous activities may be a result of the prominence of reflexive experiences (cf. Figure 1). However, with two exceptions, the students used fewer expressions of emotions when discussing previous activities. The two exceptions were rubbish collection days and an activity aimed at reducing food waste in the school canteen. These practical activities elicited emotions in the students, who also used value judgements when discussing them, such as ‘You shouldn’t litter.’ and ‘You shouldn’t throw away food!’ We have interpreted these statements as pointing to that the participation in these practical activities influenced the students’ meaning-making and value judgements, with regards to environmental issues.

**Discussion**

The goal of this study was to gain more knowledge about how emotions and values are expressed during meaning-making processes and the relationship between them. Similar to previous studies, the students in this case study engaged with, and formed emotion and value judgements in response to environmental and sustainability issues (cf. Dillon, Heimlich, and Kelsey 2013; Lundegård 2008; Öhman and Östman 2007). The reported case provides an example of how independent school work, such as a group project, can promote conversation and exchange of experiences between students, and give the
students the opportunity to experience immediate emotions and develop values; something Dewey (1916) argues is of utmost importance for the process of meaning-making. The degree of engagement was linked to the individuals’ previous experiences and to the students’ emotional experiences during the activities (Figure 1).

By analysing emotions and values as well as interactions between them, we found that personal emotional starting points often were transformed into values of a more general character during the course of the group project. In relation to the theory of Nussbaum (2001) we found the students’ expressed emotions to be complex and relational pertaining to a specific object or situation. We also found that powerful and upsetting emotional experiences led to increased student engagement, as illustrated by the observation of the student looking at images of orang-utans, in line with results as previously reported by Ojala (2013). These specific situations where students were showing emotions could be understood as the ‘aboutness’ as described by Nussbaum (2001) namely the context of an emotion that also can lead to the formation of values.

According to Quay (2013a) and Wickman (2006), it is difficult to estimate the impact of immediate emotional experiences on students’ meaning-making processes. From the examples presented in this case study the emotional experiences were important for students’ progression through the processes of meaning-making as they became complicating events (turning points) in a transformative process. These empirical findings are further understood in alignment with Dewey’s theories describing the inner process of experiencing where he argues that emotions are the ‘moving and cementing force’ (Dewey 1934, 44). The type of meaning that is created depends on the specific circumstances of the process and could also be described as transformative, rather than transmissive learning (cf. Biesta and Miedema 2002). Previous research in ESD has highlighted that several of the problems and dilemmas that students face when learning are caused by interpersonal conflicts of interest (cf. Lundegård and Wickman 2007). The impact of emotional experiences in sustainability learning have also been discussed in terms of how students cope (Ojala 2012b), or are given opportunities to reflect and learn (Wals 2007). Wals (2007) further notes that the role of emotional conflict in student learning depends on the situation, and teachers’ ability to support students. Lundholm, Hopwood, and Rickinson (2013) argue that such emotional events present a hindrance to students in their learning about environmental issues. In contrast, Lundegård (2008) and Öhman and Östman (2007) argue that emotional experiences are necessary for individual change and development.

By using Martha Nussbaum’s theory of emotions within an overall Deweyan pragmatic understanding of education, we have found both emotions, emotion judgements, value judgements and values expressed by students in the meaning-making processes regarding environmental and sustainability issues. The study has shown that emotions are relevant and an inseparable part of students’ meaning-making processes and a foundation for values (Figure 1). The results indicate that further studies using Nussbaum’s theory in analysis of emotions in meaning-making are warranted. Based on our results we agree with Wals (2011), who argues that we need new forms of learning in environmental and sustainability issues, and to ‘consider learning as more than merely knowledge-based’ (180).

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Disclosure statement

No potential conflict of interest was reported by the authors.
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