Article

Chicken Raising in a Diverse Finnish Classroom: Multidimensional Sustainability Learning

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Abstract: Social change requires new educational planning and sustainable teaching methods. Shaping an environment of care with animals as a part of the daily school life may produce such a change. In this article, we present a transdisciplinary study with the aim of exploring whether raising chickens in a classroom could promote learning, especially sustainability learning, and how. The study employs an ethnographic approach and we have analyzed the data according to interaction analysis. We collected the data in a culturally-diverse Finnish primary school class during May 2018. The data comprise field notes, videos and photographs from indoor and outdoor school activities; interviews and discussions with teachers and students; and, texts and artifacts that were made by students. The results show that having chickens in the classroom not only improved the students' learning of biology, but also enhanced many other activities. The chicken project became part of a complex learning culture that met several of the aims of the curriculum and in many ways reached beyond the aim of merely learning science. The project became a natural part of sustainability education and promoted the acquisition of knowledge and skills in relation to the ecological and social dimensions of sustainability.

Keywords: cultural diversity; classroom animals; ecology learning; ethnography; interaction analysis; multilingual; science education; social sustainability; social sustainability education; sustainability education

1. Introduction

Since the first United Nations (UN) Conference on Environment and Development in 1992, the concept of sustainable development has been divided into three basic dimensions: ecological, social/cultural, and economic. Gradually the one-word concept 'sustainability' has replaced the two words 'sustainable development', much because of the latter's contradictory nature [1]. According to United Nations Educational, Scientific and Cultural Organization (UNESCO) [2], the difference between the two concepts is that sustainability is a long-term goal towards a more sustainable world, whereas sustainable development implies the processes to reach this goal. Education is thus one of the many processes to reach sustainability [2].

The whole sustainability issue is complex, and the different dimensions of sustainable development are interrelated. Sustainability is a multifaceted and interdisciplinary matter that relates to all academic disciplines and school subjects [3]. The social dimension of sustainability has not been studied much in education, and it is also difficult to define [4]. However, Missimer et al. [5] have worked with the hypothesis that a socially sustainable society is one in which people are not subjected to

any structural obstacles to health, influence, competence, impartiality, or meaning making. The crucial elements that should be maintained in a socially sustainable context are trust, common meaning, diversity, capacity for learning, and capacity for self-organization. Even if these criteria are not especially worked out for schools, they are still applicable in a school context. 'Learning as meaning making' involves identities and emotions and emphasizes that when learning, people try to make sense of the situation with its frame, objects, and relationships based on experiences and cultural resources [6].

According to Gadotti [7], sustainability means that people live in harmony with each other and the environment; a crucial goal, therefore, is that there should be harmony among the differences [7]. The social dimension of sustainability supports equality in culturally-diverse settings. Among many other important questions, sustainability education must deal with inequality and power issues [1] and it should recognize challenges on ethical, cognitive, and practical levels [3]. Based on empirical research, Green and Summerwille [8] distinguish four meta-level categories through which they understand the essential elements of sustainability education:

> It is constituted *within the immediate materiality of school grounds, and extends to connections to local places*. It is *a collaborative and community-based practice that employs creative processes* both in terms of arts-based practices and of the problem posing and inquiry learning approaches commonly employed. These characteristics move beyond the possibility of standardized recipe-based approaches for teachers to prepare innovative and creative future-oriented generations to move forward confidently in a precarious world. [8] (p. 841, italics by the authors of this article)

The schools need to become 'facilitators of wide-awakeness and change' in the sustainability process [9] (p. 102); or, said in another way, they need to become 'proactive in sustainability' [10]. The multidimensional sustainability problems require other ways of approaching the world and society. In this world and those societies, humans and their social context, nature, technology, art and culture are viewed as entities through which sustainability issues repeatedly interfere with each other [3]. Complex authentic problems in theory and in practice are then in focus in the learning situations. Ethics is not only theory, it is also practice [9]. Bai and Romanycia [9] even ask whether schools could become leaders in a movement towards a more ecological life on earth. They see ecological ethics as being strongly related to care, in line with Noddings [11], who emphasizes a transformation of the schools to contexts of care and concern, where caring of non-human and thus non-moral creatures, like animals and plants, is a part of daily life. Different people in a different school system have various strengths, and caring is a crucial component when cultivating these strengths [11]. According to this reasoning ecology, learning becomes something broader than merely being a part of science education. It is connected to the social sustainability dimension, and, thus, social sustainability education.

There are websites from several countries, for example the United States (US), Australia, the United Kingdom (UK), New Zealand, and Finland explaining about teachers and students raising animals in the school garden or in the classroom. Yet, research on this topic is rare, especially qualitative studies. Herbert and Lynch [12] interviewed adults about their experiences after a classroom animal project and the researchers recommend further studies on the topic from the students' point of view. Our study presents the students' and one teacher's view. In this article, we have described the results of an interaction study primarily based on Linell [13], who was strongly influenced by the dialogism created by Bakhtin [14]. In our study, we observed a culturally diverse Finnish school class raising chickens.

The aim has been to study whether and how raising chickens in a classroom could promote learning, especially sustainability learning, and the primary research questions were:

1. What was it in the learning environment that made the project possible?
2. How did the project influence the teaching and learning?

(a)　　　of science?

(b)　　　of other subjects and skills?

3.　　In what ways did the presence of the chickens affect the lessons and the classroom context as a whole?

We had a basic interest in learning, but also searched for other possible outcomes of the project. In the next section of this article, we present a literature review on the experiences of children's engagement with animals, in general and in classrooms specifically, and then we explain how the topic of classroom animals corresponds with the Finnish national core curriculum. In the third section, we discuss the theoretical framework, and in the fourth, we describe the method and field study, including its extended learning context. In the fifth section, we present the analysis. Finally, we present the results and discuss their implications.

2. Research about Children, Animals and Learning

Animals have always fascinated humans, and children in particular. Children are most likely to interact with animals as pets, but also in classrooms and in the form of intentional wildlife experiences [15]. Intentional wildlife experiences comprise observing animals close to the child's home, school, or neighborhood and visiting zoos and aquariums. Children also encounter animals via mediated exposure in print, audio and visual media, and live through webcams that are installed in places like zoos and birdhouses [15]. Animals are important elements in the lives of children, according to several studies, as we outline in the section below.

2.1. Children and Animals

Previous research has revealed that there is a connection between interaction with animals and children's and adolescents' well-being. Based on a literature review, Purewal et al. [16] conclude that owning a pet may have a positive effect on children's and adolescents' emotional, cognitive, behavioral, educational, and social development. However, they also claim that there has not been enough research in this field and many of the studies lack methodological quality. Another literature review concerning the effects of pets on human health and well-being supports these results [17]. That study also indicates that pets have a positive impact on both short- and long-term physical health, as well as on psychological health [17]. Nevertheless, Purewal et al. [16] argue that the evidence is not yet conclusive for a causal relationship between companion animals and health.

However, there are other studies that have shown the value of animals in medicine and healthcare, and animal-assisted therapy (AAT) seems to be gaining ground. Reduced pain among children [18–20] and reduced symptoms among children and adolescents with mental disorders [21,22] are examples of the positive effects of AAT, which have been verified by studies.

There are also studies indicating that keeping animals at home has a positive impact on scientific knowledge. For example, research shows that having a pet at home has a significant effect on children's knowledge about animal anatomy [23]. Keeping pets at home also contributes to a more positive attitude towards animals among children [24,25], both popular animals, such as squirrels and rabbits, and less popular animals, like some predators [25]. Remarkably, according to Signal and Taylor [26], neither current nor past pet ownership significantly affected attitudes towards animals among Australian adults aged 18 to 88, but a survey of Australian university students reported the opposite [27]. Interestingly, this survey also discovered a link between human-human empathy and attitudes towards animals [27].

A German survey among children showed that pro-animal attitudes decrease with age and that girls usually have more positive attitudes towards animals than boys [24]. Children participating in animal-related activities generally show more positive attitudes towards animals, and this is related to the fact that animal-related activities among children decrease with age and are more popular among girls than among boys [24]. In contrast, the results of an Australian survey involving adults did not

identify any statistically significant effect of age, but this study also detected the effect of gender [26]. A previous American study among college students also supported gender differences at various ages [28]. Occupation and income were other demographic variables that influenced attitudes towards animals, according to the Australian study, while educational level and the presence of children in the dwelling were variables that did not have a significant effect [26].

2.2. Animals in the Classroom

It is difficult to know how common it is to have animals in the classroom for educational purposes, because there appears to be also a lack of research in this area in most countries. Gee et al. [29] conclude that 'It is likely that the involvement of animals in educational settings is commonplace' (p. 195). They refer to a study by Rud and Beck [30] showing that 25% of the teachers who participated in a survey conducted in Indiana, USA, had classroom companion animals.

What animals are typical in classrooms, for what purposes are they used, and more specifically, for what educational purposes? A survey by the American Humane Association [31], responded to by 1131 teachers, showed that the most common animals in classrooms were fish, followed by lizards, guinea pigs, and hamsters. The study revealed that 60% of the teachers having pets in their classrooms used them primarily for interaction with the students, and the practice did not involve any formal teaching plan. A similar proportion of teachers used interaction with the classroom pets as a reward for positive student behavior. One-half of the teachers used the pets in formal lessons, of which most were science and thus nature and animal care related, but also in lessons emphasizing responsibility. One-half of the teachers using pets in formal lessons included creative writing. Other purposes for animals in classrooms were humane education, self-care, anti-bullying, and the teaching of mathematics and art. The most important use was a combination of responsibility and care, with the aim of supporting leadership skills. Often a student had the role of pet caretaker for a short period, because of either a rotation or a reward system.

Live animals can be a welcome component in the teaching and learning of science, a contribution that brings in aspects when other methods and materials (books, films, and so on), are not enough. Learning science is not only about learning facts, but also about learning skills—for example, observation and experimentation skills—and attitudes towards other creatures. However, research results concerning the learning effects have been contradictory. Nevertheless, Herbert and Lynch [12] refer to studies that show how animals in the classroom have a positive impact on the learning of science. Their own study, in which they interviewed 19 adults in a school with an animal (e.g., fish, scorpion or stick insect) in every classroom, showed the same result. The adults were principals, teachers, science specialist teachers, and university science students. According to the adults interviewed, raising animals in class motivated and encouraged the students to learn about science and influenced the students' socio-emotional and ethical development positively [12]. This is also supported by Daly and Suggs [32], who interviewed teachers who stated that animals in the classroom contributed to increased empathy and development of socio-emotional skills. The birth and death of animals especially affected the students' feelings [32]. When caring for the animals, the students became responsible for the well-being and growth of others. Physical contact with animals, even unpopular animals like snails and mice, can positively influence attitudes towards animals, according to Randler et al. [33].

However, Hummel and Randler [34] claim that few studies have confirmed the assumption that having live animals in the classroom is better than other teaching methods when the aim is to deepen the understanding of animal anatomy and animal behavior among students. Their study indicates that using live animals in ethology (studies of animal behavior) experiments enhances the experimentation competence of the students, but the research surprisingly showed a similar effect when using films. When it comes to cognitive achievement, a group using live animals in the classroom and a group watching films both performed better than a control group. Remarkably though, the performance of the film group was significantly higher than the performance of the live animal group. However,

another similar study involving harvest mice did not find any significant differences in knowledge acquisition between an experimental group taught with live mice, and a control group taught with film clips [35]. Yet, in these studies, the groups working with live animals reported significantly more positive results regarding emotional aspects [34,35].

Classroom animals can stimulate the development of social competence. For example, research indicate that the presence of a dog in the classroom may contribute to the development of higher social integration in the classroom and promote sensitivity towards needs and moods of other people among children [36]. Positive effects on behavioral problems, such as aggressiveness [36,37] and hyperactivity [37], have been verified as a result of having a classroom animal. Likewise, there was also a positive effect on attention [37]. O'Haire et al. [38] reported similar positive effects on students' social skills after a classroom intervention study involving guinea pigs. The social skills increased significantly more in the experimental group than in the control group.

However, it is worth mentioning that taking care of animals also entails additional costs and work [12]. It also requires the teacher to have expertise. The American Association of Natural Science Teachers Association (NSTA), the world's largest association of its kind, urges schools to keep animals in the classroom [39]. At the same time, the association has developed instructions for responsible use of live animals in the classroom [39]. Accordingly, NSTA emphasizes that animals must be treated humanely, responsibly, and decently. On the other hand, critical voices would like to deny classroom animals for ethical reasons [40]. When considering introducing animals into the classroom, teachers are responsible for carefully balancing ethical and responsible issues with educational benefits.

2.3. Animals in the Classroom and the Curriculum

Arguments in support of classroom animals can be made from many perspectives that are based on the Finnish core curriculum for basic education [41]. The underlying values of basic education emphasizes that educated persons 'strive to act correctly and show respect for themselves, other people and the environment' (p. 16), and rearing animals is then a concrete example of how to show respect for the environment. This is expressed even more clearly in the key content areas related to the objectives of environmental studies, an integrated subject area in primary education, comprising biology, geography, physics, chemistry, and health education. 'Building a sustainable future' is one of the key content areas, and here it is emphasized that students should reflect on the impacts of their actions on themselves, other people, animal welfare, nature and society [36] (p. 260). Animal welfare is then included among the factors comprised in a sustainable future, according to the curriculum.

The concept of learning that the curriculum is based on sees the students as active learners [41], but the methods employed in practice in biology education often show the opposite, namely methods through which the teacher is active, and the students are passive [42]. Many of the objectives in environmental studies concern skills practiced in inquiry-based learning, that is, formulating questions and working on small-scale research projects and searching for answers to the questions. Observation and documentation of what is happening when rearing chickens can raise authentic questions for further investigation in the classroom. One of the objectives of environmental studies also stresses the development of conceptual structures from preconceptions towards the accurate use of concepts. With the guidance of the teacher, the concepts can be used in authentic situations [34].

In addition, rearing animals in the classroom can be a motivating experience for the pupils. One of the objectives of environmental studies is 'to spark and maintain the pupil's interest in the environment and environmental studies and to help the pupil experience all fields of knowledge of the subject as significant for himself or herself' [41] (p. 258). According to the concept of learning described in the curriculum, the school culture has to be inspiring for the pupils to develop their competence through positive emotional experiences and the joy of learning. Real animals in the classroom can strengthen the bond between school and the reality outside the school, and can spark interest and motivation. This can also contribute to the creation of authentic classroom situations that are called

for in environmental studies, according to the curriculum. Authentic situations are often naturally multidisciplinary, and rearing animals can be an opportunity for cross-subject learning, which the recent Finnish core curriculum for basic education emphasizes. We will soon display how raising animals can become a classroom project, but first we present the theoretical framework for our study.

3. Theoretical Framework

A sociocultural approach with inspiration from Vygotsky [43] to Säljö [44] is our main theoretical frame in this article. Different culturally-situated social practices employing different artifacts thus become fundamental components for analysis [45]. Implementing sociocultural views includes viewing language and identities as something to be contextualized. This understanding of learning correspondingly links to a dialogical view of interaction. Dialogism is a transdisciplinary approach that is used in, for example, psychology, social science, and linguistics [46]. The *Bakhtinian dialogicality* begins from the view that life is dialogic [47]. Living is a lifelong participation in a dialogue involving the entire person. The body and mind become an entity through the dialogues, where both gestures and talk involving for example lips, eyes and hands contribute to the world's dialogues.

Further, Linell [48] argues that dialogism must be the overall theoretical framework for analysis of communication and social life. In other words, a dialogical line considers the subject's relation to the interaction and to the context in a physical and social surrounding. The most typical category of activity is face-to-face interaction and different multimodal real-time interactions. In the double dialogical perspective (in which language is seen as situated interaction and situation-transcending practices), one cannot be 'not in a situation' and that is why both interaction and the context are crucial in the analysis.

Children's language development starts with the everyday language and continues with the development of academic language. The latter takes place mainly at school. Academic language development is an overall term employed for how language is used in different ways in and outside the school environment [49,50]. Zwiers [51] (p. 20) describes it like: 'academic language is the set of words, grammar, and organizational strategies used to describe complex ideas, higher-order thinking, processes, and abstract concepts'. Different subjects in school have their specific ways to use language [50]. The language of science is complicated and is filled with special concepts. Therefore, it is difficult even for children with the school language as mother tongue to adopt the scientific language. Learning science is actually like learning a new language.

4. The Empirical Study

This section deals with the methodological considerations and the research events connected to our study. The key methodological approach is inspired by ethnography and it includes three phases. In this section, we also present the local context in which the study took place and our ethical considerations.

4.1. Methodologic Approach

The basic methodological approach of this study is ethnography and it builds on qualitative data collected during school observation in Finland. Ethnography traditionally has been related to anthropology and 'doing ethnography' meant doing the fieldwork far away from your own well-known context. In a widespread metaphor, ethnography is called 'a way of seeing' [52]. A fundamental belief in the choice of an ethnographic approach is that taking part of the school context for a period gives a deeper understanding of the everyday life of the school. We aim to produce a thick description in which the context is of importance for understanding the analysis. Thick description is described by Lincoln and Cuba [53] and Geertz [54] introduced it in ethnography in 1973, and it indicates that the fieldwork is described in detail and that the researcher explicitly shows the cultural and social patterns in a context. In this study, the researchers who study the school context participate in learning

situations in which they observe and raise questions with the teachers and students as a part of the learning context.

An ethnographic study is based on fieldwork and it can be divided into three phases: the pre-fieldwork phase (planning), the field work phase (in the school) and the post field work phase (analysis). The pre-fieldwork phase in our case included searching for suitable schools, contacting principals and teachers, applying for ethical clearance, arranging the technical equipment, planning the observation weeks, and meeting teachers and students. One of the classes we visited before the actual observation period happened to have chicken eggs in a hatching machine. When we came back later for a week-long observation, the eggs had turned into chickens. This phenomenon made us concentrate particularly on this issue as one of the many cases of our entire study. During the fieldwork phase, we collected and constructed data through video recording and field notes of lessons and full school days, photography, discussions with teachers and students, observations of the school building and its environment, as well as of learning materials. Thus, the study is explorative, developing, inductive, and contextually diverse. Yet, in this study, we used research questions in combination with an explorative method. Data collection and analysis are both a form of triangulation. The analyses contain both descriptive analyses of environment data and interaction analysis through which we investigated the communication of participants in a school environment during lessons, breaks, and after the official school day. Linell [48] emphasizes that, when analyzing conversations, it is important to base the understanding on what the members say and mean.

It is always a challenge to capture the complexity of interaction in a text during transcription [55], or, as Ochs [56] argues, transcription is 'theory' because it outlines what exists for analysis and further which conclusions can be drawn. Transcripts are selective each time and the writer should choose the level of detail. However, we chose not to translate from Finnish to English exactly the way that the teacher and the students spoke (impossible), but rather to stay close to common English. The reason was that the students speak young people's slang and as second language speakers, they have not yet mastered the Finnish language very well.

Likewise, field notes can be documented in many ways, but it includes a textual transformation process. In our case, we had the opportunity to be two researchers in the same context at the same time and that gave us the chance to switch between our observation roles. Most of the time one of us was responsible for the recording and the other took field notes and digital photos. We did not participate in the lessons in the role of teachers, although the students occasionally asked us questions. Since one of the empirical researchers represents language education and the other science education, we strived to reach beyond the separate subject education approaches and let synergy emerge, and thus we call the study transdisciplinary. The study in the school presented here indeed became something that was more multifaceted and sustainability-related than what we had expected.

4.2. The Field Study

The school that we visited is in an old commonplace building in a suburb of a large city in Finland. It is apparent that the building was impressive during its heyday, with high ceilings, wide corridors, and with many diplomas on the walls. A stone staircase leads a few floors up to a grade 5 classroom. The school is large, and the class includes 25 culturally diverse students, of whom several have a native language other than Finnish. The teaching language is Finnish, and we did not hear the students' speak any other of their many languages during lessons, breaks, or after school. The only exception was the English lesson.

A door at the end of one of the long walls leads into the classroom. The other long wall opposite the door has two wide and high windows with wide window niches. Between the windows is a bookshelf and the teacher's desk is in the front corner near the window. On the short wall behind the teacher's desk, there is a green board and a whiteboard on the wall next to the door. On the other short wall are floor cabinets about one meter tall, and along the top of the walls there are long strings with flags. There are various artifacts in the form of maps, a globe, and many students' drawings.

The students sit together two-by-two. When we were there, the classroom atmosphere was sometimes very lively and noisy. Yet, the students who sometimes needed a solitary atmosphere could use tables and chairs in the corridor.

At the front corner of the long wall with the door stands a terrarium with three chickens that were approximately the same size as pigeons during our visit. The fact that the birds are a significant part of the classroom environment becomes evident from a student's comment:

'Just a couple of days ago, when we had a Finnish lesson, one of the chicks came to the desk where I had my computer and it started to type'. In our field notes, we have sequences that further attest to the birds' strong involvement in the classroom (see Section 5).

The teacher shows strong trust and commitment to the students. During the week, when we were there, he often showed that nothing is impossible. For example, when the students were going on a bicycle trip with the teacher and he realized that not all students had bicycles, he solved it by renting bikes along the way. The teacher also stays in school with the students after the school day has ended, as we show in an example in the results. It is usual for him to remain in school taking care of the chickens and chatting with the students.

4.3. Ethical Considerations

This study was conducted in Finland and followed the ethical guidelines issued by TENK, the Finnish National Board on Research Integrity. This means that we gave all the participants information about the project in the study, and the children's parents had to sign an informed consent document. We have used pseudonyms to protect the school, the location and the participants in the study.

5. The Results

During the time, when we were observing the school class with the chicken project, many activities took place both inside and outside the school building. It was an interesting time and we have a lot of material and many stories to tell. In this section, we present a few of these stories with relevance for the aim of our study.

5.1. Voices about the Bird Project

After spending a couple of days at the school, in the local context, the researchers follow the teacher and the students on a bicycle trip to a graffiti area. All of the students can accompany regardless of their access to a bike. The teacher Esa takes a student on the back of his bike and hires a bike for the student along the way. Nothing seems to prevent him from exploring outside of the school's walls with the student group. When the students are ready with the documentation about the graffiti, we have time to talk to the students a bit more about the chicken project.

This conversation is with Samir. It is a hot day at the end of May and Samir talks relatively undisturbed with the researcher a little bit away from the other group. They stand in the middle of a large industrial area that is daubed with graffiti. The researcher asks the student before recording if he could tell us about the chicken project, a question we asked almost the whole class during the week. The student is happy and eager to talk about the project and the researcher explains that she will now start recording. The student starts to explain that he had heard, through a mate, that there were chickens at another school, which gave him the idea. The conversation continues in conversation example 1:

Transcription guide:

/ audible break;

[. . .]parts of the transcript have been omitted;

_____ said with emphasis;

( ) Situation descriptions;

? Question intonation;

↑ marked increased voice;

(basically lowercase letters).

In the following sequence, the researcher (R) speaks with the student Samir (S).

Conversation example 1: The start of the bird project

01. S: and after that I started to ask/esa koskinen/or our teacher/and then he said yes, it is a good idea ↑ go and suggest it ↑ to the principal ↑ and then I did that ↑/and he said yes this is a good idea

02. R: so you went to suggest it to the principal?

03. S: <u>yes</u>

04. R: oh that was good ↑

05. S: and after that/uh/we had to get/you know money to buy it uh/the incubator

06. R: yes ↑

07. S: we decided with the school that they will then buy it ↑

08. R: <u>yes</u>

09. S: after that

10. R: do you know how much it cost?

11. S: uh 150 (euros)

12. F: oh ↑

13. S: we did not only buy the machine/but we bought a kind of incubator package

14. R: okay

15. S: if it includes a heat lamp/then it costs 150 (confirms with a hand gesture)

16. R: <u>yes</u>

17. S: heat lamp/food machine/drinking machine and all this kind of stuff (nods)

18. R: okay

19. S: yes and that way we could start

Conversation example 1 describes how the chicken project begins from line 01 when the teachers and school management accepted Samir's idea. This student with a non-Finnish ethnic background brought the question to the school leadership in a very student-active way. From line 11 to line 19, Samir takes an expert role and this becomes particularly clear in some other parts of the conversation too. The student's language changed from general everyday expressions to a more subject-related school language. Above, it is evident in the correct conceptual usage regarding the equipment, line 13–17, and below it appears when the researcher asks if the pupils were at school when the birds hatched and Samir replies:

Conversation example 2: Hatched like in the movies

40. S: <u>yes!</u> (nods) one of the cocks that we have in school/it was born orthodoxly in calculated time ↑ and you know/it was born that way that first when we came there/it had made a little hole/and after that it started to saw

41. R: oh ↑

42. S: like on a movie (shows a small movement with his fingers) ↑

43. R: oh no ↑

44. S: that kind of a sawing edge (a bigger finger movement)

45. R: exactly like in the movies

46. S: <u>yes</u> (nods)

47. R:　yes
48. S:　and that it flopped out (makes a quick movement with his head at the same time)
49. R:　yes, and you saw when it came out?
50. S:　yes, we did

On line 40, Samir explains 'orthodoxly at calculated time' in a very focused and committed way, and then he makes an inference to movies he has seen at the cinema or on television. In conversation, example 3 follows a sequence of life and death in the classroom.

Conversation example 3

56. S:　four hatched/oh no five/but two died
57. R:　you mean that five hatched and two died/how did they die?
58. S:　uh those two died because/one was very weak/we had to help and it started to bleed and we had to kill it
59. R:　who did that then?
60. S:　uh it was my dad
61. R:　oh
62. S:　yes/but then the other one was that way that it had the leg someway in a bad position
63. R:　yes yes
64. S:　it had become crooked/and then uh it walked on it in a little strange way it was difficult to walk/and naturally the other hens had possibly hacked it but probably they had not killed it/because/it did not seem very/yes hacked/but they had hacked it a little/and then it was there one day when we came it was only there dead/but such a problem occurred that/the Fahrenheit messenger was broken
65. F:　oh no
66. S:　and after that you know/one had to/we read how much is 100 Fahrenheit/because 100 Fahrenheit is a suitable heat
67. F:　yes
68. R:　and that was 40 (Celsius) degrees ↑ but that was too hot ↑ you could read that on the egg internet/that uh 40 degrees in 15 min can cause harmful damage
69. F:　oh
70. S:　in that egg/and then uh we turned it the last days to 38/5
71. F:　yes
72. S:　and that was right
73. R:　and when you say that your dad was with you when you had to kill one of them/was it so/now that I understand you correctly where you got those hens was it some acquaintance to your family?
74. S:　no/I called several farms
75. R:　so it was you who called
76. S:　yes and after that there was this XX-farm and we agreed with it
77. R:　yes you called yourself
78. S:　(nods) yes

Here, we can follow the entire bird project and line 60 also shows the involvement of a father, and from line 66, we can see what happened due to problems with the Fahrenheit messenger

One afternoon, the researchers follow the students, the teacher, and a co-teacher during an outdoor lesson during which they are going to position insect hotels they have built the same day in the school garden. On the same lesson, they also search for worms for the hungry chickens—last time they ate almost one liter (2.2 Lb) of worms. Two students, Samir (S) and Matteo (M), return with the teacher

Esa (E) to feed the birds when the school day ends. During the feeding, they also discuss how they will return the birds to the farm. Another recurring topic is Matteo's ongoing religious fasting (Ramadan). The film sequence begins with the teacher at the classroom sink explaining what they must do when they empty the worm bucket and how they can give the worms to the birds. While Esa guides and Matteo takes care of the feeding, a conversation starts about the birds' eating—who is the fastest, most gluttonous, and so on. Esa asks Samir how to organize the returning of the birds to the farm in the following conversation, number 4.

Conversation example 4: Time to return the birds

24. E: yes/what do you think samir, shall we send an email or call?/do you think calling is a better idea?
25. S: yes/calling
26. E: do I give you the phone ↑ and you call X (the name of the farm manager)?
27. S: yes (breathing inwards)
28. E: do you have the number, or do we have to search for it again?
29. S: we have to search for it again
30. E: mmm was it pekka huittinen?
31. S: hm I don't remember
32. M: is pekka huittinen the teacher?
33. E: no it is the farm manager/
34. M: oh how I long for eating chicken
35. E: mmm
36. R: do you like to eat?
37. M: chicken
38. E: that is probably because you are fasting, and you start to fancy all kinds of food

On line 24 Esa begins to ask about the returning of the birds, whether to call or send emails, and at the same time, on line 26 Esa says Samir is the one who should call. From line 33, Matteo expresses his hunger—since he is in the middle of a fasting period. The teacher explains: 'that is probably because you are fasting, and you start to fancy all kinds of food'.

5.2. Ongoing Activities with the Birds in the Classroom

During the observation week, we noticed many activities that included the birds. On the wall hang the students' drawings of the chickens when they had newly hatched. The students had given *the chickens* own names, but we will call the biggest one Goldie, the other two Henny and Penny in this article. Here, we give a short summary of activities and interaction around the terrarium during a 12-min period (see also Figure 1a,b). It is a break during an art lesson, and one of the researchers is sitting with Eeva by the terrarium. The other researcher and Alex join them. Eeva holds Henny with both her hands and caresses it. Eeva says very little and answers questions short or soundlessly. She caresses Henny when it is in the terrarium and she lifts out Goldie ('come come come', she says to the chicken'). Eeva puts down the chicken to let it walk on the floor, it goes around and picks up all the small trash it finds, the girl tries to prevent it from eating the small junk by putting them together (teaching the chicken). Eeva speaks more to the chicken than to us, and she says: 'o/what are you doing?/no (to the chicken)'. When she puts it back into the terrarium and it flap its wings, she says loudly 'oh my God/oh my God'.

Jaan comes and takes Goldie out of the terrarium, and holds it and caresses it, while Eeva pets Henny inside the terrarium. Jaan puts the chicken on his arm. He holds it for a while, smells it and lifts it gently, Goldie stands calmly on his arm, also when the boy does not hold it, the chicken peeps a bit, and then Jaan puts it back in the terrarium. Alex comes and sits down with his phone in his hand (holding it as a camera next to the terrarium saying: 'a couple of days ago it was so that I took a picture

when that chick/there is the chick/I will show you' (to the researcher). He has taken a lot of pictures of the chickens and shows them proudly.

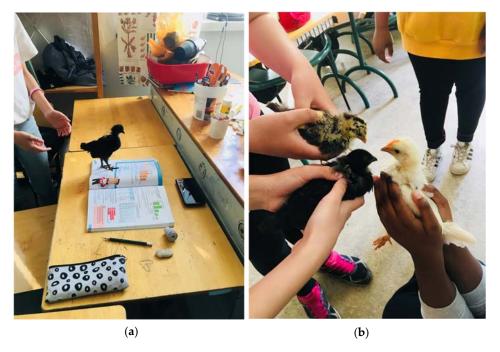(**a**)   (**b**)

Figure 1. (**a**) Penny on a math book (photo: S. Vuorenpää). (**b**) 'Chicken chat' (photo: S. Vuorenpää).

Maria walks away with Penny in her hands while Alex sits down at a desk and continues to look at the chicken pictures. Samir (the initiator of the chicken project) sits with headphones and works concentrically with his picture. Fatima brings Goldie towards Penny, which Maria holds in front of the class, then she walks with it towards Henny sitting on the desk where Jaan now sits down next to Pavel. Pavel draws while he looks tenderly at the chicken strolling towards him. Maria and Fatima walk with Goldie and Penny towards a window in the corridor and put them on the window recess (old window niches about 45 cm wide). The girls say something like 'they like it' while they walk, they chat, and cuddle the chickens continuously.

Eeva: 'They like to look out of the window' (shows with her hand). Maria walks away from the window with Penny in her hands. Esa's voice sounds in the background (Esa: 'now you have to give up)'. Eeva still cuddles Goldie walking around on the window recess ('what are you doing/look/ugh/look/no/oh my God'). Eeva takes hold of the chicken, brings it into the class, and puts it down in the terrarium, where the other two already are. Someone has fed the chickens while we were in the corridor.

5.3. A Teacher's Perspective

At the end of the school week, after all observations, we decide to ask the teacher, Esa, about his experiences from this ongoing chicken project. He takes his afternoon break to talk with us. Esa has a 30-year background at this school and now he has chosen to work with culturally diverse groups. He highlighted how important a good relationship with the students is for him and how especially grateful he is to cooperate with the culturally diverse parents. They are much more flexible, and there are fewer problems with the parents' contact when compared with native Finnish parents, he states. Esa agrees with us about our picture of the school as mainly monolingual (Finnish) despite all the students' different mother tongues. That is something he feels sorry about, but they do sing birthday songs in different languages and the children's native cultures play a greater role than their languages, he says. In contrast to that is that the headmaster promised to try to find a language teacher for those students in Esa's class that are interested in Korea pop and would like to learn the Korean language,

too. Esa explains that nature and outdoor life is an important part of his own life, both private and as a teacher. He links school to his private life during the whole week we were there as he explains further:

> One Sunday when the class had contact by WhatsApp and some students went with a student's dad by car to catch the eggs, his mum followed them as well and they phoned me when everything was ready. I came to open the doors in the school, we went to the school and made everything ready, and we switched on the egg incubator, but not the eggs yet. We made such a booklet, so you have to turn those eggs three times every day and then the project started from that. Then we updated a little, put the web camera, and followed that and then you came to have a look at it, too. And from that, it went on step-by-step. The moment when they hatched was incredible. It was really amazing. It was an English lesson and it was as big as the wall the happening. Then it knocked with the beak to break the shell and then it made an edge and then it came out and it was like in cartoons when it came the little chicken. All children turned so overwhelmed and suddenly we had the whole school in a queue to our classroom, the word had spread. (Esa, the teacher, 18 May 2018)

A staff member from the school office in the room behind interrupts us for a moment to tell us:

> What Esa is doing is so amazing so I lift my hat! It requires so much effort to do such things as a teacher. I would not do it, and then he has all those cameras so a ten plus to Esa as a colleague (ten is the highest mark in Finnish schools).

Esa went on:

> We met death, too, during this project when not all (the chickens) were born alive. One died during the hatching because it was turned the wrong way inside the egg and didn't come through. And one was born a little bit damaged and I don't know if those others hacked him to death or something else but quite soon maybe a week after we found him dead. And they are now both buried in the flower beds. And that was a thing too that we dug the hole and buried them and discussed all this and about human biology and how it works for people and how a baby turns and how the process is and about menstruation and eggs and this opens an endless stream of stuff to discuss. (Esa, the teacher, 18 May 2018)

5.4. Answers on the Research Questions

Below we will answer the three research questions one by one. The answers are based on various data, like conversations, films, pictures and field notes.

5.4.1. What Was It in the Learning Environment That Made the Project Possible?

Who the initiator was becomes clear from both the first conversation with the student Samir in conversation example 1 and when we discussed the chicken project with the teacher Esa at the end of the week. The student and the teacher gave us consistent explanations. The initiative for the project came from a student, Samir, and even if the teacher Esa told us that he hesitated at first, he did not reject the idea, but he let the student go and ask the principal. When this boy explains his experiences when he tried to convince the principal to allow the project to start, and how he then called several farms and made arrangements with the manager of the farm, how they bought the incubator and brought the eggs to the school, there is no doubt about how proud he is. The teacher also tells us about how much the initiator grew during this project. Yet, the answer on what made the project possible in this learning environment is more complex. We discuss this further in Section 5.5.

5.4.2. How Did the Project Influence the Teaching and Learning of Science?

Conversation example 1, 2, and 3 show how both science and science-related academic language came into focus through the bird project. We saw many other examples of this when we talked to the

students and the teacher and watched them in their activities during our observation study. Since the chickens had become a part of their daily life, the students had to continuously care for the birds living and wellbeing. They had to feed them, clean the terrarium, and show them empathy. The most notable result might have been that the students received training on how to care for other creatures.

5.4.3. How Did the Project Influence the Teaching and Learning of Other Subjects and Skills?

It was obvious that, besides science, the students also learnt language and practical skills. At the end of conversation 4, is an ongoing theme during while taking care of the chickens—they discuss different religions as well as the human body. The students' various cultural background becomes noticeable in the discussions. Some of them come from farms in the country and are used to animals, others not. The students also learnt to take responsibility, especially Samir, who initiated the project. In conversation 4, the teacher Esa gives Samir the responsibility to contact the farm manager even at the end of the project. The students documented the project through writing, art, social media, photography, and painting. Their WhatsApp group was very active during the project, according to the teacher. During the project, the students' academic language developed remarkably. They changed continuously between everyday language and academic language when they described the bird project. We saw many examples of how the project promoted emphatic manners, as the following excerpts with Alex (A) and Ivan (I) show:

> A: it was so interesting to watch when they hatched/to watch the chicks' life/they are sweet and/and that was so nice when they ran around here in the classroom . . . (Alex expressed his feelings with glittering eyes and a soft voice).

He also answers a question from the researcher about how he experienced the death of two chickens.

> A: it was rather sad/one of them we did not know so well/but the other one/was with us for one week/maybe two/and that one died because it could not move so well.

Also, Iiro spoke with a sad voice about the death of the chickens, and Ivan was afraid that it should happen when they hatched, but he was still positive about that three that stayed alive:

> I: Well, it was annoying, but luckily, we got these three (shows a gesture with his hand).

5.4.4. In What Ways Did the Presence of the Chickens Affect the Lessons and the Classroom Activities as a Whole?

All of our films, photographs, and notes show how the chickens had become a part of the classroom environment. Yet, even when the class had a lesson in the garden, one task was to dig up worms for the chickens and go back inside and feed them. In Section 4.2, in both photos and observations—for example, when the bird starts to type on the computer shows how strongly they are a part of the learning environment. The chicken project made it possible for the class to collaborate with people both inside (with other student groups and other teachers) and outside the school environment, such as the farm manager and the farm owner, and it involved parents in the practical arrangements and activities. The teacher told us that raising chickens was usual in the country the family of the boy (Samir) who initiated the project came from, and for that reason, it was also very natural for his parents to become engaged in the project.

5.5. Did the Classroom Chicken Project Promote Sustainability?

The aim of this study was to explore if and how raising chickens in a classroom could promote learning, especially sustainability learning. As shown above the project actually promoted learning, but did it also promote sustainability learning? This happened to be a class in which sustainability was a core, and in line with the teacher's values and commitment. Nature-related activities of many kinds were a nod to his teaching and he offered the students' time, even his leisure time, to give them

remarkable experiences. The school had a garden that was a frequent part of the learning environment. There the students learned about nature and agriculture, could relax, and play in the frame of various school subjects.

When the class went to explore a graffiti area, they used bikes and stopped for a picnic and swimming on their way back to the school. The teacher wanted to recognize every child and create a friendly and peaceful learning environment, even if this had not come about easily from the beginning. As far as we saw, the diverse cultures were equally recognized, but the diverse languages were still not visible in the learning context. The students did not speak any languages other than Finnish between themselves. Yet, the teacher and the school community are conscious of the intercultural approach, including the children's interest in learning a language new for them all, namely Korean. It is hard to know how much the chicken project promoted sustainability in this class. Our impression is that the project suited a sustainability practice that already existed. On the other hand, the project promoted both ecological and social sustainability.

6. Discussion

When we went to the school that was the place for our study, we did not know what to expect. We were excited, but had no experience of chicken raising in the classroom. Neither did we know how the teacher worked, and whether sustainability was a regular issue in his teaching or not. The whole study thus became an exploration with many interesting surprises. Herbert and Lynch [12] found benefits from having classroom animals because of science learning, humane education, cross-curriculum learning, and for opportunities for links to society outside the school. They also identified that there was an obstacle because of the added burden. We also saw signs of all of these aspects, and, in addition, benefits in a sustainability perspective.

6.1. Learning Outcomes

Herbert and Lynch [12] recommend that researchers should study the topic of animals in the classroom from the students' point of view. We have done this, and when it comes to learning, our results are much alike those of these Australian researchers, even if we used a different method, mostly observing children and discussing with them instead of using adults as the target, and though our context was different from theirs. Whether their target was diverse or not, they do not explain. However, we found the culturally diverse context to be an area of the chicken project that was especially interesting in our study.

Our results show that the students learnt a lot, both science and other skills and topics. The teacher told us that he had found endless opportunities to use the chicken project in science education, in order to teach the students about human and other animals' biology, including reproduction, fetal development, and about big issues, such as life and death. It was a great experience for the students to see both how life began and how it ended and it was obvious that they learnt science. They started to explain about life processes and to use concepts and words from biology that revealed that they had gained new knowledge.

In Hummel's and Randler's [12] study in which students learnt more from films than from live animals, the students confronted animals for observation for a short time, while the students with the chicken project had the animals as company in the classroom for several weeks. To have a process like chicken development live, right in front of the students' eyes in the classroom, must have been more expressive than having it on film, since the students could touch the chickens, talk to them, and get a response from them. The opportunities to learn were spontaneous and awoke interest in a completely different way from what would have been the case if the education about the same issue had been structured according to the schedule. When the learning happened, it mostly related to experience. Yet, as Herbert and Lynch [12] claim, classroom animals bring much more to the learning environment than merely science knowledge. This way the project was a motivator for learning.

In addition, the classroom became a place where the students learnt to care, an important skill that Noddings [11] and Bai and Romanycia [9] asked for, to promote a more ecologically sustainable life.

When Herbert and Lynch [12] listed humane education as an opportunity that classroom animals can bring about, they included aspects, like animal ethics, honesty, empathy, and mercy. According to the adult voices in their research, classroom animals can support the students' affective engagement, socio-emotional development, and even promote ethical, sustainable, and compassionate lifestyles. It is obvious from our study that engaging the students in animal-related activities fostered positive attitudes towards the animals. This correlates with findings of Binngießer et al. [24] and Daly and Suggs [32] regarding children, and Taylor's and Signal's [27] findings regarding older informants. The students in our study showed many examples of how the animals touched them emotionally. They could, for example, not understand why we thought that not all of them would handle the chickens gently and treat them decently.

As described in Section 3, the Finnish national core curriculum emphasizes cross-curricular learning [41]. Herbert and Lynch [12] established that classroom animals promote cross-curricular learning, and, according to their study, classroom animals enabled a combination of science with subjects, like literacy and numeracy, as well as personal development. This was also obvious in our study. The chickens had their own schedule; they did not wait for the science lessons to catch everyone's attention when they hatched during an English lesson. The students documented the occasion through writing, art, social media, photography, and painting. This frequent communicating about the project was active language training.

6.2. Influence on the Classroom Climate and Other Benefits

Our first surprise was that the initiative for the project came from a student. A lesser surprise was that the teacher did not agree to the idea at first. However, he did not reject it either, but he had the student do all the work to overcome the obstacles: search for a farm, talk to the farm manager, and ask for permission from the principal. If the student had not been eager enough, and had he not had support from his parents and other pupils, he might have given up. To arrange chicken raising in a small country school is one thing. To do it in a large urban school, like the one in our study, is something else. Most teachers and principals would hardly say yes to an idea like this, but this teacher and this principal did. There is no doubt that it meant a lot to the student. The teacher said that the boy grew with his task, and this is absolutely in line with the Finnish national core curriculum. The curriculum emphasizes several times that the self-confidence of the students as members of the school grows when they are permitted to take initiatives and are encouraged because of their ideas [41].

We do not know how the chicken project would have turned out in a culturally homogenous classroom. Yet, we saw that it had a positive impact on the students and the climate in this culturally diverse class. The chickens were something that connected the students. When we were there, we did not see any of them arguing about who should take care of the birds, but we saw many students that alternately took care of them and held them. There was no arguing either about who should clean the terrarium, feed the chickens, or, at the beginning, before they were born, to turn the eggs. The impression was that all students really liked to do all this.

In addition, we did not see any obvious differences between boys and girls in this respect. Girls might have been more eager to stay inside during breaks to take care of the chickens and caress them, but when discussing this with boys, the chickens attracted them in the same way, even if they did not show it as clearly. This gender-neutral result contradicts the research by Binngießer et al. [24]. Yet, the students in our study is a small sample, meaning that we cannot generalize from our findings.

We especially recognized that the chicken project was not something that only took place during lessons and in the classroom. It engaged the students from the moment that they came through the door in the morning, during breaks, and during lessons in other rooms, in the garden and other places. The chickens needed care and food, and it was the students' role to feed them.

The project also provided the students with opportunities to engage with people outside the classroom in accordance with Herbert's and Lynch's [12] study. This happened inside the school, but also outside, and the students communicated digitally and by phone with people outside the school community. To have researchers studying the project was also a part of this widened context. Our presence and interest in what happened during the school days were responses to the students that made them more open and communicative towards us (not necessarily verbally). It was evident that they liked the recognition of their caring for the chickens. Neither the students nor their teacher regarded the chicken project as a burden, but the admiration that the teacher received from his colleagues because of the project gave a hint of that other teachers might not have taken the effort.

6.3. Critical Reflections

We could have performed the study in other ways, and we could have spent a longer time with the class. It could have been beneficial for us to have had more discussions with the students, follow up the project in intervals afterwards, study more learning materials, analyze the students' writings and drawings in depth, and discuss with the teacher again. To know how much the chicken project promoted sustainability, we would have needed to compare our results with a class in which sustainability had not been a strong issue from the beginning. Anyway, the topic of classroom animals, and especially classroom chickens, needs further study.

7. Conclusions

There are numerous reasons to keep animals in the classroom. It activates students in many ways. The students learn biology, other subject and skills, not at least communication. They have an opportunity to confront their own emotions and values, to discuss ethical questions, understand each other's similarities and accept dissimilarities, improve their patience, divide the work and responsibility between them, and even encounter major issues, such as life and death. Most important for sustainability learning is that the students learn to care for others. Learning to care is ethics in practice and it combines ecological and social sustainability.

The aim of this study was to explore if and how raising chickens in a classroom could promote learning, especially sustainability learning. Missimer et al. [3] mentioned trust, common meaning, and diversity, capacity for learning, and capacity for self-organization as crucial in a sustainability context. All of these elements are obvious in our study, not at least trust. The teacher had built a sustainable and trusting environment with the students' good life primarily as his core vision. Of course, having a teacher who cares for the students, and continuously encourages them during the project and who made it an ordinary part of their daily sustainable life at school is an advantage. Without an eager teacher's engagement and a supportive school context, the whole idea might become a failure.

Yet, before starting a classroom animal project, it is important to consider that animals have an intrinsic value and they cannot be only teaching tools or toys. An important matter is also to find out if there are allergic students in the class. Chicken raising is demanding, since many factors can go wrong; learning projects must threaten neither the animals' welfare nor the students' health.

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