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in Environmental Studies and Sustainability Science

Comparative Case Studies in Experience-based Learning for Sustainability:

Principles and Practices of 4H and Permaculture in Lund, Sweden

Author:
Yo Suzuki
Address: Yamada higashi 2-10-15-502,
Suita, Osaka, 565-0821 Japan
Email: yo.bino.yo@gmail.com

Supervisor:
Dr. Pernille Gooch
Lund University, Human Ecology Department
Phone: 046 222 30 24
Email: Pernille.Gooch@humecol.lu.se

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Abstract

Education for Sustainable Development is criticized with its expert-oriented knowledge transmission approach. Experience-based learning is one of the alternative methods that encourages learners to participate in the contextual learning process. Two comparative case studies were planned to explore how the experience-based learning is designed with principle and operated in practice, and how it contributes to the local sustainability from pedagogical, social and environmental perspectives. Cases were chosen from after-school centers for children in the city of Lund in Sweden. One case adopts permaculture as the designing principle; another case operates under the 4H (Head, Hands, Heart and Health) program. Nine semi- and non-structured interviews with the employees of the learning sites and participating school teachers were conducted. Results are analyzed qualitatively by using frameworks of environmental education paradigm by Pepper (1984) and concepts of experience-based learning by Kolb (1984). Both local cases are designed fairly compatible with the principles of permaculture and 4H, and they utilize the experiences in farming activities as the source of learning. Participation of children is highly facilitated by employees, and the experience-based learning contribute to pedagogical, social and environmental perspectives in the local area.

Keywords: Education for Sustainable Development, Experience-based learning, Farming activities, Children's participation, Permaculture, 4H, Local sustainability

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List of abbreviations

4H: A youth educational program started in United States. 4H stands for Head, Hands, Heart and Health.

4H Sweden: National association of 4H of Sweden

EE: Environmental Education

EFS: Education For Sustainability

ESD: Education for Sustainable Development

S:t Hansgården/S:t Hans: Sankt Hansgården, an after-school center in Lund, Sweden

Östra Torns: Östra Torns 4H gård, an after-school center in Lund, Sweden

UN: United Nations

UNESCO: United Nations Educational, Scientific and Cultural Organization

1. Introduction

Sustainable development is a contested but yet attractive concept in transdisciplinary science today. Because of the systemic delays and geographically unbalanced feedbacks of socio-economic and environmental interactions, it inevitably involves ethical consideration beyond borders and generations. Local Agenda 21 requires the informed participation of the key stakeholders, including children (UN, 2004a).

Under the need of refurbishing the relationship between society and environment, education is of rising interest to sustainability (O'Riordan, unpublished material, *n.d.*:25). Issues of Education for Sustainable Development (ESD) gained international attention (Blewitt, 2004:1), and led to the declaration of the Decade for Education for Sustainable Development for the period of 2005-2014 (UNESCO, 2007).

However, recent studies on ESD have questioned the dominance of expert-oriented knowledge transmission (Vare and Scott, 2007:198). Knowledge of sustainability has become too technical, vague and unreachable for many people. There are growing demands of a contextualized, experience-based and participatory approach in the educational process.

Among the vast contents of sustainability, agriculture is one of the most influential and relevant field of study. Although economic and environmental impacts of agriculture are most discussed, its social and pedagogical aspects have been highlighted recently (Pretty, 2002:55). Opportunities of ecological understandings through agriculture should be designed through new educational institutions (*ibid.*:155).

Learning through farming activities is not a new approach. 4H (Head, Hands, Heart and Health) program has started as rural youth extension program in United States in early 1900s, and permaculture originates in Australia in the 1970s. However, they are rarely picked up together in the same local case studies. Two local after-school recreation centers in Lund, Sweden, provided unique opportunity to compare these two international principles in the local settings.

Accordingly, the research questions for this study were formulated.

Main questions

- How does experience-based learning with permaculture and 4H contribute to local sustainability from environmental and social perspectives?

- What are the different educational paradigms guiding the principles and practices of permaculture and 4H?

Key questions

- What are the characteristics of experience-based learning and how can it be studied?

- To what extent are the children facilitated to participate in the learning?

The objectives of this study are,

(1) to explore the similarity and divergence between principles and practices of experience-based learning within permaculture and 4H,
(2) to apply the paradigms of environmental education on transdisciplinary principles and practices,
(3) to evaluate the role of learning facilities for local sustainability from social and environmental perspectives.

The scope of the study will cover pedagogical, social and environmental aspects of education for sustainability. The economic aspect is excluded because it has less relevance to the educational orientation of this study. Two empirical cases based on permaculture and 4H are studied to explore the local cases in experience-based learning. The time scope ranges from early 1900s to 2008. The influence of national and local governance will not be discussed in detail due to the primary focus on the international background of principles and its local practices.

Outline of the thesis

The following chapter provides the theoretical background and relevant concepts from pedagogical, social and environmental aspects. Firstly, two conceptual models will help differentiate the experience-based learning from the conventional teaching model, and to understand the process of experience-based learning. This will be followed by sections to understand the value of farming activities from social and environmental aspects. Different educational paradigms will be presented in the last section of Chapter 2. Chapter 3 holds the methodology and findings of two empirical cases from Lund, Sweden. Findings consist of the descriptions of historical background of principles and qualitative data collection of principles and practices. Chapter 4 analyzes and discusses the empirical findings with the concepts and theories presented in Chapter 2. Finally, the thesis is concluded with the answers to the main research questions in Chapter 5.

Motivation

The choice of the empirical cases in this study derives from my personal experiences. My childhood memories of an outdoor nursery school in Denmark and the junior scouts' activities in Japan have both influenced my choice to become a nature guide in the mountains later in my life. My job was to provide visitors with direct experiences of nature and animals, such as milking cows and hiking in fields. This opened my eyes to the power of experience-based learning with environmental subjects.

2. Theories and Concepts

In the following section, the theoretical framework of experience-based learning will be presented.

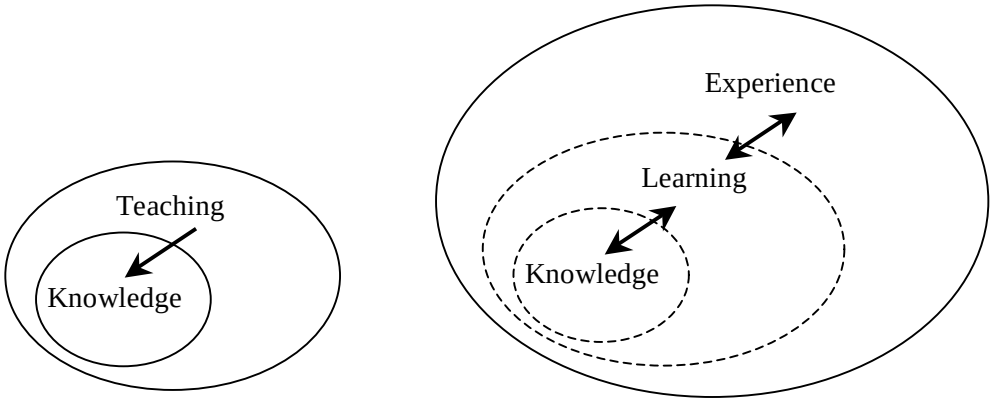
2.1 Experience-based learning

2.1.1. Conceptualizing experience-based learning

Experience-based learning, or experiential learning, is based on the pedagogical theories that were elaborated by Dewey, Lewin and Piaget (Kolb, 1984:20). Experience is regarded as the source of learning that gives an alternative explanation to the knowledge production compared to the conventional teaching model (Andresen et al., 1995:225). Figure 1 conceptualizes (A) Teaching model and (B) Experience-based learning model.

Figure 1. Conceptual models of teaching system and experience-based learning model

(A) Teaching model (B) Experience-based learning model



(A) The teaching model is characterized by the one-way knowledge transmission. Knowledge is usually a defined entity to be 'internalized' or assimilated (Lave and Wenger, 1991:47).

(B) The experience-based learning model is depicted as a dynamic process. As Dewey (in Andresen et al, 1995:4) puts, "not all experiences are genuinely or equally educative". Some experiences are more pedagogical than others, and knowledge is continuously created and recreated through the process of learning that is based on experience (Kolb, 1984:38).

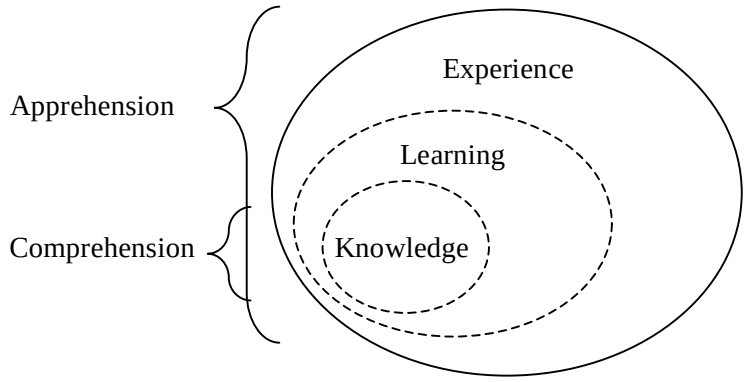
2.1.2. Tacit dimension and type of learning process

Polanyi (1983:48-49) described the process of knowing as tacit, "interpreting the world around us by converting the impacts between our body and the things that come our way into a comprehension of their meaning. This comprehension was both intellectual and practical". This tacit process is notable in the case of children's

cognitive development. “A child starts off with a scanty repertoire of innate mental connections and enriches them rapidly by using his powers of comprehension for establishing further fixed relations of experience” (*ibid.*: 45). Comprehension is the process of learning that connects the past to the future (Kolb, 1984:102), and thus lies in the core of experience-based learning process. It is the process that leads to the knowledge production.

On the contrary to comprehension, apprehension focuses on ‘here-and-now’ perception (*ibid*.:102). It is the simple recording of perceived experiences, and it does not have specific connection between the cause and the result. Figure 2. indicates the range of apprehension and comprehension adapted to the experience-based learning model.

Figure 2. Type of learning process in experience-based learning model



The model describes how apprehension can occur throughout the process of experience-based learning, while comprehension process is limited to the knowledge production within experience-based learning. From the interpretation of this conceptual model, hereafter in this paper, ‘knowledge’ and ‘comprehension’, ‘apprehension’ and ‘experience’ are used synonymously, otherwise stated.

2.1.3. Characteristics of experience-based learning

Andresen et al. (1995:225-226) attempted to characterize experience-based learning as:

1. Involving the whole person — intellect, feelings and senses
2. Recognizing and using actively all of the learner's relevant life experiences and learning experiences;
3. Reflecting continuously upon earlier experiences in order to add to and transform them into deeper understanding.
4. Intentionality of design
5. Facilitation
6. Assessment of learning outcomes

The first three points indicate the personal aspects of experience-based learning. In other words, all three points require special attention to personal participation and previous experiences of individuals as essential factors for learning. This causes a major methodological problem in this study. It is difficult to achieve complete data collection of these individual 'whole-person' experiences. Adding to this, knowledge-making process is assumed to be tacit (Polanyi, 1983:48-49), and when the target group is children, it requires professional research skills (Christensen, 2004:173).

The latter three points (point 4 to 6) focus on social or organizational aspects. These points give rooms to this study. They are not free from personal influences, but more feasible compared to the first three points. They have rather complementary characteristics to the former three points, and assist the researcher to advance the understanding of the learning process.

'Intentionality of design' (point 5) is represented by permaculture and 4H in the case studies in this research. Both permaculture and 4H can be regarded as designing principles of learning. The details of the principles and practices will be reported in Chapter 3. One notion is that experience-based learning is presumed to be a decentralized process. Lave and Wenger (1991:94) argued that the process of learning is less controlled by the intentions of masters or teachers in apprenticeship. "We assume that members have different interests, make diverse contributions to activity, and hold varied viewpoints" (*ibid.*:98). This variety of interests creates the 'situation' where learners do not only acquire knowledge and skills as intended. The author is aware of this notion, but tried to limit the scope to the available evidence and to the research questions.

In addition to the intentions of learning, 'facilitation' (point 5) is another focus in this research. The question is to what extent children's participation can be facilitated. This question will be treated with theories in section 2.2.2. with the consideration of social aspect.

'Assessment of the learning outcomes' (point 6) is a problematic characteristic. Kolb (1984:26) warned the danger of evaluating the 'outcomes' of experiential learning, because defining them can restrict the continuous process of learning. In this research, the author tried to extend the view of 'outcomes' from personal aspect and from knowledge transmission model (see Figure 1 (A) and Figure 2). Instead of focusing on 'comprehensive knowledge' as the only static outcome of learning, 'apprehensive experience' is regarded as a valid and dynamic outcome in this research. Furthermore, the outcomes of experience-based learning seem to have greater implications from social and environmental aspect. These aspects will be addressed in the next section. In this way, the author tries to draw a more holistic and dynamic picture of experience-based learning and its 'outcomes'.

Summary of the section

The theoretical work in this section corresponds with the following key question.

- What are the characteristics of experience-based learning and how can it be studied?

a. Experience-based learning is a process that functions iteratively between apprehension and comprehension
b. Knowledge-making is a tacit process and the research with children requires specific research skills
c. This research approaches the experience-based learning process by studying the designing principles and practices and the degrees of facilitation
d. Theoretical framework suggested to incorporate pedagogical, social and environmental aspect to evaluate the outcomes of experience-based learning

2.2 Environmental and social aspect of experience-based learning

In the previous section, the characteristics of experience-based learning were explored through models and characteristics. The following sections will present the environmental and social aspect of experience-based learning.

2.2.1. Lost community and assets of farming

Social process and environment have been recognized as an important source of learning: "the radical opposition of person vs. environment and individual vs. society prohibits an adequate understanding of the contextual nature of the learning process" (Descola and Pálsson, 1996:6). Agriculture is one of the crucial cases of such social process that was once a dominant occupation and has been marginalized geographically to rural areas and demographically to a small population in major industrialized countries. Pretty (2005:223) sees hope in communities that are sharing knowledge and work together in agriculture.

Tönnies's (Dickens, 2004:40) concepts of *Gemeinschaft* and *Gesellschaft* (community and society), characterize the contrast between pre-modern and modern society, and what the latter has 'lost': "Living on the same land, ploughing it, domesticating animals, handling down the land from father to son are all an integral part of *Gemeinschaft*", while *Gesellschaft* is characterized by "impersonality, competition and individualism" (*ibid*:40).

The multi-functional aspect of farming is often reduced to profit, productivity and efficiency. However, because of this dualistic disparity between human and nature in modern society, Pretty (2005:223) proposed the creation of new institutions that creates knowledge and understanding based on the sustainable connection of people and nature. Agriculture supplies not only products, but different assets including social and human capitals (Pretty, 2002:55. see Appendice 1). Recent trends of farming activities in the urban area in industrialized countries, such

as urban gardening, organic food movement, school yard programs, farm-stays and on-farm activities can be regarded as both a desire and a possibility for people to reconnect to nature and agriculture. In this respect, farming activities as learning opportunity have values in re-contextualizing knowledge with experience.

2.2.2. Children in community

Hart (2008:20) argues that children's informal participation in learning has been marginalized, especially in North America and Europe. It is assumed that the real value of children's participation can be aimed at a far higher level, where they are allowed to initiate and operate decision-making processes (Hart, 1997:41).

The idea of empowerment of the marginalized group is closely related to the concept of sustainable development. Two chapters in Local Agenda 21 are explicitly dedicated on children and education. Chapter 25 of Local Agenda 21 suggests the need of advancing the role of children and youth in sustainable development (UN, 2004a). Children and youth should be involved in the process of promoting sustainable development as well as protected from environmental hazards. Chapter 36 of Local Agenda 21 aims for the reorientation of education towards sustainable development, raising awareness and promoting training (UN, 2004b). It demands countries to meet basic needs, and to promote capacity-building.

Local community can benefit from the participation of children. Hart (1995:3) focuses on children's ability to find social problems in the community and to act as committed activists: "When they are allowed to do so, the children of the urban poor will include housing conditions, the quality of their parks and playgrounds and the safety of their streets as equally important issues for research and action by them". This indicates the possibility of regarding children as 'agents' of change.

For Bourdieu (1990:9), individuals are 'agents' who neither blindly obey to rules nor be subject to structures of society. Action by agents are based on 'dispositions acquired through experience' which he calls as 'generative habitus' (*ibid*.:9). Experience-based learning can become part of habitus because it is an acquisition of certain interactions, where learners are regarded as agents. From this point of view, experience-based learning that has participatory method is supposed to contribute to social sustainability in local community.

2.3. Educational Paradigms

Sterling (in Blewitt, 2004:50) conducted an integrated analysis on the terminology of environmental education (EE), education for sustainable development (ESD), education for sustainability (EFS), sustainable education, and summarized the current debate as 'the increasing inclusivity and fragmentation'. EE is depicted as the roots of various types of evolving terminologies in this field.

This paper will deliberately use the term ESD because it is commonly used in the documents of UN (2004a; 2004b) and UNESCO (2007), and takes a stance that ESD is an extended form of EE. By choosing EE as the origin of ESD, the author attempts to limit the scope and avoid fragmentations of the research. Although narrowed, there are plural paradigms within EE (Sterling, in Blewitt, 2004:48-49).

Table 1 characterizes different types of educational paradigms of EE (Pepper, 1984:215-217).

Table 1. Paradigms of environmental education (adapted from Pepper, 1984:215-217)

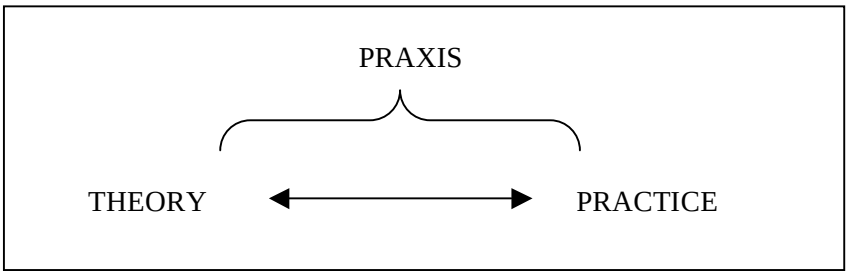
Paradigm	Focus	Characteristics and weakness
Technocentric	How to do things	Formal and knowledge on 'facts', influence of capitalist ideology, short-term
Ecocentric	What ought and ought not to be done	Radical right, ignore socio-political factors, reactionary, indoctrination
Reflexive, Critical	Praxis	Radical left, Society discourage the approach

The technocentric view relies on technology advancement and efficient management of resources. Economic growth and environment are compatible, and it is common to find short-term planning in this group (Pepper, 1984:30). The 'facts' are the central concern of knowledge, and it is influenced by capitalist ideology (*ibid*.:215-216).

The ecocentric paradigm has moral and ethical consideration as its basis. This group of thought emphasizes the idea of limitation of growth and regards human beings as parts of the ecological system (*ibid*.:28). Bramwell (1994:184) suggested permaculture as an answer to this dilemma within the group, but disputed that it cannot save the whole planet with its level of productivity.

The last group belongs to the critical paradigm. This type of education grew as an alternative to the other two groups, and advocates the reflexive method. It requires the iterative process of theory and practice, which is represented by the term, *praxis*. The concept of *praxis* emerged to bridge between theory and practice (Bawden, in Pretty, 2005:150). Abstract theory must be tested with concrete practice. And practice should be explained and refined according to theory (see Figure 3).

Figure 3. Praxis as an emergent property (Bawden, in Pretty, 2005:150)



3. Methodology and Findings

3.1. Research design and methodology

The main research questions require a method to explore the principles and the real cases of permaculture and 4H. Case study was considered to be a suitable method (Yin, 2003:5-6), because of the exploratory and qualitative nature of the research questions. Objectives of the case studies were to collect the evidence of experience-based learning and analyze with the embedded unit of analysis (Yin, 2003:40).

Cases were chosen from after-school leisure centers in the city of Lund in Sweden. Learning sites are designed to facilitate children's participation and to provide experience and learning with domesticated animals and nature. Two learning sites were chosen to fit the below criteria;

1. Same strategy: focus on experience-based learning
2. Same target: focus on children (after-school center)
3. Similar local settings: same city, urban residential area, climate
4. Principles are related to agriculture: permaculture and 4H
5. Principles with different origin and focus: Australian small-scale landscape design (permaculture) and American youth educational program (4H)

The assumption is that there should be some similarities between the cases because of the same strategy, target group, local settings and the topic (agriculture) at the local level, as well as differences due to the different background and the area of focus in principles.

Construct validity, external validity and reliability (Yin, 2003:34) were pursued through data collection described in the following sections. Internal validity (*ibid*.:34) was considered within Chapter 2 and 4.

Data collection of 4H and Östra Torns 4H gård

Documentations on 4H and learning site in Östra Torn in Lund were collected from;

- International level: International organization 4H website
- National level: National association of 4H of Sweden (hereafter 4H Sweden) website
- Local level: Lunds Kommun's website, Östra Torns 4H gård

Among the resources, '*4H of Sweden: Description of the organization*' from 4H Sweden (n.d.) helped understanding the core principles of activities in 4H.

Seven visits to the learning site were conducted in order to collect evidence for the case study during 2008-01-25 to 2008-04-25. Most visits were scheduled on weekday's morning to meet the personnel while they were

available for the author's questions. As a consequence, there were more chances to observe four groups of visitors;

- Members of the 4H club and their parents
- Children and teachers from Spelmannen (local nursery school)
- Students and teachers from Vipan (local high school for students with mobility problems)
- Residents and families living nearby

The author had the opportunities to make participant observation and non-participant observation.

- Participant observation: lecture on cows for Vipan
- Non-participant observation: lecture on dogs for Vipan

Three semi-constructed interviews according to the interview guide (see Appendice 2), and one unstructured interview were conducted. The interviewees were the following:

- Gerda Wissler (Volunteer and horse keeper): first and third interview (semi-structured)
- Marie Nilsson (Director of Östra Torns 4H gård): second interview (translated by Wissler) (semi-structured)
- Grete Jarmund Berg (Teacher of Vipan): fourth interview (unstructured)

Although Marie Nilsson was responsible for the operation of Östra Torns 4H gård, there was a difficulty to communicate in English. Gerda Wissler, who has been volunteering in Östra Torns 4H gård and who was fluent in English, was chosen as the most suitable informant. Notes were taken for the first and second interview, while third and fourth interview were recorded and transcribed.

Data collection of permaculture and Sankt Hansgården

Documentations on permaculture and S:t Hansgården were collected from literatures published by Permanent Publications.

- International level: Mollison (1990) 'Permaculture: a practical guide for a sustainable future'
- Local level: Lunds municipality's website, S:t Hansgården

Among the literature, Mollison (1990) provided the basic ethics and principles of permaculture. Books from Watkins (1993) was recommended by Pranter, the director of permaculture in S:t Hansgården. Those books helped provide an understanding regarding the urban application of permaculture in the local case.

Seven visits to the learning site were conducted in order to collect evidence for the case study during 2008-01-26 to 2008-04-19. Most visits were scheduled on weekday afternoons to observe the activities of children and meet the personnel. Three groups of visitors were observed frequently;

- Children of S:t Hansgården and their parents
- Students and teacher from Klostergårdsskolan (local primary school)

- Residents and families living nearby

The author had the chance to make participant observation and non-participant observation.

- Participant observation: lecture on medieval cooking for Klostergårdsskolan, introductory lecture on permaculture, Earth Day
- Non-participant observation: daily activities of handicraft, composting, rabbit jumping

Four semi-structured interviews were conducted according to the interview guide (see Appendice 2), and one unstructured interview was conducted, with the following people:

- Marianne Larson (Director of S:t Hansgården): first and fourth interview (semi-structured)
- Lennart Pranter (Permaculture director of S:t Hansgården): second and third interview (semi-structured)
- Esbjörn Wandt (Teacher of Stiftelsen Holma): fifth interview (unstructured)

Notes were taken on interviews, due to either outdoor settings or because of the presence of children. Stiftelsen Holma (Holma foundation) is a learning site and organization based in Höör in Sweden. Esbjörn Wandt was chosen as a key informant because of his knowledge in permaculture and experience in teaching.

3.2. Limitations of this study

There was a limit in studying the knowledge of children according to the methodological difficulty (Christensen, 2004:273). Instead of focusing only on knowledge, the author tried to achieve a transdisciplinary approach to experience-based learning. Social, environmental and paradigmatic aspects were considered in addition to the cognitive aspect (apprehension and comprehension).

Some archival data of local learning sites lack data in English, and showed lack of relevant issues related to research question. They were also mostly unpublished and discrepancies of detailed information between documents were found. Those data were omitted from the research material, and complementary observations and interviews were made. Additionally, an author with proficiency in Swedish language will achieve much more accessibility to relevant case studies and literature in Swedish.

Before presenting the findings of the empirical studies, a methodological comparison will be made to get insights for external validity of this case study. Dillon et al. (2003) analyzed a wide range of literature related to agriculture and education. The background of their problem formulation can be summarized in three points:

- Lack of children's knowledge in agriculture, awareness and attitudes;
- Lack of children's knowledge in food web;
- Lack of teaching method and improvement in effective learning on food, farming and land management.

Comparatively, my research has different background problems.

- Lack of people's participation in scientific knowledge production
- Decreasing people's participation and knowledge in agriculture
- Lack of theories combining experience-based learning and agriculture

Dillon et al. (2003) provided a set of systematic methodology for approaching the complex field of research. The list of key terms (see Appendice 3) decided the relevant literature. The case studies shows the similarities as well as differences.

From the theoretical work in Chapter 2, my study assumes that experience-based learning with farming activities has implications in reconstructing the landscape and providing learning opportunities, while offering greater participation and network among local people.

The intention of the study by Dillon et al. was to reconnect food and farming industry, as well as the consumers and the producers (Dillon et al., 2003:iv). Their focus is on building knowledge, while children are often kept away from daily participation in food production. It differs from the focus of my study, where children are encouraged to participate and experience, although some of the literature reviews of Dillon et al. included this perspectives.

Working closer with agriculture and participating in the production process might sound radical and idealistic in the educational field. However, studying the few examples of efforts to be proactive, can give insights for new type of learning experiences.

Dillon et al. (2003) summarized the characteristics of preceding studies on education for food, farming and land management under two types of tendencies:

- quantitative (positivistic) studies such as quasi experimental (pre-test/posttest) evaluations of outdoor education programmes, and questionnaire surveys of young people's knowledge and attitudes
- qualitative (interpretivistic) studies including interview-based investigations into children's perceptions of the countryside, and ethnographic research into school-based teaching and learning about food and eating. (Dillon et al, 2003:12)

From this point of view, my research is closer to the second category, which has characteristic of being interpretive and qualitative, with ethnographical research of learning sites and its activities. Participant and non-participant observations in this study were a part of my attempts of ethnographical research. The findings from the observations will not be described in detail in the next sections, but a rather incomplete list of agricultural assets will be presented in Appendice 4. The list should serve as a working format for interested researchers.

3.3. Findings

3.3.1. Historical background of principles

The case studies implies the influence of environmentalism across time and borders. It is assumed that the learning sites have been operating under influences from,

- International educational paradigm
- International environmental and sustainability paradigm

Having different seeds of principles in United States and Australia, both of which settled in Sweden, the history of 4H and permaculture should be explored historically and geographically. 4H has over hundred years of history, starting from early 1900s in United States. According to Wessel and Wessel (1989:1), cooperative extension programs with rural youth marked the beginning of this movement. 4H programs grew bigger through World War I, in which the US federal government tried to meet the huge demand of food (*ibid.*:1).

During the 1920s, the 'Back-to-the-land' movement swept through Europe (Bramwell, 1989: 104-105). Resettlement in the suburbs and scouting as an activity for urban children flourished (*ibid.*:104). That was the time when the 4H was imported to Sweden and implemented as a youth development program in local youth clubs (4H Sweden, n.d.:10). The educational outcome of fostering productive and healthy youth could have been widely dreamt to be the 'coming future of the nation'.

On the other hand, the inspirations of permaculture came from P. A. Yeomans, an Australian farmer who continued his careful observations and experiments of pest control without advanced technologies in the 1940s (Hill, 2003:39). Accordingly, permaculture is characterized by a practice-based and localized approach. Permaculture attained popularity with the alternative left counter-culture (Wandt, interview with author). Contrary to the 4H program, it has gained much less attention from institutions in Sweden (Pranter, interview with author), and information is limited to interested individuals and a few local workgroups. It can be associated with the very practical and localized approach that prohibits a hierarchical institutional structure, something which lies at the core of permaculture.

Nevertheless, Östra Torns 4H gård started as a 4H branch (Östra Torns 4H gård, unpublished material, n.d.), when nuclear discussion gained attentions in Sweden in the late 1970s and the Green Parties were recognized in European elections (Bramwell, 1989:227-228). S:t Hansgården adopted the permacultural approach in the early 1990s (Larsen, interview with author). S:t Hansgården experienced the rapid decline of public interests during the late 1990s and early 2000s, but currently they managed to appeal its ecological thoughts, with the international boost of climate change discussions (Larsen, interview with author). Östra Torns 4H gård is currently facing a serious financial cut from the local government (Wissler, interview with author).

Summary of the findings in two cases will be presented in the following categorizations;

1. The principle and its educational paradigm
2. General information, Site design & Natural resources
3. Apprehension in learning
4. Comprehensive knowledge
5. Participation and Facilitation

3.3.2. 4H and Östra Torns 4H gård

4H and its educational paradigm

4H is an educational organization for youth founded in the beginning of the 20th century in the United States (4H Sweden, n.d.:10). It started as the cooperation between rural youth and agricultural extension program for crop production. "Membership in club work had expanded continuously in the prewar years, but grew enormously as America's entry into World War I stimulated the federal government to produce more food" (Wessel and Wessel, 1982:1).

4H stands for Heart, Head, Hands and Health, and the organization aims to nurture responsible and committed youth. The movement has been introduced in Sweden in the 1920s (4H Sweden, n.d.:11), and currently holds 20,000 members under 300 clubs (Nilsson, interview with author).

Ethical statements on responsibility and connection with nature and animals are emphasized. "The vision of the 4H is to enable all children and youth to develop into committed and responsible individuals with respect for the world around them. … Each species and each individual is an important part of the whole, one not being of greater value than anyone else". (4H Sweden, *n.d.*:3)

There is a belief in love and respect for animals, environment and people as the learning object. "A person showing respect for the world around him understands the interplay between animals, nature and human beings and sees himself as a part of the whole. This interplay is of the utmost importance for the well-being of nature, animals and thus also humans, Health" (*ibid*.:3).

Employees in Östra Torn 4H gård regard its mission as delivering the countryside view to the community. Their intention is to preserve the landscape and practices lost from the community;

> People all over the world, have lived with animals, thousands of years, and it's not until the last 100 and 200 years that we, our society alienated us from animals … And I think we have no idea what that means, or how it affects and will affect us. And perhaps that is why there is more and more of a longing to retie, bond with animals as best as one can. Lots and lots of children want to ride horses, it's becoming popular, and it is possible to do so here in Sweden. (Wissler, interview with author)

General information, Site design & Natural resources

Östra Torns 4H gård is a leisure time activity center for children, located in Östra Torn, the north east district of the city of Lund. It started as 4H farm in 1977, but operated as an after-school center (fritidsgård) since 1973 (Östra Torns 4H gård, unpublished material, *n.d.*). Topics of activity range from cultivation to animal caring, forest and nature, household and culture, sports and play. School classes, after school facilities and nursery school are visiting for farm visit and pony-riding.

The municipality of Lund and membership fees are the main financial sources of the operation of 4H farm. Two employees, two volunteers are working either full-time or part-time, and approximately 30 children come steadily from schools in the neighborhood (Nilsson, interview with author).

Another feature of the learning site was the local connection with families and farmers. Children from one year and a half up to six years old, come almost daily from the nearby nursery school. The children who keep rabbits and their parents take turn in weekends and holidays to take care of animals. One farmer delivers hay and straws, and often gives children a ride on the hay tractor (Wissler, interview with author).

Apprehensive in learning

4H as a principle regards experience as their method of learning. "As theoretical studies do not always lead to real learning we want our members to use their new knowledge in practise" (4H Sweden, *n.d.*:4). They acknowledge the importance of experience and the social aspect of knowledge. "The members acquire knowledge when doing things together and sharing each other's experience" (4H Sweden, *n.d.*:9).

In Östra Torn, Gerda Wissler summarized the role of 4H farm as "to offer an opportunity for children to experience farm land, farm work, farms and animals… in a way that they otherwise wouldn't have living in towns and cities" (Interview with author). Members are supposed to learn from daily experiences in 4H farms, and activities such as handicrafts with wool, cooking with eggs and animal caring are all integration of theoretical learning and practical skills.

Direct experiences seem to make difference to the kids and visitors compared to TV, books and other media. "As long as it is only television, or even books, but it's not real. Children do not connect until, I think, one experience stand in the middle of it, you smell it and you see it and you touch it" (Wissler, interview with author).

According to Berg, the teacher of the students with mobility problems, the students started to show different behavior towards animals during their regular visit to Östra Torn. "I can see from my group, at first they were very shy, but now they are different. This girl who was afraid, now she leads the horse without fear. She is very confident. You don't have to tell them what to do" (Berg, interview with author).

Social learning is another dimension of the practical learning in 4H farm. It is related to the idea of responsibility and rules, and provide social training for the children to understand why some rules exist for security reasons.

"Keeping animals offer lot of opportunity to teach about certain rules, all rules are out of safety, there is always a function. And safety and regulation come with it" (Wissler, interview with author).

Activity with animals is regarded as mental and physical comfort. "I think the physical care for animals is important (…) it's important for people to stroke and cuddle animals. It is said to be good for the blood sugar and the stress symptoms" (Wissler, interview with author).

Comprehensive Knowledge

Three types of knowledge are closely linked to 4H activities in principle.

- Understanding of the surrounding world
- Knowledge on what nature provides
- Democracy

By 'surrounding' they mean the knowledge of animals and plants, historical and cultural knowledge at local and international level among 4H clubs (4H Sweden, *n.d.*:5). The second point indicates a more practical and efficient use of nature. "They learn how to use plants for food and protection against different types of weather, how to use animal meat for food and skin and wool for clothes. This way the knowledge of interaction with nature and our cultural heritage is enlarged" (*ibid.*:5).

For example, in their annual summer camp for 4H members in Östra Torn, they provide a textbook for members. "We are getting increasingly alienated from the knowledge that people have had, for those thousands and thousands of years we've known how to grow and how to cultivate, both the land and the animals, the less we understand about sustainability" (Wissler, interview with author). Although the intention of providing knowledge is clear in the interview, the textbook consists mainly of apprehensive learning, and not much of 'comprehension' as such. Summer camp happens once a year, and not all the children participate. The skills and attitude of employees have possibilities to complement the comprehensive knowledge.

It is the concern of employees that the children seem to lack in basic knowledge about food and environment. "Far too many children have no idea that eggs come from a hen. They know about a hen and eggs, but they have no ideas that it comes from inside hen. (…) and they don't know the difference between a cow and a pig" (Wissler, interview with author).

Employees regard Östra Torns 4H gård is an ideal place for the employees to help children understand about the recycling system in agriculture. "Here in the stables, we get opportunity to speak about how the animals eat, how to collect the manure, how to transport and spread it on the fields" (Wissler, interview with author). It is not only garbage and recycle bins in the town, traffic and energy-saving bulbs. Children know the fragments, but in many case the knowledge does not connect to real life actions; "when you throw away, it always ends up somewhere else" (Wissler, interview with author). For better understanding through experience, the employee encourage children to make rake, brooms, wool, basic cooking with available resources and local environment.

Participation and facilitation

The Main activities are restricted to members, but most of the facilities are openly accessible to visitors. Visitors are offered opportunities to observe or cuddle animals. 4H membership is possible at any age, although it is recommended that if the child is under seven years old, he/she must be accompanied by parents. The Range of different ages and interests constitute a variety of projects in 4H. It is aimed to form interactions between the children while the leaders are to support and facilitate their own learning. 'The leader who is often an older friend helps as moral support and adviser. (4H Sweden, *n.d.*:9)'

In Östra Torns 4H gård, the target age group varies from toddlers to adults, but main members are children over seven years old. Their parents and teachers are also involved in the daily learning processes. The employees are in charge of answering questions about animals, stable, farmers, manure, feed and food. "The idea is that children get a little absorbed in the general work with animals, so they help with a little bit of cleaning, feeding of the horses, taking ponies in and out of the paddocks, grooming, brushing, cleaning them, and twice a week, they have riding lessons" (Wissler, interview with author)

Special occasions occur due to the scheduled activities and conditions of animals, such as horse-riding, rabbit cuddling and jumping, sheep giving births to lambs, reparation of horse shoe and so on. Employees agree on how the professional people, such as the cobbler, describe his work precisely and communicate with children (Wissler, interview with author).

3.3.3 Permaculture and Sankt Hansgården

Permaculture and its educational paradigm

Permaculture is the core designing principle of S:t Hansgården. It has both influenced the context and the process of learning in this site. According to Mollison (1990:ix), "[p]ermaculture (permanent agriculture) is the conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability, and resilience of natural ecosystems. It is the harmonious integration of landscape and people providing their food, energy, shelter, and other material and non-material needs in a sustainable way".

Three strategies of permaculture were introduced as prominent characteristics in S:t Hansgården: 'cooperating species and building, combine many functions as possible, improve local production' (Pranter, interview with author). For the last part, Pranter mentioned that in some cases, local production is not efficient enough, e.g. energy production.

Permaculture looks at the Earth as a system, and focuses on the manageable local land and resources. The benefit of this systems thinking is that local resources can be assessed and combined systematically, and the intensity of production is controllable and improvable (Wandt, interview with author).

Permaculture argues as well for the importance of social and economic aspects. Intensity of production can be enhanced as long as the environment is managed sustainably and diversely (Wandt, interview with author). It values fair sharing among the participants to keep a healthy community: "The more we can share with others, the more interpersonal experiences we have and the more chances we have for beneficial, mutual exchanges" (Watkins, 1993:8).

Learning site: organization, resources and social networks

S:t Hansgården is an after-school center for children, located in Norra Fäladen, the north district of the city of Lund. The Municipality of Lund is responsible for the finance of S:t Hansgården, but there are some projects that received different funds. Eleven employees are working either full-time or part-time. The goal of S:t Hansgården is to raise responsible and respectful children. The place was formerly a place for local residents to keep animals and construct buildings (*bygglek* in Swedish). It started as 'peace-house' (fridshem) for children in 1991, and changed to after-school center in 2003, and they started their permacultural practice in 1993. Approximately 150 children from age ten to twelve come from five different schools in the neighborhood (Larsen, interview with author).

Due to the cyclic change in the political situation and changing public concerns, the budget provided by the local government kept fluctuating. When Larsen and colleagues first began their operation, environment and ecology was a popular concern of the people. Later, there was a growing demand from the municipality to promote 'integration', where S:t Hansgården needed to have 'social inclusion' in their agenda. The site started to operate the place on Saturdays and that enlarged the role of the learning site by providing opportunities to the local residents to acknowledge and become familiar with the site and ecological learning. Recently, environmentalism once again achieved popularity with global concerns of climate change. The employees view this political shift as both a challenge and an opportunity for the development of the learning site and its principles (Larsen, interview with author).

Apprehensive learning

Permacultural design situates the learning in the buildings and utilities that children are using day to day. Children have free access to the garden, animal house, hen house, yard and the playground. Animals, food and handicrafts play a huge role in the daily activities. Learning can happen more accidental in connection with animals and seasonal harvest of plants, compost and so on.

Among the wide range of activities they have in S:t Hansgården, there are routine works that are both challenging and require responsibility of children. Animals, outdoor and indoor physical, cultural activities requires steady cleaning up and other management of the place and tools. To keep the place clean and in order, S:t Hansgården has been using the system called 'Sabbometer' (see Appendice 5) for nearly four years. It is a

calculation note with list of activities that are either punished or rewarded with money. The money is allocated from the budget of S:t Hansgården, and at the end of the fiscal year, children have a discussion and collectively decide on how to use the money. The task list shows the range of activities that all the children should feel responsible, as well as finding the possible contribution to the whole group (Larsen, interview with author).
Name of sabbometer should not be taken in negative sense, Pranter explains, because it is mainly meant to be a reward of the works of children. The employees think this system works well; it is not too strict, but encourages the children to be involved. Marianne Larsen added that farming activities are providing many tasks that are 'do-able' for children, and sufficiently entertaining or challenging for them. If children want to have more things on the list, they can suggest them to the employees, which are nevertheless aware of the works that are not counted in the list.

Comprehensive knowledge

Gamble and Raymond (2002) listed up the ideal knowledge provided by permaculture.

- observe nature and become more aware of ecological systems
- restore the land, forests, waterways and local ecologies through integrated catchment management
- develop sustainable farming methods and food production systems that have the diversity, stability and resilience of natural ecological systems
- maintain and improve soil fertility and prevent erosion
- use water wisely — conservation, collection, storage, reusing, cleansing
- reduce pollution and waste and utilise resources responsibly
- plan and design sustainable houses and human settlements
- utilise appropriate technologies and design for energy conservation
- strengthen local economies, create local employment and work co-operatives
- develop fair trade networks, mutual aid and ethical investment organisations
- build on strengths and abundances within the bioregion
- share this knowledge with others

In Sankt Hansgården, the activities cover a wide range of knowledge from experience. It is not easy to trace what knowledge is really acquired by each child, but below are the list of activities that might contain a high level of knowledge and skills from experiences in S:t Hansgården;

- constructing animal house, huts, blacksmith with adults
- feeding animals and cleaning the stable
- keep rabbits and let them exercise jumping
- making handicraft materials using wool, clay, iron and mosaic

- baking breads and lamb meat, cooking meal and sweets for seasonal events (Pranter, interview with author)

Permacultural design contains the pedagogical aspect, and the employees emphasize the idea of ecological cycle ('kretslopp' in Swedish) using the design and resources. The detailed information posters on composting show their conscious effort to both apprehensive and comprehensive learning.

Participation and Facilitation

The sense of belonging and responsibility is important for *People Care*, one of the core ethics of permaculture. Instead of competition and isolation, permaculture emphasizes companionship, sharing and caring aspect. They offer a practical instruction how to enlarge the opportunity of participation; "permaculture offers the means to participate directly in the provision of the most basic aspects of human existence - food, energy, shelter and community, it is intrinsically empowering and action-orientated" (Smith, 2001:4).

Participation is a keyword for education in S:t Hansgården. Through participating in taking care of animals, digging the ground, cleaning up, planting and growing, motivation of learning and trust for the employees emerge. Larsen emphasizes the importance of children's participation; "When they participate, they ask question. If they do not participate, they do not have questions" (Interview with author). This shows that participation ignites the curiosity of children and affects the learning process.

Larsen believes that this process is sustained by the general attitude of the employees, the plurality of activities, norms and rules for the children, and annual events with children's initiatives. The attitude of the employees is considered very important, enabling children to build trust, to motivate questions and to take responsibility. "The employees should listen very hard, and try to understand what the children mean (...) If the children think that we laugh at what they are saying, they will never ask us again" (Interview with author).

4. Analysis and discussion

4.1. Evaluating principle and practice

4.1.1. Type of learning process in principle and practice

This section corresponds with the concept of apprehension and comprehension, and the understandings of the conceptual model in Figure 2 (section 2.1.2.). Table 2 shows the summary of the analysis of the type of learning process in cases.

Table 2 Type of learning process in principle and practice

	Apprehension (A)	Comprehension (C)
Permaculture	+	++
S:t Hansgården	++	+
4H	+	+
Östra Torns 4H gård	++	-

(++: most important feature +: major feature, -: minor feature)

Permaculture: The characteristic of permaculture is to extend the knowledge and the practice according to comprehension. The focus moves back and forth between comprehension and apprehension. Ideally, there should be some basic experiences (A) which need to be acknowledged cognitively (C). Once acknowledged, there are many strategies and practical experiments (A) which loop back to comprehension (C). Permaculture requires both apprehension and comprehension.

S:t Hansgården: Comprehension is less emphasized. Experience and experiment (A) of children are more important than understanding the theory of permaculture and technical details and design. At the same time, the participation of the children are structured with the sabbometer and promoted by the employees. It is assumed that certain knowledge and skills (C) are fostered during the practice.

4H: Apprehension (A) and comprehension (C) are both emphasized in 4H concepts. It is stated that theoretical understanding should be backed up by experience. Compared to permaculture, the learning does not require high level of comprehension of certain knowledge. Apprehensive experience can achieve enough democracy and participation when sufficient facilitation are provided.

Östra Torns 4H gård: Knowledge is less emphasized than the intentions of the principle. Similar to the case of S:t Hansgården, experience and experiments (A) are promoted. From the data collected, it focus less on the comprehension (C) compared to its principle, and also to S:t Hansgården. The lack of sufficient numbers of employees and reduction of budget might be some of the restrictions of the learning process itself.

Summary of the section

Both permaculture and 4H require apprehensive learning as the basis of learning. Apprehension is the backbone of comprehension, and comprehension needs to be backed up by apprehension. In the case of permaculture, comprehension is the key to improving technical and organizational energy efficiency and reduction of material use. In the case of 4H, apprehension and comprehension are equally important.

Both S:t Hansgården and Östra Torns 4H gård showed their main feature in apprehensive learning. Apprehension is more important than comprehension. It does not deny the possibility of comprehension in the case of S:t Hansgården. The organized structure of involving children into experience was observed. The case of Östra Torns 4H gård showed less comprehensive learning. There is a concern that comprehension can be limited to the students who show motivation and interest in both sites.

4.1.2. Educational paradigm in principle and practice

This section corresponds with Table 1. Paradigms of environmental education (adapted from Pepper, 1984) (section 2.3.). Table 3. shows the characteristics found in cases with respect to the paradigm of environmental education. The difference between the designing principle (permaculture and 4H) and the practice (S:t Hansgården and Östra Torns 4H gård) will be analyzed.

Table 3 Educational paradigm in principle and practice

	Technocentric (T)	Ecocentric (E)	Critical (C)
Permaculture	+	++	++
S:t Hansgården	-	+	+
4H	-	+	+
Östra Torn	-	++	+

(++: most important feature, +: major feature, -: minor feature)

Permaculture: The principle has the basis in its ethical considerations (E) and adopts systems thinking (C). It regards human being as an important player in ecosystem. It values the local and small production, and tries to

recognize the local resources and innovate efficient use of energy (T) beneath the conscious control of biodiversity. The principle has its characteristic in its practical approach based on the careful observation and planning.

S:t Hansgården: There are combining experiences for children with critical practice (C) based on the ecocentric view (E). It is assumed that employees have an awareness of technocentric aspects for efficient energy use and reduced impacts, but these are not the primal priority of learning objectives, and it is implicit for most of the children.

4H: The 4H adopts an ecocentric view and emphasizes respect of nature, with enhanced commitment from members. It does not emphasize technocentric notions such as energy efficiency and systematic combination of natural resources compared to permaculture.

Östra Torns 4H gård: The ecocentric view is the prominent among the three paradigms. A critical approach is found to some extent through daily practice of members, while technocentric view is less concerned.

Summary of the section

In principle, both principles describe the need of theory and practice. Primary steps to permacultural design are three questions: 'what do we have (resources) – what do we need (usage) – how to do (practice)'. 4H requires two steps in learning: 'understand surroundings' – 'know how to use'. Continuous iterative process for developing knowledge is programmed in the package in both principles of permaculture and 4H.

Permaculture shows the highest concerns in critical paradigm. Hajer (1995:282) criticized the authoritative development of knowledge and called for ecological modernization. The co-existence of different paradigms and the focus of critical view in permaculture can be evaluated as an example of ecological modernization.

When it comes to practice in S:t Hansgården, it shows diverse aspects of critical and ecocentric view, influenced by educational intentions, age-groups of children and financial limitations. Technocentric view is not emphasized. Östra Torns 4H gård seem to support ecocentric view. To some extent, this might be the influence of strong ecocentric view of the interviewee.

4.1.3. Learning sites from agroecological view

Agroecology is a relatively new approach in agricultural studies which attempts to drive the farming practice toward sustainable 'agro-ecosystems'. Hecht (in Altieri, 1998:4) introduced two definitions of agroecology; the broad approach that 'incorporates ideas about a more environmentally and socially sensitive approach to agriculture'; compared to the narrow definition focusing on 'purely ecological phenomena within the crop field, such as predator/prey relations, or crop/weed competition'.

Although learning site with farming activities can have diverse priorities in pedagogical objectives, it creates an agro-ecosystem by utilizing the agricultural resources. Permaculture suits both narrow and broad definition of agroecology, while 4H can be grasped with broad definition.

For both of the learning sites, the insight from agroecological view is the social aspect of learning sites to the local community. Altieri (1989:45) argued that agricultural production needs to be discussed in a wider and holistic view, including its interaction with society. In this respect, learning sites are linked with the society as not only as educational institutions but also as agroecosystems.

Dahlberg (1991:228) argued that both agroecology and permaculture agree on the unsustainability of large-scale industrialized agricultural system and saw positive seeds of sustainable agriculture in these alternative and trans-disciplinary approaches. This implies the adaptation of permaculture as a pedagogical method. The practical and systematic approach of permaculture have possibilities to serve as theory as well as practice of the agro-ecosystem in the learning site.

S:t Hansgården partially utilizes this pedagogical aspect in its apprehensive learning. Children are exposed to the intentionally designed agro-ecosystem in their daily practice. But to comprehend the knowledge of permaculture is not simple. It might need much more verbal communication between children and employees about permacultural theory, and also require time-consuming and extensive experiments in the learning sites. There is a possibility that the three employees who are currently learning permaculture can further this implementation and adaptation of comprehensive learning of permaculture in S:t Hansgården in the future.

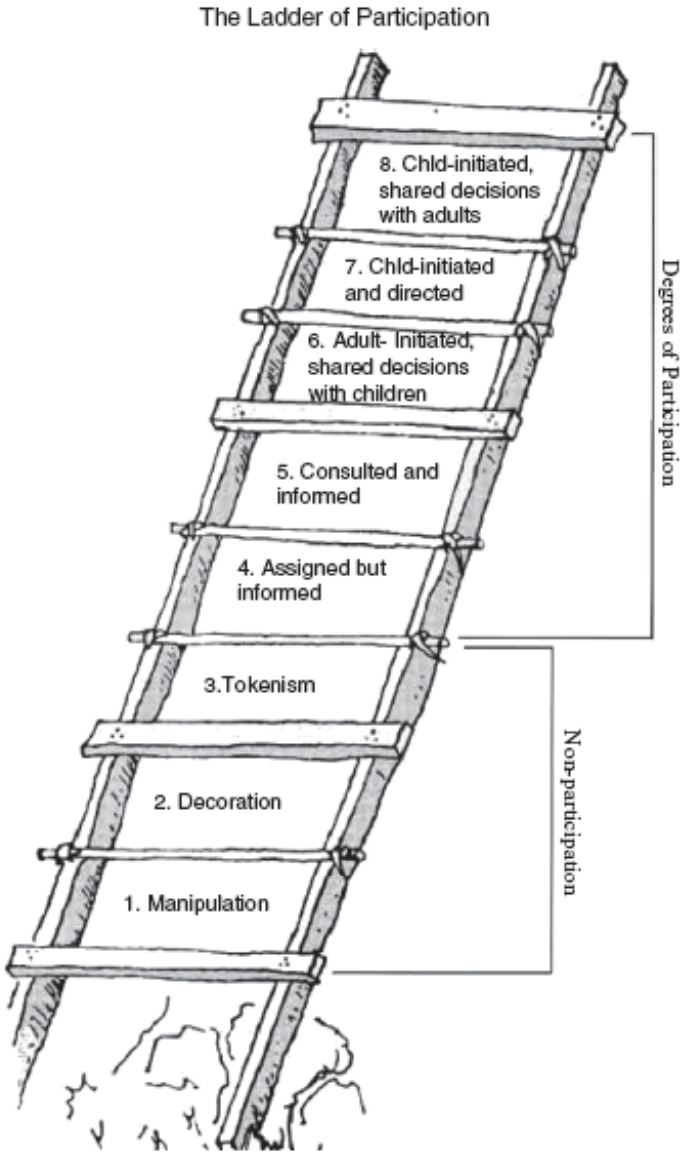
4.2. Facilitating participation

It is argued that facilitators must be aware of children's abilities and needs of participation at the same time. "It is important to recognize that not all children have the ability or desire to participate at the same level" (Iltus and Hart, 1995:2). The aim of the participation ladder (see Figure 4) is to evaluate the current level of participation and improve it. Theoretically, children are supposed to have capacity to initiate and share decisions with adults in organizations at the highest level of their participation (Hart, 1997:42).

Participation of children is emphasized in both Östra Torn and S:t Hansgården. In the case of S:t Hansgården, daily activities show high levels of children's participation in Hart's ladder. Level of participation differs from 'Assigned but informed' (level 4) up to 'Child-initiated, shared decisions with adults' (level 8). Daily chores such as cleaning the stable and keeping the animal house in order, are assigned through task lists and other posters, and also informed orally in daily announcements. These activities can be evaluated as level 4 and 5 participation. Children are often able to take initiatives in their daily activities, and consult adults when they have questions, problems and requests. The employees are highly encouraged to be aware and be serious to try to listen, understand and give advice to each child.

In Östra Torns 4H gård, participation also ranges from levels 4 to 8. However, this is not reported and displayed visually as in S:t Hansgården. Empowerment might risk the security of children when they do not have the suitable ability to handle animals or tools for farming. Wrong operation of devices, tending of animals can happen outside the instruction or attention of employees.

Figure 4 The ladder of participation (Hart, 1992, in Hart, 2008:22)



Summary of the section

The analysis in this section corresponds with the following key question.

- To what extent are the children facilitated to participate in the learning?

Both local cases showed high consciousness of employees to facilitate the children's participation. S:t Hansgården utilize financial motivation to motivate children, while Östra Torns 4H gård relies on children's voluntary participation.

4.3. Reforming the landscape, reconnecting the society

Both S:t Hansgården and Östra Torns 4H gård have been actively opening their gates towards local residents. In addition to the need of care for animals on weekends, this in the case of S:t Hansgården was partly due to political pressure. Both regard themselves as the keeper of landscape and messenger of ecological thoughts. Östra Torn aims for keeping the traditional domestic animal breeds of Sweden inspired by the outdoor museum Kulturen Östarp. It shows a new role of learning site as a unique gene bank and reserve of cultural and environmental learning facility. S:t Hansgården provide unique opportunities to learn ecological knowledge and about permaculture for local residents. There are scheduled lectures and activities led by local experts and organizations.

It is assumed that balancing productivity, profit and investing on social and human resource will be difficult for the farmers under the current global market system. There are suggestions for radical reform in agriculture and society (Kloppenborg et al., in Pretty, 2005:312) but at the same time, empirical cases showed that the learning sites with farming activities have possibility to provide people with the multiple assets and traditional knowledge of agriculture. It is Pepper's (1984:224) argument that if new type of education for sustainability is to merge with environmental education, education needs to expand its scope to society and economy. Learning sites with agroecological characteristics, such as S:t Hansgården and Östra Torns 4H gård open possibilities to build unique social networks with farmers, academic institutions and local environmental organizations, while actively involved in reshaping the local social and natural landscape.

5. Conclusion

The conclusion are drawn by the answers to the main research questions.

- How does experience-based learning with permaculture and 4H contribute to local sustainability from environmental and social perspectives?

Experience-based learning with permaculture and 4H provide experiences and knowledge through farming activities. It is believed that farming activities provide multiple assets that reconnect people and nature. High level of children's participation implies the possibility to nurture change agents for local community.

Local learning sites showed rich opportunities of apprehensive experiences, but the focus on comprehensive knowledge was less observed. Farming activities were regarded as good opportunity to facilitate children's participation.

Experience-based learning sites with permaculture and 4H can be regarded as agroecosystem, that supplies not only agricultural experiences and knowledge, but social and environmental assets to local community. Their characteristics can be summarized as reforming the landscape and reconnecting the society.

- What are the different educational paradigms guiding the principles and practices of permaculture and 4H?

Both permaculture and 4H emphasize praxis as their core concern. Permaculture shows the highest concerns in critical paradigm and it bridges between the paradigms with the focus of ecocentric and critical view. Permaculture can be evaluated as an example of ecological modernization.

Local cases showed their critical and ecocentric view, but influences such as educational priorities, age-groups of children and financial limitations provided disparity between principles and local cases.

This study showed an example of how to approach the experience-based learning with farming activities. Further studies are recommended to better understand how they contribute to local sustainability.

- Knowledge of children through quantitative and qualitative research
- Long-term environmental and social impacts
- Economic and political aspects
- International comparison within/across principles

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Contacts

Östra Torns 4H gård (Address: Östratornsvägen 2, 224 68 Lund. Phone: 046-355088)

Gerda Wissler (Volunteer, horse keeper)

Marie Nilsson (Director)

Vipan (Address: Vipeholmsvägen, 224 66 Lund. Phone: 046-357767)

Grete Jarmund Berg (Teacher)

Sankt Hansgården (Address: Svenshögsvägen 25 B, Box 100 61, 220 10 Lund. Phone: 046-35 53 20)

Marianne Larson (Director)

Lennart Pranter (Permaculture director)

Stiftelsen Holma (Address: Holma, 243 92 Höör. Phone: 0413-22080)

Esbjörn Wandt (Teacher)

Appendices

Appendice 1 Assets of agricultural systems

Capital	Description
Natural	Nature's goods and services Food (farmed, harvested or caught from the wild); wood and fibre; water supply and regulation; treatments, assimilation and decomposition of wastes; nutrient cycling and fixation; soil formation; biological control of pests; climate regulation; wildlife habitats; storm protection and flood control; carbon sequestration; pollination; recreation and leisure
Social	Mutually beneficial collective action that contributes to the cohesiveness of people in their societies Norms, values and attitudes that predispose people to cooperate; relations of trust, reciprocity and obligations; common rules and sanctions that are mutually agreed upon or handed down.
Human	Total capability that resides in individuals, based upon their stock of knowledge skills, health and nutrition. Leadership and organizational skills
Physical	The store of human-made material resources to promote productivity buildings, such as housing and factories; market infrastructure; irrigation works; roads and bridges, tools and tractors; communications; energy and transportation systems.
Financial	Accumulated claims on goods and services, built up through financial systems Savings and issue credit (pensions, remittances, welfare payments, grants and subsidies).

(Adapted from Pretty, 2002:55)

Appendice 2. Interview guide

(A) Preparation	
	Appointment
	Recorder and/or notes
	Date, time, place and name
(B) Introduction	
	Introduction of interviewer
	Purpose of interview
	Ethical considerations
	Permission for recording
(C) Interview	
1. Learning site and strategy	Brief explanation of the facility and organization
	The reason for choosing experience-base learning
2. Farming activities	Who are the learners?
	What are the resources of farming activities?
	What are the functions of animals, food or other usage?
	What kind of experience are offered?
	What kind of knowledge are to be learned?
3. Role of employees	Who is involved in the activities?
	Are there different levels of participation?
	What is the role of employees in the learning sites?
4. Learning process	Is participation necessary for the newcomers?
	Are any activity restricted to skilled learners?
	Do they have any assessment of learning?
5. Sustainability	What does sustainability mean to the learning site?
(D) Closing	
	Summary of the interview
	Any other things that the interviewee want to talk about
	Ask for Feedback

Appendice 3. Key terms comparison of education and learning sites

	Type of education	Type of learning sites
Research by Dillon et al (adapted from Dillon et al, 2003:7)	Nutrition education; agricultural education; environmental education; outdoor education; geographical/science/technology education; food education; health education; experiential education; development education; museum education; and informal education.	Learning in schools (e.g. classrooms, school grounds, school farms), urban areas (e.g. city farms, botanical gardens, museums), and rural areas (e.g. field centres, farms, summer camps)
Research by the author (this thesis)	Informal learning; situated learning; experience-based learning; learning by doing; participatory learning; lifelong learning; agricultural education; education for sustainable development	Educational organization with agricultural activities (permaculture, 4H, forest garden)

Appendice 4. Agricultural assets in Östra Torns 4H gård and S:t Hansgården

Capital	Östra Torns 4H gård (source: observation by author and interview with Marie Nilsson)	S:t Hansgården (source: interview with Lennart Pranter and Marianne Larsen)
Natural and physical	Main stable: 3 horses (2 Shetland ponies, 1 Haflinger); 3 goats; 1 pig; 4 Sheep, 1 cat Sub stable: 5 ducks (3 Blekingeanka and 2 Svensk gul anka), 8 hens (Skånsk Blommehöna), 33 rabbits Paddocks for horses	Trees (hagtorn and maples as windshield), small-scale temperature (influence of Gulf Stream), rainfall, wind, soil (mostly clay), water (creek 5 to 7m under the ground), rainwater (polluted with bacteria and car tires, asphalt, etc). Animal house: 2 goats (1 Angora-goats from Afghanistan, 1 Moroccan dwarf goat), 5 sheep (female mix of Swedish meat and fine wool sheep, each bears one to three lambs a year, except for 2008 because of unavailability of healthy male), 39 rabbits, 2 cats Hens house: 20 hens (mix of Brahmas and Australian Orpington)
Social	Children's day care center and after-school club (fritidsgård) are located next door	Permaculture network, permaculture study circles (does not exist now)
Human	Approximately 30 children 2 employees and 2 volunteers Rabbits club members and their parents	Approximately 150 children 11 employees (most of them are qualified with pedagogical skills, 3 employees started a certificate course in permaculture in 2008), Children, rabbits club
Financial	Eggs are purchasable	2 million SEK were spent to construct the buildings and facilities in the garden, funded by different organizations

Appendice 5. Price list for sabbometer for tasks in Sankt Hansgården

List of punishments
Forget sweeping the floor 100SEK
Forget emptying wheelbarrow 50SEK
Forget emptying wastepaper basket 50SEK
Forget picking away obstacles 50SEK
Forget closing rabbit cage 50SEK
Forget washing the sink 25SEK
Forget cleaning under scales 50SEK
Forget hanging out tools 50 SEK per tool (broom, shovel, etc)
Adults finding rabbit poops on sofa 200SEK
Having rabbits on sofa 100SEK per rabbit
Not hanging up buckets and hay bags 50SEK per each
Forget tidying up straw box 25SEK per each, plastics, sticks and other things except straw
List of rewards
Tidy around compost 100SEK
Sweep the bridge50SEK
Sweep outside boxes75SEK
Tidy up the complete hen's house 200SEK
Clean up hen's nest 100SEK
Dust the roof and wall in stable75SEK
Dust the roof and walls in the loft 75SEK
Clean under all the cages 150SEK
Clean wheelbarrow with wood and piles 50SEK
Clean the goat box (with adults) 200SEK
Clean around feeding boxes 50SEK
Polish window in stable and in loft 150SEK