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Emilia Fägerstam

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High school teachers' experiences of the educational potential of outdoor teaching and learning

Emilia Fägerstam

Department of Behavioural Sciences and Learning
Linköping University
SE-581 83 Linköping, Sweden

Department of Education
Macquarie University
NSW 2109, Australia

Abstract

This is a longitudinal case study where teachers from different disciplines were interviewed before and after an outdoor teaching project in a Swedish junior high school. The school grounds were used regularly as an area for teaching and learning in different subjects. The purpose of this study was to explore how teachers from different disciplines experienced regular school-based outdoor teaching and learning. The study also aimed at comparing the teachers' perceptions of outdoor teaching and learning before and after the one year project. Thematic analysis was used to analyse the interviews. Teachers' perceptions of the educational potential of outdoor teaching included increased motivation, communication and participation among students. Another perception was that the shared experiences in the outdoor environment could become a valuable starting point for subsequent indoor learning and that outdoor teaching could expand upon and strengthen indoor teaching. Challenges with outdoor education were also perceived, such as the fact that the students needed time to adjust to the new learning environment.

Keywords: outdoor learning, high school, school grounds, teachers' experiences

Introduction

The focus of this study is on the process of teaching and learning in school grounds or in the vicinity of the school. The provision of structured learning activities that take place outside the classroom, referred to as outdoor education or out-of-school learning, is a diverse research field wherein some concepts may be confused. In the Anglo-Saxon tradition, the term outdoor education often concerns adventurous experiences that focus on team-building and development of leadership skills; quite often, such experiences are provided by a purpose-built outdoor education centre (Thomas, Potter & Allison, 2009; Taylor, Power & Rees, 2010). In the Scandinavian context, the term outdoor education most often involves school-based learning outside of the classroom, in the nearby natural or cultural landscape or on school grounds, often with a cross-curricular approach (Bentsen et al, 2010; Jordet, 2007, 2010; Mygind, 2005; Szczepanski, 2008). A term used

in the Anglo-Saxon literature that is transferrable to the Scandinavian context is ‘school-based outdoor learning’ (Thorburn & Allison, 2010), which accordingly will be used in the present paper. The Forest School approach is also equivalent to school-based outdoor learning but with a focus on learning in woodland environments. The Forest School embraces regular curriculum linked learning, not only focusing on learning about nature and environment but also on subjects such as English, mathematics and science (O’Brien, 2009).

Aims of the study

This study aims to explore how teachers from different disciplines have experienced the educational potential of regular school-based outdoor teaching and learning in a Swedish junior high school. The study also aims to compare the teachers’ perceptions of, and attitudes to, school-based outdoor teaching and learning before and after one year of practicing outdoor teaching. The study is guided by the following research questions:

- 1) What are teachers’ perceptions, based on one years experience, of the educational potential of school-based outdoor teaching and learning?

- 2) How did teachers’ perception of school-based outdoor teaching and learning differ after their years experience?

School-based outdoor learning

Jordet (2010) studied regular school-based outdoor learning, called *uteskole* (literally outdoor school) in Norwegian primary schools, and proposed a model of the central characteristics of learning in outdoor settings (see figure 1). Two fundamental conditions of this model are that the school surroundings are used as a *learning arena* but also as a *source of knowledge*. If those conditions are realized, the potential for problem-based, practical, playful and creative ways of learning is unlocked. Two theories of learning inform the model. First, learning is perceived as an practical experience-based process. Students learn by using body and senses while actively exploring phenomena in the outdoor environment. From a neurological perspective, cognitive functions results from dynamic interaction between brain areas that operates in large-scale networks (Bressler & Menon, 2010). According to Jordet (2010), the embodied and multisensory experience of the outdoor environment stimulates the interaction between distributed brain areas and consequently robust long-term episodic memories are produced. Jordet (ibid) emphasises learning as interplay between bodily and mental activity.

However, learning is facilitated if the direct experiences made by the students are articulated and communicated. Thus, second, learning is also perceived as a social and communicative process. Here, Jordet (ibid) draws on contemporary socio-cultural theories of learning that perceive it as a situated, participatory and mediated (particularly by language). Students communicate and participate in the classroom too but when students engage in practical outdoor activities in collaboration with others they learn by doing and participating in a concrete ‘real-life’ context. This differs from the more

abstract classroom situation. In his model, Jordet (ibid) further distinguishes between implications for creating links to the local community and society and implications for education. Jordet's societal implications have much in common with the place-based approach to learning, developed by for example Gruenewald (2003) and Smith (2002), who argue that leaving the classroom may lead to increased opportunities to connect school learning to the wider community and nearby places. The overarching educational implications described by Jordet (2010) are a holistic approach to education that values the aesthetic and practical aspects of learning as well as the cognitive ones. Jordet's (ibid) model of *uteskole* will be applied as a theoretical framework for discussion of the findings of this study.

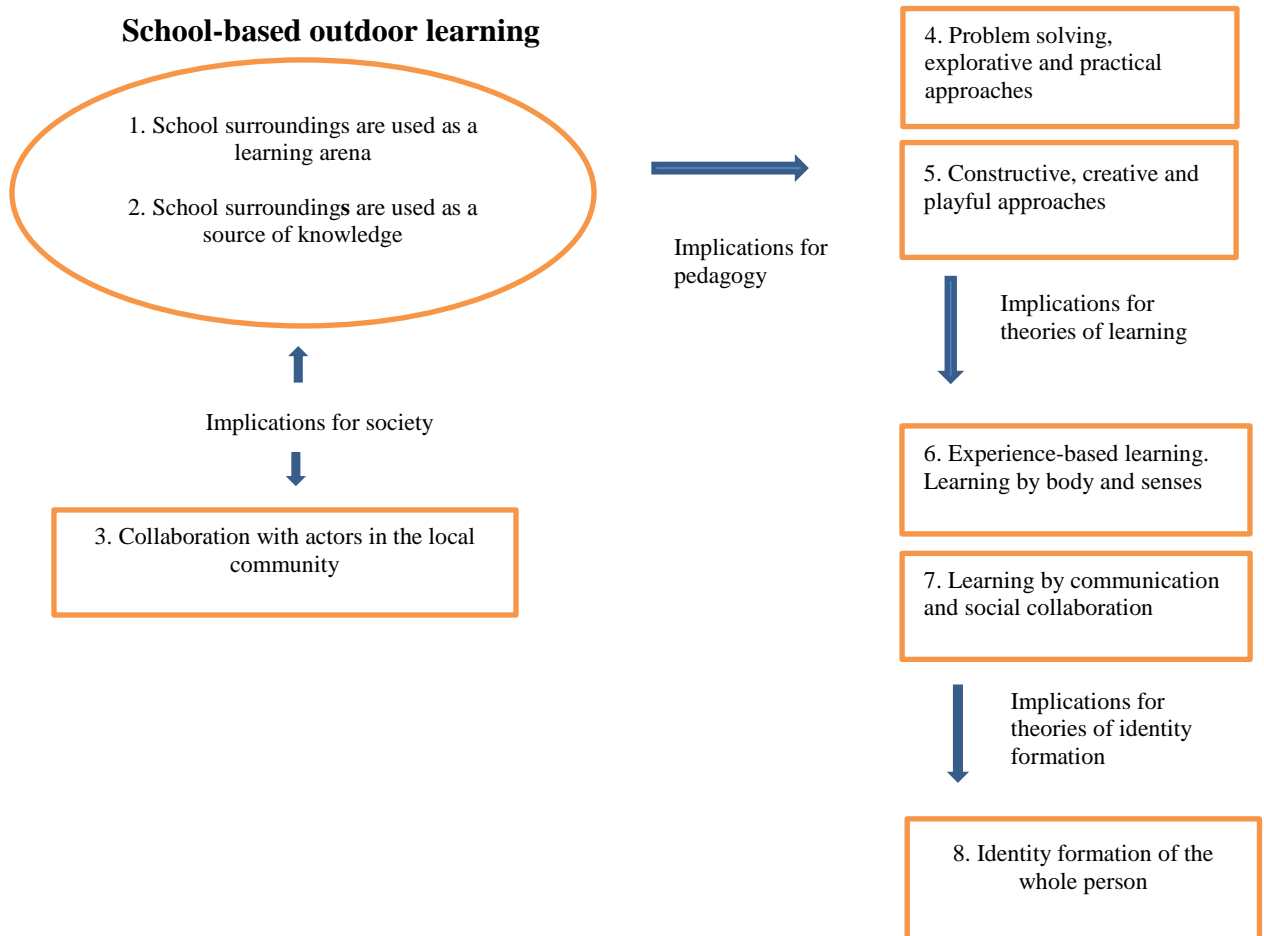


Figure 1. A model of characteristics of school-based outdoor learning. Translated from Jordet, 2010, p. 34-35.

In studies conducted by Jordet (2007, 2010) in Norway and Mygind (2005) in Denmark, primary school students spent at least half a day outdoors on a regular basis over a period of two to three years. Those studies found that school-based outdoor learning supplemented the existing curricula well, and that such experiences had a positive impact on social relations between students and between students and teachers. Dymont (2005) concludes that learning in school grounds can provide similar benefits as those that have been observed and documented from learning outdoors in other locations, such as a shift towards a multisensory and contextual mode of learning. Furthermore, since outdoor learning engages skills from various disciplines, it may also enhance multidisciplinary learning. A study where primary students went on 'outdoor journeys' in the neighbourhood reported improved cross-curricular and holistic learning, and increased connection with the students' surroundings (Beames & Ross, 2010). Thus, school-based outdoor learning seems to have the potential to improve learning in different ways.

However, many challenges stand in the way of implementation of school-based outdoor learning and it seems to be easier to work with primary school students outdoors, compared to secondary school students (Dymont, 2005). Obstacles have been noted, such as an inflexible and overcrowded curriculum, resource shortage, safety issues, lack of teacher confidence and expertise, poorly designed school grounds that limit use, lack of pupil interest, and unsuitable weather (Bentsen et al, 2010; Dymont, 2005; Han & Foskett, 2007; Rickinson et al, 2004).

This study aims to investigate how initially inexperienced teachers in secondary school experience and perceive its educational potential after practicing it across a school year. The concept, educational potential, has been used by Sandell and Öhman (2010) to refer to encounters with nature; I will utilize the concept similarly, but apply it to school-based outdoor teaching and learning. The need for focusing research on school-based outdoor learning has been emphasized by several scholars. In their review of research on outdoor learning, Rickinson et al. (2004) conclude that there is a need for a greater number of in-depth studies on outdoor learning in school grounds and community settings, compared with research on fieldwork and outdoor adventure education. Thus, results from this case study aim to address this gap in the literature. When Thomas et al., (2009) discuss potential future research on outdoor education; they suggest case studies in schools as a research need. Thorburn & Allison (2010) state that outdoor school-based approaches seem to be missing in the literature; the authors stress that the "low risk and high transfer" of knowledge is a benefit of these methods, compared to travel to outdoor centres that are dissociated from the familiar school-based learning context. Although such visits are often appreciated by both students and teachers, the difficulty of relating the learning experience to everyday school learning remains a concern. Most of the previous studies on school-based outdoor learning investigated the primary school context (Beames & Ross, 2010; Dymont, 2005; Jordet, 2007; Mygind, 2005; Waite, 2011). This study contributes to our knowledge of school-based outdoor learning by focusing on secondary school teachers.

Methodology

This study applied a longitudinal case study design (Bryman, 2008). One rationale for case study research is its possibility to generate in-depth studies encompassing some of the richness, completeness and variance of the phenomenon studied. Another strength of the case study approach is that it focuses on understanding relations between contexts and processes (Flyvbjerg, 2011). The aim of this research was to enrich the understanding of how teachers experience educational potentials and challenges of school-based outdoor teaching and learning in the secondary school, a poorly researched setting. For these reasons, the case study was deemed an appropriate design. Case study designs are often associated with limited generalizability. However, Bryman states that although case study designs often are associated with an inductive approach, they can be used for theory generation and are 'often in a position to generalize by drawing on findings from comparable cases investigated by others' (2008, p. 57). The findings from this study may be used as a basis for further hypothesizing and theory-building in the field of school-based outdoor teaching in secondary school. They also provide a well-grounded contextual understanding of the potentials of school-based outdoor teaching and learning in secondary school.

Data collection

The unit of study was a number of teachers working in a junior high school. Secondary schooling in Sweden is separated into a compulsory junior high school, i.e. Year 7-9 where students are 13-15 years old, and a voluntary senior high school, i.e. Year 10-12, where students are 16-18 years old. Two sets of semi-structured interviews comprise the empirical material in this study. In total, twelve teachers from different disciplines were interviewed (Appendix 1). The first set of interviews was conducted between 2008-2009 before the outdoor teaching project had begun. They were conducted before and/or during the teachers' attendance at a professional development course in outdoor education. Some teachers had already begun practicing outdoor teaching at the time of the interview. Ten teachers were interviewed at this time. Prior to the project, the teachers had mainly used the outdoors for occasional fieldwork or social activities. During the pre-outdoor teaching interviews, 2008-2009, the participants were asked to discuss different learning environments (classroom, school grounds, urban and natural environments) and their experiences and perceptions of teaching and learning outdoors. In the post-outdoor teaching interviews, 2010, about a year after the implementation of regular school-based outdoor teaching and learning at the school, follow-up interviews were conducted. Seven of the teachers from 2008 and 2009 were interviewed once again. Two additional teachers were also interviewed. See Appendix 1 for the participant's respective experience of outdoor teaching. All interviews started with the open question 'Can you tell me about your experiences of outdoor teaching and learning from this year?' Five of the nineteen interviews were not audio recorded due to technical difficulties. During those interviews, notes were taken and the interviews were recalled and transcribed on the basis of the these notes taken on the same day the interview had taken place. Duration of interviews was 30-60 minutes.

The outdoor teaching project

Every teacher at a junior high school, situated in Kronoberg County in southern Sweden took part in a 7.5 European Credit Transfer System (ECTS) credit professional development course from August 2008 to October 2009. This school was suggested by the senior manager of the educational district as representing an average school in the municipality. The principal and the teachers at this school volunteered to participate in the outdoor teaching project. This study was part of a wider project where the overarching aims were to study educational outcomes as well as physiological and psychological effects as a consequence of regular outdoor teaching and learning. The school is situated in an urban area but with access to green areas that included grass fields, open ground with bushes and trees, and a wood. There are no fences around the school grounds and accordingly they overlap with public areas. The area of the school grounds are approximately 35 000 square meters, comprising parts of the above mentioned green areas as well as asphalt and a gravel oval. The intervention period was September 2009 to June 2010, which is one Swedish school year. The purpose was to implement regular weekly school-based outdoor teaching to all students. During the entire year, the mean time each class was taught outdoors was for one lesson per week.

Implementation of school-based outdoor teaching

According to the multidisciplinary approach of the project, school-based outdoor teaching in this context could have several outcomes and be put into practice in several ways. It is beyond the scope of this study to cover all ways the teachers used the outdoor environment; below, a few examples will be given. Sometimes the outdoor environment was used for walk-and-talk where students, with the support of the teacher, discussed dilemmas or reviewed chapters in their textbook before an assignment. In additional language courses, the teachers often gave the students small cards with the beginning of a conversation or a few words, and then the student should walk around and communicate with each other with the help of the cards. In the Swedish language the outdoor environment could be used as a way to inspire students to improve their use of adjectives and improving writing rich and vivid descriptions. In mathematics, the students sometimes used trees or snowballs to make calculations; more frequently, mathematics was incorporated in small games where different teams had to solve problems or equations in competition with each other. An example from biology was to attract living birds with recorded bird song and discuss various animal behaviours, such as territoriality. In technology, stops at different types of fences (a stone wall, a wooden fence and a fence made of hurdle poles) during a walk initiated a discussion about historical ways of using material with different technologies.

Data analysis

A thematic analysis was conducted (Boyatzis, 1998; Braun & Clarke, 2006). In thematic analysis, the researcher seeks to identify, analyse and report patterns within the empirical material. This could be seen as a form of 'from-within interpretation' where the researcher tries to interpret explicit meaning expressed by the participants by decoding direct expressions but also to decoding meanings conveyed through indirect expressions (Szklański, 2009). The data was analysed in six phases as suggested by Braun & Clarke (2006).

In phase one, *familiarizing*, the transcripts were first read through several times for familiarisation purposes. The second phase, *generating initial codes*, generated systematic codes across the entire data set. In phase three, *searching for themes*, the codes were further elaborated and linked to emerging themes. During phase four, *reviewing themes*, the codes, themes, and sub-themes were reviewed, resulting in a thematic map that included three main themes and several sub-themes. In the fifth phase, *defining and naming themes*, the essence of each theme, as well as their roles in the emerging overall story, was refined and identified. Phase six, *producing the report*, was the final step of analysis, where selected conclusive extracts were embedded within the analytical narrative to produce a coherent and internally consistent account.

The two sets of interviews were analysed separately. Thematic analysis can be inductive, linked to empirical material, or deductive and theory driven (Braun & Clarke, 2006; Boyatzis, 1998). In this study the two approaches were combined. The interviews from 2010 were first analysed inductively, whereby a number of themes were produced. Those themes were subsequently used as a theoretical frame to investigate the first sets of interviews from 2009. The reason for this approach was that one of the aims of the study was to explore teachers' perceptions of outdoor teaching (for which the interviews of 2010 served as the relevant material). The other aim, to explore if and how these perceptions differed between 2009 and 2010, required comparison between the two sets of interviews, which involved locating the themes identified in the 2010 interviews within the material collected in 2009. However, all transcripts were read through for the purpose of familiarization, and some parallel analysis was conducted to determine if there were differences in main themes between the pre-outdoor teaching interviews and the post-outdoor teaching interviews. .

Validity

While the teachers in this study differed in their experience of school-based outdoor teaching after the project, all of them can be considered well experienced in this approach when compared with high school teachers in general. Their perceptions of the educational potential of school-based outdoor teaching and learning were well grounded in personal experience. Although not embraced by all teachers at the school, school-based outdoor teaching became a familiar and established way of teaching during the year of the project, not an extra-ordinary experience for a few. Thus, the longitudinal approach enhances ecological validity: that the findings are applicable to people's everyday life (Bryman, 2008).

Limitations of the study

When the teachers discussed their perceptions and experiences they covered many topics that concerned teaching and learning outside the classroom. This study focuses specifically on teachers' experience of the potential of school-based outdoor teaching and learning rather than practical challenges, such as organizational issues, that were brought up by the teachers. However, challenges related to the themes will be noted. Another limitation, emphasized by Zunker & Ivankova (2011), is that 'data collection may have been subject to recall bias and self-report bias associated with providing socially desirable responses' (p.876).

Findings

In this section, I intend to answer both research questions posed by the study. The experiences of educational potential of school-based outdoor teaching and learning after one year of practice will be the focus of the discussion together with the comparison of perceptions before the project. I will begin by discussing the setting for teaching and learning and subsequently present the themes from the thematic analysis. A summary of the themes is presented in table 1. For a summary of differences in perceptions see table 2-4.

The physical setting

When the possibilities for learning in different outdoor environments were discussed before the project, the natural environment with its perceived peacefulness, beauty and stimulation of the senses was seen as the best choice as a setting for learning. The school grounds were considered boring, too noisy, uncreative and not attractive as a learning environment by almost all of the participants. However, following the project, what emerged was that the school grounds were the environment most often used in school-based outdoor learning – and that it often worked well. It was uncommon to use the natural environment, apart from the cluster of bushes and trees present on the school grounds themselves, despite the teachers' initial appreciation of nature as a learning environment.

The themes

The analysis of the two sets of interviews identified three themes capturing the educational potential of school-based outdoor learning according to the teachers' experiences. The themes and corresponding sub-themes are presented in table 1.

Table 1. Summary of themes.

Themes	Sub-themes
Social aspects	Supportive environment Participation and challenge of identities Collaborative learning Teacher-student relations Discipline and structure Relaxed atmosphere Teacher collaboration
Educational aspects	Enabling on-task communication Shared experiences Expand school knowledge Confirm school knowledge
Emotions and motivation	Student emotions and motivation Teachers' intrinsic motivation

All themes were present in both the pre-outdoor teaching interviews and post-outdoor teaching interviews, but there were changes in focus and in terms of which aspects of the

themes were discussed. A summary of the differences concerning social aspects are presented in table 2.

Table 2. Summary of changes in perceptions between pre-outdoor teaching interviews and the post-outdoor teaching interviews concerning social aspects.

	Pre-outdoor teaching interviews	Post-outdoor teaching interviews
Social aspects	Only one teacher discusses social aspects	Perceived as a major educational potential
Sub-theme: supportive environment		Increased participation in class –especially ‘shy’ students seem to benefit
		Outdoor activities were often organised as small group learning and consequently increased collaborative learning were experienced as a potential
Sub-theme: teacher-student relations	Lack of discipline and structure was a major concern	Long implementation period (up to three months) before the students adjusted to their new learning environment. During that time disciplinary issues was a concern Less focus on disciplinary concerns Classes considered unstructured were more seldom taught outdoors which indicate that lack of discipline and structure was an issue
	Improved teacher-student relations was discussed by some of the participants	Improved teacher-student relations and a relaxed atmosphere perceived as a positive outcome by the majority of participants
Sub-theme: Teacher collaboration	High expectations of increased teacher	No increase in teacher collaboration and

	collaboration and interdisciplinary teaching	interdisciplinary teaching
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Social aspects

The teachers experienced a change in social relations when learning took place outdoors. These differences affected student-student relations as well as in teacher-student relations. The theme ‘Social aspects’ contained three sub-themes: ‘supportive environment’, ‘teacher-student relations’ and ‘teacher collaboration’.

Supportive environment

All teachers’ experiences after the project were that school-based outdoor teaching and learning had a positive impact on students’ interpersonal relations. Student participation in class and the way students interacted with each other was improved. This was an unanticipated outcome of school-based outdoor teaching; during the pre-interviews, one teacher discussed possible positive influences of school-based outdoor teaching on students’ social relations. An important educational potential concerned student participation and broadening of their persona in the classroom.

Participation and challenge of identities

In general, teachers agreed that more students began to actively participate when education took place in an outdoor environment. It was as if the environment had qualities that encouraged students to participate in a way a classroom didn’t. Agnes and Harry emphasized that particularly shy students seemed to benefit from school-based outdoor teaching.

Indoors, walking up to the board and [presenting] is more of a “thing”. Outdoors, it all becomes more relaxed, at least that’s how I feel. I think indoors presentations hold back many students, outside they become more confident. The students that are a bit more shy benefit from this. Harry, 2010

Many of them always keep quiet indoors, but outside it’s not that much of a “thing”. Agnes, 2010

Another potential perceived by the participants was that school-based outdoor teaching and learning challenged the boundaries between ‘high achieving’ and ‘low achieving’ students. Gary and Janet express how school-based outdoor teaching and learning challenged the roles the students’ had in class. Students got the possibility to demonstrate different sides of themselves showing other abilities.

Often, other students perform well on more practical task. Those that are good at solving text problems keep their status, but the status of the others also goes up. More of them get the opportunity to do well. Gary, 2010

They get to discover each other. The one that never says anything, usually the others think that person knows nothing. So all of the sudden it becomes fun to talk to that person, because they see that he/she can do very well. Janet, 2010

Thus, although school-based outdoor teaching seemed to benefit many students, an educational potential expressed by many participants was that particularly silent and shy students were given increased possibility to participate in the educational practice outdoors.

Collaborative learning

A related educational potential of school-based outdoor learning was increased opportunities for collaboration between students. This was another area that was perceived as a major benefit after the completion of the project but hardly discussed at all before the project began. The fact that teachers elected to have pupils work on collaborative projects outdoors certainly played a part in this. However, aside from this, almost all teachers said they thought the outdoor environment in itself had a positive impact on students' interpersonal relations. The reasons discussed by the teachers were the neutral, relaxed outdoor atmosphere, as well as the increase in space that enabled students to interact more freely.

The outdoor environment invites in some way to have a conversation, to communicate.
Patrick, 2009

Many participants in this study found it easier to get students to work together in new constellations outdoors and that collaborative work outdoors more often engaged all students in the group in contrast to indoors collaborative work, as expressed by Janet.

Then they automatically start to cooperate, I think all of them have been more active in the group when they had to move the cards, 'no, I want to put that one there', than they would have been if they were sitting in the classroom with those little cards. But the task is the same. Janet, 2010

Veronica, a mathematics teacher, found that students helped each other more outdoors, while indoors a more competitive atmosphere reigned.

In the classroom it's more difficult for them to help each other, I think, because they're so focused on getting ahead in the book. Then they're not at all as willing to help each other out. Compared to when they get a task outdoors and they're all faced with the same task.
Veronica, 2009

Thus, one educational potential of school-based outdoor teaching and learning was increased collaboration and improved interpersonal relations.

Teacher-student relations

Discipline and structure

Before the start of the project, teachers expressed concerns about outdoor teaching and the perceived challenges that they would face. Many were concerned with the difficulty of attaining discipline and structure outdoors. They thought outdoor teaching would be more demanding, in terms of well-defined aims and structured lessons; otherwise, the students would lose focus. One teacher even said it was impossible to teach his/her subject outdoors. Many thought junior high school students needed the classroom as a distraction-free framework, as exemplified by Edward.

The kids of today, they are just so terribly fragmented, so in order to get through to them at all you have to be whole, that is, you can't have anything disturbing around you. So you need an incredible amount of disciplinary things, that is that you keep very disciplined. Edward, 2009

Although student behaviour was still a concern to the participants in the post-interviews, this was not brought up as much as before the project. The teachers' experiences were that the students needed time, up to three months, before they realized that going outdoors was part of everyday school practice. During the transitional period, teachers were bothered by a lack of discipline and concentration, and some chose to stay in the classroom rather than face these challenges.

In the beginning it was a complete disaster /.../ they weren't listening to what we were saying at all, but it was that sense of freedom that might have gotten to the heads of many of them /.../ but once you get that working, then they know the rules, then you can even decide meeting times /.../ Edward, 2010

Agnes, a participant who elected not to teach outdoors regularly, reasoned that her class was "difficult" and in need of a high level of structure to function well, while also acknowledging that it might benefit from it.

I have a class that requires extremely well-structured teaching. That's why neither I nor that many of the other go outside with them /.../ maybe that's the class that needs it the most /.../ Agnes, 2010

Agnes' experience exemplifies the difficulties of moving out of the classroom. Students seemed to need quite a long time to adjust to the new learning environment. However, the participants that persevered in their efforts experienced that discipline gradually improved and thought the effort worthwhile in the end.

Relaxed atmosphere

After the project, changes in teacher-student relations were frequently mentioned as a positive outcome and potential of outdoor teaching (rather than disciplinary problems). Many teachers enjoyed the possibility to alter the hierarchical structure in the classroom and get closer to their students in a relaxed way.

When we were outdoors, the atmosphere was very nice, and it's great, I think, to be able to walk and talk to the students about, maybe, other things than one usually would, and then it's legitimate, I mean in the classroom you're still supposed to be, to have a certain role. If you're outside walking and talking that opens up the potential for some other ways to connect and that benefits you when you get back to the classroom. Stacy, 2009

Another experienced potential was that it was easier to help students outdoors in less obvious, more discreet ways than in the classroom. The increased mobility of the teacher and the students outdoors meant that it was easier to pass by students asking them how work was going on without singling out any particular student as in need of assistance. Harry reports utilizing this aspect of outdoor work to make sure all students are focused on the task.

You can stand a bit close to the ones you know need help without the others noticing when you go over the theoretical bits. You can focus on that student and make sure they're following along. Harry, 2010

Thus, in addition to improved student-student relationships as a consequence of increased collaborative learning, the teachers also identified a potential for them in expanding the relationships with their students, as well as the potential to more easily assist students with difficulties.

Teacher collaboration

Before the start of the project, expectations that interdisciplinary as well as disciplinary collaboration between the teachers would increase were expressed. The teachers perceived collaboration as an important educational potential of school-based outdoor teaching and viewed the project as an opportunity to change the rather rigid boundaries between disciplines at the school.

They're expecting a lot of collaboration from us now, it's important. So that you're not alone, that I'm out there doing my thing and you're doing your own thing. That way it becomes pointless, I think. Michael, 2009

However, those expectations were not realized; after the project was completed, teachers' perception was that collaborative and interdisciplinary work had not increased. This was partly explained by lack of time for planning, but also, as exemplified by Janet, that teachers felt that one change in methodology was already stressful enough.

It would have been too much, if I had tried that [interdisciplinary work] too. Janet, 2010

To summarize, the main social aspects of the educational potentials of school-based outdoor teaching were that it enhanced participation and collaboration in class. Teacher-student relations changed in a positive direction but teacher-teacher relations were unchanged.

Educational aspects

The theme 'Educational aspects' contains the four sub-themes 'enabling on-task communication', 'shared experiences', 'expanding school knowledge' and 'confirming school knowledge', of which 'enabling on-task communication' and 'shared experiences' were themes that emerged following conclusion of the project. See table 3 for a summary of findings. Many of the teachers reported that outdoor lessons entailed a decrease in the amount of topics covered and mathematics problems solved, but even so, teachers involved in regular school-based outdoor teaching found that their students performed as well as students taught mostly indoors.

Table 3. Summary of changes between pre-outdoor teaching interviews and post-outdoor teaching interviews concerning educational aspects

	Pre-outdoor teaching interviews	Post-outdoor teaching interviews
Educational aspects	Majority of participants concerned about the time	Common perception was that a lower number of

	demands for outdoor teaching although they see potential	topics were covered outdoors but students' academic performance was equally good as before the project
Sub-theme: enabling on-task communication	Not discussed	Increased on-task communication a potential discussed by particularly language and mathematics teachers
Sub-theme: shared experiences	Some of the participants perceived outdoor learning to facilitate multisensory learning and strong episodic memories	Same as before with the addition of using the shared memories of first-hand experiences as a pedagogical tool
Sub-theme: Expand school knowledge	High expectations of increased 'holistic' and 'real-life' learning outdoors High expectations of place-based learning in the neighbourhood	This was mainly discussed by two teachers (natural science and social science) Outdoor teaching in the neighbourhood increased but tight schedules made it difficult to achieve
Sub-theme: confirm school knowledge	Discussed as a potential by many of the participants Match with syllabus documents and limited resources were a concern	Same as before but particularly natural science teachers expressed concerns about how to match outdoor activities with syllabus documents.

Enabling on-task communication

At the start of the project, none of the teachers expected school-based outdoor teaching to enable increased lesson content-focused communication among the students, but this became a common perception at project completion. Teachers of second- and third-languages were particularly impressed with the way school-based outdoor teaching increased communication skills among their students.

What I am most happy about, and that's why I kept on giving German class outdoors, is that it got them talking. Janet, 2010

The teachers reasoned that the outdoor environment could be a more neutral and relaxed setting. Outside the classroom, students had more space and were not overheard by other students when speaking in a foreign language. This encouraged students to talk and

improved their rate of communicating. Janet admitted that school-based outdoor teaching made a substantial difference to her students and that her way of teaching a third language indoors had not enabled her students to communicate as well as they did outdoors. She experienced a major difference before and after the project.

It is very cool to see what they can do [talk German] compared to the students who graduated ninth grade two years ago. And that gets me thinking, and besides, I think more students think of it as fun now. Janet, 2010

Janet and two other teachers also perceived that they could communicate and interact with the students outdoors to a greater extent than indoors, something that increased their knowledge about the students' academic achievement.

I've got a better picture of what they know and what they don't, and these things are often hard to assess /.../ I get more opportunities and I remember it better too /.../ the others [shy students] get a better chance to show what they can do Janet, 2010

The potential of school-based outdoor education to enable on-task communication was recognized both by language and mathematics teachers. As a result, teachers in those subjects practiced school-based outdoor teaching frequently. Similar to the language teachers, mathematics teachers experienced that students communicated more about the subject during school-based outdoor teaching compared with indoors, and that they found it easier to assess student capabilities during outdoor lessons.

Shared first hand experiences

According to teachers of natural and social science, one of the main educational potentials of school-based outdoor learning was that the students were exposed to *contextual multisensory experiences* and attained rich episodic memories from those experiences. Science teachers did not use the outdoors in teaching as often as mathematics and language teachers did, but on the other hand, when they did, they emphasized the use of the local context and specific place where the lesson was held as a significant part of the learning experience in ways that teachers of the other subjects didn't.

To see your area and the local place where you live, that's very beneficial. You'll never learn that if you just put up a map on an overhead projector, then you'll never learn that, since you can't see it. But if you show that map once you've taken them outside, they can have points to refer to, 'oh yeah, that was there', in a totally different way. Steve, 2010

The episodic memories the experiences gave rise to had value by their own, as Steve indicated, but additionally the *shared experiences* had the potential to contextualize and establish a point of departure for subsequent indoor learning.

/.../ if all we do is stay inside, it can all become rather abstract, most times. But then if I say 'do you remember that thrush that we got excited and he came closer to us?' Then it's much easier to grasp so that they get a picture in their heads of what it is that we're talking about. Edward, 2010

However, mathematics teachers also reported that they used recollection of shared experiences as a point of departure and transfer between outdoor and indoor learning.

It's easier to connect to things they've done outdoors. I use it all the time. When they've experienced it by themselves, it's a totally different thing. Gary, 2010

It is much easier to follow up 'do you remember when we did that exercise with the cones', they remember it easier, 'yeah, that's right'. They have pictures in their heads in a different way. Veronica, 2010

Veronica also emphasized the physical and emotional aspects of school-based outdoor learning as important factors that enhanced student recollection of learning episodes.

That you've done it with the whole body, you can refer to when we were there and there, and it 'sticks' better /.../ the memories are more positive. Veronica, 2010

Although some teachers mentioned increased episodic memories as a perceived outcome before the project, the educational potential with the shared experiences as a point of departure and a link between outdoor and indoor learning was a sub-theme that emerged only at the conclusion of the project.

Expand school knowledge

All the teachers expected school-based outdoor learning to contribute to education in a substantial way before the project. When discussing school-based outdoor learning the teachers identified many potential advantages. In the pre-interviews, teachers expressed expectations that school-based outdoor learning would result in an increase in the amount of contextual learning beyond the everyday school context, and that students would become more open to learning experiences in their immediate urban and natural environment. Before the start of the project, all the teachers expressed the belief that the learning process would be more 'holistic' and involve more 'authentic' experiences.

/.../ to go out and collect and explore, because that is what is all about, many of them just run or cycle past, or walk past forests and nature, just as something that they pass on the way to school. They don't discover anything, they just pedal along. Edward, 2009

However, after the project had concluded, most of the participants made no explicit reference to holistic approaches to learning or the value of 'experience in the real world' as an outcome of school-based outdoor learning.

The teachers endorsing the above-mentioned potential of school-based outdoor learning at the end of the project were Steve and Edward, who also stressed the confirmatory aspect (see below), as well as Veronica, a mathematics teacher.

I want to offer a different view on what maths means, that it's not just about sitting and solving problems in the book. Veronica, 2009

However, many teachers in the school (besides the informants interviewed for the study) frequently used the local area as a place for learning, something that was done very infrequently before the start of the project. Steve provides an example:

Now I'll be teaching law and the court system with the 7-years, then we could go to the execution grounds a bit over, the old execution grounds. And I think it's a great thing to do. They don't know that much about their local area. So I can imagine that when their parents are driving them somewhere, that knowledge will be in their heads. And they'll talk about it. Steve, 2010

Steve and Edward also believed that the students had improved their knowledge of the local area after the project.

/.../ It feels like they know the area better /.../ If they're supposed to get to some particular place, say, two kilometers away, they'll find their way now and they didn't use to before. Steve, 2010

The expected educational potential of school-based outdoor learning as a more holistic way of learning in the natural and urban environment was not a common topic in teachers' discussions after the project and seemed difficult to achieve. Before the project, the social science teachers expressed their intentions for making fieldtrips to nearby urban and natural places. However, at the conclusion of the project, the experience was that it was difficult to leave the school area for longer trips. The expectations were not realized due to organizational constraints, particularly time limits. However, the project did increase the amount of place-based learning in the immediate vicinity of the school.

Confirm school knowledge

Some teachers also expressed another idea about the potential of school-based outdoor learning to confirm and facilitate students' transfer of textbook knowledge to the everyday world. In this sense, school-based outdoor teaching was perceived as a complement to ordinary indoor teaching practice rather than an expansion of it.

Then they get to see that math can be applied outside the classroom as well, and that's where you want to get them really. Michael, 2009

This theme was expressed in a similar way after the project was concluded as well. In particular, Edward and Steve, two of the natural and social science teachers, still emphasized the educational potential of school-based outdoor learning to confirm knowledge learned indoors.

To connect it to a task, so that they can see the point of it all that we've been talking about. To help them see that there's something of what we've talked about in here – out there. Edward, 2010

In the natural and social sciences, the teachers were concerned with the need to find relevant outdoor locations and materials that matched the curriculum, as exemplified by Edward.

You can't just stand there and tear off a couple leaves and look at the pieces, you need some materials that they can use. Edward, 2009

This was perceived as a challenge to school-based outdoor teaching in the pre-interviews as well as in the post-interviews. The natural science teachers also believed that they did

not need the variation given by the outdoor environment to the same extent as other subjects due to the way in which natural science education involved various laboratory exercises and other variable ways of teaching. For this reason, as well as because of the perceived lack of equipment, natural sciences, in particular chemistry and physics were not often taught outdoors.

Emotions and intrinsic motivation

The emotional dimension of school-based outdoor teaching and learning did change between the two sets of interviews, see table 4 for a summary.

Table 4. Summary of changes in perceptions between pre-outdoor teaching interviews and post-outdoor teaching interviews concerning emotional aspects.

Emotional aspects		
Sub-theme: Student emotion and motivation	Mainly discussed as expecting students’ lack of engagement and interest	Students’ enjoyment and engagement perceived as a major educational potential
Sub-theme: teachers’ intrinsic motivation	Majority of participants acknowledged their own intrinsic motivation as a prerequisite for successful outcome of the project	Same as before, but many participants expressed enjoyment of outdoor teaching

Students’ emotions and motivation

Before the project, teachers were concerned with a perceived lack of student motivation and the effect it would have on outdoor learning. The participants thought students would react negatively to being taken outdoors due to bad weather, lack of appropriate clothes, lack of concentration and disturbance from other students. This would in turn make working outdoors more difficult.

After the project, the experience of all participants most, but not all, of the students, appreciated school-based outdoor learning highly. Teachers noted an increase in motivation and interest among their students. The teacher that thought his/her subject was impossible to teach outdoors now wanted to continue teaching his/her subject outdoors mainly due to the students’ increased interest and motivation. Thus, one educational potential of school-based outdoor learning was that it made school work more enjoyable, which in turn affected students’ interest and motivation.

The students are happy, positive and awake. They ask ‘ what are we going to do today?’ There’s a different kind of curiosity now. Veronica, 2010

Harry, Agnes and Janet thought the overall school atmosphere improved during the period with intense school-based outdoor teaching.

It's been great in general to look out over the schoolyard and that there's been a lot of movement, you hear a lot of laughter and see happy and committed students... Janet, 2010

Mathematics teachers in particular noted an increase in motivation and interest among the students as a potential of school-based outdoor learning, as the quote from Gary shows.

To sum it up, you could say that they don't know more but they're hungrier for knowledge /.../ They don't do better at tests but they're having more fun. They've got a different attitude. Gary, 2010

Thus, initial fears that students would lack motivation and perceive school-based outdoor learning as a burden, teachers found that it actually led to an increase of motivation and interest.

Teachers' intrinsic motivation

Before the project, many participants believed intrinsic motivation to play an important role in a teacher's decision to go or not go out with his/her class. They thought that intrinsic motivation was necessary to overcome obstacles, such as extra time needed to plan, prepare and teach, disciplinary problems etc, and without it, most teachers would probably stay in the classroom. After the project a common opinion was that school-based outdoors teaching was indeed very time consuming and some teachers thought the classroom was more effective as a place for learning. However, the majority of the teachers explicitly stated that they enjoyed school-based outdoor teaching. Even though some teachers saw school-based outdoor teaching as something they would not have done voluntarily, they now wanted to continue due to their own feelings of satisfaction and enjoyment. They appreciated that school-based outdoor teaching made them rethink their teaching practice and develop new ways to teach. One of the teachers enjoying school-based outdoor teaching thought that her own positive feelings were a prerequisite for her students' motivation and interest.

It got me thinking, but it's been fun. It's got my motivation up and that's essential for getting the students on board. Catherine, 2010

The teachers acknowledged that without intrinsic motivation it was difficult to satisfy the demands of school-based outdoor teaching. However, a number of the participants said school-based outdoor teaching would be a regular practice in their teaching repertoire further on, due to their own and their students' increased enjoyment.

Discussion

Jordet's (2010) model of school-based outdoor learning is used as framework for the discussion. The key aspects of this model is informed by socio-cultural theories of learning as well as more individually oriented experience-based theories of learning. This study contributes to the field of outdoor teaching and learning research in two ways. Firstly, most research of school-based outdoor teaching has studied primary schools. Studies of high school students are rarer. In general, studies of outdoor learning in high school focus on fieldtrips, camping trips or excursions to outdoor- and environmental

education centers. Studies of regular school-based outdoor teaching are few (Rickinson et al, 2004; Thorburn & Allison, 2010). This study examines teachers' perceptions and experiences of school-based outdoor teaching and learning before and after a school-based outdoor teaching project and therefore makes a contribution to our knowledge of the educational potential of school-based outdoor teaching and learning in a secondary school context.

Secondly, results from this study suggest that school-based outdoor learning in secondary school has similar educational potential as demonstrated by previous results from primary schools (Jordet, 2007; Mygind, 2005). This study demonstrates that just moving outside on school grounds has educational potential; students don't need to travel to a school forest, an environmental education center or camp. Thus, Jordet's model of *uteskole* (2010) seems to be relevant also in a secondary school context and on school grounds. This study agrees with his suggestions that outdoor schooling facilitates experience-based as well as communicative and participatory learning. Findings from the present study further emphasize the influence on the emotional dimension of learning from school-based outdoor learning which was not considered in Jordet's (ibid) model.

Participation, communication and collaboration

This study demonstrates that school-based outdoor learning on school grounds has a positive effect on student participation and social behavior, which has major educational potential. Active participation by more students and extended collaboration with a larger number of peers are two things that many teachers reported as potentials of the new way of teaching.

Socio-cultural theories of learning emphasize participation, communication and peer collaboration as fundamental aspects of learning (Daniels, 2001; Forman & McPhail, 1996). Forman and McPhail write that 'school introduces children to aspects of mathematical and scientific register (e.g., vocabulary items) but provides them with relatively few opportunities to practice these registers' (1996, p. 226). They conclude that collaborative problem solving can be a possibility for children to use these academic registers in a meaningful way, to share ideas and engage in logical arguments. School-based outdoor learning appears to increase students' potential to engage in meaningful collaborative work, in particular when making sense of scientific and mathematical concepts and communicating in a second or third language. This study did not examine if the increased collaboration and participation lead to higher academic achievement but this could be an area for further research. However, two meta-analyses that examined the effect of small group learning in general, (Hattie, 2009), and in science, mathematics, engineering and technology (Springer, Stanne and Donovan, 1999), conclude that small group learning is effective in promoting greater academic achievement. Students also show more favorable attitudes towards learning. Students' increased motivation toward learning was an experienced educational potential in this study and may be affected by the increase in collaborative work. A reported challenge to structuring cooperative learning is difficulties in its implementation in ordinary school work (Gillies & Boyle, 2010). This study indicates that outdoor teaching may be one way to facilitate such learning as it seemed to lend itself toward collaborative small group learning.

Experience-based learning; shared experiences, episodic memories and practice of scientific concepts

In comparison to the assumptions of Jordet (2010), the communicative and participatory aspects of school-based outdoor learning were more prominent in these results, rather than the active and experience-based aspects. However, the latter were also experienced as an educational potential. The teachers reported that students recalled school-based outdoor learning events easier. These shared episodic memories could be used as a link between indoor and outdoor teaching. Another potential was the use of these shared experiences as a mutual point of departure for further learning indoors. One difference between school-based outdoor learning in primary school and secondary school might be that multisensory learning plays a bigger role in primary school where learning more easily can involve smelling, touching and experiencing unfamiliar objects and settings. In secondary school the emphasis was rather on application of scientific concepts and subject-specific problem-based learning. There are probably fewer unfamiliar settings to experience with the senses in secondary school.

A potential expressed by some of the teachers was that the value of school-based outdoor learning was to confirm what had been learnt indoors. This presented a possibility to link school subjects to the everyday world. More science teachers perceived this potential compared to other teachers, reflecting concerns that science, frequently perceived as an abstract discipline, is particularly distanced from everyday life. Forman and McPhail (1996) argue that there is a lack of possibilities for students to practice scientific concepts in a meaningful way in the traditional classroom settings. This study demonstrates that school-based outdoor learning could be a way to practice scientific and mathematical concepts in a meaningful way involving aesthetic, relational and emotional aspects (cf. Sandell & Öhman, 2010).

Place-based and multidisciplinary learning

Increased collaboration with actors in the local community is one aspects of Jordet's (2010) model of school-based outdoor learning. The use of the school surroundings as an learning arena is another aspect. Before the start of the project, teachers emphasized the aspect of expanding school knowledge by increasing place-based, multidisciplinary and 'authentic' learning outdoors. Increased multidisciplinary learning outdoors, in the way suggested by Dymont (2005) and Beames & Ross (2010), seemed harder to achieve in the high school context than in a primary school context. This can be related to the highly structured and subject-specific schedule employed in high school education leaving less room for multidisciplinary teaching. While this proved hard to achieve, it was a desired goal prior to the start of the project. An area for further research is to examine whether continuous school-based outdoor teaching at the school increases cross-curricular approaches once the teachers become more accustomed to teaching outdoors.

However, the surroundings of the school were utilized, to some extent, for teaching over the course of the project. Students visited familiar places (e.g. a museum, gas station, forest, and suburban area) as well as particular places of interest in the neighborhood (e.g. an old execution ground) and some teachers perceived that school-based outdoor teaching facilitated a broader approach to the subject. Knowledge and inspiration could be found in places other than text books or the classroom. Thus, the results of this study parallel

Jordet's (2007, 2010) and Beames and Ross' (2010) findings from primary schools that school-based outdoor education and trips outside the classroom can be a way to connect the school with the community.

Emotions and motivation

Previous studies reported that lack of student motivation might be an obstacle to outdoor learning (Bentsen et al, 2010; Han & Foskett, 2007). This was a concern to the participants before the project, but not at its conclusion. The students seemed to be highly motivated by school-based outdoor teaching, even while for some of them, it took time to understand that outdoor lessons were actually lessons, not recess. That many of the improvements from regular school-based outdoor learning take long time to occur was a finding made also at the Forest Schools, concerning children aged three to nine years (O'Brien, 2009). Learning outdoors in natural environments is most often associated with positive attitudes from students (Ballantyne, Anderson & Packer, 2010; Mygind, 2005; Stewart, 2003). However, there is no research concerning secondary students' attitudes towards regular school-based outdoor learning and the results from this study clearly indicate that there is a significant educational potential in the positive impact school-based outdoor education has on students' motivation and enjoyment. The role of emotions in education is not well researched (Jarvis, 2006). Recent research in neuroscience reveals that emotions and cognition are closely intertwined and that the affective aspect of learning should be taken into consideration (Immordino-Yang & Damasio, 2007; Immordino-Yang, 2011). That school-based outdoor learning in the school grounds was associated with positive feelings and increased motivation by the students could to such a large extent well be one of its most important potentials. An area for future research is to further explore the relationship between the affective and cognitive aspects of school-based outdoor learning.

Conclusions

The findings from this study suggest that school-based outdoor teaching and learning in junior high school has educational potential. In contrast to teachers' expectations before the start of the project, school-based outdoor learning increased student motivation and enjoyment. Teachers expected disciplinary difficulties at the beginning of the project, and many participants also reported that it could take a long time of regular school-based outdoor teaching before the students really began to focus in their outdoor lessons in the same way as they did indoors. Another potential benefit identified after the project, but not emphasized before the project, was that school-based outdoor teaching enhanced participation and collaboration. In general, all students increased their participation in class work; this seemed to benefit shy students in particular.

Before the start of the project, teachers placed rather high expectations on school-based outdoor education, believing it would provide place-based and 'authentic' learning. This proved difficult to realize completely, however, some place-based learning took place during the project. Lack of schedule time made it difficult to leave the school grounds, therefore teachers mainly chose to stay on the school grounds or in close vicinity of the school. While teachers perceived the school grounds as noisy and unattractive before the start of the project, it seemed to work quite well as a place for learning. Language

teachers and mathematics teachers utilized outdoor learning most frequently. Increased on-task communication between students was identified as a novel, significant educational potential in language and mathematics subjects in particular.

Other educational potential of experience-based learning outdoors were that it could be used as a mutual point of departure for further learning indoors and a link between outdoor and indoor learning. School-based outdoor learning had the potential to facilitate understanding of scientific and mathematical concepts by relating them to the everyday world outside the classroom. To summarize, school-based outdoor learning appears to have cognitive, social and affective educational potential in junior high school. School-based outdoor learning does not need to be practiced at particular places far away from the school. Even on the school grounds, school-based outdoor teaching and learning has significant potential.

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Appendix 1

Participants (all names are pseudonyms)

	Interview 2008-2009	Interview 2010	Discipline	Experience of outdoor teaching 2010
Veronica	Yes	Yes	mathematics, physics, technology	Regularly ¹ in mathematics, rarely ² in physics
Janet	Yes	Yes	Swedish and German	Regularly in German, occasionally ³ in Swedish
Stacy	Yes	Yes	Swedish, English, social sciences	Regularly in Swedish, occasionally in English and social sciences
Gary	Yes	Yes	mathematics,	Regularly in

			biology, chemistry	mathematics, occasionally in biology
Catherine	Yes	Yes	history, Swedish, technology	Occasionally in history, Swedish and technology
Steve	Yes	Yes	social sciences	Occasionally in social sciences
Edward	Yes	Yes	biology, chemistry	Rarely in biology
Harry	No	Yes	music	Occasionally in music
Agnes	No	Yes	English and Swedish	Rarely in English and Swedish
Michael	Yes	No	mathematics, physics, technology	n.a
Patrick	Yes	No	mathematics, ph ysics and chemistry	n.a
Anne	Yes	No	Domestic science	n.a

1

¹ Once to twice a week on a regular basis almost the entire year (e.g. less during coldest winter months)

² 2-5 times a year

³ Less than once a week on a regularly basis but on several occasions during the year