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# Teachers' Intentions for Outdoor Learning: A Characterisation of Teachers' Objectives and Actions

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**Abstract.** Building on authors' previous study of teachers' intentions and educational objectives for outdoor learning, this paper examine the alignment between teachers' predefined objectives and the kinds of knowledge and cognitive processes reflected in the outdoor activities. The Halldén's theory of intentional analysis and Bloom's revised taxonomy were combined when analysing observations of performed outdoor activities and subsequent semi-structured interviews with nine teachers. Four teaching orientations were reveled: one that values affective and social objectives and promotes activities to understand factual knowledge, another orientation focuses on activities intended to gain procedural knowledge and emphasizes application of practical tasks. The other two teaching orientations primarily focus on cognitive objectives, partly to reinforce conceptual knowledge, partly to deepen understanding or improve strategies to enhance meta-cognitive knowledge. The degree of alignment between intended objectives and performed activity is higher among teachers promoting affective and social goals as well as meta-cognitive and analytical understanding, than teachers who use outdoor activities to mainly reinforce conceptual knowledge. The study shows that there is a range of possible learning goals in outdoor education and that teachers are guided by what they value and how they perceive learning.

**Key words:** Outdoor learning; Teacher's intentions; Bloom's taxonomy

## Introduction

Outdoor teaching and learning as part of the school curriculum have long been of interest for teachers as well as researchers in many countries (Bentsen, 2010; Jordet, 2007; Nundy, 2001). The educational values ascribed to outdoor learning by its proponents are based upon beliefs about the potential for outdoor environments to reinforce learning, since the meeting with nature becomes more holistic and involve

all senses in the knowledge-building (Wilhelmsson et al 2012; O´Brian & Murray, 2007; Sandell & Öhman, 2010). A review of international research of outdoor learning show that depending on the setting it can be understood both as a concept and a practice which is varied and complex with extensive field activities (Rickinson et al., 2004). It encompasses many different activities, for example field-work within school subjects and projects in school grounds run by regular teachers, visits to field study centres or out-of-school learning and adventure education run by leaders other than teachers, all with a body of its own literature. Outdoor learning occurs in many different parts of the world, and even though the context varies, the experiences gained seem similar (Rickinson et al., 2004; Rea & Waite, 2009; Lai, 1999). In this study we focus on outdoor learning that is taking place outside the classroom with regular teachers following the Swedish syllabus.

Many teachers in Sweden show an interest in locating learning outdoors. Personal encounters with nature (Sandell &Öhman, 2010) and teachers' autonomy are likely motives for why Scandinavian teachers are readily inclined to locate learning outdoors (Rea & Waite, 2009). This is in accordance with current Swedish school curricula, in which providing outdoor learning opportunities is desirable but is non-statutory, a position similar to that in many countries. Relevant objectives in science curricula include, for example, stimulating interest and curiosity and creating a desire among students to explore and understand nature. Furthermore, human relations with nature and environmental issues are highlighted in biology, social sciences, and geography curricula (The National Agency for Education, 2011). Swedish teachers' value arranging teaching outdoors since it creates an alternative learning arena (Wilhelmsson et al., 2012) where theoretical knowledge can be combined with experience-based learning. Outdoors can provide opportunities in terms of unique activities, which simply do not exist inside the classroom. Thereby, students' cognitive development as well as improvements in affective, social and physical learning domains can be gained (Wilhelmsson et al., 2012).

In the review by Rickinson et al. (2004) benefits and impacts of outdoor learning was investigated. The authors made a distinction between four learning domains; cognitive, affective, interpersonal /social and physical/ behavioural, and their meta-analysis indicated that well-taught fieldwork can lead to '*reinforcement between the cognitive and the affective domain with each influencing the other and providing a bridge to higher order learning*' (Rickinson et al., 2004, p 24). The four domains were used as an analytical framework. In an evaluation study of an out-of-school programme involving schools from London, UK, with data from 2700 students reported that students gained self-confidence, a greater sense of independence, and improved relationships both between students and students as well as students and teachers (Amos & Reiss, 2012). A positive impact in the affective and social domains seems to be a prerequisite to gains in the cognitive domain. Learning objectives within the cognitive, affective, social and physical domains also became apparent through an analysis of teachers' intentions with outdoor teaching in Sweden (Wilhelmsson et al., 2012).

A positive development of the students' social relationships, experience of teaching and self-perceived physical activity level is reported by Mygind (2009). The importance of the combination of classroom and outdoor teaching is also described in Norwegian research into schools which locate learning outdoors on a regular basis

(Jordet, 2007). The interaction between theoretical knowledge and hands-on experience is crucial for successful learning and can make the distinction between success and failure for many students. The teachers' opinions were that physical and practical learning activities may contribute to improving students' cognitive, affective and social development.

Teachers have expressed a range of reasons for using outdoor as an alternative arena for learning including reinforcement of theoretical knowledge through experience-based learning, to explore real objects using multiple senses, to stimulate positive feelings towards nature and to promote collaboration (Wilhelmsson et al. , 2012; Braund & Reiss, 2006; Jordet, 2007). The results correspond with previous international research concerning students' benefitting from positive influences in the affective and social domain in order to succeed in acquiring knowledge (Amos & Reiss, 2012) and confirm the importance of interaction between classroom-based and outdoor experiences to achieve deeper understanding and renewed motivation towards learning (Braund & Reiss, 2006; Frøyland 2010). Specifically inquir-based learning, which is believed to increase interest in science (EU, 2007), can be pursued in outdoor contexts. Outdoor activities can take the forms of inquiry, i.e., as a "systematic and principled process of pursuing and refining explanations for phenomena in the natural or material world" (Linn, Davis and Bell, 2004) Many of the mentioned advantages with outdoor learning are similar to the advantages linked to non-formal or informal learning e.g., to nurture curiosity and engage in socially interactive settings for learning through experience (Eshach, 2007). Outdoor teaching and learning within a school context is somewhat comparable to non-formal learning. This type of learning is described as 5structured and guided, or teacher -led, but more flexible than formal learning (Eshach, 2007). Flexible learning afforded by the outdoor arena seems to suggest important opportunities to many teachers, yet often its potential is not fully utilized, according to Eshach (2007). From an educational perspective, there is a strong case for the need for further research from different perspectives including pedagogical outcomes, effective teaching approaches and initiatives that improve as well as provide evidence of effective practice (Rickinson et al., 2004). Initiatives in the outdoor arena with young people as creators and active participants may promote scientific literacy and increase motivation to learn (Braund & Reiss, 2006). These actions do not have to form a major part of the teaching and learning, but in order to be effective they have to be carefully and purposefully organized (Wilhelmsson et al, 2012; Frøyland, 2010; Magntorn, 2007; Rickinson et al., 2004). This includes the importance of being accurate in instructions in order to promote students' understanding of, for example, making connections between theoretical concepts and practical context. According to Österlind and Halldén (2007) students construe different meanings for instructions in practical contexts with respect to theoretical concepts, which means that teachers should pay close attention to given instructions and explanations, in order to actually facilitate students' learning process outdoors.

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*Aim and research questions*

The overall aim of this study is to examine the knowledge and skills teachers want their students to develop through engaging in outdoor activities. By analyzing teachers´ educational objectives, we wanted to understand which cognitive processes and knowledge perspectives the teaching is aimed at. In addition, we investigated the activities and teachers' dialogue with the students during activity implementation to establish insights into how the intended objectives were promoted and realized by the teacher. Hence, we are able to examine the alignment between teachers' intended objectives and the knowledge focus in performed activities outdoors. To do so, we use theories developed by von Wright (1971, 1979) explaining actions as a result of an individual's interpretation of the motives and prerequisites of the situation at hand. Further Bloom's revised taxonomy (Anderson & Krathwohl, 2001) was applied as an analytical tool to categorize educational objectives of teaching in a knowledge dimension and a cognitive process dimension.

We explore teachers' educational objectives and the knowledge and cognitive processes reflected in the activities and the alignment between these, by addressing the following questions:
1. What are teachers' objectives for outdoor learning, and specifically what kinds of knowledge do teachers want to promote during outdoor activities?
2. What kinds of knowledge and cognitive processes are dealt with in outdoor activities?
3. How do teachers make use of the outdoor environment to align intended objectives and activities?

In order to inform practice, this paper will also discuss how the alignment between teachers' predefined objectives and the kinds of knowledge and cognitive processes reflected in students' actual performance can be improved. We aim to provide teachers who work outdoors with insight into the importance of careful consideration of how to use the outdoor environment to align objectives and activities to make use of the full potential of the outdoor arena.

## Methods

*Participants*

Teachers with extensive outdoor teaching practice were identified through a database of Forest in school (www.skogeniskolan.se) and recommendations of directors of educational offices in three Swedish municipalities. Nine of those teachers volunteered to participate in the project meaning that nine semi-structured interviews were conducted and twenty-six different outdoor sessions were observed (Table 1).

**Table 1. The participants with pseudonyms, educational backgrounds, teaching grades, experience and the number of observed activities for each teacher.**

| Teacher | Educational background | School year | Ages of students | School | Years of teaching experience | Number of observed sessions |
|---|---|---|---|---|---|---|
| Alice | Teacher education, specialization in Swedish/ Social Science | 3 | 8/9 | A | 12 | 7 |
| Ina | Leisure (non-teacher educator) | 3 | 8/9 | A | 12 | 7 |
| Anna | Teacher education, specialization in Mathematics / Science | 4 | 9/10 | A | 6.5 | 7 |
| Johan | Teacher education, specialization in Mathematics / Science | 4 | 9/10 | B | 9 | Not observed |
| Annie | Teacher education, specialization in Mathematics / Science | 5 | 10/11 | A | 6 | 7 |
| Sverker | Teacher education, primary school programme | 5-6 | 10/12 | C | 37 | Not observed |
| Maria | Teacher education, specialization in Mathematics / Science | 6 | 11/12 | D | 42 | Not observed |
| Margareta | Teacher education, specialization in Mathematics / Science | 6 | 11/12 | A | 7 | 7 |
| Roger | Teacher education, specialization in Mathematics / Science | 6 | 11/12 | E | 5 | 12 |

All teachers but one (Ina) have a teacher certificate. The reason for including Ina in the study, with a certificate from a leisure-time center training, was because of her many years of experience in teaching outdoors and her responsibility for implementing outdoor activities in school year 3 (children aged 9). Alice, Ina, Anna, Annie and Margareta come from the same school whereas the others from different schools. All the schools are situated in small cities and have about 200 pupils (in school years 1-6, children aged 7-12). The study pays strict attention to the Swedish ethical principals in research (Vetenskapsrådet, 2006).

*Data collection*

This paper builds upon a previous research study in which results from the interviews with four of the nine teachers are presented (Wilhelmsson et al., 2012). The study design is presented in Figure 1 and a description of how the data collection relates to the research questions is shown in Table 2. In spring and early autumn 2010, data were gathered by semi-structured interviews with the nine teachers. The interview schedule used in all interviews consisted of three parts: 1) a general discussion about why and

how outdoor teaching is used, 2) a focused discussion about successful outdoor activities, and 3) teachers' reflections on different metaphors concerning teaching and learning outdoors. The complete interview schedule is presented in Wilhelmsson et al. (2012). By late autumn 2010, three of the nine teachers had changed duties so empirical data comprising non-participant observations were collected from the remaining six teachers. These observations took place in an outdoor environment near the respective schools. Each observation of an outdoor session lasted 1.5 - 2 hours. Teacher-student dialogue was audio-recorded during observations, with a microphone attached to the teacher's collar. Before each outdoor session, the teacher described how their plan for activities had been constructed alongside their intended objectives, with a focus on knowledge and cognitive processes. These conversations took place in school without students present. Throughout the observations field notes were also made. The five teachers from the same school (school A) conducted their outdoor activities in the same location.

Alice, Ina and Anna conducted outdoor activities at the same location due to safety reasons and so did Annie and Margareta. Therefore, two, and sometimes three, teachers were observed at the same time. In these cases, one of the teachers was carefully observed for continuous intervals of ten minutes each, at a short distance, while the other teacher/s was observed every four minutes in order to note, e.g., mode of acting, dialogue with students. Ina and Anna wore microphones with grades 3 and 4, as did Annie and Margareta with grades 5 and 6. The audio recorder helped to capture the conversations between teacher and students which were often not possible to follow at a distance. After the observation, a discussion followed with each teacher to elicit and summarize the activities and their intended objectives. The total number of observed activities amounted to twenty-six (twelve with Roger, seven with Ina, Alice and Anna and sevenwith Margareta and Annie). In this paper a selection of examples is described to illustrate typical results. All interviews and observations were recorded and transcribed verbatim. All interviews and observations were carried out in Swedish and the citations presented are translated from Swedish to English.

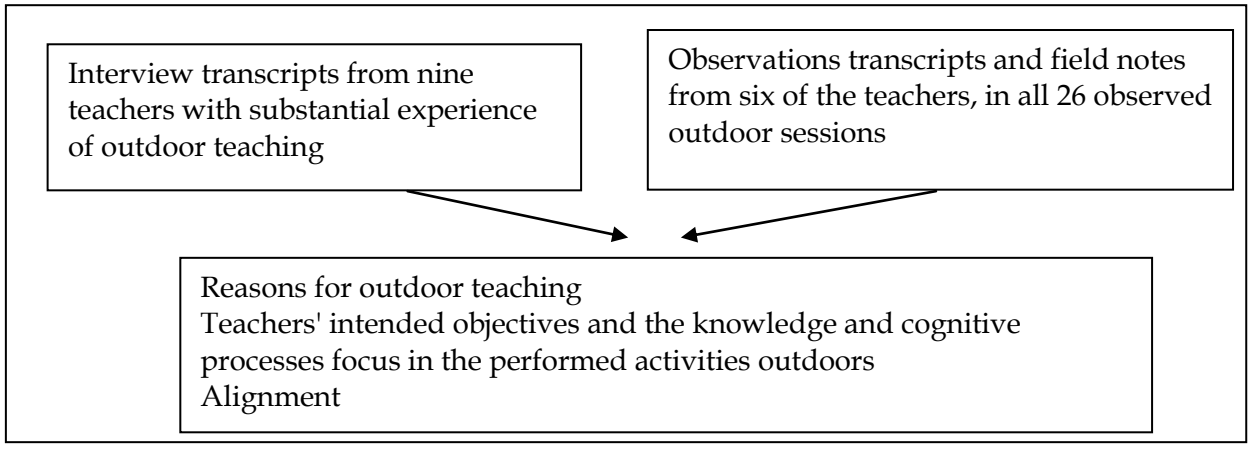


**Figure 1. Study design used to obtain information on reasons for outdoor teaching, the kinds of knowledge and cognitive processes teachers intend to develop and the knowledge and cognitive processes focused in outdoor teaching and the alignment**.

**Table 2. Description of research design used to obtain information on reasons for outdoor teaching, identification of objectives and knowledge focused in outdoor teaching within the interviews and in the observations.**

| Research question | Dataset | Data analysed by | Information obtained |
|---|---|---|---|
| RQ 1:<br>Teacher intentions | Interview transcripts from<br>- General questions<br>- Successful activities | Intentional analysis | Explicit and implicit reasons for outdoor learning<br>Identification of objectives within different domains |
| RQ 1:<br>Skills and knowledge to develop | Objectives in the cognitive domain achieved by intentional analysis<br>Interview transcripts from<br>- Successful activities<br>- Metaphors | Bloom's revised taxonomy | Identification of knowledge dimension and cognitive processes to develop by outdoor learning |
| RQ 2:<br>Skills and knowledge dealt with outdoors | Objectives in the cognitive domain achieved by Bloom's revised taxonomy<br>Observation transcripts and field notes | Bloom's revised taxonomy | Identification of knowledge dimension and cognitive processes dealt with in outdoor learning |
| RQ 3:<br>Use of the outdoor environment | Results from dataset in RQ 1 and dataset in RQ 2 | Bloom's revised taxonomy | Identification of alignment between intended objectives, knowledge focus in activities and teachers' use of the outdoor environment |

*Data Analysis*

The interview transcripts were first analysed by intentional analysis theory (Halldén, 2001; von Wright, 1971, 1979), using a modified version of Lager-Nyqvist's model (2003) to identify explicit and implicit reasons/intentions to locate learning outdoors (Figure 2). The internal determinants enable or limit what the teachers consider a possible performance action, while external determinants determine the teachers' interpretation of all the potential actions likely to be performed in the defined situation (Halldén, 2001; Lager-Nyqvist, 2003). An individual's intentions can be explicitly stated to a greater or lesser extent, and implicit intentions might be interpreted by the researcher from what is stated by the individual. Hence, each transcript from the teacher interviews was read through several times and all statements of intention noted. Interpretations of the teachers' implicit and explicit responses to all questions in the interview were used to understand teachers' intentions for outdoor teaching. The interpretation of the intentions is not validated by the individual interviewed but by

the degree of rationality, found by the researcher, within the analysis of the different parts of the interviews (cf. Halldén, 2001).

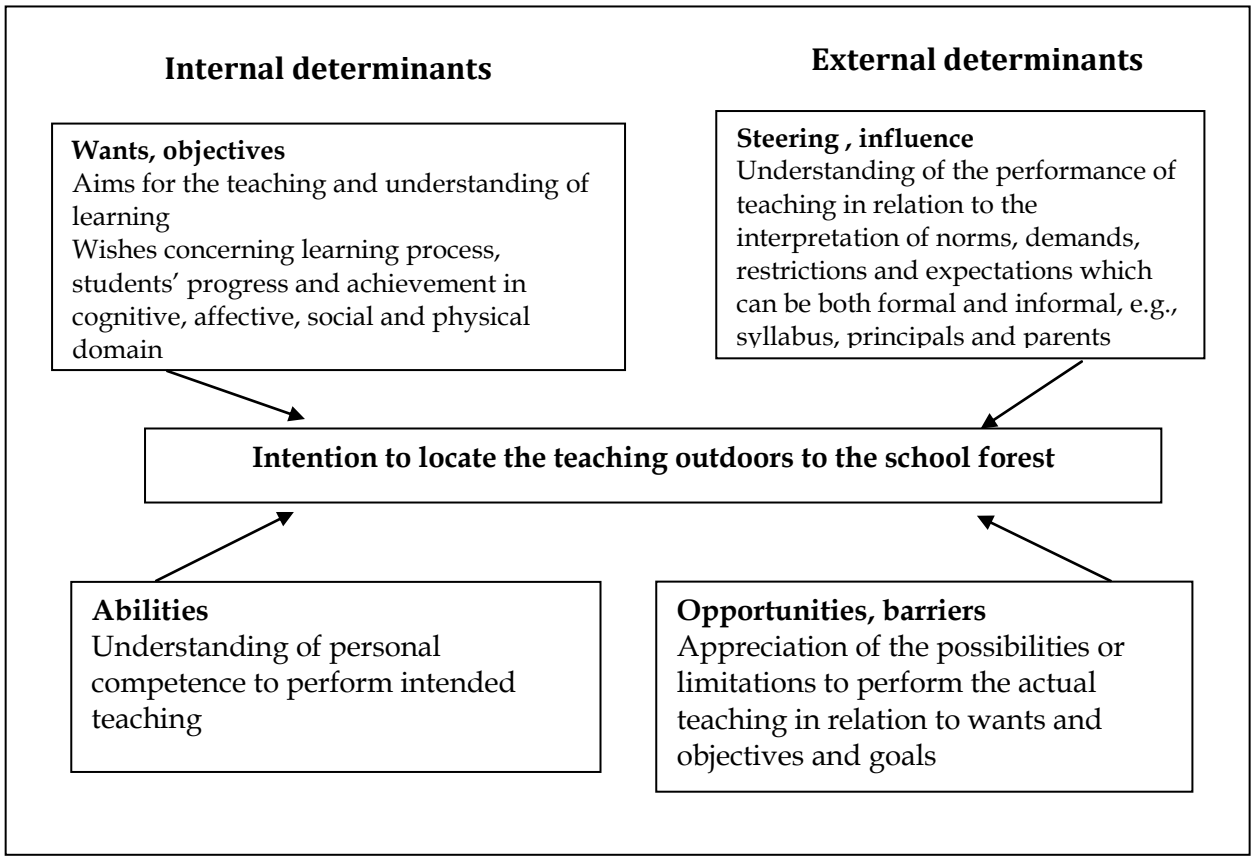


**Figure 2. The model for intentional analysis used to identify teachers' intentions to locate teaching outdoors (modified from Lager-Nyqvist, 2003) which shows *the examined teachers' internal and external determinants.***

The analysis of transcripts from interviews and observations revealed teaching objectives in four different domains, cognitive, affective, social and physical, similar to the categories made by Rickinson et al. (2004) and also seen in Wilhelmsson et al. (2012). All of the teachers had teaching objectives in more than one domain, and each teacher described many activities expressing a similar orientation with regard to the teaching objectives. Different teachers placed an emphasis on different objectives and so this required further analysis to reveal in what way they varied. An analysis of the learning objectives in the cognitive domain was undertaken and then the results from the different analyses were cross examined (see below).

The interview transcripts regarding the teacher's objectives for outdoor learning in the cognitive domain were further analysed by Bloom's revised taxonomy, a framework for categorizing educational objectives (Anderson & Krathwohl, 2001) to interpret which knowledge perspectives and cognitive processes the teachers were striving for (Wilhelmsson et al., 2012). The knowledge dimension and the cognitive process dimension represent a coherent continuum from basic elements to more abstract and complex categories of knowledge or cognitive processes. The knowledge dimension in the taxonomy (Anderson & Krathwohl, 2001) proceeds from detailed, factual knowledge, to more complicated conceptual knowledge about categories, principles,

theories and structures. Further dimensions are procedural knowledge based on how to do something, and finally the meta-cognitive knowledge which is more abstract and strategic. In the cognitive process dimension, 'to remember' is considered to be the lowest level of underlying cognitive complexity and 'to create', the most complex level. The aim of analyzing the objectives within the framework is to describe which skills and knowledge the teachers intend to develop through activities outdoors. Concerning the analysis of the observations of the teaching activities, Bloom's revised taxonomy was also used (Anderson & Krathwohl, 2001). First, the objectives of the proposed activities in the cognitive domain, as expressed by the teacher in the conversation before the lesson, were analysed, coded with capital letters (A) and placed in a particular cell in the taxonomy table (table 6). Second, the activities promoted during the actual lesson were analysed, coded with lower-case letters (a) and placed into the taxonomy table. Third, the consistency between objectives and activities was analysed. If (A) and (a) were placed in the same cell, there is an alignment and the teacher has provided opportunities for the students to acquire the intended knowledge and cognitive processes as exemplified in Table 6. The interpretations have been validated through a process by which each author interpreted the statements independently and then compared the analysis such that agreement was reached by the research team.

By cross examining, i.e. comparing the similarities and differences between the different analyses of teachers' intentions, learning goals in different domains and the analysis of teaching objectives in the cognitive domain, we were able to define four different teaching orientations: to inspire, to do, to reinforce and to inquire. The characterization of the different teaching orientations is described in table 3 and examples of different activities within the orientation is described in the results.

**Table 3. Characteristics of the teaching orientations found among the nine teachers, based on interviews of teachers' intentions and learning goals for outdoor teaching and categorization of educational objectives of observed activities.**

| Teaching orientation | Description of characteristics within the orientation |
|---|---|
| To inspire | Emphasizes objectives in affective, social and physical domains, and factual knowledge within the cognitive domain |
| To do is to learn | Emphasizes objectives in affective and social domains, and procedural knowledge in cognitive domain |
| To reinforce | Emphasizes cognitive objectives – to understand and apply conceptual knowledge |
| To inquiry | Emphasizes cognitive objectives – mainly conceptual and procedural knowledge. Uses an approach to learning that involves exploring the world, asking questions, making discoveries. |

**Results**

For all teachers, the main intention for arranging outdoor learning was to create an alternative learning arena, as an important complement to classroom learning, contributing value to students' learning processes. It gives students the chance to experience with all the senses and combines academic skills with experience-based learning. The teachers stress that outdoor learning draws on the actual world but their objectives within these authentic activities are diverse. The intentional analysis reveals similarities in the teachers' intentions for outdoor learning, primarily in the external determinants but also in the internal determinant: in the 'abilities' category (Figure 2). The differences between the teachers are mainly apparent in the internal determinant: in the 'wants and objectives' category. The objectives were described in cognitive, affective, social and physical domains. Some teachers included objectives in all domains but the different teachers put more or less emphasis on each domain (Table 4). The similarities and differences revealed provide the basis for four different teaching orientations: to inspire, to do, to reinforce and to inquire. Within each teaching orientation there is concurrence between teachers' intentions, objectives and ways of using the outdoor arena to achieve educational objectives. To illustrate this further, each teaching orientation is presented separately. First, the objectives favoured by each teaching orientation are given, followed by the kinds of knowledge and cognitive processes they want to promote by learning outdoors. A summary of the teachers' main reasons for staging outdoor learning is presented in Table 4. Furthermore, a summary of the knowledge and cognitive processes the different teaching orientations aim to promote, analyzed using Bloom's revised taxonomy, is presented in Table 5.

In the second part, results from the observations of the six teachers' outdoor activities, the kinds of knowledge they focused on, and how the teachers made use of the outdoor environment, are presented. Descriptions are included in order to discuss the alignment between teachers' intended cognitive objectives and the knowledge focus in the performed activities outdoors.

**Table 4. Distribution of the teachers' expressed objectives into cognitive, affective, social and physical domain sorted into four different teaching orientations. Numbers refer to how many different types of objectives in each domain. The distribution within the domains and the main reasons for locating learning outdoors is a result of the intentional analysis.**

| Teaching orientation | Main reasons for locating learning outdoors | Distribution of teachers' objectives in cognitive (C), affective (A), social (S) and physical (P) domains |
|---|---|---|
| To inspire | Stimulate writing and reading (Alice) | 2C, 2A, 1S, 1P |
| | Stimulate interest in nature (Ina) | 2C, 3A, 1S, 1P |
| To do is to learn | Generate feeling of achievement (Maria, Sverker, Anna) | Maria: 2C, 4A, 2S, 2P<br>Sverker: 2C, 3A, 1S<br>Anna: 3C, 2A, 2S, 1P |
| To reinforce | Confirm learning through various aesthetic expressions (Margareta) | 4C, 2A, 1S, 1P |
| To inquire | Reflect upon and reconsider responsibility for own learning (Johan) | 6C, 1A, 1S |
| | Reflect upon and reconsider own learning (Annie) | 5C, 2A, 1S |
| | Reflect upon and reconsider their own perspectives (Roger) | 7C, 2A, 1S |

**Table 5. The teaching orientations with identification of knowledge and cognitive processes they want to promote through learning outdoors, analysed by Bloom's revised taxonomy.**

| Teaching orientation | Identification of knowledge and cognitive processes |
|---|---|
| To inspire | Focus on understanding of factual knowledge (Alice, Ina) |
| To do is to learn | Focus on applying procedural knowledge ( Maria, Anna, Sverker) |
| To reinforce | Focus on understanding and applying conceptual knowledge (Margareta) |
| To inquire | Focus on understanding conceptual knowledge, aiming at analysing conceptual knowledge (Johan)<br>Focus on applying procedural knowledge, aiming at analysing procedural knowledge (Annie, Roger)<br>Elements for understanding meta-cognitive knowledge (Johan, Annie, Roger) |

*Reasons for outdoor learning and the knowledge teachers want to promote*

The four defined different teaching orientations highlight the following main reasons for outdoor learning: to inspire, to do, to reinforce and to inquire.

***Teaching orientation: To inspire - focus on affective, physical and social dimensions***

This teaching orientation emphasizes mainly objectives within affective, physical and social domains. Concerning affective objectives, the aim with outdoor activities is to stimulate students' interest in nature and to evoke positive feelings about being outdoors (see Table 4). Opportunities for play and physical activities are essential and

it is important that students consider the outdoor environment in a positive manner, associated with both inspiring and playful activities. Group work is used to promote cooperation in various tasks. When referring to the cognitive domain, activities promoting understanding factual knowledge is emphasized (Table 5). On the one hand, objectives aimed at understanding science facts with a focus on explaining causes and effects are expressed. For instance, one activity was designed to problematize littering by telling stories about injured animals to illustrate examples of human impact on nature and to awaken empathetic feelings for nature as being worth taking care of from a life-long perspective. On the other hand, factual knowledge to support inspiration which facilitates theoretical tasks in the classroom is stressed. Here, linking writing or reading tasks to experiences in nature, e.g. in writing fairytales or explaining facts about implemented activities outdoors, is thought to stimulate students' learning processes indoors. For Alice, for example, there is a dichotomy between outdoor learning which provides practical knowledge combined with physical activity, and learning inside which provides theoretical knowledge.

*After we have been out the entire morning, then it is very quiet in the classroom ... then you know, we have done something practical ... then we can, in good conscience, work on something theoretical in the classroom.* (Alice)

***Teaching orientation: To do is to learn - focus on applying procedural knowledge***

Within this teaching orientation, affective and social objectives are primarily emphasised. In their affective objectives, all three teachers draw attention to the importance of generating feelings of achievement, particularly for students with learning difficulties (Table 4). The significance of strengthening students' abilities and self confidence in order to potentially transfer feelings of achievement into theoretical subjects in the classroom is stressed here. Regarding social objectives, Maria and Anna focus attention upon the value of the group to generate well-being, while Sverker stresses student peer interactions as an important motivator for unmotivated students. When referring to cognitive objectives, the ability to apply procedural knowledge is in focus (Table 5). All three teachers view concrete outcomes as vital and emphasise activities to improve basic factual understanding, e.g. categorising certain herbs and other plant species in order to build factual knowledge, as well as exercises to attain procedural knowledge. Maria describes how she uses the forest's growth cycle: to explain the carbon cycle, planting trees, maintaining the forest and thinning out the saplings. Anna works with camp fires to demonstrate energy flow by building a reflector oven, which shows how such flow can be affected by the use of different materials. Similarly, most of the activities Sverker mentioned have objectives related to gaining procedural knowledge, e.g., how to make charcoal and constructing water wheels. The objectives were often discussed in terms of applying knowledge with a focus on practical issues.

***Teaching orientation: To reinforce - focus on understanding and applying conceptual knowledge***

This teaching orientation stresses mainly cognitive objectives in order to understand and apply conceptual knowledge (Table 5). Outdoors, students are provided with opportunities to demonstrate learning through various forms of aesthetic expression considered valuable for improving understanding of, for example, ecological relationships or processes (Table 4).

*Being outdoors is fantastic...there is more space to use, to be able to understand... to process what you have done in the classroom* (Margareta)

This teaching orientation is characterised by the conviction that the interaction between the in- and outdoor arenas helps the students with their learning processes, making them longer-lasting and more comprehensible. Group work is used to promote social interaction to motivate students in different tasks. In these activities students with learning difficulties have the opportunity to demonstrate practical skills that are significant for strengthening their self-esteem. By using a variety of ways of demonstrating and reinforcing learning, the students can relate to positive experiences when back in the classroom.

***Teaching orientation: To inquire - focus on understanding conceptual knowledge and applying procedural knowledge***

This orientation particularly emphasizes understanding or applying cognitive objectives, aiming at analyzing conceptual or procedural knowledge. An intention to gain knowledge in the meta-cognitive dimension is explicitly expressed (Table 5). This teaching orientation reflects a belief that the outdoor setting offers students potential to undertake the learning process differently, not merely with reference to textbooks and the teacher. Teachers assert that outdoor learning can add value to students' learning processes only if preparatory work has been properly done, together with accurate follow up. Moreover, students not only benefit from learning both in- and outdoors in order to become skilled and knowledgeable human beings, they also need interaction with others to develop learning processes. Thus, outdoor lessons are mostly carried out in groups with a focus on inquiry-based learning. During activities, the students are encouraged to take responsibility for both personal learning and transferring different skills and knowledge to each other in order to improve their group work. The teachers provide the students with hands-on experiences, for example, how things are related to larger physical systems in order to create a deeper understanding of nature. They also stress the importance of students' understanding of human impact on nature and our personal responsibility for that. All three teachers showing this orientation promote activities concerning conceptual knowledge, and the use of ideas from textbooks to solve problems outdoors. For example, Annie and Roger describe how they use blueberries to make indicators to discuss pH values and ask students to perform systematic observations using measuring instruments in order to gain procedural knowledge. This teaching orientation would lead to activities intended to create awareness amongst students of their responsibility for, and strategies for, learning (meta-cognition). Encouraging students to reflect upon and consider their own perspectives provides possibilities a higher level in the cognitive process dimension, moving from 'applying knowledge' to 'analysing knowledge' (Table 4 and 8).

*The kind of knowledge gain promoted in learning outdoors and the alignment between teachers' intended objectives and actual activity outcomes*

This section reveals six teachers' objectives from interviews and descriptions of selected sequences from observations of outdoor learning episodes, exemplifying the kinds of knowledge and cognitive processes the teachers aim for and promote in enacted activities. Capital letters are used to code for expressed objectives before the activity and lower-case letters for performed activities, as shown in the taxonomy framework. This is to illustrate the alignment between teacher's predefined intended objectives and the knowledge focused on during activity implementation.

***Teaching orientation: To inspire - focus on affective, physical and social dimensions***
In one activity the two teachers used a combined walk and quiz and the results are presented in table 6. By answering multiple-choice questions about appropriate clothes to wear, what food to bring along and which appropriate outdoor equipment to use, students were encouraged to draw conclusions about ways of being outdoors from a health perspective (A). Students were divided into pairs, instructed to follow a forest trail, and to discuss and agree on their answers. The questions gradually became more difficult and at the end, some students seemed to guess their answers. As students reached the meeting place where Alice was waiting, she encouraged them to play and to be physically active until all had completed the walk. When everyone was gathered the students took a break and had something to eat.
*To bring along something to eat and drink is important...you stimulate social relationships, also significant for being outdoors (Ina)*

A follow-up continued where Ina and the students discussed each question and the correct answers were shared. Focus was on students' understanding of factual knowledge (a). This case shows alignment and consistency between Ina's intentions (to understand factual knowledge) and the objectives promoted and achieved in the outdoor activities.

**Table 6. Bloom's revised taxonomy, the framework used for categorizing the teachers' intended objectives with actions outdoors in the cognitive domain (Anderson & Krathwohl, 2001), showing an alignment between Ina's expressed objective before activities (A), and the promoted outcomes during activities (a). Anna's predefined cognitive objectives to achieve actions B, C, D, E in alignment with the outcomes achieved in outdoor activities (b, c, d, e).**

| Ina & Anna | | The Cognitive Process Dimension | | | | | |
|---|---|---|---|---|---|---|---|
| The Knowledge dimension | | Remember | Understand | Apply | Analyse | Evaluate | Create |
| | Factual Knowledge | | A<br>a | | | | |
| | Conceptual Knowledge | | | | | | |
| | Procedural Knowledge | | | B,C,D,E<br>b,c,d,e | | | |
| | Meta-Cognitive Knowledge | | | | | | |

***Teaching orientation: To do is to learn - focus on applying procedural knowledge***
Sometimes Anna uses role play, aiming at providing students with opportunities to apply different techniques, in order to achieve procedural knowledge. This time students' tasks are to manage incidents in the forest like stabilizing a broken leg (B), moving an injured friend to a safe place (C), stopping excessive bleeding (D) and building a wind shield (E), by using objects found in nature (table 6).

Students were asked to bring scarves and ropes to use in outdoor activities but no further preparation had been done. Anna told a story combining various different challenging situations for the students to handle and solve, in predetermined groups. Each group selected a suitable site in the forest and began their role play. Meanwhile

Anna circulated, supported ideas and drew attention to techniques for handling a broken leg (b) and how to lift and carry ergonomically (c). She encouraged the students to use their scarves as a compression bandage (d) and pointed out the importance of holding the wounded body part high to reduce bleeding (table 6). To promote feelings of achievement, she praised successful solutions.

The aim of applying procedural knowledge was enthusiastically promoted in all exercises. Follow-up was done inside, where all groups presented their solutions and assessed learning from the outdoor activities. Anna was satisfied with the outcomes and emphasized the importance of the activities for strengthening students' self-confidence and creating a feeling of success. The description indicates that the intended objectives and actual outcomes, as a result of the outdoor activities, are in alignment.

***Teaching orientation: To reinforce - focus on understanding and applying conceptual knowledge***

Margareta's aim is to reinforce conceptual knowledge building upon theoretical work done in the classroom. In the outdoor activity, students were expected to perform a role play to show understanding of conceptual knowledge about biodegradation. In preparation for this task, whilst still inside, the students used written material supported by questions about photosynthesis, cell respiration and decomposition of various materials. They used text books to help them to write definitions for difficult words connected to each process and Margareta performed a demonstration in the classroom to show decomposition of different materials.

Outdoors, students were required to take part in an investigation applying what they had understood about biodegradation. They were asked to first discuss, agree and set up a hypothesis (A), then, based on their agreed hypothesis, to collect objects from nature to illustrate both rapid and slow biodegradation processes (B, C). They were then to explain their hypothesis (D) and devise a role-play using the collected objects to show rapid and slow biodegradation (E, F) (table 7). Students were divided into groups and, before the investigation began, Margareta asked them to explain biodegradation, and to give examples of objects in nature representing rapid and slow biodegradation. The students actually gave short, ambiguous answers, which revealed an inadequate understanding of the concepts and processes. Consequently, Margareta gave a brief summary about biodegradation (a) and made links to the work done in the classroom. She also posed questions to assess students' understanding. Despite incomplete responses, indicating a vague understanding, she pursued the tasks.

**Table 7. Predefined intended cognitive objectives (A-F) and actual outcomes enacted in outdoor activities (a-f), Margareta.**

| | | The Cognitive Process Dimension | | | | | |
|---|---|---|---|---|---|---|---|
| The Knowledge dimension | | Remem-ber | Under-stand | Apply | Analyse | Evaluate | Create |
| | Factual Knowledge | a,e,f | b,c,d | E, F | | | |
| | Conceptual Knowledge | | A, B, C, D a | | | | |
| | Procedural Knowledge | | | | | | |
| | Meta-Cognitive Knowledge | | | | | | |

The students worked with differing commitment and soon some of them lost interest in the work. Margareta encouraged them to discuss, reflect and perform a role play. Finally, all groups presented their work. Collected objects and descriptions of the processes of biodegradation were explained briefly in terms of factual knowledge but most students had difficulty in explaining the processes involved. In addition, none of the groups produced a hypothesis or a role play. The first group presented a leaf and a piece of glass as examples of rapid and slow biodegradation:
*Student: Grass ... fast biodegradation, it takes about ... six months... to … break down.*
*Margareta: ...What happened to the grass?*
*Student: It starts to wither*
*Margareta: What is it like in the spring then? Is it visible?*
*Student: No...*
*Margareta: But what has happened?*
*Student: It grows again*
*Margareta: No…It …decays and becomes ... soil*

The second group showed water for rapid and a plastic bag for slow degradation, while the third group chose grass leaves, then branches and trunks of trees, as examples of rapid and slow cycles. Margareta tried to maintain students' attention by asking questions of the reporting group but received fragmentary and often inaccurate responses during which both everyday language and scientific concepts were used, indicating perhaps unclear comprehension. Afterwards Margareta was unhappy with students' work and stressed that additional tasks were now needed to achieve the objectives.

The data from the observation show misalignment between predefined intended objectives and the actual outcomes achieved during activities resulting in a less complex cognitive process than the intended (table 7). Due to students' lack of secure prior understanding of photosynthesis, the water cycle and biodegradation, the tasks concerning explanations of conceptual knowledge and role play were too challenging. Inadequate instruction by the teacher also made it difficult for the students to understand what to do. Hence, the students focused on describing factual knowledge. Questions were posed by the teacher, but students remained silent, perhaps so as to

not reveal their own misconceptions or lack of knowledge. The word 'hypothesis' is used by the teacher, expecting students to make a prediction and show its relevance by using objects in nature. These tasks were neither performed by the students nor followed up by the teacher.

***Teaching orientation: To inquire - focus on understanding conceptual knowledge and applying procedural knowledge***

Annie often links theory to practice in everyday life and tries to find solutions to enhance students' learning processes. In one of the activities, Annie's aim was to improve students' self-confidence by providing opportunities to communicate in small groups to enhance factual and procedural knowledge. To overcome some students' lack of confidence with speaking when the whole class is listening, she located the activities outdoors. She asked the students to practice and perform a play, the fairytale Cinderella, first in Swedish and then in English. Each group chose a place in the forest, different roles were distributed and students started supporting each other with pronunciation and grammar. Annie supported them when needed but did not intervene unnecessarily. All students supported each other, acted and spoke English very well.

At Roger's school, a yearly event known as "Maths Masters" occurs, where older students work with younger ones on mathematical problems. The aim is to encourage students of different ages to solve various mathematical problems outdoors. The pedagogical idea is to apply mathematical concepts in concrete situations. The older students are expected to be group leaders and teachers for younger students and the challenge lies in choosing the right strategy for specific situations, to promote the development of meta-cognitive knowledge (A) (table 8). To prepare the older students, Roger provided opportunities to take on leadership roles with the aim of achieving procedural knowledge. In the forest, the students were divided into groups and in hands-on activities they practiced different techniques (B). Each student conducted an exercise while the others supported and gave feedback (a, b). Roger observed and gave hints when needed. Occasionally, Roger challenged the students with questions to encourage them to reflect upon their own views, in order to appraise solutions (C). During the follow-up, Roger was keen to evaluate how activities were implemented and whether the students felt confident to convey instructions to the younger students. Each student reflected upon their own work and got feedback from other group members (c). According to Roger, this type of exercise strengthens self-reliance, thus constructing a frame of reference to relate to in continued work in the classroom. This description shows that there was an alignment between the planned objectives and actual outcomes achieved during the outdoor activities. The same holds for Annie concerning alignment between intended objectives and enacted activities.

**Table 8. Roger's predefined intended cognitive objectives to achieve (A, B, C) in alignment with the actual outcomes achieved in outdoor activities (a, b, c), Roger.**

| | | The Cognitive Process Dimension | | | | | |
|---|---|---|---|---|---|---|---|
| The Knowledge dimension | | Remember | Understand | Apply | Analyse | Evaluate | Create |
| | Factual Knowledge | | | | | | |
| | Conceptual Knowledge | | | | | | |
| | Procedural Knowledge | | | B<br>b | C<br>c | | |
| | Meta-Cognitive Knowledge | | | A<br>a | | | |

**Discussion and Implications**

Teaching and learning outdoors within a school context is multifaceted. Teachers' reasons for using this alternative arena, often implicit, are diverse and linked to a belief about the outdoor environment reinforcing positive effects on learning, where experiences 'interact' with all senses (Wilhelmsson et al., 2012). Our results show that, to succeed in reaching intended objectives, awareness of one's own ability to choose appropriate tools and/or modes of work is essential. Otherwise, there is substantial risk of inconsistency between intended objectives and the actual outcomes of outdoor activities. In our study the teachers reflect surprisingly little on the effect of the work forms chosen.

Bloom's revised taxonomy (Anderson & Krathwohl, 2001) functioned as a valuable analytical tool for interpreting teachers' educational objectives and for examining the alignment between objectives and activity outcomes. In addition, we stress the usefulness of the typology as a way of highlighting commonalities and differences between teachers' intentions and objectives, to examine the significance of awareness about vital pedagogical tools, such as inquiry based science teaching (Braund & Reiss, 2006) and to stimulate collaborative learning (Nundy, 2001), in order to achieve intended objectives within different learning domains.

The study shows a range of expressed intentions for organizing outdoor teaching among our teaching orientations. The main ones are to achieve knowledge gain through experience-based learning, to explore real objects with multiple senses, to stimulate positive feelings towards nature and to promote collaboration. Thus, the outdoor arena was chosen as a result of its potential contribution to improving students' cognitive, affective, social and physical development both by the teachers in this study and in Wilhelmsson et al. (2012), and in a review of research on outdoor learning (Rickinson et al., 2004). Essential for gains in the affective domain are objectives about creating positive feelings for both nature, students' achievement and to improve self-confidence, in common with earlier research (Amos & Reiss, 2012; Eshach, 2007; Nundy, 2001). Further, group work promoting collaboration is common in development within the social and cognitive domain.

However, teachers focus on, and promotion of, diverse objectives are both due to teachers' varying degrees of awareness of the range of possible outcomes and their personal values concerning them. These form the basis for the choice of outdoor activities. Based on teachers' intentions, an objective is chosen and enacted by means of an activity that can use different ways of working or with diverse pedagogical tools. This includes recognizing personal teaching ability, pedagogical content knowledge, knowledge about students' prior understanding, educational methods, time for planning, accurate implementation and follow-up (Frøyland, 2010; Magntorn, 2007; Rickinson et al., 2004; Wilhelmsson et al., 2012). When the teachers' intended objectives are consistent with the ability to choose appropriate tools/modes of working, those objectives can be achieved through outdoor activities. In these cases, there is alignment between objectives and activity outcomes. On the other hand shortcomings in recognizing which tools/modes of working to use, may lead to misalignment.

For the teaching orientation, *to inspire*, the affective and social objectives are highly valued and considered as a prerequisite to achieve cognitive development (cf. Amos & Reiss, 2012). The teachers adopting this orientation are aware of the potential range of objectives, but choose those mentioned above as a result of students' prior knowledge and selected objectives in the curriculum. For example, developing knowledge of what promotes healthy living means 'understanding factual knowledge' is promoted in all exercises, evidently in alignment with intended objectives. The same holds true for the orientation, *to do*, where activities intended to 'gain procedural knowledge' in order to promote students' feelings of contentment connected with something they managed to create are stressed. For this teaching orientation, the visible learning outcome is a measure of a successful student. Thus, the application of practical tasks is strongly emphasized during all outdoor activities, in alignment with predefined intended objectives.

The other two teaching orientations primarily focus on cognitive objectives to reinforce knowledge, deepen understanding or apply knowledge, thereby encouraging students to reflect upon and consider different strategies for reaching a goal. This latter teaching orientation often challenges students with activities to create awareness among the students of their personal responsibility for learning and skills needed to improve group work, demonstrating alignment between objectives and activity outcomes. Here, learning is based on students' understanding of reflection, comparing and evaluating their own views with others and improving strategies to reach a higher level, moving from "apply knowledge" to "analyse knowledge". Encouraging students to take responsibility for their own learning and supporting others seems to be a successful way of handling outdoor activities, in accordance with Nundy's findings (1999). This teaching orientation also make more use of the interaction between outdoor and indoor settings (cf. Braund & Reiss, 2006; Eshach 2007).

In the case of teaching orientation, *to reinforce*, students are expected to show conceptual knowledge in practical and aesthetical exercises. In our study, as a result of insufficient instruction from the teacher and inadequate exercises both in- and outdoors, the students had difficulty in transferring ideas about the carbon cycle to what happens in nature, without doing further investigation. The teacher's limited experience in choosing an appropriate way of learning and setting exercises at an

unsuitable level for the students resulted in misalignment between the intended objectives and activity outcomes.

In this study we have used Bloom's revised taxonomy to examine the degree of alignment between intended objectives, awareness of personal teaching ability in the outdoor arena and activity outcomes. We find higher alignment among teachers who primarily promoted affective and social goals, or meta-cognitive and analytical understanding than the teachers who mainly promoted confirmation of conceptual knowledge. To reinforce understanding of different theoretical concepts or processes by using objects from nature seems to be significantly more difficult than previously thought (cf. Österlind & Halldén, 2007). The strong belief about the outdoor arena reinforcing positive impacts on learning intended objectives seems to override a well-considered choice of instruction and modes of work to achieve the intended knowledge. Thus, the potential for learning outdoors is not fully utilized, indicating a need to improve teachers' skills in using the necessary tools (Eshach, 2007). We suggest, as do others (for example, Bentsen, 2010), that this may be a common problem. It should also be noted that the teachers in our study reflect surprisingly little on the correlation between the modes of work and kinds of knowledge possible to achieve.

On this basis, one may wonder whether it is possible to perform outdoor activities which are potentially able to achieve objectives addressing every aspect of Bloom's revised taxonomy, and also if that is actually desirable? It would be interesting to investigate whether the pursuit of more complex cognitive processes or knowledge dimensions results in a loss of affective and social goals, which would not be desirable especially for our defined teaching orientations "to inspire" and "to do".
In this study, the typologies have been useful in illuminating different teaching orientations with diverse intentions and achieved results, which are likely to be found amongst teachers in general. Teachers need to reflect more upon how diverse pedagogical tools can be suited to attaining different goals in the outdoor arena. This might be something to stress more in teacher education and during in-service teacher education.

This study has highlighted the educational intentions and objectives of nine Swedish teachers' for outdoor learning. Nevertheless it is a contribution to greater insights generally into teachers' objectives and their awareness of the educational tools needed in order to achieve alignment between objectives and activity outcomes.

The framework of Bloom's revised taxonomy analyses primarily cognitive objectives and that may be a limitation in a practical context since some objectives are in other domains. This study shows the importance of discussion, in schools and in teacher education, centered on educational intentions, objectives, tools and the alignment between objectives and outdoor activities to achieve intended knowledge outcomes.

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