Teachers' intentions for outdoor education: conceptualizing learning in different domains.

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Umeå 2012

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ISBN: 978-91-7459-448-5
Cover picture: Olof Bergvall, olof.bergvall@slu.se
Printed by: Print & Media, Umeå universitet
Umeå, Sweden 2012

To Anders, Fredrik, and Viktoria

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ABSTRACT

In Sweden there is a growing interest among teachers to locate teaching outdoors. This is linked to beliefs about the potential for outdoor environments to reinforce learning, since the encounter with nature becomes more holistic. Outdoors, all the senses are involved in knowledge-building and activity experiences. According to previous research, outdoor learning can lead to reinforcement between learning domains and provide a bridge to higher order learning.

This thesis, comprising two papers, will focus on teachers' intentions and educational objectives with outdoor learning, and how these educational objectives are implemented in outdoor activities. The alignment between teachers' predefined objectives and the types of knowledge and cognitive processes reflected in the outdoor activities are also investigated.

Semi-structured interviews, including descriptions of successful activities and reflections on metaphors and observations, were used to collect data. The interview transcripts were analysed using Halldén's theory of intentional analysis to identify teachers' intentions when locating learning outdoors. Teachers' objectives in the cognitive domain were further analysed by Bloom's revised taxonomy.

The teachers have a range of reasons for outdoor learning, including pursuing theoretical knowledge through experience-based learning, exploring real objects using multiple senses, stimulating positive feelings towards nature, and promoting collaboration. The main intention of arranging outdoor learning is to create an alternative learning arena as an important complement to classroom learning, contributing values to students' learning process. The teachers use a diverse set of outdoor activities.

The findings included a typology of four teacher types: one values affective and social objectives and promotes activities to understand factual knowledge, another type stresses activities intended to gain procedural knowledge and emphasizes application of practical tasks. The other two teacher types primarily focus on cognitive objectives, partly to reinforce conceptual knowledge, and 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 alongside meta-cognitive and analytical understanding, than teachers who use outdoor activities mainly to reinforce conceptual knowledge. The thesis 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.

SAMMANFATTNING

I Sverige finns ett växande intresse bland lärare att förlägga undervisning utomhus. Detta är kopplat till föreställningar om utomhusmiljöns potential för att stärka lärandet, eftersom mötet med naturen blir mer holistisk. Utomhus är alla sinnen involverade i kunskapsuppbyggnad och erfarenheter genom aktivitet. Enligt tidigare forskning kan lärande utomhus leda till förstärkning mellan lärandedomäner och ge en överbryggning till mer komplext lärande.

Denna avhandling, bestående av två delstudier, fokuserar lärarnas avsikter och pedagogiska mål med lärande utomhus och hur dessa pedagogiska mål genomförs i utomhusaktiviteter. Vidare undersökts överensstämmelse mellan lärarnas fördefinierade mål och de typer av kunskap och kognitiva processer som avspeglas i utomhusaktiviteterna.

Semi strukturerade intervjuer, vilka inkluderade beskrivningar av framgångsrika aktiviteter och reflektioner kring metaforer samt observationer har användes för att samla in data. Intervju transkripter har analyserats med hjälp av Halldéns teori om intentionell analys för att identifiera lärarnas intentioner med att förlägga lärande utomhus. Lärarnas mål i den kognitiva domänen har analyserats vidare med Blooms reviderade taxonomi.

Lärarna har en rad anledningar till lärande utomhus, vilka inkluderar att utöva teoretiska kunskaper genom upplevelsebaserat lärande, att utforska verkliga objekt med hjälp av flera sinnen, att stimulera positiva känslor för naturen, och främja samarbete. Det huvudsakliga syftet med att arrangera utomhuslärande är att skapa en alternativ lärandearena som ett viktigt komplement till klassrumsundervisningen, vilket bidrar till värden i elevernas inlärningsprocess. Lärarna använder en mängd olika utomhusaktiviteter.

Resultaten innehåller också en typologi av fyra lärartyper: en som värden affektiva och sociala mål och främjar aktiviteter för att förstå faktakunskap, en annan typ betonar aktiviteter som syftar till att få formella kunskaper och understryker tillämpning av praktiska uppgifter. De andra två lärartyperna fokuserar främst kognitiva mål,

dels för att stärka konceptuella kunskaper, dels för att fördjupa förståelsen eller förbättra strategier för att förbättra meta-kognitiv kunskap. Graden av överensstämmelse mellan avsiktliga mål och utförda mål genom aktivitet är högre bland de lärare som främjar affektiva och sociala mål liksom meta-kognitiv och analytisk förståelse, än de lärare som använder utomhusaktiviteter främst för att förstärka konceptuella kunskaper. Avhandlingen visar att det finns en rad möjliga lärandemål i utomhusundervisning samt att lärarna styrs av vad de värderar och hur de uppfattar lärande.

LIST OF PAPERS

Paper I

Wilhelmsson, B., Ottander, C., & Lidestav, G. (2012). Teachers' intentions with outdoor teaching in school forests: Skills and knowledge teachers want students to develop. *NorDiNa Nordic Studies in Science Education,* 1, 26-42

Paper II

Wilhelmsson, B., Ottander, C., & Lidestav, G. (submitted 2012). Teachers' intentions for outdoor learning: To characterize teachers' objectives and actions. *International Journal in Science Education, part B*

1 INTRODUKTION

1.1 Introduction

Teaching is intentional because we always teach for some purpose, primarily to facilitate student learning (Anderson and Krathwohl, 2001). What reasons do teachers have to perform teaching in the way they do? What motives lie behind their planning and implementation? Teachers' teaching is characterized by beliefs about learning, teaching, and how different factors interact (Lager-Nyqvist, 2003). Pedagogical content and goals are influenced by individual skills and abilities, such as content knowledge, pedagogical techniques and ideals (ibid.). However, teaching is also influenced by external factors, for example local and national steering documents, student groups, possibilities to use the outdoor environment, teaching materials, etc. Understanding the underlying reasons for teachers' choice of content and ways of teaching is no simple task. Many questions arise, one of which is why teachers choose to locate learning to other educational environments than the classroom. My personal interest in this field is teachers' reasons for choosing the outdoor arena for learning and the goals of these actions.

In Sweden there is a growing interest among teachers to locate teaching outdoors (Dahlgren & Szczepanski, 2004; Szczepanski, 2008). This is linked to a belief about the outdoor environment reinforcing effects on learning, where knowledge and experience interact with all senses (Jordet, 2007). These ideas are in good agreement with the current curricula, which provide the opportunity but at the same time do not require that teaching take place outdoors. The objectives of the science curricula include stimulating interest and curiosity and creating an urge among the students to explore and understand nature (The National Agency for Education, 2011).

Examples of this growing interest are the term "school forest" which gives over 270,000 hits and the Swedish word for "outdoor activities" which gives over 260,000 hits with the

Google internet search engine. A Swedish organization working to promote outdoor learning is “Forest in School”, which offers assistance to teachers who wish to integrate the outdoor environment in their teaching and learn more about the forest, (www.skogeniskolan.se, Skogen i Skolan). The core pedagogical idea of Forest in School is to encourage teachers to use an appropriate outdoor location, preferably a forest near the school, as a complement to indoor teaching. The school can also arrange with the forest owner to use this area as their own experimental field. The school can thus establish a long-term relationship with a well-known place, known as the school forest, where the students can meet nature without being held back by, for example, fear of getting lost (Rickinson, et al., 2004)

In my former work as chairman of the Forest in School organization, I met many teachers who emphasized the significance of locating teaching outdoors. The outdoor arena seems to be of importance and in discussions of the pros and cons of learning in the school forest, the teachers often mentioned opportunities to use students' theoretical knowledge in practical activities to improve their understanding of nature. They also highlighted the value of hands-on activities, especially for students with learning difficulties in order to demonstrate skills through practical work.

However, there were also teachers who questioned the effects of outdoor learning or those who stressed difficulties, such as colleagues not being very keen on collaborating on outdoor activities or lack of teaching materials. As a former teacher of physical education with extensive experience of locating teaching outdoors, I have never met colleagues or parents who question the choice of arena for learning. In this subject, it is conventional to use both the indoor and outdoor arenas. The talks with the teachers thus inspired me to further investigate teachers’ motives for choosing the outdoor arena despite the difficulties they expressed. During my time as chairman of the Forest in School organization, I have seen a great many different activities performed and heard many teachers'

discussions of the pros and cons of learning outdoors, indicating that the outdoor education field is extensive and the reasons for using the outdoor environment are very varied.

From an educational point of view, there is thus a need to learn more about the pedagogical outcomes from outdoor activities and to improve understanding of the learning aspects in the outdoor environment (Jordet, 2007; Rickinson et al., 2004; Szczepanski, 2008).

1.2 Aim and research questions

This thesis examines teachers' intentions and objectives for outdoor learning. By analysing the educational objectives, we are able to understand which knowledge perspectives and cognitive processes the teaching is aiming at. Additionally, to study the activities and the teachers' dialogue with the students during activity implementation is to establish insights into how intended objectives are promoted and realized by teachers. Based on this knowledge, the alignment between teachers' intended objectives and the knowledge focus in activities performed outdoors will be explored. The research questions are:

- What are teachers' intentions and objectives with learning outdoors?
- How is the outdoor arena used?
- What type of knowledge and cognitive processes do they want their students to develop by locating learning outdoors?
- How do teachers make use of the outdoor arena to align intended objectives and activities?

2 BACKGROUND

This chapter begins with research regarding outdoor learning followed by outcomes of outdoor teaching within a school context. The teacher role and different perspectives on learning will also be presented.

2.1 Outdoor learning

Outdoor learning can be understood both as a concept and a practice which is varied and complex with an extensive field of educational activities in several different settings (Rickinson et al., 2004). When Rickinson and his colleagues were asked to critically examine research on outdoor learning published internationally in English between 1993 and 2003, they identified an enormous field of outdoor activities. For the purpose of the review, outdoor learning was defined as learning that achieves or is a result from activities undertaken in outdoor locations beyond the classroom (ibid.). To further limit the vast area of outdoor activities the review was determined to encompass three kinds of activities; fieldwork and visits to field study centres, parks, farms and gardens; outdoor adventure education; projects in school grounds (ibid.). The activities presented in this study are most comparable to the first and the third kinds of actions. Moreover, to make sense of possible learning outcomes the authors used a four-fold breakdown and made distinctions between learning domains, such as cognitive, affective, interpersonal/social, and physical/behavioural (ibid.). This thesis explores possible outcomes that may be achieved by outdoor learning within the different learning domains.

The long tradition of personal encounters with nature (Sandell & Öhman, 2010), and greater possibilities in the curriculum are likely reasons why Scandinavian teachers are able to arrange teaching outdoors (Rea & Waite, 2009). From this tradition of outdoor learning within the school context, the Scandinavian countries are in this sense often mentioned as pedagogical models in a European perspective (Muños, 2009;

Rea & Waite, 2009). Teachers have a range of reasons for using the outdoor arena for learning, including the pursuit of theoretical knowledge through experience-based learning, stimulating feelings for nature, exploring real objects with multiple senses, and promoting collaboration (Braund & Reiss, 2006; Jordet, 2007). Several of the reasons mentioned are similar to the advantages linked to non-formal or informal learning, e.g. nurture curiosity, engage in socially interactive settings for learning through experience, and provide memorable and rich experiences (Eshach, 2007). Outdoor learning within a school context is somewhat comparable to non-formal learning and is described as guided or teacher-led and structured but more flexible than formal learning (ibid.). Flexible learning afforded by the outdoor environment seems to suggest significant possibilities to many teachers. However, there is a need for further research from different perspectives and initiatives that improve as well as provide evidence of effective practice (Rickinson et al., 2004).

2.2 Outcomes of outdoor teaching

The educational values ascribed to outdoor learning by its proponents are based upon a wide range of personal, social and curriculum-related benefits. For the opponents, these outdoor activities have been regarded as ineffective and more like funny and relaxing moments in contrast to the "real" learning in the classroom (Nundy, 2001). The debate has been in progress for many years and has resulted in an increasing amount of research about outdoor learning. Studies show that the outdoor environment may enhance learning since the encounter with nature becomes holistic, where knowledge and experience interact with all senses (Jordet, 2007; O´Brian & Murray, 2007). In the 1980s and 1990s, the role of outdoor education was to encourage outdoor experience and to stimulate caring about nature and behavioural change (Sandell & Öhman, 2010) But in order to change attitudes and behaviour in for example environmental issues, long-term and frequent encounters

together with authentic experiences and social interaction are essential (Bogner, 1998). In recent years, a more pluralistic approach to environmental and sustainable education has developed, suggesting further educational potentials for encounters with nature (Sandell & Öhman, 2010).

Positive impact from outdoor learning has been shown in students' collaborative skills and interpersonal relationships (Amos & Reiss, 2012), as well as in improved teacher-student relations (Lai, 1999). Effective and well-intended fieldwork can also lead to individual growth and improvements in social skills (Rickinson, 2004). More importantly,

> *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).*

This quote is interesting and has been significant for this study, in order to examine how reinforcement takes place and how bridges may be built between different domains.

Teachers' teaching and promotion of first hand experiences in the outdoor environment are of significant importance within areas such as ecology. Yet teaching within this subject tends to be too theoretical because of too great a focus on processes and formulas, which may result in an obvious risk of losing contact with true nature as it really is (Magntorn, 2007). In a Norwegian study of schools that locate teaching outdoors on a regular basis, Jordet (2007) reports that the interaction between theoretical knowledge and realistic, hands-on experiences is crucial for successful teaching and makes a distinction between success and failure for many students. The opinion of the teachers in this study is that the physical and practical learning activities contribute to improve students' cognitive, affective, social, and physical development and open new opportunities to learn. However, more research is essential to demonstrate in what sense teaching outdoors affects cognitive, physical, and practical areas (Jordet, 2007).

Teachers' engagement and competence are, not surprisingly essential for outdoor teaching, which is also shown in a Danish study by Mygind (2009). Here, 20% of the regular teaching was located to a forest involving subject-related tasks prepared indoors, carried out in experience-based situations outdoors with a follow-up in the classroom. Positive impact was shown in the students' social relations, experience of learning and self-perceived physical activity level (ibid.). The substantially experienced teachers and their ownership of the project had great influence on the positive outcome (ibid.).

However, the actions do not have to form a major part of the teaching, but in order to be effective, they have to be carefully and purposefully organized (Frøyland, 2010; Magntorn, 2007; Rickinson et al., 2004). Poorly organized outdoor activities can lead to reduced learning (Openshaw &Whittle, 1993). Studies show that the objectives of outdoor learning are not always translated into practice, indicating gaps between intention and reality in this type of teaching (Bentsen, 2010). This may lead to the full potential of the outdoor arena not being fully utilized (Eshach, 2007). Similarly, Jordet (2007, p. 16) stresses that *'progressive ideas seem more like intentions than realities in today's schools'* (my translation from the Norwegian). Hence, teachers' educational objectives and the knowledge teachers want their students to develop by undertaking activities outdoors merits closer examination.

2.3 Teacher role

Teachers are expected to create environments for learning and construct the framework for the activity, in other words, not merely be implementers of activities (Carlgren & Marton, 2007). Creating learning environments thus involves developing learning contexts that give meaning, designing content as well as modes of work to facilitate students' learning processes (ibid.). There are also demands on teachers, from school leaders, parents, and students, to argue and communicate ways of thinking about the content of teaching,

and goals to achieve through implementation of different actions (ibid). Teachers' teaching is based on perceptions of students' learning processes and what conditions exist to implement the intended activities. Differing learning perspectives involve different structuring of planning the content, learning materials, and activities. Not least important, are the teachers' perception and awareness of their own role as teacher in students' learning (Lager-Nyqvist, 2003). Teachers' conceptualizations of learning are significant in order to understand why teachers perform their teaching in the way they do. In this study, perspectives on learning are explored through the interviews by using general and specific questions, descriptions of successful outdoor activities, and reflections about metaphors, described in the methods section.

2.4 Perspectives on learning

One of the perspectives on learning which has had significant impact both in rationale and practice within teaching, and especially in science teaching, is the constructivist perspective, based on the theories of Piaget (Mortimer & Scott, 2003). Within this view, learning is a process where the learner constructs meaning based on previous experiences and knowledge (Andersson, 2008). It is the individual who construes learning and the teacher is assigned the role as a facilitator and supporter. This means that the teacher must have knowledge of a student's understanding and the student's starting point to support the student in attaining the goals. However, the student must actively process the new content in order to enhance understanding (ibid.).

Piaget's theories of learning based on individual perspective were further developed by Vygotsky with emphasis on learning in social contexts. Within this socio-cultural perspective, learning is constructed in interaction with other individuals (ibid.). The teacher's role here is significant as the bearer of knowledge and experience in order to make the content understandable and interesting to students. In addition, the

teacher has an active role in making, for example, scientific ideas in teaching available, internalizing these ideas and finally handing over responsibility to the students to use them. Discussions and argumentation in peer groups are also important in promoting understanding. However, in order to improve learning, the student must actively reflect on what is being communicated (ibid.).

Another way of discussing perspectives on learning is used by Sfard (1998), who illustrates two metaphors to describe the difference between cognitive/individual and socio-cultural perspectives of learning, which she calls acquisition metaphor and participation metaphor. In the first metaphor, learning is considered to be an acquisition or something you have, which makes us think about the human mind as a container to be filled with certain materials. The learner is by the process owner of the materials, also considered to be an object. The teacher may help the student reach the goal and own the materials by facilitating, delivering, conveying, informing, etc. Here, the learning can be regarded as completed when the learner has access to knowledge. The other metaphor for learning is about participation. Within this perspective, the learning is conceived of as a never-ending process in order to participate in certain kinds of activities rather than accumulate individual materials. Learning means becoming a member of a certain community with the ability to communicate and act according to the particular norms. The teacher is assigned the role of expert or preserver of the discourse. Sfard (1998) discusses advantages and disadvantages of the two perspectives and emphasizes that they are "eye-opening devices" for each other (p. 9, 1998). As we live in a reality constructed from a variety of metaphors but none of them seems to cover the entire field, the author proposes using a metaphorical plurality of metaphors when describing learning.

Leach and Scott (2008) discuss the difference between the two metaphors of learning described by Sfard (1998) and between individual and social perspectives on learning. The dimension that varies between the individual and social process

is seen by the authors as a continuum, which is a difference in comparison to the acquisition metaphor and participation metaphors. Here, learning is considered as a continuum, more or less individually or socially. Within this perspective, the teacher's role is to introduce and sensitize students to the ideas that form the basis for the scientific language and thinking and not just engage students in science activities. Based on the teacher's knowledge of students' everyday ways of understanding, a common understanding of scientific explanations can be developed through conversation and discussions (cf. Mortimer & Scott, 2003).

These perspectives on learning form the basis of the metaphors used in the interviews in this study, presented in detail in the methods section. According to Leavy, McSorley, and Boté (2007), metaphors may be a significant key to helping teachers understand their role as teacher and relating this understanding to their own practice. Metaphors of learning may also influence and facilitate teachers' understanding of what it means to learn (Martinez, Sauleda & Huber, 2001). Here, one may wonder what different perspectives exist among teachers who choose to locate teaching outdoors and how they reflect on their own practice, because no research exists that presents how "outdoor teachers" reflect upon learning.

3 THEORETICAL FRAMEWORKS

The intentional analysis with reference to the theories of von Wright (1971, 1979) and Bloom's revised taxonomy (Anderson & Krathwohl, 2001) are the two important theoretical frameworks used in this thesis.

3.1 Intentional actions

Describing the thoughts behind teachers' choice of content, ways of teaching, planning, and implementing different learning activities is not an easy task. Individual perspectives on teaching and understanding of learning characterize teachers' teaching and a number of factors interact, for example, when the activities are planned and implemented. The content and objectives are determined by various skills such as subject knowledge, ideas about learning or what the teachers want students to improve or develop. External reasons such as demands in relation to the national curriculum, expectations from parents or students, and access to the outdoor environment also affect teachers' planning and performance. One way to analyse these various underlying factors, which lead to different actions, is given by George von Wright, who from a philosophical perspective analyses human actions in social contexts. To understand a series of behaviour events in terms of actions, he says:

> *Behaviour gets its intentional character from being seen by the agent himself or by an outside observer in a wider perspective, from being set in a context of aims and cognitions. This is what happens when we construe a practical inference to match, as premises match a given conclusion (von Wright, 1971, p.115)*

Consequently, to understand behaviour as meaningful actions, we need to look at it in context. Practical inferences are construed in various ways by von Wright (1971) using a practical

syllogism, shown by the following illustration, modified from Halldén, Haglund & Strömdahl (2007):

P1 *A* person *P* intends to bring about *x (*where *x* is a verb or a verb-phase) in situation *s*

P2 *P* believes that he or she can bring about *x* in situation *s,* by doing *y (*where *y is* a verb or a verb-phase*)*

C Thus *P* does *y*

The first premise contains an aim ascribed to P and in the second premise there are beliefs of how to act to achieve the goal x. The conclusion that follows is that P performs the action. An act is thus more than just a behaviour that implies that the one who is acting wants to achieve something with their behaviour (Halldén, Haglund & Strömdahl, 2007).

An action has an inner and outer aspect according to von Wright (1971, 1979). These two aspects characterize and give meaning to the action. The outer aspect is the visible result of an action i.e., the behaviour that is observed by a viewer. The inner non-observable is the intention of the action. To understand the behaviour as meaningful, the viewer may presume that the inner aspect exists. The viewer makes an interpretation of what the behaviour means, i.e. ascribes intention to the action. An act is never random and actions without intentionality may be regarded as reflex actions or responses to a stimulus (von Wright, 1979). This means that two individuals can show the same behaviour but the intentionality of the action may be different and should therefore be considered diverse actions.

With reference to von Wright (1971), intentional, logical acting can be understood as actions to achieve a goal, an aiming, as results of intentions and an individual's beliefs about conditions in the situation.

> *Intentions are formed. The factors which form intentions can be called determinants of intentions. They are, at second hand, also determinants (reasons, causes) of our actions (von Wright, 1979, p.111)*

Here, we can make a distinction between internal and external determinants (von Wright, 1971, 1979). The former refers to an individual's wants or abilities, which enable or limit a possible action to perform. The latter is linked to duties, norms or opportunities in all potential actions in the defined situation.

3.1.1 Intentional analysis

With reference to the theories of von Wright (1971, 1979), Ola Halldén developed a model that came to be termed intentional analysis (Halldén & Wistedt, 1998; Halldén, 1999, 2001). This analysis has been further developed by Halldén himself and by other researchers (Lager-Nyqvist, 2003; Persson, 2011). It is based on the practical syllogism mentioned above and is useful in processing data from interviews and observations concerning actions (Halldén et al., 2007).

What someone does is determined by the individual's beliefs or abilities to achieve a certain goal as well as interpretations or beliefs of potential actions appropriate to perform in the specific situation (Halldén et al., 2007). These beliefs can be regarded as determinates for action and we can make distinctions between internal or competence-oriented determinants and external or discourse-oriented determinates (Figure 1). The former enable or limit what the individual considers a possible action to perform, irrespective of situation. Here, wants, desires, and abilities, together with beliefs constitute the competence-oriented determinants. The discourse-oriented determinants are constituted by conceptions of duties, norms and opportunities and determine the individual's interpretation of all the potential actions probable to perform in the defined situation (Halldén et al., 2007).

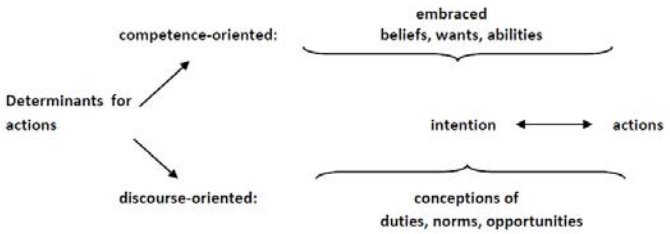

Figure 1. Determinants of actions (modified from Halldén, Haglund & Strömdahl, 2007)

In order to ascribe an intention to an act, the situation must be considered (Halldén et al., 2007). In this thesis, the actions are performed in teaching outdoors, looked upon as a frame or a discourse, which in turn is part of an overall school context. Within this school context, teachers' competence-oriented determinants refer wants, objectives and abilities to perform intended teaching outdoors. This includes the teachers' aim for activities and understanding of learning, wishes concerning students learning process and perception of their own ability to perform intended teaching outdoors. Teachers' discourse-oriented determinants relate to the their understanding of the performance of teaching in relation to the interpretation of steering documents, norms and expectations but also to the opportunities or limitations to perform the actual teaching outdoors in relation to wants and objectives. The competence-oriented and discourse-oriented determinants interact in each action and modify teachers' ways to act. 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. The choice the teacher makes includes recognizing his or her 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).

For example, based on a belief of gaining knowledge through experienced-based learning outdoors, a teacher intends to locate part of the teaching outdoors. He/she feels confident

about the content knowledge and in his/her own ability to teach outdoors. The norm is indoor teaching but the school leader and colleagues support the ideas of learning outdoors. The chosen modes of work are also encouraged by the local steering documents. The competence-oriented and discourse-oriented determinants thus affect the teacher positively, resulting in the teacher's decision to locate teaching outdoors.

The example shows that the competence-oriented determinants also include the knowledge base needed in order to teach. In a teaching context, the pedagogical knowledge is considered to be the "how" of teaching, acquired through experiences in different teaching situations while the content knowledge is referred to as the "what" of teaching. This knowledge base encompasses both subject knowledge and the ability to use and translate the knowledge into the teaching situation (Nilsson, 2008). These competence-oriented determinants include and have similarities with the concept of pedagogical content knowledge (PCK). The notion of PCK was initiated by Shulman (1986) as a form of practical knowledge, which goes beyond knowledge of subject matter and is used by teachers to guide their actions in the actual teaching situation. PCK can be thought of as a blending of content and pedagogy into an understanding of how activities are organized, adapted and represented (Shulman, 1986) as with teachers' wants, objectives and abilities in the intentional analysis. The core of PCK is the manner in which activities are transformed for teaching. No comprehensive analysis of how PCK and the competence-oriented determinants overlap was made in this study. The notion of competence-oriented determinants is wider then PCK and thus includes both teachers' subject matter knowledge and pedagogical knowledge.

3.2 Knowledge aspects

To describe aspects of knowledge, a tool for categorization of content knowledge and cognitive complexity is needed. In addition, what content knowledge and in what way the teachers

want their students to process this knowledge is also of interest. In this thesis, Bloom's revised taxonomy was chosen because this framework is considered valuable as it works in all academic subjects and enables general objectives to be categorized (Näsström, 2008). Bloom's taxonomy, a framework for categorizing educational objectives (Bloom et al., 1956) was published in 1956 and since then has had a significant influence on test design and curriculum development all over the world (Anderson & Krathwohl, 2001). A revision of the original version made in order to reach new intended audiences such as teachers at all levels of the education system and to include new ideas and knowledge about education that had been developed after 1956. This new framework is called Bloom's revised taxonomy (Anderson & Krathwohl, 2001). In the revised version, teaching is emphasized as an intentional and reasoned act, where teachers' objectives are can be explicit or implicit (ibid.).

Table 1. Bloom's revised taxonomy, a framework for categorizing educational objectives within the cognitive domain (Anderson & Krathwohl, 2001).

The Knowledge Dimension	The Cognitive Process Dimension					
	Remember	Understand	Apply	Analyse	Evaluate	Create
Factual Knowledge						
Conceptual Knowledge						
Procedural Knowledge						
Meta-Cognitive Knowledge						

The revised version of Bloom's taxonomy (Anderson & Krathwohl, 2001) consists of a knowledge dimension and a cognitive process dimension, each representing a coherent continuum from elementary, basic elements to more abstract

and complex categories of knowledge or cognitive processes (Table 1). By analysing where the objectives are within the framework. we are able to understand what skills and knowledge the teachers intend to develop. The knowledge dimension in the taxonomy proceeds from detailed, factual knowledge to more complicated conceptual knowledge about categories, principles, theories and structures. Further dimensions are procedural knowledge about how to do something and finally meta-cognitive knowledge, which is more abstract, and strategic knowledge. In the cognitive process dimension, *remember* is considered to be the lowest level of an underlying cognitive complexity followed by *understand*, *apply*, *analyse*, *evaluate*, and finally create, which is the most complex level.

4 METHODS

In this chapter, the methods used to obtain information about teachers' intentions and objectives with outdoor teaching are illustrated. The data collection is based on interviews with nine teachers involved in outdoor education in selected schools. The observational studies are conducted with six of the nine teachers. The participants involved in this study are briefly presented, followed by a description of the methods used to gather and process the empirical data. The analytical process of using first the intentional analysis (Halldén & Wistedt, 1998; Halldén, 1999, 2001) and second, Bloom's revised taxonomy (Anderson & Krathwohl, 2001) was motivated by an interest in obtaining further information about teachers' objectives within the cognitive domain. The revised taxonomy was used as an analytical tool to interpret teachers' educational objectives in the cognitive domain and to examine the alignment between objectives and activities.

4.1 The Participants

To be able to answer my research questions in the first study, teachers with experience of outdoor education were identified by means of a selection process. A prerequisite to be selected to take part in the study was that the teachers' school regularly located part of the teaching outdoors and had access to a place nearby that was suitable for outdoor teaching. A database from Forest in school (www.skogeniskolan.se, Skogen i Skolan), where school forests are registered, was used as a framework for selecting schools. Eight schools in different parts of Sweden were identified from this database and contacted to volunteer to take part in the study. Positive replies were received from four teachers of grades 4-6 with substantial experience of outdoor activities (Paper I). These four all had a degree from a teacher education programme and came from different schools. All the schools were situated in small cities and had about 200 students each (in grades 1-6). All four teachers, Maria, Sverker,

Johan and Roger, were interviewed; this is further described in section 4.2.

The plan was to continue with the four teachers in a second study and to further investigate how and in what way their intentions and objectives were achieved and realized through outdoor activities. All were eager to continue but due to circumstances concerning reorganization and retirement three of the teachers were prevented from participating further. Another selection was therefore needed to identify teachers interested in taking part in the next study. Using the same method as before, five teachers were identified and selected (Table 2). These teachers, Alice, Ina, Anna, Annie and Margareta, come from the same school, also situated in a small city with about 200 pupils.

Table 2. The participants with fictitious names, educational backgrounds, teaching grades, experience and the number of observed activities for each teacher.

Teacher	Educational background	Grade	Ages of students	School	Years of teaching experience	Number of observed activities
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 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 but one (Ina) come from a teacher education programme background. The reason for including Ina, with a degree from a

leisure-time centre education programme, in the study was her many years of experience of teaching outdoors and her responsibility for implementing outdoor activities in grade 3. The interviews with these five teachers followed the same procedure as the other four and are presented in section 4.2. Observational studies were conducted with Roger from the first study and the teachers Alice, Ina, Anna, Annie and Margareta (Paper II).

4.2 Interviews

Semi structured interviews were chosen because of their flexibility as tools for data collection, giving the interviewer opportunities to create scope for spontaneity and possibilities to return to areas of questions to confirm earlier responses (Cohen, Mansion & Morrison, 2010). All interviews were audio recorded. In the interviews, the participants were able to express and talk about their views on teaching and learning in general and to describe experienced successful outdoor activities. The interviews varied from 60 to 90 minutes and took place at the respective school or nearby at an appropriate location chosen by the teacher. The interview guide can be found in Appendix A.

At the end of each interview, the teacher was presented with six metaphors that consisted of short descriptions, three about teaching and three about learning, each one with a different underlying approach modified after Leavy et al. (2007) and Martinez et al. (2001) and presented in Appendix B. The approaches were; a behaviourist/empiricist point of view; a constructivist point of view; a situative/socio-cultural point of view, that were shown to the teachers in mixed order and without the labels of the approach. First, the teachers were asked to reflect upon the metaphors about teaching and then the ones about learning. The teacher was asked to explain how the metaphors agreed or disagreed with his/her approach to teaching and learning in general and outdoors specifically. If the metaphors failed to correspond to the teachers' view, he/she

was asked to suggest an own metaphor to reflect on. The metaphors were used as a tool to let the teachers openly reflect upon their view of knowledge, learning, and in particular teaching outdoors, but also to catch unexpected threads and to confirm earlier replies. The statement below shows a teacher's reflections on the metaphors about learning. The perspective of learning is illustrated, with an emphasis on making the activities inspiring and interesting in order to achieve knowledge.

> *It must be the brick house. If I own my knowledge and understand that I must own it, then learning can develop. My responsibility is to clarify the goal and make it interesting and inspiring for students to reach* (Ina).

The interview setting with general and specific questions, stories about successful activities, and teachers' reflection on metaphors were three different approaches to collect data about the same aspect. With Maria, Sverker, Johan and Roger, complementary interviews were conducted by phone to obtain more comprehensive empirical material but also to validate previous responses.

4.3 Observations

Observations are valuable tools to attain authentic data and were chosen in order to watch and follow directly what was happening during the outdoor sessions. Capturing real data was of importance in order to examine the outdoor activities described by the teachers in the interviews. Observational studies were conducted with six of the nine teachers (Paper II). Before each outdoor session, the teacher described how the plan for the activities had been structured along with the intended objectives. This took place at the school in question but without students present. Non-participant observations in combination with field notes took place in the outdoor environment near the respective school. All observations were audio recorded, with a microphone attached to the teacher's collar, in order to gain

information about the dialogue with the students. The audio recorder helped capture the conversations between teacher and students which were often not possible to follow at a distance. Field notes were made throughout the observations. The total number of observed activities was 26 (12 with Roger, 7 with Ina, Alice and Anna, and 7 with Margareta and Annie). A selection of examples to illustrate typical results is presented in the results section.

4.4 Methodological considerations

The plan was to use the knowledge that emerged during the interviews with the four teachers about teachers' intentions and objectives (Paper I) and examine how their intentions and objectives were realised through outdoor activities. Due to reorganization and retirement, a second selection process was needed to identify more teachers keen to take part in the observation study. The strength of enlarging the number of teachers was the opportunity to explore whether there were any other intentions and objectives with teaching outdoors.

The weakness of this second selection process lay in how the observations happened to be conducted. The interviews revealed that Alice, Ina and Anna conducted their activities at the same location and at the same time, as did Annie and Margareta. This made the way of observing the teachers more complicated. One of the teachers (Roger) was observed alone, while in the other cases, two or three teachers were observed at the same time. When two or three teachers were out at the same place, one of the teachers was carefully observed at intervals of ten minutes from a short distance. The other teacher was observed every 4 minutes in order to note, for example, what she was doing, how she was acting, and to whom she was speaking. Observations are valuable tools to capture real events and make reality checks of the teachers' activities but they are time-consuming (Cohen et al., 2010). The different ways of conducting the observations of the teachers, described above, were completely due to the limited possibilities to gain access to

observe teaching outdoors. Here, the audio recorder proved to be a significant tool and almost all communication between teacher and student could be followed. For example, in the written field notes, a situation was observed such as; a teacher corrects a student, but when listening to the tape, one can hear the teacher explaining the task very intensely and thoroughly.

4.5 The intentional analysis

The interview transcripts were first analysed according to the theory of intentional analysis, (Halldén & Wistedt, 1998; Halldén, 1999, 2001; von Wright, 1971, 1979) using a modified version of Lager-Nyqvist's model (2003) to identify explicit and implicit intentions to locate learning outdoors (Figure 2). In our model, the internal determinants refer to wants and objectives, respective abilities, which enable or limit what teachers consider a possible action to perform.

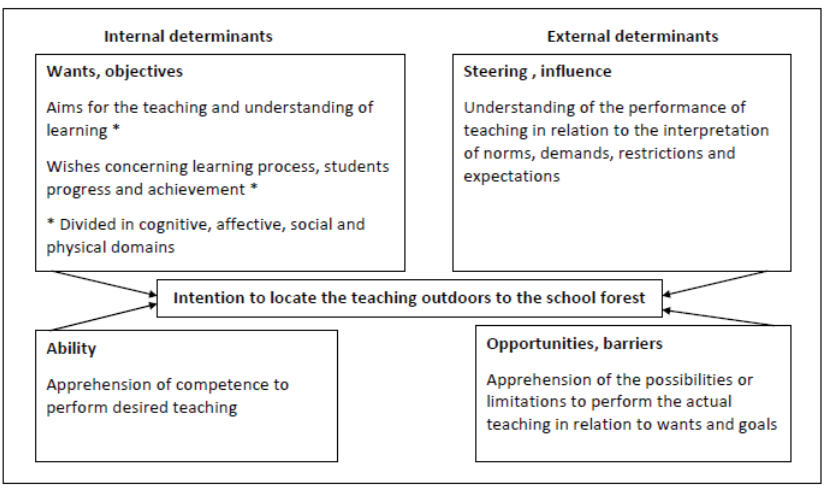

Figure 2. The model for intentional analysis used to identify teachers' intentions to locate teaching outdoors (modified from Lager-Nyqvist, 2003).

The external determinants are linked to steering and influence respective opportunities and barriers that determine the teacher's interpretation of all the potential actions in the

defined situation (Halldén & Wistedt, 1998; Halldén, 1999, 2001; Lager-Nyqvist, 2003; von Wright 1971, 1979).

An individual's intentions can be more or less explicitly pronounced and implicit intentions might be interpreted by the researcher from what is stated by the individual (Halldén, 2001). Every transcript from the teachers' interviews was read through several times and all statements of intention were noted. Interpretations of the teachers' implicit and explicit responses to all questions in the interview were used to understand their intentions with outdoor teaching. After several readings of the transcripts, four different domains – cognitive, affective, social and physical – were identified within internal determinant, wants and objectives (Paper I). The distinction is similar to the categories devised by Rickinson et al. (2004). The analysis of the cognitive domain is described in the next section.

First, different subcategories of the teachers' wants/objectives in the affective domain appeared, for example create curiosity and interest to discover nature; improve feelings of success within each student; stimulate interest in and caring about nature; transfer sense of achievement to theoretical subjects. Second, in the social domain, the teachers on the one hand express individual wants/objectives, for example the group as a "sounding board" to reflect their own views of the individual or peers as motivators for unmotivated students. On the other hand, there were wants/objectives for groups, for example promote well-being through cooperation or use each other's skills and knowledge in tasks to improve group work and encourage each other to enhance their learning. Third, the issues related to health were placed in the physical domain.

By analysing the different teachers' intentions and comparing the similarities and differences between them, four different teacher types were defined: to inspire, to do, to reinforce and to inquire, further described in chapter 5.

4.6 Analysis of the cognitive domain

Bloom's revised taxonomy (Anderson & Krathwohl, 2001), was used as an analytical tool to categorize the teachers' objectives within the cognitive domain. The aim of analysing the objectives within this framework is to describe which skills and knowledge the teachers intend to develop through activities outdoors. The taxonomy was used in three different stages. First, to analyse teachers' objectives within the cognitive domain to identify the knowledge and the cognitive processes, the teachers want their students to develop. The interview transcripts regarding each teacher´s objectives within the cognitive domain were analysed and then placed in a particular cell in the taxonomy table. The statement below illustrates how the teacher expresses an activity to achieve both factual and procedural knowledge. The students are expected to remember (cognitive process) how to calculate (factual knowledge) and apply (cognitive process) the result of the calculation to chop enough wood to build a charcoal stack (apply procedural knowledge).

> *We make a charcoal stack ... each year. It's to calculate the wood consumption, chop a cubic meter wood. And then be built in a certain way.* (Sverker)

Second, the taxonomy was used to identify the knowledge and cognitive processes during activity implementation to establish insights into what ways the intended objectives were promoted and realized by the teacher (Paper II). The objectives of the proposed activities in the cognitive domain, as expressed by the teacher in the conversation before the lesson, were first analysed, coded with capital letters (A) and placed in a particular cell in the taxonomy table (see Table 3). Then, the activities promoted during the actual lesson were analysed, coded with lower-case letters (a) and placed in the taxonomy table.

Table 3. Bloom's revised taxonomy, the framework used for categorizing the teachers' objectives with actions outdoors in the cognitive domain (Anderson & Krathwohl, 2001), showing an alignment between the teacher's expressed objective before activities (A), and the promoted activities during their performance (a).

Teacher		The Cognitive Process Dimension					
		Remember	Understand	Apply	Analyse	Evaluate	Create
The Knowledge Dimension	Factual knowledge		A a				
	Conceptual knowledge						
	Procedural knowledge						
	Meta-Cognitive knowledge						

Finally, 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 3.

4.7 Reliability and validity

Reliability and validity indicate a measure of quality. The reliability of an interview is whether a study can be replicated at different times and by other researchers (Kvale & Brinkman, 2009). Since an interview is an interchange between two or more people on a topic of mutual interest, there is always a risk in conducting interviews that bias or values may influence how responses are interpreted, especially when the interviewer is familiar with the topic (ibid.). A way to avoid these pitfalls is to clearly describe each step in the process of the interview (Kvale, 1997). Ways to control the reliability, that have also been carefully taken into account in this study, are for example to take care when sampling, not change the sequence of the questions, avoid leading questions, and interpreting recorded data and transcripts accurately (Cohen et al., 2010).

Strengths of observations are the potential to reach authentic data and to look directly at what is taking place. On the other hand, lack of control may render observations less useful and make interpreting what the data means difficult (Cohen et al., 2010). To reduce problems with reliability and validity in the performed observations, the following aspects have been taken into account; careful preparation and consideration about when, where, how and what to observe; record all observations in the same way; write detailed notes during each observation and as soon as possible after the occasion.

Validity in interviews is often discussed in terms of whether the questions asked measure what they claim to measure (Kvale & Brinkman, 2009). Here, the interview setting with general and specific questions, stories about successful activities, and teachers' reflections on metaphors are three different approaches to collect data about the same aspect in order to reduce, for example, misinterpretations from the interviewer of what the interviewee answered or misunderstandings from the respondent about the question that is being asked (Cohen et al., 2010). The complementary phone interviews were also done to validate previous responses.

4.8 Ethical considerations

All kinds of research always embrace ethical considerations in relation to the purpose of the study, consequences for the participants, and the researcher's role and methodology (Kvale & Brinkman, 2009). The Swedish Research Council has formulated four ethical requirements to be fulfilled for the individual's protection. They are the informational requirement for information, the requirement of consent, the confidentiality requirement and the requirement of restrictive use.

This study pays strict attention to the Swedish ethical principals in research (Lag, 2003:469; Vetenskapsrådet, 2006). All participants were informed about the purpose of the study, their roles as voluntary informants, and that they could withdraw from the project at any time if they wanted. All

teachers gave their consent to participate. They were also informed that all data would be kept confidential and only used for the purposes of research. Furthermore, when data was used for publishing, the individuals and schools would be anonymous.

5. RESULTS

Teaching and learning outdoors within a school context is multifaceted and a range of reasons exist for using the outdoor environment as a supplement to what students learn in the classroom. In this chapter, the results are described and the presentation follows in broad outline the research questions, except for the beginning with teachers' use of the outdoor arena followed by their intentions and objectives with learning outdoors. Then, the teachers' intended objectives with activities are shown with subsequent presentation of the teachers' knowledge focus during activity implementation. Finally, the alignment between the intended and activity outcomes is presented, followed by a short summary.

5.1 Use of the outdoor arena

Teachers' reasons for using this alternative arena are diverse, often implicit and linked to beliefs about the potential for outdoor environments to reinforce learning, since the encounter with nature becomes more holistic.

The main part of the nine teachers locates learning outdoors in spring and autumn, when the weather is more favourable. This is due to students' often inappropriate shoes and clothes and the risk of discouraging students from being outdoors. Only two of the teachers say that they deliberately locate activities outdoors in the winter (Roger and Sverker). Generally, the teachers use a morning or an afternoon a week for learning outdoors. The activities are often planned indoors while the follow-up is performed both outdoors and indoors. Here, discussions in small groups in terms of "what have you learned from the activities outdoors?" are common. The reason is to let the students express and articulate their experiences from the activities. Occasionally, the teachers also use students' experiences from outdoors in various writing or reading tasks in order to stimulate students' learning processes indoors.

All teachers say that play is essential and that they think that the students consider the outdoor arena to be a positive and relaxing environment associated with both school work and play activities. Exercises related to play and physical health is also stressed by some of the teachers, referring to objectives within the physical domain. Consequently, many activities the teachers describe include elements of play with an obvious emphasis on movement and cooperation in various forms. These collaborating exercises are often conducted in groups of 3-5 students. Exercises with a knowledge focus, such as collecting and categorizing lichens, leaves, mosses and fungus are also common. Here, the collected objects are sometimes used in different kind of play activities, e.g. memory games. In these activities, groups are used to promote well-being through cooperation or to use each other's skills and knowledge in tasks to improve group work and encourage each other to enhance their learning. However, group work is also used as a "sounding board" to reflect students' own views of the individual as a motivator for unmotivated students, relating to teachers' individual objectives in the social domain.

Some of the teachers also emphasize the hands-on activities with real, visible outcomes as vital to generate feelings of success, especially important for students with learning difficulties (Paper I).

In the outdoor activities, several subjects interact but the emphasis is on science with a practical approach, according to the teachers. Here, they describe activities such as using magnifying glasses and collecting and categorizing certain species; how to make charcoal from logs; working 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; using various forms of aesthetic expression for improving understanding of ecological relationships or processes (Paper I). Other common activities are conducting systematic observations of wind and weather and documenting the changes in text and pictures. Some of the teachers also emphasize the use of role play in order to improve students'

self-confidence to communicate in small groups or to apply different techniques such as how to stabilize a broken leg and to stop excessive bleeding by using objects found in nature (Paper II).

A range of expressed reasons for organizing outdoor teaching exists among the nine teachers. For all nine teachers, the main intention of arranging outdoor learning is to create an alternative learning arena as an important complement to classroom learning, contributing values to students' learning process. It gives students the chance to experience with all their senses and combines academic skills with experience-based learning. In order to more closely examine the teachers' intentions, the intentional analysis was used.

5.2 Intentions and Objectives

In this section the teachers' intentions and objectives within the affective, social and physical domains are presented. The objectives within the cognitive domain are shown in 5.3.

The intentional analysis showed similarities in the teachers' intentions with outdoor learning, primarily in the external determinants but also in the internal determinant: in the abilities category (Paper I). Here, the teachers emphasized the external determinants as possibilities for having a school forest available and encouraging and supporting school leaders and colleagues. They also expressed similar barriers to outdoor learning such as students' inadequate clothing and footwear or unfavourable weather but emphasize that these are overcome by careful preparation. Eight of the teachers had extensive outdoor experience and are confident in their abilities to teach outdoors (Paper II).

The differences between the nine teachers were 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 objectives teachers

focus on and promote are both due to teachers' varying degrees of awareness of the range of possible outcomes and their personal values concerning them (Paper II). These form the basis for the choice of outdoor activities.

In the affective domain, stimulating feelings for nature to improve students' achievement and self-confidence are essential objectives for all teachers. Group work to encourage collaboration is also common in development in the social and cognitive domains. In Paper I, teachers' intentions and goals is presented and described in detail. Here, all nine teachers' intentions and goals are presented to demonstrate the patterns among the teachers.

Table 4. Distribution of the teachers' expressed wants and objectives (from Paper I but extended with Paper II) into the cognitive, affective, social and physical domains according to intentional analysis. The numbers refer to how many different types of objectives there were in each domain.

Teacher	Cognitive	Affective	Social	Physical
Alice	2	2	1	1
Ina	2	3	1	1
Anna	3	2	2	1
Maria	2	4	2	2
Sverker	2	3	1	
Margareta	4	2	1	1
Johan	6	1	1	
Annie	5	2	1	
Roger	7	2	1	

By analysing the different teachers' intentions and comparing the similarities and differences between them, four different teacher types are defined: *to inspire, to do, to reinforce* and *to inquire*. Within each teacher type there is concurrence between teachers' intentions, objectives and ways of using the outdoor arena to achieve educational objectives (Paper II).

The *to inspire* teacher type emphasizes mainly objectives within the affective, social and physical domains (Paper II). Activities to stimulate students' interest in nature are common and to evoke positive feelings about being outdoors are

considered important. Group work is often used to promote cooperation in various tasks. Within the *to do* teacher type, affective and social objectives are primarily emphasised to generate feelings of achievement, which is particularly important for students with learning difficulties. The other two teacher types, *to reinforce* and *to inquire* primarily focus on cognitive objectives, partly to confirm knowledge and partly to deepen understanding or to apply knowledge (Paper II).

5.3 Intended knowledge focus within the cognitive domain

Analysis of the interview transcripts of teachers' objectives and the described successful activities from the interviews using Bloom's revised taxonomy illustrated a large number of activities focusing on to do, but the teachers have diverse goals with the doing, even if they sometimes describe the same activities.

The *to inspire* teacher type highly values the affective and social objectives which are considered to be prerequisites to achieve cognitive development. The teachers are aware of the potential range of objectives but choose to focus on factual knowledge as a result of students' prior knowledge and selected objectives in the curriculum. This type emphasizes on the one hand objectives aimed at understanding science facts with focus on explaining causes and effects and on the other hand factual knowledge to support inspiration which facilitates theoretical tasks in the classroom is stressed, e.g. linking writing or reading tasks to outdoor experiences.

Within the *to do* teacher type, activities intended to 'gain procedural knowledge' in order to promote students' feelings of contentment connected with something they managed to create are strongly stressed. The concrete learning outcome is a measure of a successful student. The ability to apply procedural knowledge is in focus in all of the activities, for example how to make charcoal from logs, and use the forest's growth cycle to explain the carbon cycle.

This *to reinforce* teacher type stresses mainly cognitive objectives in order to understand and apply conceptual knowledge. Various forms of aesthetic expression are used, which are considered valuable for improving understanding of, for example, ecological relationships or processes. By using a variety of ways of demonstrating and reinforcing learning often in different student groups, the students can have positive experiences to relate to when they are back in the classroom. The interaction between the indoor and outdoor arenas helps the students with their learning processes, making them longer-lasting and more comprehensible.

The *to inquire* type emphasizes in particular understanding or applying cognitive objectives, aiming at analysing conceptual or procedural knowledge. An intention to gain knowledge in the meta-cognitive dimension is explicitly expressed. This type provides activities intended to create awareness among students of their responsibility for, and strategies for, learning (meta-cognition). Encouraging students to reflect upon and consider their own perspectives provides possibilities to reach a higher learning level in the cognitive process dimension, from "applying knowledge" to "analysing". The analysis of Roger's reflection about the metaphors reveals objectives and knowledge perspectives, in this case the importance of students' own responsibility for learning and the value of the group for supporting each individual student on the way and the teacher's responsibility to guide the students with the intention to enhance learning.

> *It is a combination of the group and the house, because you build your own knowledge… The goal is nothing; the road towards the goal is everything…You make a joint trip but there is still someone who must know the direction of travel.* (Roger)

5.4 Knowledge focus during activity implementation

The results from observations of six of the nine teachers' outdoor activities exemplify the types of knowledge and cognitive processes the teachers aim for and promote in the activities enacted (Paper II). Here, a selection of examples is presented to illustrate typical results.

To inspire: In one of the activities, using a combined walk and quiz and answering multiple-choice questions about appropriate clothes to wear and what food to bring along the teachers encouraged the students to draw conclusions about ways of being outdoors from a health perspective in order to understand factual knowledge. The students, divided into pairs, followed a forest trail and discussed their answers. The questions became more difficult and at the end some students seemed to be guessing. A follow-up ensued where the teacher and students discussed the questions and the correct answers, focusing on explaining and exemplifying factual knowledge (Paper II).

To do: In a typical activity for this teacher type, the teacher told a story, combining different challenging situations for the students to handle and resolve. The students were encouraged to use different techniques to learn, e.g. how to use a scarf as a pressure bandage or the importance of holding the wounded body part high to reduce bleeding in order to apply procedural knowledge. While the students were working, the teacher circulated, supported ideas and drew attention to techniques for handling the challenging situations. (Paper II).

To reinforce: In one activity, the student groups were expected to perform a role play to illustrate both rapid and slow biodegradation processes based on an agreed hypothesis and collected objects from nature to show understanding of conceptual knowledge about biodegradation outdoors. The teacher's aim with outdoor activities was to reinforce conceptual knowledge building upon theoretical work done in the classroom. The students worked with varying degrees of commitment and some of them soon lost interest. The teacher

encouraged them to discuss, reflect and perform a role play. Finally, all groups presented their work. Objects collected 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 (Paper II).

To inquire: In one of the activities, the pedagogical idea was to apply mathematical concepts in concrete situations where the older students were expected to be group leaders and teachers for younger students. The challenge lay in choosing the right strategy for specific situations to promote the development of meta-cognitive knowledge. Each student conducted an exercise while the others gave support and feedback. The teacher observed and gave hints when needed. Occasionally, the teacher challenged the students with questions to encourage them to reflect upon their own views in order to appraise solutions. During the follow-up, the teacher 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 received feedback from other group members (Paper II).

5.5 Alignment

In order to identify alignment between teachers' intended objectives and the actual activity outcome, a categorization was made using Bloom's revised taxonomy (Anderson & Krathwohl, 2001). The objectives expressed before each activity and the activities performed outdoors were coded, as described in Paper II.

For the *to inspire* teacher type, developing knowledge of what promotes healthy living categorized as understanding factual knowledge is promoted in all exercises and was also observed in all the other exercises and is therefore in alignment with intended objectives. The same holds true for the *to do* type, who strongly emphasize the application of practical tasks during all outdoor activities, in alignment with predefined intended objectives.

Within the *to reinforce* teacher type, the students were expected to show conceptual knowledge in practical and aesthetical exercises. However, the data from the observation showed misalignment and inconsistency between predefined intended objectives and the actual outcomes achieved. As a result of inadequate instruction from the teacher and insufficient exercises both indoors and outdoors, the students had difficulty in transferring ideas about the carbon cycle to what happens in nature without investigating further. The teacher's lack of ability 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.

The *to inquire* teacher type often challenges students with activities to create awareness 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 assessing their own views with others and devising strategies to reach a higher cognitive level.

5.6 Summary

The intentional analysis shows that all teachers have a range of reasons for using this alternative arena for learning, including pursuing theoretical knowledge through experience-based learning, to explore real objects using multiple senses, to stimulate positive feelings towards nature and to promote collaboration. Teachers' reasons vary and are often implicit and linked to beliefs about the potential of outdoor environments to reinforce learning, since the encounter with nature becomes more holistic. For all nine teachers, the main intention of arranging outdoor learning is to create an alternative learning arena as an important complement to classroom learning, contributing values to students' learning process.

By analysing the different intentions and comparing the similarities and differences between them, four different

teacher types were defined: *to inspire, to do, to reinforce* and *to inquire*. Within each teacher type there is concurrence between intentions, objectives and ways of using the outdoor arena to achieve educational objectives.

The *to inspire* teacher type highly values affective and social objectives, considered as prerequisites to achieve cognitive development. Understanding factual knowledge is promoted in all exercises, to focus on explaining cause and effect or to support inspiration in order to facilitate theoretical tasks, e.g. linking writing or reading tasks to outdoor experiences, in alignment with intended objectives. The same holds true for the *to do* type*,* who stress activities intended to gain procedural knowledge. Affective and social objectives are emphasized in order to promote students' feeling of achievement connected to something they managed to create. The application of practical tasks is emphasized during all activities, e.g. using the forest's growth cycle to explain the carbon cycle, in alignment with predefined intended objectives.

The other two teacher types, *to reinforce* and *to inquire*, primarily focus on cognitive objectives, partly to reinforce knowledge, and partly to deepen understanding or apply knowledge, thereby encouraging students to relate their own views to those of others in order to reflect upon and consider different strategies for reaching a goal. The *to reinforce* teacher type stresses mainly objectives in order to understand and apply conceptual knowledge. Various forms of aesthetic expression are used which are considered valuable for improving understanding of for example ecological relationships or processes**.** However, the data from the observation showed misalignment and inconsistency between predefined intended objectives and the actual outcomes achieved. The *to inquire* type often challenges students with activities to create awareness of their personal responsibility for learning and the skills needed to improve group work, demonstrating alignment between objectives and activity outcomes. Hence, learning is based on students' understanding of reflection, comparing and

evaluating their own views with others and improving strategies to reach a higher knowledge level.

The degree of alignment between intended objectives, awareness of personal teaching ability in the outdoor arena and activity outcomes is thus higher among the teachers who primarily promoted on the one hand affective and social goals and on the other meta-cognitive and analytical understanding than among the teachers who mainly wished to confirm conceptual knowledge.

6 DISCUSSION

This thesis has focused on teachers' intentions and objectives in different learning domains. The knowledge and cognitive processes the teachers want their students to develop by locating learning outdoors have also been explored. The teachers' activities in the outdoor arena have been examined to establish insight into how intended objectives are promoted and realized by the teachers. In this chapter, the results are discussed with reference to other research, beginning with the commonalities and differences between the teachers' intentions and objectives, followed by reflections on the alignment between intended objectives and the knowledge focus in activities performed outdoors. The section ends with reflections about the teachers' use of the outdoor arena in relation to performed activities.

6.1 Commonalities and differences between the teachers

Teaching and learning outdoors in a school context is multifaceted. There are several reasons that teachers may select from when planning and doing activities outside the classroom. Some of these reasons are: pursue theoretical knowledge through experience-based learning; explore real objects with multiple senses, and promote collaboration. Several of the teachers' reasons are similar to the advantages related to non-formal or informal learning, e.g. stimulate curiosity, engage in socially interactive settings for learning through experience and provide memorable experiences in a similar way to that presented by Eshach (2007). In the study, Eshach (2007) discusses the difficulty in defining out-of-school learning, the cognitive and affective aspects of non-formal learning and offers recommendations in terms of practical ideas of how to bring theories described in the paper into practice. Common to all nine teachers in this study is choosing activities to provide many amusing and engaging experiences in order to stimulate

interest in nature. However, this is not stressed as important for either biology knowledge as in Magntorn (2007) or in education for sustainable development as in Sandell & Öhman (2010). The main intention is in all cases to create an arena for learning as a complement to classroom learning, contributing values to students' learning process. Even if the teachers describe the same activities, they often have different goals with them. The teacher typology, *to inspire, to do, to reinforce* and *to inquire,* proved to be useful in demonstrating similarities and differences and various intentions and achieved results. These teacher types are likely to be found amongst teachers in general. Within each type, there is concurrence between the teachers' intentions, objectives and ways of using the outdoor arena to attain educational objectives.

Based on the intentions, an objective is chosen and enacted by means of an activity. The various objectives the teacher types focus on and promote depend on their varying degrees of awareness of the range of possible outcomes. The selection of objectives may depend on their competence, i.e. what they feel able to do and address in their pedagogy. This refers to varied pedagogical tools such as pedagogical content knowledge, knowledge of students' prior knowledge, individual teaching ability, educational methods, appropriate planning, implementation and follow-up (Frøyland, 2010; Magntorn, 2007; Rickinson et al., 2004). However, the teachers' choice of objectives may also depend on their values, i.e. what they perceive to be the most important kinds of learning objectives in the outdoor context and their potential contribution to improving students' cognitive, affective, social and physical development. These learning domains were identified by the intentional analysis and are similar to the categories reported by Rickinson et al. (2004). The four domains were also used in an evaluation study of an out-of-school programme, where the authors considers that a positive impact in the affective and social domains seems to be a prerequisite to gain impact in the cognitive domain (Amos & Reiss, 2012). Here, similarities can be drawn to the *to inspire* teacher type, who value and promote

affective and social objectives in order to achieve cognitive development. The same holds true for the *to do* teacher type, who emphasize the importance of strengthening students' abilities and self-confidence through outdoor activities in order to transfer their feeling of achievement into theoretical subjects in the classroom. With reference to Rickinson et al. (2004), and their results about reinforcement between the cognitive and affective domains, these two teacher types' intended objectives indicate a possibility to improve students' learning. The findings in this study thus support the first part of the quote from Rickinson et al. (2004, p. 24) concerning the reinforcement. However, one may question whether the teachers' intended objectives are a bridge to higher order learning because they did not keep to especially high levels of knowledge. This is further discussed in 6.3. For the other two teacher types, *to reinforce* and *to inquire*, the affective and social objectives are of secondary importance to the objectives in the cognitive domain.

6.2 Alignment

In this study, I have confined myself to investigating alignment within the cognitive domain by using Bloom's revised taxonomy (Anderson & Krathwohl, 2001). The degree of alignment between intended objectives and activity outcomes was higher among the teachers choosing affective and social goals and the ones promoting meta-cognitive and analytical understanding than the teachers wishing to confirm conceptual knowledge. Here, one may wonder whether it is less complicated to achieve alignment of some objectives or for certain teacher types. An ability to choose appropriate tools seems to be essential to succeed in reaching intended objectives. The teacher must thus have knowledge of which modes of work promote the knowledge goals addressed in his/her teaching (Frøyland, 2010). Otherwise, there is considerable risk of inconsistency between predefined objectives and the actual outcomes of outdoor activities (cf. Bentsen, 2010). This discrepancy may also result in a less complex cognitive process than the intended

as in the case of the *to reinforce* teacher type. This study also shows that, despite the alignment between intended objectives and activity outcomes within the *to inspire* and *to do* teacher types, the outdoor activities do not provide a bridge to higher order learning, referring to the quote from Rickinson et al., (2004, p. 24). In these cases the achieved objectives are more reinforcement between cognitive and affective objectives in order to recall and understand factual knowledge or to apply procedural knowledge, i.e. reinforce students' prior knowledge. Confirming understanding of different theoretical concepts or processes by using objects from nature seems to be considerably more difficult than previously thought (cf. Österlind & Halldén, 2007). Here, a strong belief that the outdoor arena reinforces positive impacts on learning intended objectives seems to override well-considered modes of work to achieve the intended type of knowledge. The potential for learning outdoors is thus not fully utilized, indicating a need to improve teachers' skills in using the essential tools (Eshach, 2007). I propose, as do others (for example, Bentsen, 2010), that this may be a common problem.

6.3 The outdoor arena

The reasons teachers have for using the outdoor arena are varied and often implicit. Their motives behind planning and implementation are linked to beliefs about the potential of outdoor environments to reinforce students' learning, since the encounter with nature becomes more holistic. Outdoor learning, as described and performed by the teachers in this thesis, is somewhat similar to non-formal learning (Eshach, 2007) with a focus on activities linked to curriculum subjects and often integrated and taking place in or near the school in a forest area (cf. Rickinson et al., 2004).

The nine teachers regard outdoor learning as the outcome achieved from activities outside the classroom. With reference to Rickinson et al. (2004) and their distinctions between different kinds of activities, the actions presented in this study

are most comparable to fieldwork and school ground projects. Outdoor learning, as performed by the four teacher types, offers students opportunities to develop knowledge that adds value to their everyday experiences in the classroom, similar to the impact of fieldwork (Nundy, 1999; Rickinson et al., 2004). The teachers' activity outcomes within the affective and social domains are most similar to the results from school ground projects, indicating greater confidence, and motivate students through play activities or group work, promoting wellbeing (Rickinson et al., 2004). However, the actions do not form a major part of the teaching, but are in most o cases carefully planned and purposefully organized and with proper follow-up (cf. Frøyland, 2010; Magntorn, 2007; Openshaw & Whittle, 1993).

6.4 Generalization

Generalization is a question of to what degree results can be generalized to a larger population or wider situations. The primary objective of this thesis was to obtain a thorough insight into teachers' different intentions and objectives with teaching outdoors, not to generalize the results (Cohen et al., 2010). The first four teachers interviewed were categorized into two teacher types: *to do* and *to inquire*. When more teachers were interviewed, the teacher types expanded with two additional types, viz. *to inspire* and *to reinforce*, indicating that there may be more teacher types who implement learning outdoors. However, the four teacher types identified in this study are probably, with a relatively high degree of certainty, found among teachers in this country. The interviews were extensive and detailed because the teachers had the opportunity to talk about outdoor teaching and learning at different levels. They described and reflected generally on outdoor learning, about specific examples and, finally, about the metaphors. There was thus a triangulation of interpretations of the various aspects, making me feel comfortable with my interpretation. Lessons drawn from the study are probably of interest for many teachers

where the conditions may be similar in other schools where outdoor activities are implemented.

7 IMPLICATIONS

This thesis has highlighted the educational intentions and objectives of nine Swedish teachers for outdoor learning. It contributes to greater insights generally into teachers' objectives and awareness of the educational tools needed in order to achieve alignment between objectives and outcomes. The intentional typologies have been useful in illuminating different teacher types with varying intentions and achieved results, who are likely to be found amongst teachers in general. Teachers need to reflect more upon how different 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 training.

Other interesting issues to explore are the multiple goals that teachers may select from when doing activities outdoors. This selection may depend on what they perceive to be important, i.e. on their values and on their competence. But how aware are teachers of the goals and how do they communicate these to the students? These questions awaken interest in also examining whether teachers systematically select different goals to vary students' experiences.

The framework of Bloom's revised taxonomy analyses primarily cognitive objectives and this may be a limitation in a practical context since some objectives are in other domains. However, this thesis shows the importance of discussion, in schools and in teacher education, centred on educational intentions, objectives, tools and the alignment between objectives and outdoor activities to achieve intended knowledge outcomes. Additionally, the results support the need for preparatory work, accurate implementation and proper follow-up in order to enhance the learning process.

APPENDICES

Appendix A

Interview guide

Information about background, interests, general about attitude towards work as a teacher

Tell me about your educational background

Other previous jobs?

Why did you become a teacher?

Do you enjoy teaching?

Which grade do you teach? How many students are there in your class?

Tell me about your interests

Do you see any connection between your interest in the outdoors and how you use the school forest in a teaching context?

The school forest and teacher's intentions with outdoor teaching and views on learning

When did you start to locate teaching outdoors? In the school forest?

Has the teaching changed over time? In what way? Why?

How often are you in the school forest for educational purposes?

What time of the year?

In which subjects do you use the school forest?

Describe activities you choose to move out of the classroom.

Describe your reasons for locating these activities to the school forest.

Describe what you want the students to learn in the school forest.

Can you describe any of your successful activities in the school forest?

What is it that makes this a successful activity?

What is most important with the activity? For you as a teacher? For your students?

Have you implemented this activity with many classes? Any similarities or differences?

What happens after the outdoor activities? In what way do you follow up the activities? How do you take advantage of the experience of the outdoors?

Are there subject matters that are more suitable for outdoor education? Are there differences between learning outdoors and indoors?

Is it possible to achieve the same goals by teaching indoors?

Are there any limits to locating teaching outdoors?

The planning, are there differences between teaching indoors and outdoors?

Metaphors about teaching shown

Is there any metaphor that corresponds with your view of teaching? Describe how you think. If not, can you give me your own metaphor about teaching?

Is the metaphor in line with your view of teaching outdoors? Indoors?

Metaphors about learning shown

Is there any metaphor that corresponds with your view of learning? Describe how you think. If not, can you give me your own metaphor about learning?

Is the metaphor in line with your view of learning outdoors? Indoors?

Appendix B

Below a presentation of the metaphors used in the study.

Point of view	Teaching	Learning
Behaviourist/ empiricist point of view	Teaching is like growing plants. I am the gardener who looks after my plants. I give them adequate food and water in order to develop well. The plants are dependent on me and only I as a gardener can create the best conditions for my plants. If I do not make sure to give them the right care they cannot evolve.	Learning is like a sponge in which the learner absorbs as much water as possible. The learning is controlled by water availability. Anyone who distributes water also controls the learning process. Greater access to water means more learning and vice versa.
Cognitivist/ constructivist point of view	Teaching is like a guided tour. The guide gives you hints and tips for discovering new places, sights and insights that can be useful for those who have never visited the place. You choose the direction with the guide who provides support and assistance. If you have already visited the place the guide's information can give you a new way to explore the place or to understand the culture.	Learning is like building a brick house. The student is bricklayer who adds stone on top of stone so the house gets bigger and bigger. The student is also the owner of the house. As the teacher I am the site foreman who gives good advice and provides help so the house can be steadily and firmly anchored.
Situative point of view	To teach is like the ants' work in an anthill. Each ant's contribution is valuable and stimulating for the survival of the stack, but cooperation between them is important. In order to achieve a good outcome the ants cooperate, a result that is beneficial to all in the anthill.	Learning is a journey where the group discusses its path to the goal. The trip is not mapped and the target is not completely known. Perhaps the trip will go in a different direction depending on what we encounter on the route. Within the group the way is traced out and everything new that is discovered after the trip is communicated within the group

ACKNOWLEDGEMENTS

During this journey I have met many fine and interesting people who have supported and encouraged me. It has been an experience and there are several people I would like to thank. First of all I would like to gratefully acknowledge the Swedish Forest Society, and especially you, Hans-Jöran Hildingsson. Without help and financial support from the Forest Society, this thesis would not have been possible. I would like to thank you Hans-Joran, because you believed in me and worked purposefully in order to convince the Forest Society to support this work. I would also like to thank Umeå University and in particular Umeå School of Education for the financial support.

I would especially like to acknowledge my supervisors. Very special thanks to you, Christina Ottander, for stimulating discussions, always with constructive comments and valuable ideas. Without your help, this work had been much more difficult. I have appreciated your help very much! Special thanks to you, Gun Lidestav, for your valuable comments contributing to pleasant discussions about pedagogical aspects, which sometimes are taken for granted.

I would also like to thank all of my dear colleagues at the Department of Science and Mathematics Education for many enjoyable discussions around the coffee table and at lunchtime. Here, I want to give a special thanks to the "small group" including Annika Manni, Karolina Broman, Nina Ottander and our supervisor Eva Silfver, for being good friends and for our discussions of different isms, theories, perspectives, and everything else that has been debated. I will really miss our talks. Thank you my nice and caring colleagues at the administrative office of Umeå School of Education. You are all wonderful and supportive people who I like.

Finally I would like to thank my family, my wonderful and dear husband Anders and my beloved children, Fredrik and Viktoria, for always supporting me, giving me energy and loving me. Thanks for being there!

Umeå June 2012
Birgitta Wilhelmsson

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Department of Science and Mathematics Education
Umeå University, SE-901 87 Umeå, Sweden
Umeå 2012

ISSN 1652-5051
ISBN 978-91-7459-448-5