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END PIECE

A comparison of childrens' statements about social relations and teaching in the classroom and in the outdoor environment

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Two teachers from a school in Copenhagen were allowed to move their third grade teaching into a forest every Thursday for three years. Thus 20% of the class's regular teaching took place in an outdoor environment. The purpose of the present study was to ask the children how they experienced lessons in the classroom and the forest settings. Therefore, two almost identical questionnaires including a total of 26 statements adjusted to each context were completed by the children four times from 2000 to 2003. Further, in the forest questionnaire three specific statements were added about the outdoor environment plus one question about their choice of playmates during breaks at school and breaks in the forest. Ten statements were categorized as 'social relations', 14 statements as 'teaching' and finally two related to 'self-perceived physical activity'. A significant difference ($p < 0.001$) was found between the school/classroom and the outdoor environment when scores from all four questionnaires (2000–2003) were summed. The categories 'social relations' ($p < 0.001$), 'teaching' ($p < 0.001$) and 'self-perceived physical activity' ($p < 0.001$) all showed significant differences. It is concluded from the present case study that the combination of classroom and outdoor teaching, over a three-year period had a positive effect on the children's social relations, experience with teaching and self-perceived physical activity level.

Introduction

What do children in primary school think about school and education in Denmark? A Danish national investigation in 1998 concluded that 89% of pupils in grade 5 expressed that they 'in general like school' (54%) or 'like school very much' (35%) (Rasmussen, Due, & Holstein, 2000). On the other hand, from 1984 to 1998

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the number of 11-year-old children who 'like school very much' decreased from 60% to 35%. In other words, the enthusiasm of going to a public school decreased over time, but also with age. A total of 24% of grade 5 pupils expressed that they were bored in school and this figure increased to approximately 44% in ninth grade (Rasmussen et al., 2000). In another Danish investigation published in 1994, 56% of 429 children in grade 4 in the municipality of Greve expressed that they 'very much enjoyed going to school' and 30% 'liked to go to school' (Schultz-Jørgensen & Ertmann, 1998).

In general, children in Danish public schools like going to school, but there seems to be a downward trend over time and with age. Furthermore, attention should be drawn to the fact that there were large variations in the degree of satisfaction between schools. Thus, there were a few schools where only 12% of pupils enjoyed going to school compared to other schools where almost one-half of the pupils stated that they were very satisfied with their school life (Due & Holstein, 1997, p. 42). Still, there seems to be a need to continuously develop, vary and create other ways of learning that can maintain the pupils' interest, motivation and enjoyment in a Danish school context.

Investigations indicate that the school setting and environment are important for well-being, learning, social relations and the health of pupils (Due & Holstein, 1997; Backe-Hansen & Ogden, 1998; Rasmussen et al., 2000). This raises the question of which role outdoor classrooms and outdoor learning can play as a context for well-being, social relations, teaching and learning in Denmark, and also what kind of experiences with outdoor learning can be drawn from English-speaking as well as Nordic countries.

Research and development in outdoor learning projects in English speaking and Nordic countries

'There is a growing concern that opportunities for outdoor learning by school students in England have decreased substantially in recent years' (Rickinson et al., 2004, p. 5). In response to this, the government, the Field Studies Council, and several partner organizations commissioned the National Foundation for Educational Research to undertake a review of research on outdoor learning. Consequently, a review of 150 research papers on outdoor learning published in English between 1993 and 2003 was undertaken (Rickinson et al., 2004). It concludes that 'substantial evidence exists to indicate that fieldwork and visits, properly conceived, adequately planned, well taught and effectively followed up, offer learners opportunities to develop their knowledge and skills in ways that add value to their everyday experiences in the classroom' (Rickinson et al., 2004, p. 5). Fieldwork can have a positive impact on long-term memory due to the memorable nature of the fieldwork setting, and reinforcement can take place between the affective and cognitive domain, providing a bridge to higher-order learning.

Two meta analyses of previous research (i.e. attitudes, self-perceptions, self-esteem, interpersonal and social skills) provide strong evidence of the positive benefit

of short- as well as long-term outdoor adventure education (Cason & Gillis, 1994; Hattie, Marsh, Neill, & Richards, 1997). Evidence of cognitive and physical/behavioural benefits is less strong. However, there are examples of outdoor education programmes yielding benefits in terms of general and specific academic skills as well as improved engagement and achievement. In relation to fostering environmental concern and understanding, the evidence of a positive link using the outdoor environment is not strong (Rickinson et al., 2004, p. 29). The impact of school grounds and community projects are linked to the affective domain, which includes greater confidence, stronger motivation to learn, and a greater sense of belonging and responsibility. Rickinson et al. (2004) conclude that students develop more positive relationships with each other and with their teachers and that studies focusing on physical activities as a consequence of outdoor education are rare. A case study in Denmark gives one example of how the mean physical activity level significantly can increase during teaching on days in the forest compared to normal school days (Mygind, 2007). Also, a Norwegian case study arrives at the same conclusion while comparing teaching on a normal school day and a day in the forest in grade 6 (12 years of age) (Grønningsæter, Hallås, Kristiansen, & Nævdal, 2007).

In a Norwegian school project (Lutvann School) it was decided in 1995 to use the community and nature surroundings as a classroom one day every week (Jordet, 1998). Recently, in a four-year case study, the didactics of outdoor education were investigated using interviews and questionnaires involving teachers and pupils from the Lutvann School (Jordet, 2002, 2007). It is concluded that outdoor teaching offers good opportunities for dialectic learning but at the same time indicates that outdoor teaching in itself is not enough for dialectic learning. Furthermore, outdoor teaching seems to add new aspects of progressive pedagogy through changes in 'didactics' (Jordet, 2007, p. 342).

In an intervention study conducted in Sweden, the nature and potential of outdoor education was recently analysed from a teacher perspective. The teachers' experiences (mood) using the outdoors in a rural school (intervention group) were compared to a group of teachers in a city school (reference group) (Szczepanski, Mamler, Nelson, & Dahlgren, 2007). Measurements of the teachers' mood using a mood scale test showed a decrease in both the intervention group and the reference group over one year, although significantly less so among the teachers in the intervention group (Szczepanski et al., 2007). It is suggested that a general economic reduction over the recent years could explain the decrease in both groups.

Background and goals of an outdoor learning project in the Danish Folkeskole

For decades the outdoor environment has been used as the playground for children at pre-school level on a daily or weekly basis in Denmark. However, outdoor learning or outdoor education has never been a compulsory part of the curriculum in the Danish Folkeskole. The opportunity to investigate the outdoor school idea in younger grades arose with the establishment of a class called 'nature class' at a

school in Copenhagen in August 2000. Two teachers who introduced their ideas about outdoor learning were allowed to teach their grade 3 students in a forest setting (north of Copenhagen) for three years with approval from the school administration. The lessons were compulsory and involved most of the subjects that the students took part in at this level. The class had lessons in all the traditional subjects in both educational settings, except for PE and English, which only took place in the school setting. Thus, during the three-year period, 20% of lessons were carried out in a natural setting. A research team analysed how teaching in a natural environment influenced the children, their teachers, and their parents (Mygind, 2005).

Research questions and hypothesis

As a part of this multi-dimensional and cross-scientific case study one main question was raised: how does a three-year period with compulsory outdoor education lessons influence the categories 'social relation', 'teaching', and 'perception of physical activity' from a schoolchild's perspective when 20% of all lessons are taught in a nature setting? Based on the aforementioned research and empirical experience, it was hypothesized that learning in an outdoor setting would have a more positive effect on social behaviour, attitudes towards teaching and learning, and the physical activity level when compared to an indoor learning setting. It was uncertain whether the children would enjoy or dislike the time spent in a forest due to weather conditions during summer and winter. Therefore, a few questions were also asked about expectations concerning being taught in a natural setting and the influence of weather conditions.

Design and method

Schoolchildren sample and data collection

The nature class at the school in Copenhagen included a total of 19 school children (14 girls and 5 boys). The weekly outdoor teaching in the forest started in August 2000. Data collection took place after six months (winter 2000), after one year (summer 2001), after two years (summer 2002) and finally after three years (summer 2003) (Table 1).

Questionnaires

Between year 2000 and 2003 a total of eight questionnaires were completed by the schoolchildren, namely four in the forest setting and four in the classroom. Each questionnaire included a total of 26 identical statements given in the two educational contexts; 10 statements related to the category 'social relations', 14 statements were about 'teaching' and two concerned 'perceived physical activity'. Furthermore, at the end of the 'forest questionnaire' each child was asked

three specific statements about the outdoor environment making a total of 29 statements plus one question about their choice of playmates during breaks at school and breaks in the forest.

Since 1987 the Danish National Institute of Social Research has involved schoolchildren in surveys. Recently, an investigation titled 'What can children answer as participants in quantitative questionnaire investigations?' concluded that age is of great importance for answering questions (Andersen & Kjærulff, 2003). That is, seven-year-old children have difficulty in selecting answers to questions. Furthermore, answer quality is dependent on the nature of the questions. According to the same investigation, suitable questions are those that are on themes and concepts generally known to children. The development of the present questionnaire was inspired by statements developed in a Danish questionnaire that was applied in a study about the Danish public school system and early primary schools (Christiansen, Jensen, & Westerstråhle, 1983, 2000), 'Children's Perceived Competence scale' (Harter, 1982) and 'The Pictorial Scale for Children' (Harter & Pike, 1984). Further, a study which was part of a larger Nordic study of 10-year-old pupils' achievements (Schultz Jørgensen, & Ertmann, 1998) was of interest and inspiration. Finally the study 'Validating "About my self" – a questionnaire for children' (Grønfeldt, Sigsgaard, Hansen, Hasselstrøm, Froberg, & Andersen, 2003) took interest because the data was statistically described and examined for missing values, internal factors, gender differences and reproducibility. The purpose of the last-mentioned study was to develop and validate the questionnaire for group administration in a school setting including 30 items monitoring seven-year-old children's thoughts about themselves with regard to social acceptability, academic competence, physical competence, social competence, thriving at school and social status. Some 254 children answered the questionnaire and 90 of these children were asked again 10–12 weeks later in order to verify the children's understanding of the structure and content (reproducibility). Spearman correlation coefficient showed a moderate reproducibility (0.674, $p < 0.01$) and in conclusion the questionnaire was found valid for the purpose (Grønfeldt et al., 2003).

In the present school study the children were in grade 3 (i.e. 9 years of age) when they completed the questionnaire for the first time and thus more mature as compared to the study of Grønfeldt et al. (2003). Based on experience and arguments from the above-mentioned studies a four-point Likert scale was preferred because nine-year-old children are expected to cope more easily with four categories instead of five or six, but the 'extreme' categories 'always' and 'never' were preferred modified in the Rødkilde study and the children required to choose between the following four answer categories: almost always, often, little, and always never (Table 1). Negative as well as positive statements were repeatedly given throughout the questionnaire in order to keep the children alert from question to question. The highest value (4) represents the most positive perception of the statement, 3 is positive, 2 is negative and 1 is the most negative as illustrated in Table 1 (number codes are shown in Table 1, but were removed in the questionnaires given to the children).

Table 1. Example from one questionnaire illustrating categories, codes and a few statements

Nr	Statements in the classroom	Almost never	Little	Often	Almost always
5	I like the teaching in the classroom	(1)	(2)	(3)	(4)
6	I quarrel with classmates when time is spent in the classroom	(4)	(3)	(2)	(1)

Table 1 shows an extract from one questionnaire. Four times the nature class answered a questionnaire in the classroom and four times in the outdoor environment (forest) from 2000–2003. Each time the same statements had to be answered in the two contexts: classroom or forest. In 2000 the children answered the classroom questionnaire first and the forest questionnaire 14 days later. The same procedure was followed in 2001, 2002, and 2003.

Although the above-mentioned research has shown that seven-year-old children can monitor a questionnaire when it is understandable and meaningful in structure and content and with support from a teacher, for example, it could still be questioned how reliable the results are when 9- to 12-year-old children answer a questionnaire using four answer categories. A pilot group of eleven nine-year-old children from two parallel classes tested the questionnaire and all statements were understood by them. Upon receiving the questionnaires for the first time in the pilot group as well as in the nature class the statements were read one by one in order to ensure all the words and concepts were understood. One teacher was present in order to help a child if a statement was not understood. In the nature class, where four children were less competent readers according to the teacher, one word 'teasing' had to be explained (is it meant in a fun or a serious way?). In the nature class the children were told to interpret the word 'teasing' as a situation where people would be upset about being teased. In grades 4 and 5 the children were able to complete the questionnaires by themselves. During the completion of the questionnaires the children were physically in the educational setting in question.

Statistics

The data were analysed using a non-parametric method. Differences between the two educational contexts were examined using the Wilcoxon Signed Ranks Test (Asymp.Sig; 2-tailed) (SPSS 10 Statistic Package).

Results

A total of 13 children completed all eight questionnaires between 2000 and 2003. First, the results from the three specific statements about the outdoor environment are presented. This is about the children's expectations and the time spent in the forest, and the influence of the weather. Then follow the results of social learning statements and how the children socialize in the breaks on normal schooldays and in

the nature setting. Finally, the results of teaching and perceived physical activity levels in both educational contexts are presented.

Statements about expectations and time spent in the forest

'I look forward to spending time in the forest' was one of three statements the children had to answer in the forest. The average values for the first statement showed that the children looked forward to the days in the forest with great pleasure. However, this tended to decline, although not significantly, after the first year of outdoor teaching (Figure 1). Four children stated a maximum positive expectation about the forest days each time they were asked; two had unalterably marked the expression 'often' and two became more positive over time. Five children reported a diversifying interest, which in the end led to a decreasing mean satisfaction.

In the first questionnaire completed in winter 2000, none of the children selected the most negative statement 'very rare', while three students in 2003 expressed that they 'very rarely' looked forward to the days in the forest.

The second statement was phrased in a slightly different way in order to understand how the children experienced the time spent in the forest: 'I think the class spends too much time in the forest'.

In other words, did it become increasingly more boring in the forest over the time period of three years? The answers showed that the children 'very rarely' or 'sometimes' found the time spent in the forest too long (Figure 2). That is, the 13 children answered 37 out of possible 52 times (65%) that the class 'very rarely' spent too much time in the forest. On 11 occasions the students indicated 'sometimes' and only five times did they choose the words 'often' or 'very often'. In one student there was coherence between a decrease in expectation and the feeling of time in the forest being too long. No significant change in attitude took place from 2000 to 2003.

It could be argued that the weather conditions and cold would reduce the children's enthusiasm during outdoor learning. When the children were asked about the cold, they did not express concern (Figure 3). During the project period 43 out of 52 statements (83%) expressed that the children 'very rarely' or 'sometimes' felt the

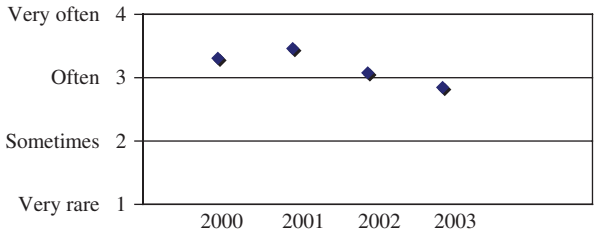

Figure 1. 'I look forward to spending time in the forest'

Notes. The mean values express the expectations of the nature class before they travel to the forest measured on four occations. Year 2000 represents a winter situation. 2001, 2002 and 2003 represent summer measurements (N = 13).

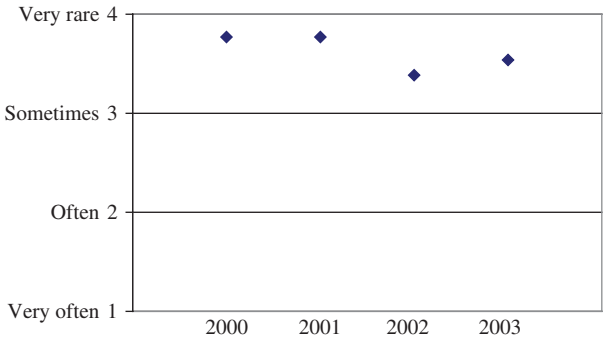

Figure 2. 'I think the class spends too much time in the forest'

Notes. The mean values of the nature class representing their opinion about time spent in an outdoor teaching context measured on four occasions. Year 2000 represents a winter situation. 2001, 2002 and 2003 were summer measurements ($N = 13$).

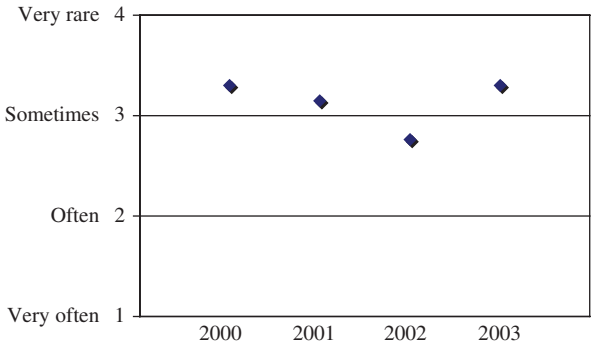

Figure 3. 'I feel cold in the forest'

Notes. The mean values of the nature class representing their opinion about feeling cold in an outdoor teaching context measured on four occasions. Year 2000 represents a winter situation. 2001, 2002 and 2003 were summer measurements ($N = 13$).

cold. Only on one occasion did two children state that they 'very often' froze and that was in the summer 2002. No significant differences were found in the students' perceptions of feeling cold during the winter 2000 and the following three summer statements (Figure 3).

Results about social relations during teaching and in the breaks

The answers concerning the two statements 'well-being' and 'a less noisy place to be' indicate a significantly more positive learning environment in the outdoor settings ($p < 0.05$) than in the indoor settings. The mean of the statements concerning well-being in the classroom was 3.38 compared to 3.60 in the forest setting. There were no significant differences between the statements 'quarrel with classmates' or 'to be teased by other classmates' in the two contexts (Table 2), but if p values

Table 2. Statements about social relations

Statements	December 2000		May 2001		June 2002		June 2003		Level of significance comparing the two educational contexts from 2000–2003
	Classroom	Forest	Classroom	Forest	Classroom	Forest	Classroom	Forest	
	$N = 18$	$N = 18$	$N = 18$	$N = 18$	$N = 17$	$N = 17$	$N = 16$	$N = 16$	
I like the	3.5	3.5	3.7	3.7	**3.0**	**3.7***	3.3	3.5	**$p < 0.05$**
It is noisy in the....	2.8	2.8	2.5	2.9	**2.7**	**3.2***	2.9	3.0	**$p < 0.05$**
I quarrel with classmates in the....	**3.2**	**3.6***	3.5	3.6	**3.5**	**3.8***	3.6	3.6	**NS**
Classmates teases me in the ...	3.1	3.5	3.7	3.7	3.7	3.7	3.6	3.9	**NS**
I tease my classmates in the.....	**3.3**	**4.0***	3.5	3.2	3.5	3.7	3.5	3.4	**NS**
I decide what to play in the breaks in....	2.8	2.6	2.8	2.8	2.7	2.7	**2.8**	**3.3***	**NS**
I have my own way when we have to co-operate in the....	2.1	2.0	2.0	1.9	2.1	1.8	1.9	1.9	**NS**
I try to assist my classmates in the	3.3	3.1	3.3	3.4	3.1	3.3	3.1	3.3	**NS**
I feel sad when my classmates experience something bad in the	2.3	2.5	2.8	2.7	2.4	2.5	2.5	2.7	**NS**
I am ready to co-operate with my classmates in the....	3.4	3.1	3.2	3.5	3.2	3.4	3.3	3.3	**NS**
Sum score including all 10 statements representing the mean values from the two educational context, respectively	3.0	3.1	3.1	3.2	3.0	3.2	3.1	3.2	**$p < 0.001$**

Notes. Mean values and levels of significance between teaching in the classroom and in a natural setting. The highest value (4) represents the most positive perception of the statement, 3 is positive, 2 is negative and 1 is the most negative. (NS = not significant; * = significant).

between 0.05 and 0.1 are accepted as representing a tendency, it could be argued that there was a tendency towards more quarrelling in the classroom compared to the forest setting ($p < 0.06$) and a tendency towards more teasing in the classroom ($p < 0.09$) over 3 years. There was no difference in the inclination to co-operate, be helpful, show empathy or arrange games during the breaks (Table 2). The sum score showed a continuous positive attitude of well-being and social relations over three years. In general, the children were satisfied with their school life and had good mutual social relations in both the classroom and the forest settings (Table 2).

No significant difference was observed in the sum score when comparing outdoor and indoor statements over the years. There were only scattered and desultory significant differences (Table 2). This seems to illustrate a certain context dependency in the children's responses. Summarized, all statements in the two educational settings showed a significant difference in the way that the forest was the preferred learning place to be from a general social and well-being perspective ($p < 0.001$).

Outdoor learning days involved 'breaks' or 'free time' although not in the same structured way as a normal school day. One question addressed the fellowship of the nature class within games or free play during breaks in school and the forest. Would the forest setting influence the choice of playmates in the nature class? Which playmates were involved in the games in the schoolyard, and did the same playgroups exist in the forest? In the questionnaire handed out in the forest, every child was asked to mention the classmates he/she played with during breaks on normal school days and whether 'other' classmates were included in the forest. The results are summarized in Table 3.

Since the children had to decide if they played with different classmates during the breaks in the forest compared to the breaks in school at the time in question (every time they completed the questionnaire), these classmates had to be mentioned again (provided that they still were not part of the game in the schoolyard). In 2000, 37% answered yes to the question conerning playing with new classmates, followed by 44% in 2001, 35% in 2002 and finally 50% in 2003.

Five children answered every time that they did not play with new classmates in the forest while one child recorded one or several new classmates every time the questionnaire was handed out in the forest. The rest answered that they played with one or several new classmates one, two or three times out of the four questionnaires

Table 3. New social relations in the breaks

	2000	2001	2002	2003
New classmates	$N = 19$	$N = 18$	$N = 17$	$N = 16$
Yes	7 (37%)	8 (44%)	6 (35%)	8 (50%)
No	12	10	11	8

Note. The number of children who answer yes or no to the question: 'Do you play with new classmates during the breaks in the forest', i.e. classmates you never play with in the breaks in the school yard.

that were handed out. At some point in time, 14 out of 19 pupils in this case study established one or several new play relations during school breaks in the outdoor learning context (Table 3).

Results about teaching and learning

A significantly higher preference for the forest class concerning teaching and learning was found when evaluated with the total sum score for the whole period ($p < 0.001$, Table 4). The level of satisfaction was very similar to the statements about social relations. Every year the average sum score for all 14 statements varied between 3.1 and 3.3 in the two learning contexts. The statements on how the children liked the teaching in the classroom (mean score = 3.13) and in the forest (mean score = 3.45) showed a high degree of satisfaction in both educational settings, although the outdoor setting was ranked higher ($p < 0.05$). It was supported by the perception that more 'sloppiness' with schoolwork ($p < 0.01$) and disturbances during group work ($p < 0.05$) occurred in the classroom. Although not significant the teaching in the classroom tended to be more boring ($p < 0.09$), to involve more disturbances in general ($p < 0.1$) and to consist of less assistance towards others during group work ($p < 0.09$, Table 4).

A series of teaching-related statements did not show any significant differences between the two educational settings, for example, the ability to work long and focused on assignments; listening, remembering, and understanding the subjects; keeping things organized; and the wish to receive support from teachers.

Results concerning physical activity

The self-reported experiences on physical activity were strongly in favour of the forest learning environment. Significant differences were found on all four occasions where the questionnaire was completed ($p < 0.01$, Table 5).

It should be mentioned that the children also found the physical activity level during breaks in the forest significantly higher compared to school breaks during the period 2000–2003 ($p < 0.01$, Table 5).

Discussion

The aim of the present case study was to analyse how a class in the primary school experiences a three-year period during which 20% of all lessons were taught in a nature setting. Furthermore, the aim was to analyse how teaching in the classroom and in the forest setting influences the childrens' perceptions on 'teaching', 'social relations', and 'physical activity'.

Changes in attitudes towards well-being in the classroom and outdoor setting

The schoolchildren in grade 3 took a great interest in the project prior to the beginning in August 2000. Therefore, it was expected that the nature class would travel to

Table 4. Statements on teaching and learning

Statements	December 2000		May 2001		June 2002		June 2003		Level of significance comparing the two educational contexts from 2000–2003
	Classroom	Forest	Classroom	Forest	Classroom	Forest	Classroom	Forest	
	$N = 18$	$N = 18$	$N = 18$	$N = 18$	$N = 17$	$N = 17$	$N = 16$	$N = 16$	
I like teaching in the	3.1	3.3	3.4	3.6	2.9	3.3	**3.1**	**3.6***	**$p < 0.05$**
I am careless about my school work in the	**3.2**	**3.8***	3.4	3.5	3.7	3.9	3.7	3.8	**$p < 0.01$**
I disturb during group work in the	3.2	3.6	**3.3**	**3.8***	3.5	3.7	3.7	3.5	**$p < 0.05$**
I support classmates during group work in the.....	3.2	3.2	3.1	3.4	**3.2**	**3.5***	3.3	3.3	**NS**
I disturb in the	3.6	3.7	3.4	3.7	3.8	3.8	3.5	3.8	NS
I was bored when being taught in the.....	3.4	3.2	**3.1**	**3.8***	3.4	3.4	**3.1**	**3.7***	NS
I am concentrated about the tasks I get in the	3.3	3.2	3.3	3.4	3.2	3.5	3.4	3.4	NS
I understand the instruction I get in the...	3.1	3.0	3.1	3.2	3.1	3.2	3.0	3.3	NS

(*Continued*)

Table 4. (*Continued*)

Statements	December 2000		May 2001		June 2002		June 2003		Level of significance comparing the two educational contexts from 2000–2003
	Classroom	Forest	Classroom	Forest	Classroom	Forest	Classroom	Forest	
	$N = 18$	$N = 18$	$N = 18$	$N = 18$	$N = 17$	$N = 17$	$N = 16$	$N = 16$	
I am able to work for a long time with the tasks I get in...	3.1	3.0	3.0	3.0	3.2	3.1	3.1	3.2	NS
I want more support from my teacher in the...	1.9	1.8	1.7	1.8	1.8	1.7	1.7	1.6	NS
I am listening when my teacher tells me something in	3.1	3.1	3.6	3.7	3.7	3.6	3.7	3.6	NS
I keep my things tidy in the.....	3.2	3.1	3.1	3.4	3.3	3.2	2.8	3.1	NS
When we work in groups I leave to others to decide...	2.6	2.6	2.8	2.6	2.8	3.1	2.9	2.8	NS
I forget what I learn in.....	2.9	3.2	3.5	3.8	3.4	3.4	3.6	3.6	NS
Sum score including all 13 statements over a year	3.1	3.1	3.1	3.3	3.2	3.3	3.2	3.3	$\boldsymbol{p < 0.001}$

Notes. Mean values and significance levels during teaching in the classroom and in a natural setting. The highest value (4) represents the most positive perception of the statement, 3 is positive, 2 is negative and 1 is the most negative (NS = not significant; * = significant).

Table 5. Perceived bodily activity

	December 2000		May 2001		June 2002		June 2003		
	Classroom	Forest	Classroom	Forest	Classroom	Forest	Classroom	Forest	Level of significance 2000–2003
Statements	$N = 18$	$N = 18$	$N = 18$	$N = 18$	$N = 17$	$N = 17$	$N = 16$	$N = 16$	
I use my body when I am in ...	**2.3**	**3.1***	**2.7**	**3.7***	**1.9**	**3.7***	**2.6**	**3.8***	***P* < 0.01**
I am active, playing and moving in the breaks when I am in	3.6	3.8	3.6	3.8	**3.3**	**3.9***	3.8	3.8	***P* < 0.01**
Sum score	**3.0**	**3.5**	**3.2**	**3.8**	**2.6**	**3.8**	**3.2**	**3.8**	***P* < 0.001**

Notes. Mean values and significance levels of perceived bodily activity in the classroom and in the forest. The highest value (4) represents the most positive perception of the statement, 3 is positive, 2 is negative and 1 is the most negative (NS = not significant; * = significant).

the forest for the first couple of months with joy and high expectations. Would the joy of routine travel by bus and train continue when the winter season began and the compulsory school days in the forest became part of 'everyday school life'?

The children expressed a significantly more positive attitude towards spending time ($p < 0.05$) as well as being taught ($p < 0.05$) in an outdoor setting. In general, the enthusiasm and well-being in the two educational contexts were high during all three years. Specific questions asked about well-being in the forest showed a decreasing interest over time, although this was not significant. On the other hand, when the children were asked if they spent too much time in the forest there was no change in attitude from 2000 to 2003. The children expressed a very high degree of satisfaction throughout the project period using the term 'almost always' a total of 71% and 'often' in 22% of the times. Continuous data exists from only 13 out of 19 children, therefore it could be argued that with statements from all the children the picture would be different. However, unpublished data from other investigations in this multi-dimensional and cross-scientific case study seem to support the above-mentioned findings, i.e. the very positive statements from the parents (Jacobsen, 2005: in Mygind, 2005) and from interviews with the teachers. In parenthesis it should be mentioned that in the end of the forest lessons the teachers very often had to stop the learning process. This rarely happened in the classroom on a normal school day. Several parents expressed concern about cold weather in the beginning of the project, but after three years only a few parents mentioned this as a problem (Jacobsen, 2005, p. 262). Apparently, the students did not share their parents' concern for the cold. One explanation might be that the children learned to dress appropriately during the first six months. The weekly travel to the forest, where teachers and children spent 20 minutes by walking, 15 minutes by bus and 20 minutes on a train, did not seem to have a negative influence. Travelling time was used for preparation, evaluation and debriefing by the teachers.

In conclusion, there was a positive attitude towards having lessons in the forest and the classroom across all three years. This enthusiasm did not change between grades 3 and 5. Although the number of children in the present study is very low, the percentage that like school very much is higher than generally reported (Rasmussen et al., 2000; Schultz-Jørgensen & Ertmann, 1998).

What are the factors that explain the relatively homogenous and high degree of satisfaction throughout all three years in both educational settings? Two engaged and competent teachers with ownership of the project obviously played a major role. The improved learning environment might have evolved through a mutual benefit and positive attitude from both educational settings. Apparently, the forest setting with its different and varied possibilities for teaching activities and games in the breaks fostered new contacts in the nature class.

Social learning and new classmates

Seemingly, the 'new' classmate constellations remained a phenomenon connected to the forest setting, as only a few children changed play patterns in the school yard.

More thorough questions have to be asked in order to expose what lies behind these circumstances, however, the conclusion is that the day in the forest contributes to establishing new play contacts. The more noticeable use of common games in the forest (often in continuation of group teaching situations) might explain these findings. Further, it can be concluded that the breaks in the forest contribute to expanding 'the rings' of social play relations for most of the pupils in this case study. These findings are in line with the positive effects and improvements in social skills, group cohesion, communication skills, and team work found in the summarized studies of fieldwork, outdoor visits, and outdoor adventure education programmes (Rickinson et al., 2004).

Indoor and outdoor teaching

The days in the forest were prepared at school on the previous days (Tuesdays and Wednesdays) and adapted on the following Friday. Theoretical, subject-related assignments were prepared and tested in specific and bodily experienced situations in the forest to allow for the written and oral classroom adaptation the following day. These work processes may very well have created an involvement and a desire to work centred around solving the assignments in the classroom, as they most often are based on the experiences of the pupils. The desire to narrate, write and calculate in and at the forest through self-experienced story lines might have created a synthesis between both educational settings, and thereby explain why very few differences in the statements given were observed. The classroom and forest each have strong points and qualities as spaces for learning that may complement each other in a common positive process. The only statements that significantly differed in favour of the forest setting were: 'I like the teaching in . . .', 'I am careless about my school work in the. . .' and 'I disturb my classmates during group work in the . . .'. A study comparing pre-school children in one kindergarten with a traditional playground and another with daily contact to nature areas showed differences in the ability to remember and concentrate on assignments in favour of the outdoor setting (Grahn, Mårtensson, Lindblad, Nilsson, & Ekman, 1997). However, there were no differences between the two educational settings in the present project. A possible explanation for this could be the way that the teaching was organized and the mutual combination of practical outdoor experiences and increased motivation to work with oral and written texts in the classroom.

Physical activity

The forest setting naturally invites the children to be more active (no tables or chairs where pupils are expected to be seated quietly). The self-reported experiences on physical activity strongly were in favour of the forest learning environment ($p < 0.01$) as well as the breaks ($p < 0.01$) Significant differences were found on all four occasions when the questionnaire was completed. The statements are supported with specific measurements of the children's activity level on traditional schooldays and

on days in the forest (Mygind, 2007). The perceptions of the active teaching in the forest puts forward questions to the general health debate and especially if outdoor education should play a role in the Danish public school. It raises the question of whether children who are overweight would benefit in particular from a higher degree of physical activity from this combined use of indoor and outdoor teaching.

Conclusion and perspectives

Certainly, nature has an independent importance for the children, but it is not possible to precisely express to what degree. Without enthusiastic and well-informed teachers as the driving force in these types of projects there is no proof that the implementation of natures' room would have developed as described in this project. The nature class was initiated on a grass roots level with both teachers continually experiencing an ownership of the task. Both have a wealth of experience teaching different grades. Furthermore, one of the teachers is a competent outdoor guide who provides valuable insight into converting theoretical components into practice within the nature/forest setting. The end result was, of course, greatly influenced by these conditions and should also be evaluated in this light.

Based on the above-mentioned research and empirical experience, it was hypothesized that learning in an outdoor setting would have a more positive effect on social behaviour, attitudes towards teaching and learning and the physical activity level when compared to learning indoors. The main message can be summarized with the following points:

- In general, the pupils were very satisfied with school life and teaching in both the classroom and the forest.
- Estimated from the whole three-year period, the pupils were remarkably more satisfied with spending time and being taught in the forest. The pupils experienced less noise in the forest than in the classroom and correspondingly less 'sloppiness' with schoolwork and greater assistance with regard to group work.
- The pupils established more social relations during both lessons and breaks in the forest. Thus, 14 out of 19 in the nature class established new play relations during breaks in the forest compared to the breaks in the schoolyard over the three-year period of the project.
- There was a tendency for more teasing, enmity, disturbances and boredom in the classroom compared to the forest during the entire period.
- The children felt that they were significantly more active both during lessons and breaks in the forest.
- When completing the questionnaires only scattered and desultory significant differences were found over three years and this seems to illustrate a certain context dependency in the children's responses.

The present case study consists of an asymmetrical distribution of 14 girls and 5 boys and the small number of students which therefore affects the statistical uncertainty. Therefore, generalizations cannot be made from the material presented. The

results should be critically evaluated on the outlined premises. On the other hand, the results should be acknowledged in line with theories related to teaching and learning inside and outside the classroom in other studies. Finally, contributions from other research studies in the school project (teachers, parents and field observations, Mygind, 2005) do support the results and throw supplementary light on what importance nature and outdoor settings have for pupils' learning. Hopefully these results will be a pawn in the game of developing the Danish public school.

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