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Ghanaian teacher students’ view on using outdoor pedagogy when teaching natural science

Ghananska lärarstudenters syn på användning av utomhuspedagogik vid undervisning i naturvetenskap

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Preface

This Minor Field Study (MFS) was financed with a scholarship from the Swedish International Development Cooperation Agency (SIDA). The purpose of this programme is to give students the possibility of acquiring knowledge about development countries and development issues. Our hope is that this study is going to benefit not only us in our coming profession but also the teacher education in Ghana, where the study took place.

This study is also an examination thesis on the Teacher programme at Malmö University, Sweden. The data for this thesis was collected in Ghana over a period of 9 weeks and we have been equally involved in the entire process.

We came up with the idea of writing this project early in our education because we both share an interest in outdoor pedagogy and also because we would like to make a difference. The idea of sharing experiences about outdoor pedagogy from our own education with teacher students in another country came to us some years ago and we are thankful for the opportunity we have been given.

We want to thank the University of Education in Winneba for working with us and especially the department of Basic Education that has assisted us throughout the project. We would like to give a special thank you to professor Sakina Acquah for helping us with practicalities with the work and Andy Agordah for helping us with other concerns. Furthermore, we thank our supervisor in Sweden, Helen Hasslöf, for believing in our project, giving us valuable feedback and having patience with the unstable internet connection. We also want to thank our families and friends for reading and commenting on our work.
Abstract

The aim of our study is to investigate what possibilities and challenges Ghanaian teacher students express regarding outdoor pedagogy, in order to find out their view on using it as a method when teaching natural science in primary school. The teacher education in Ghana has not yet a course in outdoor pedagogy to offer their students.

The view of outdoor pedagogy that is presented in this paper shows a learning situation where the learning context is moved to the natural landscape, which opens up for practical learning and the interaction between the senses of the pupils and the environment. Furthermore, reflection and concrete experiences in authentic situations are highlighted. The research took place at the University of Education, Winneba and the method consisted of qualitative interviews and a workshop with 20 teacher students of the department of basic education. We gathered our data before, during and after the workshop, therefore our result is divided as such. The results of the analysis show three main themes of the teacher students’ view on outdoor pedagogy; the learning context, teacher’s and student’s role. In the results section, each of these themes are categorized in possibilities and challenges expressed by the teacher students.

Possibilities that can be found in the results is the fact that the learning will become practical and hands-on, it will involve the senses and therefore lead to deeper memories. Furthermore, the teacher students express a possibility for the pupils as they get an opportunity to take control of their own learning when sharing their knowledge with their peers. This affects the teacher’s role which becomes more guiding than authoritarian.

Difficulties the students expressed includes issues on behalf of the teacher in keeping control of the class due to the great number of pupils in the classes and the safety aspect with dangerous animals. Another category that recurred was the challenge with placebound prerequisites; to find a safe place suitable for the topic to teach. A difficulty on behalf of the students might be a fear of contributing to the teaching due to the lack of experience in sharing and talking in the classroom environment.

Keywords: outdoor pedagogy, outdoor education, natural science, teacher students, Ghana
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1. Introduction

Outdoor pedagogy as an educational form offers learning in an alternative context to classroom teaching. Through experience- and enquiry-based form of learning puts the student in the center as an active learner (Szczepanski, 2013). The government of Ghana (2007) states the importance of science and technology as it forms the base for interventions, manufacturing, logical thinking and action. The government claims that science is especially important in developing countries that has to develop faster in the attempt to raise the standard of living conditions for the people (Ministry of education, science and sports, 2007). The government has over the past years done a lot to improve the school system in Ghana. According to the latest education strategic plan, the government aims to strengthen the teaching and learning of science by year 2020 (Ministry of education, 2012). The syllabus in natural science for primary 1-3 emphasizes the importance of developing process skills for scientific inquiry already in the early years of school. The teaching should aim at developing students’ understanding of the world around them and they should be “exposed to situations that challenge them to raise questions and attempt to solve problems” (Ministry of education, science and sports, 2007, p. 10).

The teacher program at the university of Winneba does not offer their students a course in outdoor pedagogy. We believe that the learning environment together with the cultural context is a meaningful part of the education, where the students are able to, through scientific enquiry, explore their environment and raise questions. We are therefore curious to find out what possibilities and difficulties Ghanaian teacher students express with outdoor pedagogy as a method in primary school. In a Swedish context outdoor pedagogy is considered a method which can enable a bridge between practical and theoretical learning (Säljö, 2014) and strengthen students’ understanding in natural science. Through conducting a workshop in outdoor pedagogy with focus on productive questions, observations and critical thinking we want to find out what possibilities and difficulties the future teachers of Ghana express about using outdoor pedagogical methods as a part of their coming profession.
1.1 Definition of outdoor pedagogy

As of today, there is not one universal definition for outdoor education that can be applied in all learning contexts (Wattchow & Brown, 2011 in Mikaels 2017). One of several attempts to describe the characteristics of outdoor education is education “in, about and for the outdoors.” (Donaldson & Donaldson, 1958, p. 17). Learning in the outdoors means learning about place, in the place, about creating more knowledge and a sense of place for the places close to our daily lives as well as learning about unique landscapes such as mountain areas, forests and seascapes. Learning about the outdoors focuses on the relationship between humans and natural resources with the aim of developing empathy and a sense of responsibility for the places in focus through learning about their cultural, historical and ecological conditions. Learning for the outdoors is about the abilities, attitudes and understanding necessary for a sensible and dignified engagement with the natural world (Boyes, 2000).

Outdoor education was initially developed in the United States, in the early 1900’s, as a way of protecting the nature (Mikaels, 2017). Since then it has developed and, as suggested by Boyes (2000), divided itself into different terms such as environmental education, adventure education, experiential education and education outside the classroom. Outdoor education in the Swedish school context is often viewed as “education outside the classroom”. This means that outdoor education, in this context, is not a learning area itself but rather a method that can be used in teaching all school subjects in the curriculum (Mikaels, 2017).

The definition of outdoor pedagogy that is used in this thesis comes from “Nationellt centrum för utomhuspedagogik” (NCU), which is as follows: Outdoor pedagogy is an approach that aims at learning in interaction between experience and reflection based on concrete experiences in authentic situations. Outdoor education is a multidisciplinary research and education area that, among other things, means that the learning space is moved to social life, the natural and cultural landscape. The interplay between experience of senses and literary education and the importance of the place for learning is also emphasized (NCU, 2018).
1.2 Cultural context

1.2.1 The educational system of Ghana

The republic of Ghana is located in West Africa and was the first sub-Saharan country to gain independence. Since 1992, with the restoration of the multi-party system, Ghana is seen as one of the leading democracies in Africa (BBC, 2017). The education in Ghana is compulsory for the first 11 years; which contains 2 years of kindergarten, 6 years of primary school and 3 years of junior secondary school (see figure 1). This is referred to as basic education.

![Figure 1: Showing structure of the education system according to UNESCO (2006).](image)

With more than 14,405 public primary schools (Ministry of Education, 2015), the majority of Ghanaians have relatively easy access to basic education and they have one of the best attendance rates in Africa with an average net enrollment rate (NER) in primary school of 91.11% in the year 2015 (UNESCO, 2015). With this said, there are still many children that does not have an easy access to basic education, which can lead to a lack of participation in their education. (Ministry of education, 2015). Even though the basic education is compulsory, many students are still not attending (UNESCO, 2015).
1.2.2 Curriculum - a comparison between Ghana and Sweden

In the *Teaching syllabus for natural science (primary 1-3)* we found several parts that outdoor pedagogy can support. It is stated that the students should "develop the spirit of curiosity for investigating and understanding their environment" and "treat all resources of the world with humane and responsible attitude" (Ministry of education, science and sports, 2007, p. 2). We also found teaching activities that suggest using the outdoor school area (Ministry of education, science and sports, 2007). During the early years of primary school, primary 1-3, the curriculum emphasises that the natural science education should aim at students developing attitudes and process skills for scientific enquiry rather than factual knowledge or understanding (Ministry of education, science and sports, 2007).

"The scientific method is the means by which a scientist solves problems or seeks to gain information about events. Pupils should be exposed to situations that challenge them to raise questions and attempt to solve problems. The more often they are faced with these challenges, the more likely they are to develop positive attitude toward science, and the more likely they are to develop the relevant process skills." (Ministry of education, science and sports, 2007, p.10)

This can be compared to the Swedish curriculum where a major emphasis of the natural science teaching in primary school's early years is aimed to enable students to develop a curiosity and interest in natural science.

In the curriculum and aim of the subject of biology in Sweden it is stated that "Teaching in biology should aim at helping the pupils to develop knowledge of biological contexts, and their curiosity and interest in getting to know more about themselves and nature. Through teaching, pupils should be given the opportunity to put questions about nature and Man based on their own experiences and current events" (Skolverket, 2011, p.105).

1.2.3 Background research

To get into the local context we started by doing background research at the University of Education Winneba (UEW) and in primary schools. For more information about the methods see method section 5.1.1.
The professor at UEW strongly believes that all children must learn for themselves. She emphasized that science is very practical and that they therefore form all activities at the teacher education to be practical. When talking about teaching methods at UEW she informed us that the education is based on child centered methodology, pedagogy of mutuality and constructivism. She therefore proclaims teaching where the children are active and able to seek knowledge for themselves. Furthermore, she highlighted the importance of critical thinking when learning science.

The teachers at both of the primary schools performed the lessons in front of the class with the children quietly observing and only a few of the children were taking notes. The communication in the classroom always lead from teacher to students except in the end of the class when the students were given the opportunity to ask questions. The children are often asked to repeat sentences and words that the teacher writes on the blackboard and this is something that they have to do several times all together. Furthermore, the students got awarded with applauds if they answered the teacher’s questions correctly and misbehaving could lead to the teacher beating the student with a stick on the hands, legs or on the head. A big difference that we noticed in the two different schools was the number of students in the classes. In the public school they were 69 and in the private they were 14. This was a normal amount of students in both of the schools, due to the school fee for private tuition. Furthermore, the class 3 at the public school had an age variety from 8 to 16 years and the class at the private only differed from 9 to 11. The wide variety in age in the class at the public school is due to the fact that the students need to pass an exam by the end of each semester in order to continue their education. In both schools, public and private, there was only one teacher in each class, even though there is a big difference in the number of students. The science lessons revolved around factual knowledge and instrumental learning and was based on government-based textbooks. The classrooms had benches in lines facing the desk of the teacher. Some posters, along with the blackboard, represented the classroom environment as a whole. The environment overall made it hard for the students to interact with each other or the classroom environment, see picture in the Appendix (p. 43).
2. Aim and research questions

The aim of our study was to investigate how teacher students, at the University of Education Winneba, experience outdoor pedagogy as a method of teaching natural science related to primary school 1-3. To clarify this, we investigated what possibilities and challenges Ghanaian teacher students express regarding using outdoor pedagogy as a method after being part of a workshop of outdoor pedagogy. We also wanted to find out their previous experiences in outdoor pedagogy.

The research questions of the study are as follows:

- How do teacher students at the education program at the University of Education Winneba experience outdoor pedagogy as a way of teaching natural science in primary 1-3?
- What possibilities and challenges do the students express with using outdoor pedagogy as part of their coming profession?
3. Theoretical framework

Outdoor pedagogy is based on a view of learning where the pupils can interact with each other in an authentic outdoor environment. It is a social, explorative pedagogy where learning is situated in an authentic, practical context and consists of an interaction between exploration and reflection. This correlates with the view of learning presented in a sociocultural perspective where learning is considered a social activity. The true development of thinking is not from the individual to the social, but from the social to the individual” (Vygotskij, 1986, p. 36). Outdoor education is described by most researchers as a communicative pedagogy where learning takes place in groups and builds relationships through common experiences and is therefore based on the sociocultural learning theory (Säljö, 2011). In the article Outdoor education & science achievement, Rios & Brewer (2013) advocates the use of communicative learning in students’ zone of proximal development (ZPD) as a way to encourage them to critical thinking and meaningful learning (Rios & Brewer, 2013).

Brookes (1991) argues that how outdoor education is understood, is relative to the learning context. This goes in line with a pragmatic view that outdoor education is relative to time and place. The pragmatic theory highlights the interaction between the student's experiences, the content of the school and society. Another aspect of the pragmatic concept of knowledge is that theory and practice are seen as an indivisible entity as they are integral parts of human actions. Without practical experiences theoretical perspectives cannot be understood and without theory you cannot comprehend the practical (Lindberg, 2012). Outdoor education is based on the thought that practical methods increase the learning in the student - “learning by doing” (Dewey, 1916). The schools of Ghana have not applied this way of learning where theory and practice interact. Instead the teaching is dominated by abstract teaching indoors using textbooks. This teaching may benefit from learning in a context where theory and practice are parts of the actual teaching. Outdoor pedagogy can enable a bridge between the practical and the theoretical (Säljö, 2014).
Furthermore Dewey (1916) already in 1916 emphasized the importance of critical thinking. In outdoor context the individual can gain new perspectives on the reality, but it is in collaboration with others we build the prevailing reality of the world and ourselves.
4. Outdoor pedagogy in a global context

In this section we will list some of the previous research in the field of outdoor pedagogy. The research presented in this section represents studies from different cultural settings such as Israel, South Africa as well as USA and Sweden to give examples of how outdoor pedagogy is experienced and used in different parts of the world.

Andersson & Szczepanski (2015) argue, based on several studies in Sweden, that place-based teaching using outdoor environment can serve as a bridge between theory and practice, through enabling a more concrete connection to the classroom education that is more theoretical. Dahlgren & Szczepanski (2004) show in their studies that the outdoor-based learning opens up for possibilities in combining practical and theoretical understanding through direct experience (Dahlgren & Szczepanski, 2004). This is supported by Mygind (2009) who conducted a study on a primary school class in Denmark that integrated outdoor pedagogics in 20 % of the teaching for three years. Results of the study show that having a common outdoor experience created a desire for the students to work theoretically within the field in the classroom. The combination of working methods may have created a synthesis between the two learning environments, outdoor and indoor (Mygind, 2009). The results in Mygind’s (2009) study also shows that the students' social relations and the classroom climate were positively influenced by the outdoor pedagogy. Tatarchuk and Eick (2011) supports this through their research in Canada and shows that students learning improves if text-based learning in the classroom is followed by an exploratory working method in an outdoor environment.

Outdoor pedagogy provides the ability to a bodily learning through the interaction between the senses and the environment and therefore reinforces the knowledge the students get in the classroom (Szczepanski, 2013). The outdoor environment offers hands-on experiences and gives the pupils’ an opportunity to see, hear, feel and touch their close environment. Through stimulating the senses of the pupils’ their memory capacity increases (Waite, 2007). Outdoor education also provides an opportunity to create shared experiences outdoors together with the students (Szczepanski, 2013).
Ferreira (2014) has conducted a study in South Africa where teachers participated in a project situated in an outdoor setting in an attempt to educate the teachers and by doing so improving the quality in their education in natural science. Results show that through the workshop the teachers gained confidence to do similar activities with their pupils. The teachers could also see the value in changing their teaching methods and emphasized the importance of seeing the objectives of teaching and working hands-on, “we know learning by doing is better, but we do not always have the ideas to do that” (Ferreira, 2014, s.9). They could also see changes in the pupils’ behaviour in the outside environment; “some were scared and maybe we saw that some we did not know to be strong were strong” (Ferreira, 2014, p.11). When asked upon what they had learned through the workshop “most of the teachers indicated that they had developed their observation, identification, communication, investigation and problem-solving skills.” (Ferreira, 2014, p. 9).

Furthermore Ferreira (2014) concluded, in correlation with Ferreira, Ryan & Tilbury (2007), that teachers hold the key to change in schools.

Strotz & Svenning (2004) present an issue with the teachers who might not have a good self-esteem outside. When the self-esteem within the teacher is stronger in the classroom environment than outside they therefore might be reluctant to use outdoor education because they are afraid of losing control. The results also shows that there are possibilities in greater meaningfulness in education if the learning environment does not give everything away. However, this requires that the teachers have the confidence not to be the one who has all the answers but rather dare to cooperate with the students to find answers together.

Carrier, Tugurian & Thomson (2013) present similar research from USA that shows that uncertainty within some of the teachers’ relation with nature leads them to not feeling safe or comfortable in teaching outdoors in science. This can be compared to the teachers in Ferreiras (2014) study where some of the teachers felt intimidated by the thought of the outdoor experience, they felt scared because they did not know what to do or expect. The results of Szczepanski (2013) study show similar results. Many active teachers lack the natural relationship to the local environment, which makes it difficult for them to convey it to their students.

Tal & Morag (2013) has conducted a longitudinal study aimed at understanding the current challenges a school in Israel meets with the inclusion of outdoor education in the
education. The results of the study shows three key factors that influence the effect of outdoor education at school. The first was the tension between the school's traditions and the ambition of the new teachers. The other was conflict between new and older teachers in school and the third was the time aspect; that outdoor education took time from other content in the curriculum. The results of the study shows that “the teachers struggle with high stake assessments more than in the past, they feel under pressure for accountability, they work hard, and the field trips, in the current form that attempts to maintain the “old tradition” are difficult to handle.” (Tal & Morag, 2013, p. 23). Despite clear intentions to include outdoor education at the beginning of the project, the results of the study show that the teachers did not feel that they had neither the time nor the skills to include outdoor pedagogy as part of their profession (Tal & Morag, 2013).

Lack of resources and stress to meet the requirements of the content in the syllabus is highlighted in several articles as critical aspects of introducing of outdoor pedagogy (Carrier et al., 2013; Mygind, 2009; Tal & Morag, 2013). The location of the school can be crucial for the outcome of outdoor pedagogy (Szczepanski, 2013).
5. Method

5.1 Procedure

Our research in Ghana was for a period of nine weeks. In order to obtain an understanding of the cultural context we started our project with doing background research. The background research gave us a valuable insight into the school system of Ghana. After the background research we conducted five qualitative interviews. For the qualitative interviews we chose five science teacher students from the basic education programme; teaching from kindergarten to junior secondary school (see figure 1). After the initial interviews we conducted a workshop that we used as a tool to introduce outdoor pedagogy as a method and to share an experience of outdoor pedagogy to use in further discussions. After the workshop we interviewed the same five teacher students again to explore what possibilities and challenges they express regarding using outdoor pedagogy as a method in natural science. The material gathered through the interviews was recorded and later transcribed and analysed through content analysis according to the themes in the interviewees answers.

5.1.1 Background research

To get into the local context we started by doing background research. Firstly, we started by interviewing a science professor at University of Education Winneba (UEW) to explore what concepts of science they feel is important to teach at the University. We also observed natural science lessons in primary year 3 at one private school and one public school, both located in Winneba. The lessons in both schools were 45 minutes long. We were observing the lessons in silence from the back of the classroom. The data from our observations was compiled in field notes.

5.2 Qualitative interviews

As our aim is to gain an understanding of Ghanaian teacher students’ view on outdoor pedagogy our method was to conduct individual qualitative interviews. In qualitative
studies, it is assumed that there is no objective truth, but that reality can be perceived in many different ways (Alvehus, 2013). We are not only interested in finding out if and how outdoor pedagogy is viewed upon in the teacher education programme, but also ask the question why this is. A qualitative method gives the opportunity to find out the interviewees’ perceptions and views (Alvehus, 2013), which correlates with the aim of our study. The interviews were semi-structured with pre-written questions which we used as a base to form our interview from (Bryman, 2011). We chose to interview the students individually to allow us to go into depth in each interview.

5.3 Selection of sources

According to Ministry of education (2015) Ghana had 14405 public primary schools and 6904 private primary schools in 2014/2015. For our observations in primary school we therefore selected two different schools. We could choose among different schools in Winneba and decided on one private and one public school in order to see the differences and get a wider understanding of the school system in general. We selected the schools based on their location, a comfort choice (Bryman, 2011). The students were able to show interest for the project through social media. A professor selected the first students that showed interest. The selection was not based on gender, grades or socioeconomic status. For our workshop we selected a number of students we found would be appropriate for the activity. Apart from the 5 students who participated in the interviews another 15 students could apply for the workshop.

5.4 Literature search method

We based our selection of literature on the aspect of relevance for our paper and used keywords such as outdoor pedagogy, natural science and primary school in our search process. We used the data bases Libsearch, Google Scholar & ERIC. We also got some recommendations of literature from our supervisor. Furthermore, the results of the literature search were selected in order to show a wide range of cultural settings. The articles presented are not representative for the whole research field about outdoor pedagogy. The fact that our SAG (first cycle degree thesis) also was about outdoor pedagogy made it
possible for us to use many of our references from that study which, due to our limited time for this research, has been valuable.

5.5 Ethical aspects

Through our interviews, we want to find out what possibilities and challenges the students express regarding using outdoor pedagogy as a method in their future profession. When conducting interviews, it is important to be aware of the structures that define the relationship between the interviewer and the interviewee and to make the environment as comfortable as possible for the interviewee. All interviews come with asymmetries in the balance of power between the interviewer and the interviewee (Kvale & Brinkmann, 2014). The consequence of this is also an important aspect of the structural problems with conducting interviews. To try to reduce the effects of this ongoing structural problem we tried to conduct our interviews at a safe place for the students. We went to a place of their choice, at north campus where they study. Before we started the interview, we explained the purpose of the interview and that every answer is anonymous. Furthermore, we also explained that there is no right or wrong answer but that we are interested in their thoughts and view. We asked the interviewees to explain more throughout the interview and encouraged them to think further on the subjects. We were open about the aim of our project throughout. “As always, you should be honest and open about your investigation” (Hedin, 1996, p. 5). In order to assure the anonymity of the students we chose to name them in the result section based on some of the most common names of Ghana.

5.6 Workshop

After the initial interviews we conducted a workshop together with 20 Ghanaian teacher students. The workshop was designed based on our view on outdoor pedagogy with the purpose of functioning as a common reference framework and starting point in the interviews. It was also important for us to choose our content in the workshop according to what we believe could be suitable for the Ghanaian school system and useful for the students participating. After observing the lessons, interviewing the professor at UEW and
studying the syllabus we therefore saw to it so that the workshop should correlate with the view of children represented in the schools and the cultural context of Ghana.

The workshop contained three main parts. The first part was about giving students the opportunity to explore their surroundings and choose items that are either living or non-living in their close environment. In the curriculum and syllabus for natural science for primary 1-3 it states that students of primary 1 should be able to “recognise the great variety of living and non-living things and their interconnectedness in nature” (Ministry of education, science and sports, 2007, p.17).

The second part was that the students, in groups of five, located a number of items or materials in their close environment. They then sorted the items into different categories based on characteristics of their choosing. In the syllabus it reads that students should be able to “group materials into living and non-living things” and “differentiate between things that are living and things that are not living” (Ministry of education, science and sports, 2007, p.17).

After the sorting the groups got to ask productive questions based on their material and lead a discussion with the entire group. Productive questions are questions that stimulates the children's curiosity and makes the child active, it offers closer examination and guides the children to the answers (Elstgeest & Harlen, 1996). The curriculum for primary 1-3 (2007) places a major emphasis on that the students should develop curiosity for investigating and understanding the environment, develop critical thinking and skills, habits of mind and attitudes necessary for scientific inquiry. We had this core content and the thought of productive questions in mind when we designed the workshop. For more information on productive questions see Appendix (p. 44-46).
6. Results and analysis

The aim of our study has been to investigate how teacher students, at the University of Education Winneba, experience outdoor pedagogy as a method of teaching natural science related to primary school 1-3. In the data we focused on which possibilities and challenges the teacher students expressed after being part of a workshop of outdoor pedagogy. We also wanted to find out their previous experiences in outdoor pedagogy. The results of the analyses shows three main themes of the teacher students’ view on outdoor pedagogy. The first theme was outdoor pedagogy in relation to the learning context, which includes the learning environment and learning process. The second theme concerns the teacher’s role, how it was portrayed in the classroom setting and in an outdoor environment. The third theme was the student’s role and how it changes in an outdoor environment. Each theme was then analysed according to which possibilities and challenges that were expressed by the teacher students. Finally, we analysed what possibilities and challenges the teacher students expressed in relation to implementing outdoor pedagogy in Ghana. The interview questions we based our interviews on are found in the Appendix (p. 47-48).

6.1 Initial interviews

6.1.1 Learning context

During the initial interviews we were curious to find out the teacher students overall view on learning and on the learners. The common view was a learning process where the children move from basic knowledge towards a more complex understanding, which means that teaching should be in line with the age of the pupils.

Abena: “Learning develops in them from known to unknown. You see they do not know. So what they know you build upon it. As they keep on going they know more. And you have to also consider the age limit of the learners. You cannot give them something that is above them. “

Kofi: “I have to follow from the simple to the complex. This will rather help the child to develop his or her mind. “

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6.1.2 Teacher’s role

Talking about the teacher’s role in this learning process all of the students viewed the teacher as superior and the only one who can spread knowledge in the classroom. They therefore express the importance of the teacher being well-prepared and knowledgeable.

Kofi: “I would say you the teacher being knowledgeable. If you are knowledgeable and you prepare, as a teacher you prepare before you enter the classroom because without preparing you can go to the classroom and just misbehave. So you need to prepare you go to the classroom, you the teacher must be knowledgeable than the student because a student can ask any question that you need to answer the student. So if you’re not able to answer the student means that you are not really a good teacher.”

Furthermore, they all expressed the importance of knowing the strength and weakness of your pupils.

Kofi: “With the strength and weakness of the children you will be able to know those that they’re good and those that they’re not good. Then you group them in the classroom, so you group those that are brilliant at the right side and those who are not brilliant on the left side so that much a time you can concentrate on those that they are not good in the classroom.”

One of the teacher student stands out, with a different view of the pupils. The student describes the problem of having pupils with different capabilities as an opportunity. The student wants to use these differences as a point of departure to meet each student at their level and to motivate the pupils to study.

Adwoa: “that is what is happening in Africa, if you don’t perform most teachers will even insult you and they will not even involve you. Every question they throw it at the brilliant one and if the question is answered you move forward without even guiding those weak ones.” ... “This is what is killing students because as a teacher you must be there for all. So you must check each and every one, plan a lesson that will cover all of them.”

6.1.3 Student’s role

While the teacher is described as authoritative and knowledgeable the student’s role is to absorb the knowledge passed on from the teacher. This also affects their ideal teaching environment where noise should be limited and the teacher in charge.
Fifi: “When teaching you at the moment you are my student and I... You see that even that I may not know more than you or I will not be more knowledgeable than you but in that particularly point I’m impacting something that I think you don’t know and so I think you would be less knowledgeable in that area. So I see myself to be superior and you to be the person that is supposed to humble themselves to me to impact the knowledge.”

Abena: “I like teaching in the morning.” “That is the time that everything is quiet. There is no talking and whispering. As you go we refresh our minds so as you come to school in the morning or that you is power to transfer the children so they can easily take it or absorb it and learn.”

6.1.4 Previous experience of outdoor pedagogy
Throughout the interviews it became clear that none of the students had heard about outdoor pedagogy before. After explaining the basic foundations of outdoor pedagogy, we discussed potential possibilities and challenges that they could think of.

Possibilities
Two main categories were found concerning possibilities of learning context and the student’s role. The first is the practical aspect of the teaching method with hands-on learning and the opportunity for the pupils to interact with objects in the outdoor environment in order to create personal experiences. Secondly, they emphasize the importance of seeing and feeling what they are learning about.

Abena: “It will allow the students to be able to know hands-on. To know what you are teaching hands-on. As they are experiencing the teaching they got to know it.”

Fifi: “Because I believe that your pupil they love to manipulate things especially outside. Play around and all that. So if you give them an opportunity to play around in science and all that I think the lesson is going to be more effective than always base it in the classroom.”

Adwoa: “So the understanding is more captured at field trip than in the classroom. Because the materials is there for them to see, in the classroom it’s mostly talking.”

Kweku: There is a difference between somebody hearing and then seeing. If you have a sense of it you can speak of it more. Because the kids would grasp anything that is being
taught to them. Since it is something they can feel, something they can touch, something they can interact with. So the learning will be achieved. Much achieved.

Challenges

When discussing challenges, the students could think of many challenges on behalf of the teacher’s role such as safety, placebound prerequisites and losing control of the class.

Adwoa: “Okay, there are some safety measures that... even in going out there to teach plants you know Africa here snakes and dangerous flower, so you need to first of all monitor the place very well.”

Abena: “The difficulties. That is where you wouldn’t find the material that you want to teach with. Maybe in your location or your locality they are limited. Those materials are not there. So that can be a difficulty accessibility. That can be a difficulty.”

Kweku: The way you are teaching them is not a lecture method and they are quiet and you are teaching them and it becomes an activity with the like let’s do something let’s practically let’s do something and it becomes you. No, so they disturb other classes. They might disturb the environment.

6.2 Implementation of workshop

The workshop consisted of three main parts. The first part gave the students an opportunity to explore their close environment and pick any three items of their choice. In this part of the workshop the students were able to feel, learn and reflect upon their close environment. Things that they gathered were, for example, different kinds of leaves, grass, glass bottles, plastics, rocks, roots, paper, anthill, samples of soil.

The second part of the workshop was a group discussion in which the students sorted the gathered materials into different categories. At first almost all of the groups divided their items according to if they were living or non-living materials, in line with the topics in the syllabus. We therefore tried to challenge them to come up with other ways of sorting the objects. We asked them to make fewer or greater number of categories, if they could think of other ways of grouping the materials, making sure they knew that we did not want them to sort the items in a particular correct way, but instead according to their choice as a group.
After the sorting we asked the groups to ask productive questions based on their material and lead a discussion with the entire group. Questions that the students asked during the workshop were “what if we put this paper notebook in the pile with living materials?” This question lead to a discussion about natural and artificial materials where the students questioned each other. Some meant that paper comes from trees and are therefore as natural as a twig. Others meant that a paper is artificial and the branch natural.

Another question that came up was “what happens if we put the plastic rubber into the pile of materials that decompose?”. This lead to a discussion about whether or not plastic decompose in the nature. None of the students were sure of the answer and they compared it to rocks and said that it probably will decompose in a really long time. One of the students firmly believed to have heard somewhere that plastic don’t decompose. We did not give any answer but encouraged them to follow up the workshop with research. We also asked them if there is any experiment they can do together with their future pupils to find out. They did not have any ideas on that.

A third question that came up was “what happens if we put the glass bottle together with the stone?”. This lead to discussions about what glass is composed of. Most of the students were sure that glass is glass and are made out of glass. One student told a story about a stone that was heated to many, many degrees and then became glass.

6.3 Post workshop

During the interviews after the workshop the teacher students were asked to express their thoughts about the different parts of the workshop. They also expressed what possibilities and challenges they could see in using outdoor pedagogy as a part of their coming profession when teaching natural science in primary school. In the end of this section we present data regarding if and how the students believe that outdoor pedagogy may fit into the context of Ghana in relation to the current school context and curriculum.

6.3.1 Learning context

Possibilities
The two main themes regarding the learning context in outdoor pedagogy remained the same after the workshop. All of the students highlighted the practical aspect and the
possibility for the pupils to meet the environment and the material hands-on and get to manipulate it themselves. They could also see possibilities for the pupils learning when they are able to use their senses during the lesson as they became active learners.

Abena: “It will improve learning when you send children outside to experience hands-on activities, it will really improve learning. Why? Because as I said earlier you can teach a lesson in the classroom, maybe a topic you have chosen to teach in the classroom. But it would be better if the children know more about what you are teaching, that is where you send them outside, to show them “this is this”. They will be able to what? To see. And when they see it improves their learning. Yeah, it improves their learning.”

Kofi: “What they see in the environment. What they feel the thing. How they can just use their mind to just rest on thing that is what they also want. (...) Most at times when you go to the classroom and you just see what you are just teaching. Just rattle and then go. Much of the children will not understand what you are really talking about. So I think really it’s better that just help them to just have a manipulative skills then that they can just feel and touch other things. So that you just help them improve in their learning.”

Fifi: “One way is that when the teacher don’t do most of the findings and bring it to students and students are you know asked to actually do most of the thinking. I think because it’s coming from them. Yeah I think it. It will go in both ways. And it’s, it’s something. I think it’s, you’ll find it educative enough. Compared to the teacher always trying to tell them so I think if. Their hands are you know made to work and find certain things. Yeah. That is how I think it’s going to be.”

Challenges
Another category that recurred was the challenge with placebound prerequisites; to find a safe place suitable for the topic to teach. They expressed the need of having plenty of materials to use in teaching in the location to achieve better learning. One student also expressed the fear that the pupils will find items that are above their knowledge and therefore suggests a stricter way of teaching outdoors.

Adwoa: “So I can build upon it by looking at the area where more variables can be identified, more objects can be identified. (...) I think that if more things can be find or discovered there, what we did yesterday had been more enhanced.”
Kofi: “And this idea is how to get much of the things in the environment. (...) Cause most of the times it’s really difficult to get some of the things in the environment to use it. So with this you need to also do much extra effort.”

Abena: “Okay, what I would do differently is I would also pick certain things that are within their range that they can learn in the classroom, within their knowledge range. You see, using a soil can help them, yeah you can use soil to help them teach. With the plastics and all that I think it’s a little bit above them, so change that within their knowledge of understanding. So let’s say today we are learning about soil you send them outside, I gather some samples of soil; clay soil, loomy soil, sandy soil. I show them and I give them a little on the characteristics, maybe one or two because they are very young so they need not to know a lot at least something that is small for them to know. As they grow they’ll build on it so with their age I think I will give them some small characteristics one or two about it and we move on.”

6.3.2 Teacher’s role
Possibilities
The students could see a change in the teacher’s role when the lesson is being held outside.

They compared the teacher’s more guiding role in outdoor pedagogy to the superior role in the classroom setting.

Kweku: “The interactions between the teacher and the pupil reduces so that the pupil will interact with themselves and then the teacher only facilitate, ask them questions “why that, that, that...”. It relieves the teacher; the teacher only guides you. By not coming there and bring a whole notebook “you are doing that, that...” No, but the teacher only becomes a facilitator that guides the group. She has researched, she has planned so now it’s left with the pupil to also do.”

Fifi: “I think if that is being used things have, a challenge to bring up productive questions out of their own findings. I think it’s really going to help them. Yeah, so you guide them when they are find some difficulties. Try to guide them so that they come out with this productive questions.”
Challenges

When discussing challenges on behalf of the teacher when using outdoor pedagogy in primary school the students expressed the issues with safety and controlling the class due to the size. The first category of challenges is the number of pupils in the classes and the issue with control. They express that if the children are many the teacher’s focus might turn towards disciplining and keeping control rather than being able to guide the students in their learning process.

Adwoa: “First of all the number. The number of children taken out there. Because when the children are many the.. Even the controlling itself is one. Then because they are many the teacher may not get access to each. So some will take that advantage use it as a playing time.”

Adwoa: “The teacher might lose focus when the children are many. Because instead of maybe directing them and all that because some people are disturbing you have to always. Because they are many and they are disturbing you have to move. Turn them to keep quiet so you may even lose focus.”

Secondly the students expressed the safety aspect with going outdoors as a challenge due to dangerous animals and plants. They discussed that parents might not approve of outdoor activities due to the risks on behalf of the students. The responsibility of the teacher therefore increases in the outdoor context.

Kofi: “That is a really challenge. So anything can happen so you as the teacher you need to be able to be well sure of the place that you are sending the students to. You need to be able to make sure that nothing happens to the children outside.”

Fifi: ”I think that will be sort of dangerous because you have to pass through some bushy areas before and all that. And students you know there are so many things that can happen to them. Talking about certain animals like snakes and other things. So I think even though that would be very appropriate. That environment is more or less dangerous to the students.”

Kofi: “One thing I can say is that when you send children outside in the environment and something happens to them. We are not saying that something should happen to them but actually something could happen outside. (...) Let’s say for instance we were in the bush a snake can just enter.”
6.3.3 Student’s role

Possibilities

When discussing the workshop one of the main aspects of the discussion was the possibility of interacting and discussing shared experiences. In the background research and previous interviews, it became clear that group discussions between pupils is not commonly practiced in the primary schools in Ghana. Despite this the result shows that all of the students point out the possibility of learning from each other as a positive outcome of outdoor pedagogy.

Kweku: “The kids, out of what they have gotten, bring what is in them for others to benefit. Because not the same idea run through all of us, it runs through individual, so what one person bring out will be relevant to another person and it will help us learn a lot.”

Fifi: “Sharing ideas among themselves so that is another point. (...) They will not talk in front of, let’s say sometimes some pupil is very afraid to talk to their teachers. If you ask some questions and all that. So if you are raising these questions and all that I think it creates that sort of confident. That is done with the pupil that you don’t talk with their everyday, so I think (...) I think it becomes more effective.”

Furthermore, while discussing the productive questions they highlighted them as one of the most important parts of the workshop as it promotes critical thinking.

Adwoa: “When the productive questions came. We made to think far ahead. (...) Without the productive question we should have just gathered it and then looking at the physical characteristics. But the productive questions push us to think far from just looking at the materials and just talking about the features and other things. So the productive questions where very useful. In fact they were the most useful tool. What we did yesterday.”

Kweku: “It allowed us to think. We didn’t get every answer but it allowed us to think. (...) So it allowed everybody to think, so the productive questions make the people think and come out with it.”

Abena: “The possibilities are, in fact it will help the children to think, they will think critical thinking because as you send them outside to learn, you give them questions on that particular experience, in fact they will be able to think and bring out answers to those questions.”
Challenges
The students express challenges with pupils not being confident enough to share their ideas with other pupils, due to the teaching they are used to.

Fifi: “Some of the students are less say... not feel that confident to share certain ideas that you know they know. Especially when they are to discuss things among themselves. (...) Cause maybe the thing you are thinking about might help the lesson. Because the teacher is not there to, you know, bring certain things out and the students not thinking about these things they know that maybe they will try to keep them.”

Kofi: “Another challenge can also be when the learners... are not ready to give what they have. Once the learners are not ready to give what they have even though they’ve seen the things in the environment. But they are not able to give what they have. It can also become another problem. So you should be able to let them feel free. They should be able to come up with anything. Once they are able to come up with anything they have in their mind. That one will easily facilitate the learning. But once some of them feel shy and they are just moving up and above. That one I think will drawn the learning situation outside.”

6.4 Outdoor pedagogy in the context of Ghana

When asked if, and how, they believe outdoor pedagogy may fit into the context of Ghana the students describe a school where teachers are restricted to classroom-based teaching with textbooks and exams.

Kweku: “I don’t remember the number of times we went out school. Everything is in the class, “hey, sit down, take your notebooks”, that is that. Outdoor learning... it’s not in Ghana.”

Abena: “You see with the curriculum we use here in Ghana, even though we are expected to take children outside more times it is not done. Teachers are restricted, they only teach in the classroom. They give the student what they are supposed to know in the classroom, but it should have been better if you send them outside. They have to know more, that one will also be better because if you’re restricted to only the classroom children will know, they will learn but there are certain things they have to see on their own and touch it.”
Kweku: “It could work, it can work. But I don’t know why in our country we do not know that. Everything is book. Book, book, book, apart from book I don’t know. And then with the book also you have a guideline, you have a guideline you are supposed to move from here to there. So if that line is not cut, you can’t practicalise that one, it becomes a problem. Because at the end of the day they are not going to ask you to make something practical, you are going to write it. So the teacher will feel like “oh let me put this aside and then just teach them the book-one because that is what they are going to write exams on”. And it’s really affecting us. Everyone is supposed to chew and run and forget it. You read everything, and you go and write it for the teacher then you yourself don’t remember it. But if this work was supposed to come into it, every child will benefit.”

6.4.1 Teacher students’ view of the curriculum

The teaching in Ghana is strictly tied to the curriculum which presents topics, aims and goals for what the students should learn together with teaching suggestions for the teacher. When viewing the syllabus for natural science in primary 1-3 we could find several topics that outdoor pedagogy correlates with such as the teaching of plants, animals and soil. We could also find that students should develop process skills and attitudes such as planning and designing experiments, observing by using “the senses, the microscope and other tools to make accurate observations of phenomena.”, communicating their results, analysing by “identifying the parts of objects, information or processes, and the patterns and relationships between these parts.” and classify objects by “grouping objects or events based on common characteristics.” (Ministry of education, science and sports, 2007, p. 11)

This view can be put in contrast to the students view of the curriculum. When asked upon if they feel that outdoor pedagogy correlates with the syllabus for natural science primary 1-3 the students could all see possibilities but expressed that the school system requires a change for it to be used in reality.

Kweku: “Our curriculum doesn’t bring out those things. It gives you a topic, go and teach this. So when you ask them “go and pick whatever you want to pick” will it work?”

Kofi: “For me, I always say that the curriculum is, is a little bit structured. And there is not much practical in it. (...) You will only see the less practical materials. So I think that if more practical is being include it could help more children.”
Kofi: “It doesn’t fit the curriculum now. It doesn’t fit the curriculum and I’m hoping that with time they will understand it and introduce much practical aspect to the curriculum.”

Two of the students express a different view about the content in the syllabus.

Adwoa: “The curriculum is more open but due to one or few reasons most of the teachers don’t really focus on what the curriculum says.”

Fifi: “Yes. I mean. Looking at the syllabus for instance. There are certain parts that require the teacher to engage students in certain activities. And also challenge teachers to come out you know certain ways you can help students learn. So I think that it works very very well with the curriculum.”
7. Conclusion and discussion

7.1 Conclusion

From the analyses of the data three interrelating themes (1, 2 & 3) constitute the teaching situation as a whole: Learning context, teacher's role and student's role (figure 2). It can be concluded that the teacher students' view of the teaching situation as a whole as well as within each of the interrelated themes, have different outcome when comparing traditional indoor teaching with the outdoor pedagogy of the workshop.

As can be seen in figure 2 the three aspects interrelate and affect each other in the learning situation. When one of the three aspects change it will affect the others. Our result shows that when the learning context is moved outside of the classroom and, in agreement with Szczepanski’s (2013) study, becomes experience- and inquiry-based it puts the student in the center as an active learner, therefore also changing the students’ role in the teaching situation. This leads to a change in the relation between the students’ and the teachers’ role. The students’ role changes from being a recipient of knowledge in the classroom environment to becoming a co-creator and taking responsibility for their own learning process in the outdoor environment. The role of the teacher changes in accordance with the learning situation and the role of the students. From being the authoritative mediator of knowledge, the teacher takes on the role of guiding the students in their learning process. This leads to a more free and open teaching environment which, expressed by the students, lead to increased self-esteem among the pupils as well as a willingness to share their thoughts and skills to their peers. This is in line with the results in Ferreira’s (2014) study where the teachers were surprised by the change in confidence among some of the pupils in
the outdoor environment. “Some were scared and maybe we saw that some we did not know to be strong were strong” (Ferreira, 2014, p.11). Some teacher students express a challenge that some pupils in the beginning might have some difficulties in adapting to such free environment. Despite that all of teacher the students view the interactive teamwork between pupils as a significant opportunity for increased learning. Furthermore, the students express that outdoor pedagogy, through open teaching, encourages creativity, critical thinking and the pupils to start asking questions.

The students furthermore saw possible challenges with the changes of the relationship between the pupils and the teacher in the outdoor environment. They ask how the pupils learning will be affected if the teachers are unable to answer the questions of the pupils. As the student Kofi expresses it “if you're not able to answer the student means that you are not really a good teacher.”. This view of the role of the teacher and the students seems to be deeply rooted in Ghanaian society. The school is a reflection of the society and the student view represented in society seems strongly linked to tradition, despite the fact that the professor at UEW and several of the teacher students indicate a change. From this point it can be a challenge for the teacher in switching to a more guiding role.

The data also shows that all of the students show a positive outlook on using outdoor pedagogy as part of their coming profession. However, the number of pupils in combination with a dangerous environment of snakes and plants is emphasized as challenges on behalf of the teacher. All of the teacher students expressed the fear of losing control over the class as a result of going outdoors to teach. A reason for this can be the great number of pupils in the classes. The great number of pupils in the classes makes it difficult for the teacher to be responsible for and controlling the class in an outdoor environment. Comparing the number of pupils in public school classes with private school this shows an important difference. Will it be possible to guarantee the safety in bringing 69 children outdoors in the public schools or will it only be a method useful for the private schools? The question if outdoor pedagogy really can work in such a context is brought up by many of the teacher students:

Kweku: “I don’t remember the number of times we went out school. Everything is in the class, “hey, sit down, take your notebooks”, that is that. Outdoor learning... it’s not in Ghana.” “It could work, it can work. But I don’t know why in our country we do not know
that. (...) But if this work was supposed to come into it, every child will benefit.” Even though the students found it difficult to see how the method could fit in the context of Ghana, all of the students expressed that they thought the learning context should improve with outdoor pedagogy. The pupils will get a better understanding when they are able to explore, manipulate the objects hands-on and use all their senses in the learning. The students express, in line with Waites (2007) study, that exploring and creating experiences in the outside environment will make longer lasting memories.

Although the students appreciated that the teaching situation outdoors was open, depending on earlier mentioned aspects, many students expressed doubts as to how such an open teaching can work together with the curriculum and the actual school context in Ghana. From a theoretical perspective this can be seen as an uncertainty on whether outdoor pedagogy, with a more sociocultural and pragmatic view of learning can fit into a society where the teaching is strictly behaviouristic. This can be compared to the results in the Tal & Morag (2013) study that shows that the teachers didn’t feel that they had neither the time nor the skills to include outdoor pedagogy as part of their profession (Tal & Morag, 2013). The results of the study shows that “the teachers struggle with high stake assessments more than in the past, they feel under pressure for accountability, they work hard, and the field trips, in the current form that attempts to maintain the “old tradition” are difficult to handle.” (Tal & Morag, 2013, p. 23). However, all the students in this study expressed that they want to, and will, use outdoor pedagogy as part of their coming profession. This can be contrasted with the results in Tal & Morag (2013) and Carrier et al.s (2013) studies where several of the participants chose not to include outdoor pedagogy in their teaching.

Another aspect of the results that was not represented in the literature search is the fact that the teacher students stressed the issue of whether or not the location outdoors will have enough materials for the pupils to interact with. A reason for this can be that even though the aims in natural science in the syllabus can be supported by outdoor pedagogy, the content of the lessons is decided based on the topics. If the topic for the lesson is soil and the class fail to locate the right kind of soils in the outdoor environment the lesson might be viewed as unsuccessful. This also supports the doubts expressed by the teacher students
about whether teaching that is not bound to a specific topic in the syllabus can work together with the curriculum and the actual school context in Ghana.

7.2 Discussion

7.2.1 Contribution to the field
Outdoor pedagogy is a widely researched area but research in the cultural context of Ghana is yet to be found. In order with Ferreira, Ryan & Tilbury (2007) we believe that teachers hold the key to change in schools. As the government of Ghana aims to strengthen the teaching and learning of science by 2020 (Ministry of education, 2012) we hope that this minor field research can be a small step in the right direction as it might affect the view some of the teacher students at UEW have on their coming profession as natural science teachers. Furthermore, we can see a big gap in the research area about outdoor pedagogy in an African context and this minor field study can be seen as a small contribution to that field.

7.2.2 Relevance for our coming profession
As future teachers we have an important assignment. The Swedish curriculum has established that every operative school staff should promote respect for each person's own worth and our common environment (Skolverket, 2011). Furthermore, the curriculum states that the school system is founded on the basis of democracy. Today Swedish elementary schools face global challenges in a way that is unseen before. As teachers, we must therefore adapt to the society we live in and develop an including attitude towards all students. By being introduced to the teacher education in Winneba and discussing school related issues, student motivations and attitudes to educational methods, we were able to get an invaluable insight into another cultural context and school system. While experiencing their perspective on teaching this research also gave us new perspectives on our way of looking at our own teaching and things we take for granted in Swedish schools. The fact that globalization has reached primary school in form of multicultural classes can be a huge asset if we as teachers learn how to face it. As a teacher in today’s multicultural society it is of highest importance to try to understand different cultures than the Swedish.
Through this project we have received valuable insight in the teaching profession in the cultural context of Ghana which will benefit us in our coming profession.

It has also been valuable for us to go in with our thoughts and ideas about outdoor education and discuss this in a school context that is different from our own. This has given us a greater understanding of outdoor education as a method and how it can take on different forms in different contexts and conditions. As a teacher, it is important to be able to apply different teaching methods in the teaching, but also to individualise them to suit various environments and students.

7.2.2 Method discussion

Despite our efforts in reducing the ongoing structural problems, such as making the environment as comfortable as possible for the interviewee, we are aware that there remained differences and that it is not possible to even the situation completely. The fact that the students evaluated something that we brought to them might affect the validation. It is possible that the students expressed a more positive outlook on outdoor pedagogy than they would while just discussing with each other. A way of minimizing this was to conduct the workshop in order to have a common experience to discuss. Nevertheless, it may affect the result. Furthermore, the fact that the first five students that showed interest are the ones we interviewed might result in some common characteristics among the students such as ambition or curiosity. We are aware that the selection, as any selection, can have an effect on the outcome of the study.

However, we believe that the individual interviews helped us in achieving our purpose as we could show full interest in the interviewee's ideas and thoughts, and therefore could ask supplementary questions and go into depth. We also think that the individual interviews made the interviewees more comfortable with developing their thoughts without the risk of being criticized by each other.

7.2.3 Suggestions on future research

This research shows what possibilities and difficulties Ghanaian teacher students express regarding using outdoor pedagogy as a method when teaching science in primary 1-3. Due to the time limit and the extent for this research it can only be seen as a first attempt to
describe the teacher student’s view. It would be interesting to do a greater comparative study on if, and how, using outdoor pedagogy can affect the knowledge of the pupils when teaching natural science in primary school in Ghana. As the government aims to strengthen the teaching of science, more studies in this area can be of value for the country of Ghana. It could also be interesting to research the outdoor pedagogy from other perspectives such as the teachers in practice and from the pupils in the schools.
8. References


Appendix

Picture 1: A primary school classroom
Productive questions
The art of asking the right questions at the right time.

From:

Our way of asking children questions control the activity and the degree to which children are likely to bring their own thoughts and draw their own conclusions. It is important to ask the right question at the right time.

Are there "bad" questions?
In this context a bad question is characterized by being purely verbal and that it requires a wordy response, often dressed in phrases straight from the textbook. Often the answer is found in textbooks or from something the adult addressed earlier. The children scan through their memories. The fastest and most verbal is the most successful.

Productive questions
A good question stimulates student´s curiosity. It is an invitation to a closer examination or a new experiment. The children are led to where they can find the answer. They can show rather than tell the answer. “Look, this is how it is!” The children have the opportunity to examine by themselves. These questions are called "productive" because they stimulate an activity.

There are productive questions of different kinds:
1. **Questions that capture the attention**
These are the easiest type of productive questions. They often start with:
Have you seen... or Have you noticed…

_Have you noticed that the snail’s eyes are on the tip of its tentacles?_  
_Can you see if the spider has eyes?_
2. Questions that encourage the children to measure or count
How many... How long... How often...?

*How many legs does the wood-louse have?*

*How often does a corixidae come up to the surface?*

3. Questions that make the children compare
The former type of questions can easily lead to comparative type questions; is it longer, stronger, heavier, faster than…

Well thought through comparative questions can help the children to bring order out of chaos and identify similarities in variation.

*How do the seeds differ from each other?* The children are trained to see and describe various characters; shape, color, surface, size, brand, etc.

4. Questions which create activity
These questions are of great value, especially when you are to investigate the properties of a newly introduced material. They are "What if..." questions.

*What happens if you put a seed on a damp paper?*

*What happens if you let saltwater evaporate?*

*What happens if you put a willow twig in water?*

*What happens if you throw a small paper ball on a spider's web?*

An exciting continuation to the "What if..." - issues is to try to predict the outcome. The children have to guess and are thereby trained to formulate hypotheses, which are useful when we use problem-oriented questions.

5. Problem-oriented questions
When we use this type of questions it leads to a problem-solving activity. The children formulate hypotheses (guesses), plan how they can conduct an experiment, get busy to see the result and through reasoning eventually reach a conclusion. These are the most sophisticated productive questions and also the kind that most children find most difficult to work with. If a problem-oriented question comes too early, before the children have had time to get acquainted with the materials they work with, the result can be disappointing. If, for example, you ask the question "Can you show which leaves wood-louse like best?" too early, you might get the answer "No, I can’t." The children have not had sufficient time to work with them in the past.
6. Questions that make the children reason and speculate

These questions often begin with the words "How..." or "Why..." Therefore, they can easily be confused with "bad" questions; the answer required is purely verbal. The uncertain child can take it as an interrogation question. But there is no right or wrong answer to these questions. The idea is that they should get the child to think and argue freely according to its own experience. They should open a discussion where children feel free to express thoughts from their observations. By adding "do you think..." we can make it easier for the children. “Why do you think the wood-louse chose these types of leaves?”
Interview pre-workshop

1. What attracts you about being a teacher?
2. Can you tell us a little about your previous experience in teaching?
3. When do you enjoy teaching? Why do you enjoy it?
4. What would you say characterize a good lesson and good teaching?
5. How would you like to arrange your classroom and the teaching environment? - why?
6. How do you look upon development of learning in the students?
7. How do you view students?
8. What pedagogical or educational knowledge do you take with you from UEW for your future profession as science teacher in primary school?
9. Do you have any previous/personal experience of outdoor pedagogy?
   i. (In what way) Have you learnt of outdoor pedagogy during your education?
10. How would you describe outdoor pedagogy?
11. How would you define the term?
12. What possibilities do you see in using outdoor pedagogical methods?
   a. For the teacher, the learning, the students?
13. What difficulties do you see in using outdoor pedagogical methods?
   . for the teacher, the learning, the students?
14. What, in your opinion, makes science education important? Why?
15. Are you familiar with the aims and goals in the syllabus in natural science for primary 1-3?
   . What difficulties do you see in achieving these goals?
16. What do you feel is important to achieve in the natural science lessons in primary 1-3?
   . How will you make sure that you manage that?
   a. Can you see any difficulties in achieving this?
17. In what way do you think outdoor pedagogy may work in relations to science education in primary 1-3?
Interview post-workshop

1. What was interesting about the workshop? Why?
2. What did you find new or challenging with the workshop?
3. What would you do differently if you were supposed to do this workshop with children? Why?
4. Do you have any further ideas on how to improve the workshop? Why do you want to improve that?
5. Does the workshop feel relevant for your coming profession? Why/why not? (In what way?)
6. Do you think it is possible to do a lesson as the workshop we did when you work as a teacher? Describe if you have done anything similar before as a student or as a teacher student.
7. Do you see any possibilities/difficulties for the students learning in the workshop? (compared to the curriculum.)
8. What possibilities do you see with using productive questions?
9. In what way is working in groups relevant for students?
10. What possibilities can you see in arranging lessons outside?
   a. for the students, the teacher, the learning
11. What difficulties can you see in arranging lessons outside?
    a. for the students, the teacher, the learning