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**How schools manage and deliver environmental
education:
A Case Study in Lund City, Sweden**

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Abstract

This study aims to explore management and delivery of environmental education by schools. Looking at Lund city schools as a case study, this study will examine children's perception on sustainability as an outcome of implemented environmental education and the ways the children learn about environmental sustainability from schools. The nature of the research was guided by literature related to environmental education and sustainability. The research methods behind the case study are questionnaire and interview, as well as the review of applicable literature and Swedish laws and regulations. The results show that (1) school management of environmental education in Lund city lacks two important management functions, control and motivation. This brings concerns on ultimate goal of environmental education, which is children's 'brightness' in sustainability and development of their 'sustainable' behavior and thinking. (2) Although children have some knowledge on sustainability, the most of them have difficulties in combining their 'dispersed' knowledge.

Key words: children, environmental education, intelligent progress, organization management, science education, sustainability, system thinking.

ABBREVIATIONS

Naturskolan	Eco-school
Skolverket	Swedish National Agency for Education
UNCED	United Nations Conference on Environment and Development
UNCRC	United Nations Convention on the Rights of a Child
UNEP	United Nations Environmental Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFPA	United Nations Population Fund
WHO	World Health Organization

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1. INTRODUCTION

1.1 Research context

From the first day a child is born, the brain is beginning to record information. We grow, we do progress and we learn many things, we taste and experience them, we use the knowledge we gained. The way we act today based on our knowledge and experience.

Human society faces serious environmental and social threats as a result of systemic unsustainable actions and values, as the lack of understanding, information, experience and inefficient management of social and natural systems (Carson, 1962, p.69). Humans exploit the nature causing irreversible harm to environment: depletion of the world's natural resources, spreading pollution, degradation of the whole ecosystem. In response, the environment affects humans causing health problems and decreasing quality of life (WHO, 1999). The environmental threat captured scientific and public attention, creating environmental education movement. Environmental education was introduced and entered school curricula in the early 1970s through science subjects (Gough, 2004). The early formulations of environmental education aimed to raise awareness among individuals of all ages and stimulate their responsibility. Later, the goals and objectives of the environmental education have been changed to emphasize more explicitly values and attitudes, decision-making skills and actions (UNESCO, 1977).

Education for sustainable development among children is an important strategy for the long-term success in sustainability. 30% of the world's population are children and estimated increase by 2050 is at 33 million annually (UNEP, 1992; UNFPA, 2009). These children need to be provided with a broad overview of what is known, in order for both to avoid mistakes of the past and solve the occurred environmental problems. Environmental education targeted children as the main object to teach and develop 'sustainable' attitudes and behaviours.

Apart from family and friends, school is an important source of information for children. School can contribute to a child's learning about the sustainability and develop 'sustainable' thinking and behaviour. The end goal of environmental education to a large extent depends on school management and delivery of environmental knowledge. In other words the success of environmental education depends on how it introduced and managed by decision-makers.

1.2 Research goal

The end goal of environmental education at school is to make children aware of environmental problems and to pursue development of their ‘sustainable’ behaviours and thinking. Therefore, this study seeks to explore schoolchildren’s knowledge on environmental sustainability as an outcome of environmental education implemented by schools. Looking at schools located in Lund city as a case study, this research aims to explore how environmental education is managed by schools, what methods are used to inform children and how children are progressing in understanding sustainability. The overall aim of the study is to investigate whether management and delivery of environmental education by schools in Lund city is effective.

1.3 Research questions

The main question of the study is: **How environmental education is managed by schools?**

In support to the main question, the research questions are followed:

- 1. How environmental education is managed by schools located in Lund city?**
- 2. What methods employed by schools to inform children about environmental sustainability?**
- 3. What are the children’s perceptions on and awareness of environmental sustainability?**

1.4 Thesis outline

The Background (Section 2) will introduce the main object of the research – children and explain the necessity of their involvement for a long-term sustainability success. This section will also provide with short introduction of the Swedish education system. Furthermore, theoretical background (Section 3) will be used as ‘theoretical lens’ to guide this study. In Methodology (Section 4) research strategy, design and methods of this study will be described. After that, primary data will be analysed (Section 5). Main findings will be discussed in Section 6. This section will also provide recommendations for future research. Final conclusions of this study will be presented in Section 7.

2. BACKGROUND

2.1 Knowledge and progress

“Knowledge is a dynamic human process of justifying personal belief towards the truth.

Knowledge is created by the very flow of information, anchored in the beliefs and commitments of its holder. Knowledge is essentially related to human action”.

(Nonaka&Takeuchi, 1995, p.58).

There are many ways to think about knowledge. From human’s perspective knowledge in collaboration with ‘*creative thinking*’ is important for pushing us towards development in our everyday life (Smith, et al., 2000). Thousands of years ago what a man knew was roughly the same as all the other animals – skills appropriate and essential for survival and procreation, the difference between man and other species was insignificant. (Darwin, 1859). Today humans grow up in a far more intelligent environment, they are trained to live within it and go forth smarter than all forebears – the Flynn effect (Flynn, 2007). The fast-accumulating changes to human’s experienced world are the transformations keeping pace with expansion of intelligence and knowledge. This expansion involves human’s ability to combine information from different areas, reason and draw conclusions based on prior experiences. This certainly improved the man’s living conditions but threatened the environment. As a consequence at present humanity faces the worst ecological problems ever, such as the water, the air and the soil pollutions, deterioration of the whole ecosystem, and the climate change (UNEP, 2002; Stern, 2007, p.3).

2.2 Children’s involvement for the long-term success in sustainability

“... If the ultimate aim of environmental education is to sustain our planet and its resources for future generation, then a related aim must be to provide an education which encourages people to strive towards that goal”

(Palmer&Neal, 1994, p.3)

Working towards sustainability is an ongoing, long-term process whereby current unsustainable processes are evaluated and changed. Engaging decision makers on all levels to the point where they become committed to make changes within education system to promote environmental skills among the children is a starting point to activate changes in all human organizational systems towards the sustainable development.

Even though, children are not considered as an important subject in achieving sustainable development today, their involvement is ultimate for the long-term success in sustainability. If decision-makers want future society to behave in a certain way they have to consider information and education provided to children. Raising the new generation of 'sustainable society' (Manfred, 2006) requires education stimulating human's behaviour to act upon sustainability framework. Approximately one third of the world's population are children, their involvement is essential for the long-term success in sustainability. Environmental education is important support for children in the future. This education provides support to them in understanding sustainability as inseparable and essential part of their happiness and well-being. In Tbilisi Declaration children considered as the general group to teach environmental education (UNESCO, 1977, p. 12). Education provides priceless knowledge to children. They can use and carry it throughout their lives.

2.2.1 School as a formatter of child's thinking ability

"We find that the greater our capacity for learning and building knowledge, the greater our likelihood of enjoying the continuing success"

(Allee, 1997, p.8)

Schooling is important socialization process that a child goes through outside the family. Children and teachers work, play, eat, and live together for 6 hours per day, 5 days per week, and at least 180 days per year. Children spend approximately third of their conscious life at school. By grade 5, children will have spent a minimum of 5400 hours in school (Gresham, 2001, pp. 327-328). Within the school walls, they learn to read and write, to speak and listen, to count and express themselves as well as being prepared to survive in a real life with no parents and teachers. The schools and the teachers play a very important role in a child's formative years. Looking at the whole mechanism of a school functioning it seems like school is the factory of creating a new life product whereby a school's ideological stance shapes up the stances of the children. This factory is capable to change the society and better organize a city life (Stalley, 2009, p.566).

2.3 Swedish Education system

It is 10 years since education for sustainable development has been accepted as a critical step in achieving sustainable development in Sweden (Baltic 21, 2000). To better understand what strategies and methods used to manage knowledge on sustainability at schools and how

it influences the information available for children, the working mechanism of Swedish education system is presented.

The rights of the children to education are regulated by the Swedish Education Agency with reference to Universal Declaration on Human Rights. The school is compulsory for all children at the age seven to sixteen. Both public and private schools are available in Sweden. Private school is comparable to public in most areas and obeys the same regulation and laws. Swedish education system has a hierarchical structure, each level setting the limits of discretion for the next level down (Figure 1).

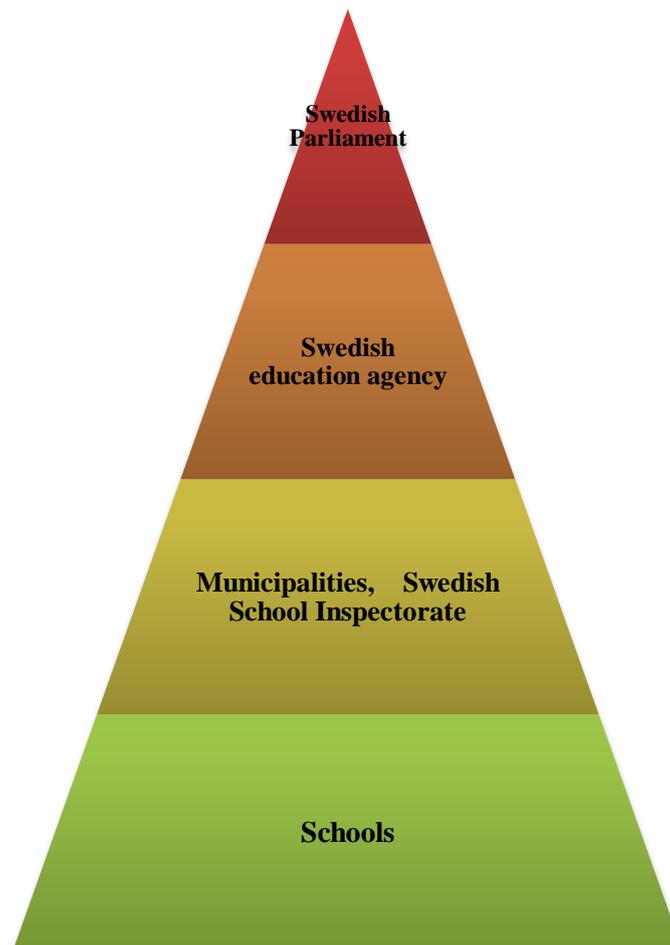


Figure 1. Structure of Swedish Education

Structure of Swedish education system as followed, there is a preschool education followed by a nine-year compulsory school and then voluntary by upper secondary schooling and university (Figure 5).

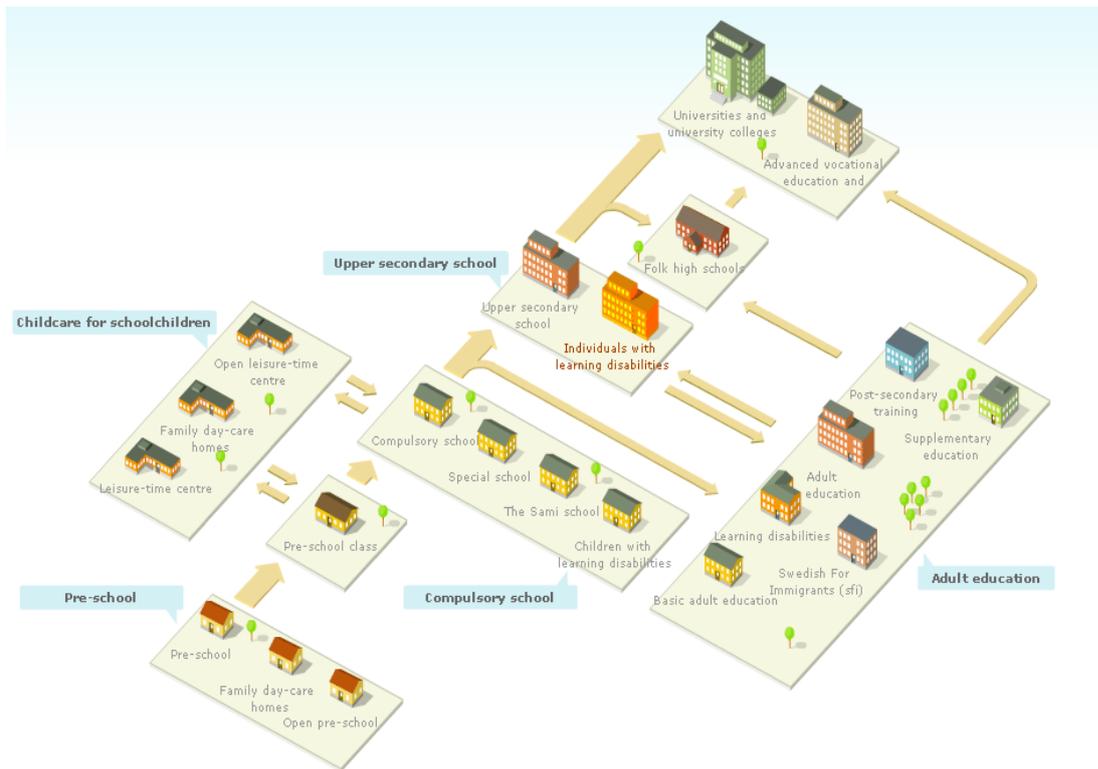


Figure 2. The structure of the Swedish Education System (Skolverket)

The focus of this study is on compulsory schools. These schools are under control of local municipalities. Local municipalities coordinate and guide mechanism of schools, located within the municipality area. Local municipalities have privileges to choose strategies and methods to implement environmental education, demanded by the Government, as well as to establish their own, do not contradicting to the Skolverket laws. Schools choose teaching methods to educate and inform children. A school is headed by principal, Head Master, supported by educational staff.

3. THEORETICAL FRAMEWORK

3.1 Organization theory

There is a prevailing belief today that knowledge is one of the most important sources of an organization's competitive advantage (Watson&Hewett, 2006, p.1). Even though many realize the value of knowledge, they do not know how to place knowledge on the wheel. For the best use of the existing knowledge it has to be effectively managed. For that purpose people form organizations to reinforce each other's abilities through a division of labor.

Organization provides a means of using individual strengths and knowledge within a group to achieve more than can be accomplished by people working individually. School is also considered as organization which is formed to profit by delivering knowledge and information to pupils. Over the years there have been many theories and models how organizations function. Business organizations are concerned with the knowledge about their products, markets, finance and other factors. A success of business organization depends on relevant information actions and ignorance the irrelevant. In case of school, the main product is knowledge, the main customers are children. For success of school-organization all relevant information to new knowledge has to be considered as well as preferences of the customers.

The researcher will examine organizational theory from two perspectives. One is presented by Webber and another one by Fayol. Webber's organizational theory is rooted to the late 19th century, to the Industrial Revolution. His organizational model is based on absolute authority, where responsibilities for workers are clearly defined and behaviour is tightly controlled by organizational policies and regulations (Webber, 1947). Webber's theories of organizations reflect an indifferent and impersonal attitude towards employees in the organization. Argyris (1957) calls that top-down communication style, whereas the top level imposes limitations on the actions of their subordinates. Though, Argyris finds this approach problematic because it ignores individual's own goals and leads to lose of motivation to make a job. As a result this organization might face inefficiency, disharmony and conflict (Argyris, 1957). Even if Webber's theory is considered as imperfect, it provides important insight into process efficiency, division of labor, and hierarchy of authority.

Fayol (1967) is another important contributor to organization theory. He introduced seven managerial functions which characterize successful organizations: generation of a plan (planning), organizing efficient use of available resources, including human resources (organizing), enlisting and supporting people to accomplish organizational goal through policies and regulations (leading), defining what needs to be done in different situations (coordinating), checking progress (controlling/monitoring), hiring people for appropriate job (staffing), motivating a goal oriented behavior (motivating) (Fayol, 1967). To adjust initial plan or goal of any organization requires incremental implementation of management operations. The success of the end goal depends on effective run of management operations. This study explores management of environmental education by schools in Sweden.

Management functions of the environmental education

Environmental education was first introduced in Tbilisi Conference, 1977 (UNESCO, 1977). The education was widely accepted by many countries, including Sweden. Environmental education was carefully planned by Swedish authorities, when Sweden signed Baltic agreement on emergent need of education for sustainable development (Baltic 21, 2000). Swedish authorities organized environmental education and took the lead of Swedish society to develop sustainability understanding and appropriate behaviors. They introduced Green Flag program as one of the methods to inform schoolchildren about environmental sustainability and develop their 'sustainable' behavior and thinking. They entrust promotion of the program to principals of the schools. Further, this study explores how schools manage and deliver knowledge on environmental sustainability to achieve the end goal of environmental education, which is children's 'brightness' in sustainability (Woodrow, 1919).

3.2 Science education with Environmental education

Many people perceive science as provider of facts about a subject. Though, science is not just collection of facts, it is rather a process of investigation and generalization of new knowledge through this process. This new knowledge pushes humans to scientific and technological progresses. Science education was included in a school's curriculum as the hope for a better world. Science education is engaging children in studies of the knowledge and methodology that comprise the modern, professional practice of science and produce bearers of new scientific knowledge. Through ages science education became considerably more complex and divergent. There are many reasons for that tendency (Stenhouse, 1979). One of those is environmentalism which is questioning the naive positivism of science introduced in school curriculum (Robottom&Campbell, 2004). In some articles, science education is regarded as the right and the only key for environmental education (Gough, 2004, p. 2). The environmental education was introduced to schools as an important instrument in solving occurred environmental problems and improving quality of the environment in the long run (The UN, 1972). Environmental education was included in school's curriculum, to provide with accurate information about environmental situation and stimulate children's attitudes and behaviour change for better. Environmental education entered Swedish school curricula through science education, despite the argument that science education is not the right vehicle for environmental education as this excludes influence of human and social values

(Robottom&Campbell, 2004). In this study, the researcher explores whether children consider a man as an object that can both harm and benefit the environment.

3.3 System thinking skill in a child

Sustainability subject is complex and multidimensional. This includes three large systems (environmental, social and economic), which further become even more complex and divided into subsystems (Rogers, et al., 2008). Dr. Karl Henrik-Robert first introduced system thinking approach to understand sustainability in Sweden in 1989. System thinking approach is completely different from that of usual or traditional forms of analysis. Traditional analysis focuses on separating knowledge into pieces, on the contrary system thinking combines studied things and in connection to other constituents of a system. In other words, instead of limiting and isolating missing parts of a system being studied, system thinking considers as many as accessible interactions and information on issue being studied. System thinking is indisputably effective in solving complexities of the sustainability issue, those that include great number of interactions and dependencies (Robert, 2002). This is the beneficial key of system thinking, to deal effectively with complex problems, involving multiple actors and issues. This stimulates human's thinking ability to the level at which they achieve needed results in resolving difficult situations featured by multidimensional and complex issues. In this study, researcher explores children's system thinking ability as a key to perceive the complexity of environmental sustainability subject and its benefits from it in the future.

3.4 Intelligent progress in a child

As has always been the case—the progress is impossible to stop. One of the most significant breaks humans made is industrial revolution. Just a few hundred years ago the artefacts of the revolution such as cars, factories, engines and many others did not exist at all. These artefacts allowed a man to live in a far more intelligent environment, made comparatively the whole living easier. However, industrial revolution worsens the environment like never before. The man is not a perfect specie and not capable to predict all the sequences from any invention or intervention. Though, with more knowledge on sustainability, the man is capable to recognize the harm from the industrial revolution and find intelligent solutions. Woodrow scale defined that process as an increase of the intelligence in amount through ages (Woodrow, 1919, p. 41). These intelligent solutions are important strategies to progress towards sustainable development. Sustainable development as a '*social choice*' of the future requires

development of ‘sustainable’ behaviour and thinking within the society (Sen, 1998). The best period to cultivate certain behaviour and thinking is at the age between five and twelve when a child is discovering and establishing self beyond the family life (Comer, 1997, p. 222). Children are considered as important objects for the long-term success in sustainability. They are important as future-decision-makers. Woodrow scales measure intelligent progress in a child in two ways, increase in weight and height. He believes that intelligent progress leads to ‘brightness’ in a child which is valuable for future ‘sustainable societies’ (Woodrow, 1919). The first scale is that of amount of intelligent increase through ages. The second is when intelligence stays constant through the life but comparatively higher in one child than in his peers. Intelligent progress in children is beneficial for their sustainability brightness in two ways. Increase in amount of knowledge through ages raising up their chances to develop ‘sustainable’ behaviour and actions and avoid recognised environmental and social system threats. The second scale is identifying children whose perception on sustainability is higher which increases their chances to better understand the complexities of sustainability issues.

Making a distinction between the two scales to measure intelligence allows us to understand how children are progressing in learning environmental sustainability. Therefore, this study explores intelligent progress in height scale among children of one class and in weight scale among children of two different classes. This study also compares intelligent progress among children of one school with their peers from another.

4. METHODOLOGY

4.1 Scientific Approach

4.1.1 Literature selection and collection

The nature of the research was guided both by literature related to the environmental education and sustainability. The process of gathering literature has been conducted primarily utilizing the various search engines available through the Online Library Database of Lund University and Google Search engine. This included access to databases such as *EBSCO*, *Wiley Blackwell*, *Science Direct*, *JSTOR*, *Lund UB*, and many others. Keywords such as knowledge, education, and sustainability were used, but, it turns complicated due to a vast number of the literatures appeared. The search to become narrower, the keywords were used

in combination with other words, for instance, intelligence and education, children and education, environmental education.

The multidisciplinary sustainability subject and the plenty of available literature allow researcher to get quite carried away. However, while selecting and collecting literature the researcher used logical ability to build the structure of the research project. The chosen literature is that which is believed the most applicable for the giving research.

4.1.2 Choice of methodology

The study employs qualitative research method as a major method (Patton, 2002). However some elements of the quantitative method occur in the analytical part of the study. The choice of subject followed by literature overview and generalization of the research questions. This research is characterized as explorative. This study seeks to explore children's perception on sustainability as an outcome of management and delivery of environmental education by schools through interpretation of that by its practitioners, teachers and schoolchildren.

Case study design is chosen as the most suitable out of the five types of research design: experimental, cross-sectional/survey, longitudinal, case study and comparative (Bryman, 2008, p.35; Yin R. K, 2003). The study focuses on Lund city area. Environmental education is chosen as the main object of the research targeting to explore children's perception on sustainability. The detailed and intensive data will be collected from two public schools located in Lund city. The type of the giving research is exemplifying whereby schools are members of the large education system. Investigated schools will provide the applicable data for certain research questions to be answered (Bryman, 2008, pp.55-56).

Despite all the beliefs that drawings method is the best way to communicate with children, this study employs interview and questionnaire method to collect data (Patton, 2002, pp.4-5). The complexity of the sustainability issue makes it difficult to express through drawings, therefore questionnaire method is believed the most suitable. This method is an element of quantitative methodology. In this study, this method is used to analyse data, received from the respondents.

Teachers and children who live and work within school walls are chosen as the main respondents of the giving study. The following requirements for respondents are established:

School-worker, teacher:

1. A respondent has to work at the targeted school. Preferable, if it would be a Head Master or Head Master's executive assistant.
2. A respondent has to be responsible for school-work coordination and management as well as scheduling subjects.
3. A respondent has to know general information about schoolchildren and their teaching program.

Children:

1. A respondent has to study in the targeted school
2. A respondent has to study at 4th and 5th grade classes

This study employs a semi-structured form of the interview out of several types accessible to researchers: structured, unstructured and semi-structured (Bryman, 2004, p.321). Each method has as advantages as disadvantages. For instance, structured interview would help to cover specific points necessary for the research. However this may inhibit the respondent to proceed interview towards what he believed is more important. The chosen semi-structured form of the interview for the given study allows respondents to freely develop their thoughts and discuss information acquired to certain topics. In dealing with children, semi-structured form of interview gives flexibility in proceeding interview. The flexibility allows the researcher to easily communicate with children by explaining unclear points to them and guiding in answering questions. The structure of the interview is based on Kvale's nine types of question: introducing, follow-up questions, probing, specifying, direct, indirect, structuring, silence, interpreting (Bryman, 2004, pp.326-328).

In this study, the questionnaire is divided into four parts: general, specific, opinion and concluding questions. The structure is organizing the logic of the data collection and makes the researcher easily follow data sequence.

The structure of the questionnaire for children (Appendix 1):

General questions. General questions are generalized in order to find out the general information about the respondent, the age, sex and numbers of hours spend at school.

Specific questions. The specific questions aim to explore children's perception on as well as awareness of sustainability. The first three questions explores children's perception on three terms (environment, pollution and sustainability) used in sustainability. The next question

aims to explore whether children consider human factor as the main beneficial or harmful to environment. the last two questions aim to explore children's perception on sustainability.

Opinion questions. Opinion questions allow children to express their opinions. The first two questions aim to find important source of information for a child. The third question allows children to express their opinions on the quantity of the information on environment provided by the school. The next two questions allow children to express their opinions on the use of the environment for them.

Concluding questions. The two concluding questions seek to explore whether a child is taking a part in easy environmentally friendly actions.

Each child-respondent will be supplied with a blanked paper before the questionnaire will be distributed. Child-respondent has to fill in the paper, answering question by question.

Children will get information about the three concepts in response to the answered questionnaire. A short presentation is prepared to explain the meaning of: environment, sustainability and pollution. The presentation is a type of entertaining and at the same time informative education, a part of cognitive communication between the researcher and the respondents-children. The information will be presented when all respondents answer the questions.

The structure of the questionnaire for teachers (Appendix 2):

General questions. General questions aim to extract the general information about school and the interviewee. The first question aims to identify teacher's position within the school. The second question aims to identify potential respondents. The next two questions aim to find out the general information about education system in the school. The last question posed to guide the respondent to the main object of the interview.

Specific questions. A short introduction to Swedish laws and regulation will be presented. The first two questions aim to find out whether any actions to implement the law were taken by the school. The next two questions seek to identify methods used by the school to inform children about sustainability. The overall aim of the specific questions is to explore management and delivery of environmental education by schools.

Personal opinion questions. Personal opinion questions aim to find out the level of the interviewee personal assessment and interest in implementing environmental education at the school.

Concluding questions. The first two concluding questions posed to explore whether a teacher personally take participation in easy environmentally friendly actions. The last question aims to explore whether the interviewee possess a simple knowledge and awareness of the harmful particles used by humans in everyday life. Besides, concluding questions allow the interviewee and the researcher to end the interview on a good tone.

Each respondent-teacher is going to be supplied with copy of the interview questions before the interviewing day. This will encourage a respondent to begin thinking about the topic and be prepared. The type of the interview is in person. This type allows a flexible interview process, see facial expressions and interpret other things like stress or comfort in body language (Bryman, 2008, p. 198).

4.2 Case Study

4.2.1 Case study - Lund city

Lund city is chosen as a case study. The city is located in the centre of Öresund region in southern Sweden. The population of Lund municipality is 109 147 inhabitants. Population growth is 1796 inhabitants annually (Statistics, 2010).

The city is described as an old city with a history of more than thousand years. It is also famous as a city of new ideas and creativity. Lund city prioritizes the quality of education on all levels from preschool to university (Lund's kommun, 2010). Apart from all obvious benefits, there is another important reason influenced the researcher's choice. The city is aiming to get the status of the 'green city' (Roseland, 2001). By that mean the city aims to involve its inhabitants with no exception in winning this status for the city (Lund's kommun, 2010). The aim to get the 'green city' status and prioritization of the education quality make the city attractive for the given research.

4.2.2 Data collection

Interviews and questionnaire

The comprehensive study of educational organizations, located in Lund city, identified two public schools for empirical data collection. School A is located in the North part of the city; School B is located at the Central part. The names of the schools are hidden due to the ethical reasons. Data collection period is the end of March to the end of April.

In order to produce some homogeneity of the sample and to increase comparability, this study is targeting children at 4th and 5th grade, living and study in Lund city. The targeted age group is often regarded as a formative period of child's thinking and behaviors. (Comer, 1997, p. 222). Besides, comprehensive study of the Swedish education system allows the researcher to identify that from 5th grade class, at age 11-12, all schools in Sweden must implement a compulsory science subjects. Though the Swedish school program do not include any compulsory subject on sustainability or the environment, these concepts are included in many science subjects such as biology, physics, chemistry, etc. (Skolverket). Hence, the targeted age group is suitable and attractive for the given research project.

A total of 110 pupils with ages ranging from 10 to 13 years completed the questionnaire. Data collection, in the form of questionnaire, took place within the school walls. All answers were written down by the respondents. It took longer time for children to answer the questions, one hour instead of planned 30 minutes. Children who had difficulties/or did not answer the questions were targeted for an interview.

Data collection from the teachers in the form of interview was planned in advance. The arrangements included email exchanges and personal contact, while delivering the questionnaire. In person interview with teachers took place at the targeted schools. The answers from teachers were written down by the researcher in the form of notes. The interview with Head Master from School A was done with some limitations and delays. The Head Master of the School A was absent on the agreed day for the meeting, due to a personal reason, the interview was held by executive teacher. The teacher was not capable to answer specific questions of this study, but provided the researcher with general information about the school. The specific questions were answered by the Head Master later, in a week. The interview with Head Master from School B was successfully done on time, within forty five minutes.

5. ANALYSIS OF PRIMARY DATA

5.1 Management of environmental education by schools in Lund city

5.1.1 Environmental education in teachers' minds.

Implementation of the environmental education at schools in Lund city to a large extent depends on principal's personal assessment and interest in it. The researcher asked Head Masters from both schools to share their opinions about environmental education and their plans to implement the education at the schools. This was done to explore one of the Fayol's management functions, motivation to implement environmental education.

The Head Master from School A regards environmental education at the school as in the middle of poor and average rank. The Head Master absolutely agreed on importance to teach environmental education, starting from an earlier age. However, the Head Master is not planning to work on this issue within the next 1 or 2 years, referring on her and children's busy schedules and other more important things to be done before. This answer leads to the idea that school is missing motivation to follow sustainable development framework. Authorities did not add any value to the environmental education to be implemented at schools (Beblin, 2000, pp.56-61). According to Argyris, this is top-down communication approach, whereas Head Master's goal does not reflect municipality's goal. As a result, Head Master is not motivated to do the job.

The Head Master of the other school, School B, regards environmental education at the school as an average, keeping in mind goal to achieve an excellent level in the nearest future. The Head Master showed personal awareness of and interest in sustainability. The Head Master said that she worked in another school with Green Flag status before and she wants the same for School B. The Head Master believed that it is important to teach children about environment and sustainability starting from an earlier age, in case of schools starting from 1st grade.

5.1.2 Children's opinions on information provided by the schools

Children's opinion about important source of useful information for them

At these formative ages it is important to consider what information provided to the children. One item of the questionnaire asked children about important source of useful information for

them. It was an open-ended question. As a result, 45 children (41%) consider school as important source of useful information, 37 consider family (33.6%), and 27 mentioned other sources such as Internet, TV, radio and books (25.4%) (Table 1). The time children spent at school has its consequences (Gresham, 2001). The majority of the children perceive school as an important source of useful information for them.

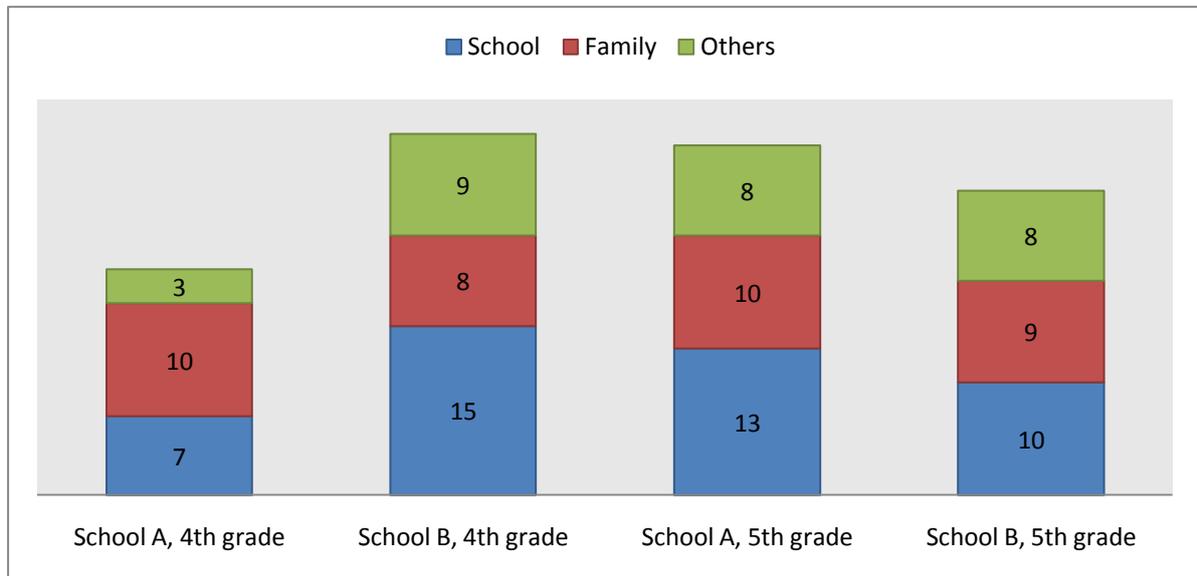


Table 1. Important source of information

Children’s opinion on amount of the information on environment provided by School A

Totally, 35 children think that they learn little about environment at school and 16 children think lot (Table 2). However the researcher must admit that during the interview few children said that they did not want to write that they learn little or nothing at school. Answering that they learn little at school, children wrote that they do not talk about it. One pupil said that he learned more about environment in another school but not in this one. The majority of the negative answers (35) reflect Head Master’s opinion that school in the middle of poor and average rank regarding environmental education.

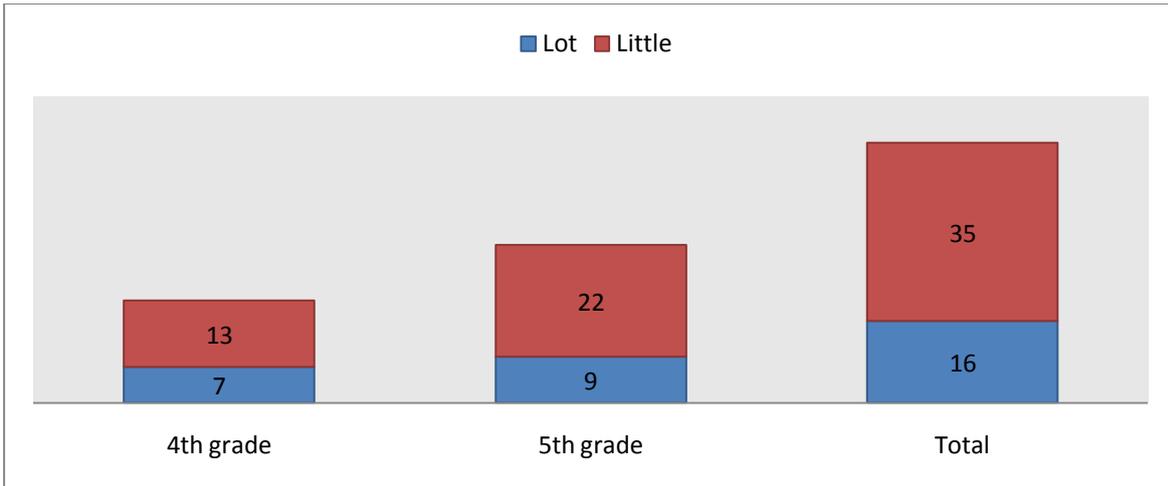


Table 2. Children’s opinion, School A

Children’s opinion on amount of information on environment provided by School B

From the beginning the question provided two options for children to answer (lot or little) but some children were confused and included third option to answer. Their answers were included respectively. Totally, 27 children think that they learn lot at school, 10 think average and 22 think little (Table 3). However, the researcher must admit that many children, answering that they learn little, said that it was not enough of what they had learnt.

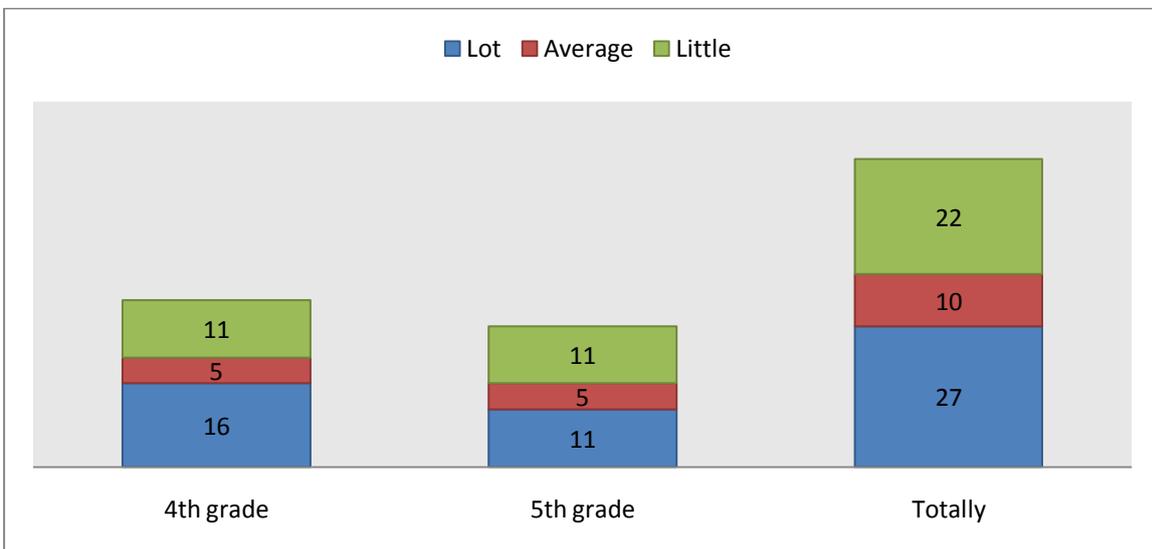


Table 3. Children’s opinion, School B

Concluding remarks. Conducted data identified one school which is missing motivation to implement environmental education. Principal from School A showed no desire in implementing environmental education at school. Children from School A are in risk to stay behind their peers from School B. This contradicts the universally accepted declaration on

children's rights to be informed, express an opinion and participate in decision-making and the Tbilisi Declaration which is targeted children as the main object for environmental education (UNCRC, 1989). The rights of the children from School A are not fulfilled which makes this approach to rely on one man's decision ineffective.

5.2 Methods employed by the schools to inform children about environmental sustainability

Unclear methodology is an obstacle to the efficient management of the knowledge on sustainability among schoolchildren. Without clear methodology, this is confusing for teachers of what knowledge children need and how to deliver it.

Except the Green Flag program, the researcher found no clear methodology to inform children about sustainability. Based on conducted data, School A has very simplistic introduction of environmental subject, the elements of it are included in science subjects. The science subjects are starting from 5th grade. One day in the spring semester children spend outside where they tidy up the school's yard, plant flowers, etc. Children's rights and preferences to be informed are not considered as important (Roe, 2007). In this study children from both schools were asked whether they like to spend time outside, in green area. They all positively responded, saying that they do not mind to have outdoor lessons. Many boys mentioned that they liked to play football and girls liked green grass.

The other school, School B, is more concerned in implementing environmental education. The elements of environmental subject included in science subjects which are starting from the 1st grade. School B is striving to get Green Flag by increasing children's, as well as teacher's participation in achieving sustainable development of the school. Teachers and schoolchildren spend a day-out every week. It is considered as environmental education where children can increase contact with nature (Pretty, et al., 2009, p.2). That day teachers talk about nature and introduce natural environment to the children through different activities, such as playing in a green area, having a picnic outside, taking a tour around the city. Children identified green playground beneficial to them. To play there is fun and joy for them. Consider children's preferences, outdoor education method is beneficial for environmental education at school.

Environmental education in authorities minds

A variety of educational programs are introduced to different organizations in Sweden, whereas Green Flag remains the leading program of environmental education for schools. Therefore, this study explores organizational management of the program. To follow Fayol's management functions, Lund kommun created and hired a group of three people to inform and promote environmental education at schools located in Lund. This group introduces Green Flag program for the schools as one of the methods to inform both children and teachers about sustainable development idea and ways to achieve it within the school walls (Naturskolan).

To find out more about the Green Flag program, the researcher interviewed representative of Naturskolan, Anders Kjellsson. He is advisor of environmental education for schools. The interviewee regards implementation of environmental education in Lund city as medium; the best results in implementing environmental education are in the Eastern part of Sweden. Green Flag program is introduced to more than a hundred schools and preschools located in Lund city. However, only nine compulsory public schools and thirty preschools are participating in the program. The program includes six specific areas (climate and energy, water resources, consumption, health and lifestyle, neighbourhood, and recycling). Schools choose five cases they actively want to work with. Each time the case is successfully done, the school begins to work on the next one. Each case takes approximately six to eighteen months. There are no financial or any other benefits for schools from participating in Green Flag program or implementing environmental education. The only benefit is the green status of the school. The real motivation for effective management of environmental education is missing (Fayol, 1967).

Anders Kjellsson agreed that there are no valuable motivations for schools to implement Green Flag program in schools. However, he relies on Head Master's personal awareness of and interest in environmental education and beliefs that Head Master should not be forced to do so. This will lead to a gap between all levels of the Swedish education structure in teaching environmental education among schoolchildren. Swedish Government set goal to implement environmental education among schoolchildren, Swedish Education agency supported the goal with regulations and laws, Lund municipality introduced Green Flag program but left the right to Head Master to decide whether to implement the program at school or not. If Head Master will not show a desire to implement environmental education at

school, the case of School A, the goal will not achieve its end (Fayol, 1967). This is not following the pattern of effective organizational management. One function of the effective management, controlling, is missing because the knowledge progress is not checked (Fayol, 1967).

5.3 Children’s knowledge as an outcome of environmental education

Intelligent progress in children, School A.

Total number of the received answers is 51. Children from School A could describe environment (56.9%), pollution (58.8%), and sustainability (9.8%) (Table 4). The results from Table 4 also show that intelligent progress of two age groups is insignificant. 4th grades described environment (50%), pollution (75%), and sustainability (5%); while the results of 5th grades are environment (61.3%), pollution (48.3%), and sustainability (13%). In case of children’s perception on pollution 4th grades provided even with better results than 5th grades. The intelligence progress between these two age groups is insignificant, despite introduced science subject to 5th grades. To compare children’s perception of three concepts in height scale is more complicated than in weight scale. These children who could not describe the terms have higher chances than their peers to face difficulties in understanding sustainability.

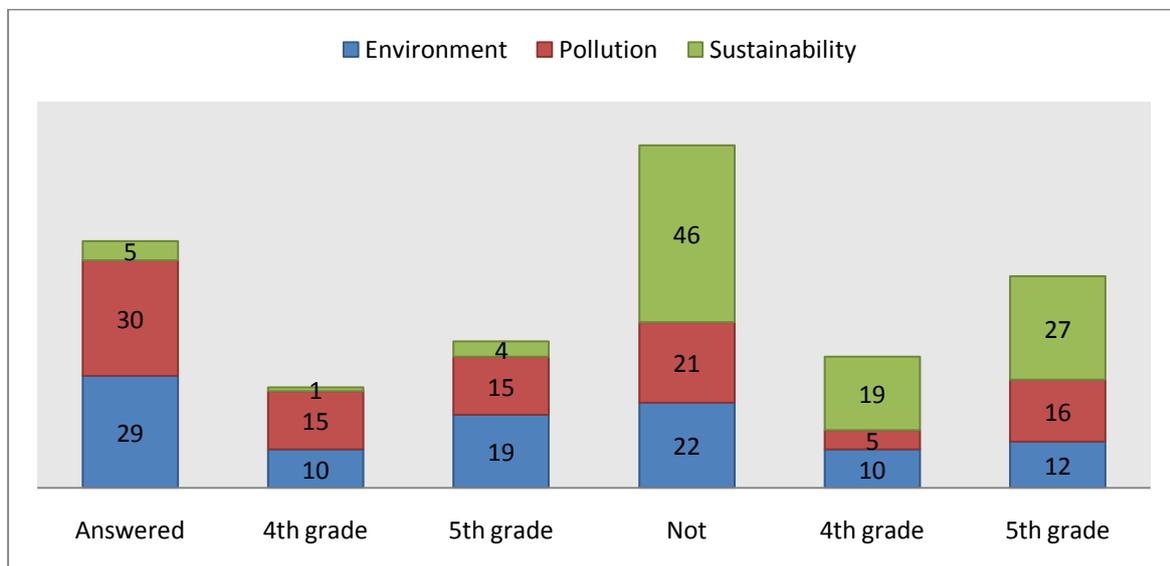


Table 4. Children’s knowledge on environment, pollution and sustainability, School A

Intelligent progress in children, School B

Total number of the received answers is 59. Children described the terms, environment (79.6%), pollution (72.9%), and sustainability (20.3%) (Table 5). In School B, children began

to teach science subjects from the 1st grade. With the conducted data to trace its influence on environmental education is difficult. Though, children from School B as from School A do not consider a man as important component to influence living conditions of a plant.

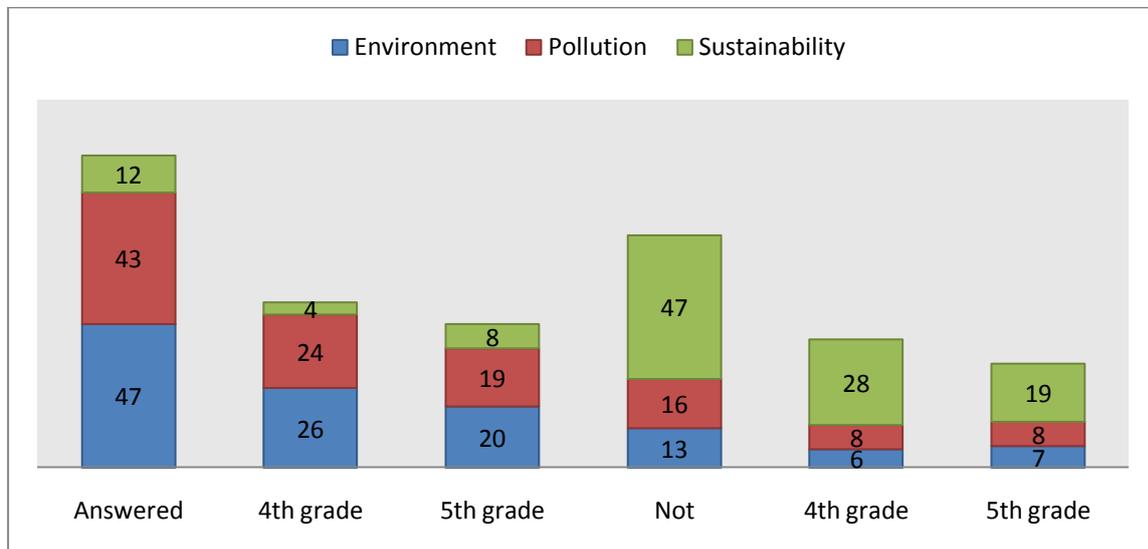


Table 5. Children’s knowledge on environment, pollution and sustainability, School B

Intelligent progress in children was analysed in accordance to two Woodrow’s scales. 4th grades described environment (81.2%), pollution (75%), and sustainability (12.5%); while 5th grades described environment (74%), pollution (70.3%), and sustainability (29.6%). in overall 5th grades did not show significant intelligent progress in understanding three concepts in comparison to the 4th grades. Though, the results show that children from School B are brighter in comparison to their peers from School A. That fact leads to the idea these children have better chance to understand sustainability than their peers from School A.

Summary of children’s knowledge on three terms

Totally, children from both schools described environment (75), pollution (73), and sustainability (17) (Table 6). Comparatively, School B showed better results than School A in describing environment (79.6% vs. 56.9%), pollution (72.9% vs. 58.8%), and sustainability (20.3% vs. 9.8%). Despite the belief that science education is the right key to environmental education this study did not show valuable difference in weight scale among children of two different classes. Science subjects introduced from 5th grade in School B did not influence children’s perception on terms used in environmental sustainability subject. Besides, in this study children from both schools were asked open-ended question, to name important component of how to keep a flower alive. All 110 children named at least one of the components necessary for a plant to stay alive. 95% of them provided with a proper answer

listing at least three components: the water, the soil and the sun. However, nobody wrote that the flower needs a care from a man. Children are missing the full picture of human and nature interaction, the fact that man can support or affect the living conditions as one small plant as the whole ecosystem does not come to children’s minds. Majority of the children have been studied science education before, though they still ignored human aspect from their thinking about green representatives of the environment. This questions whether science education is the right vehicle to environmental education (Robottom&Campbell, 2004).

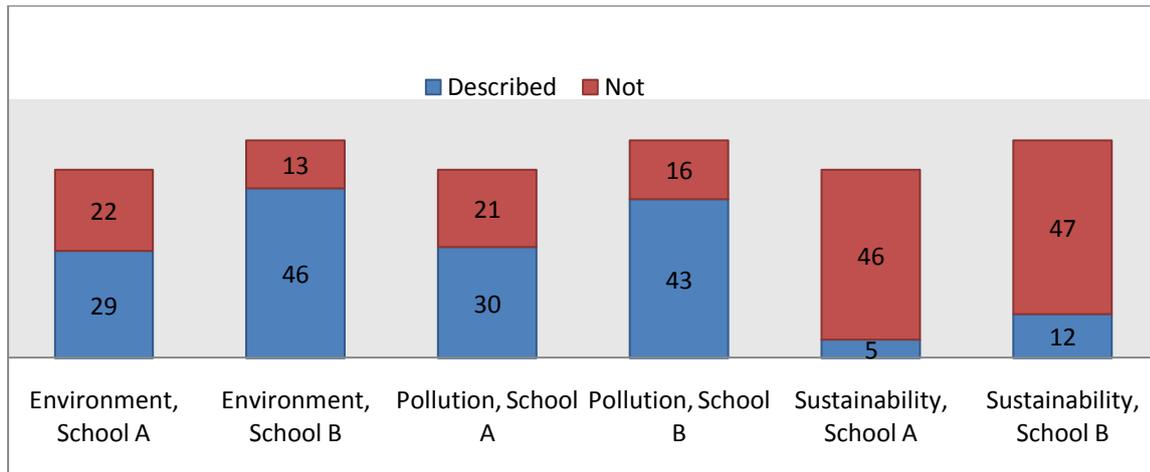


Table 6. Summary of children’s knowledge on three terms

Children’s perception of sustainability term is the worst result of the study - 15%. The 45 % of the children answered that they did not know or had not heard about the sustainability. Children are lacking information on sustainability. More than a half of the children answered that they know about the sustainability but only few could describe it. Information and explanations of sustainability among schoolchildren are required. Even though, it was difficult for children to explain and understand the word sustainability some of them could express the term using some words that could explain the sustainability. Some of the responses included: *“I think, it means something about nature, and anything what is around us what does not last forever”*; *“Do not destroy the environment”*. If some of them could explain the term, others could do the same intelligent progress (Woodrow, 1919).

Besides, many children could describe bad/ good action towards the environment. 96 children (87.2%) were capable to describe a good action towards the environment, 79 (71.8%) described a bad action (Table 7). Children certainly have knowledge related to sustainability but their young untrained brains are not capable to combine it, system thinking ability is missing (Robert, 2002). The further development of that understanding will benefit children

in understanding of the system where humans and the nature actively interact with and depend on each other. This increases their chances to understand sustainability.

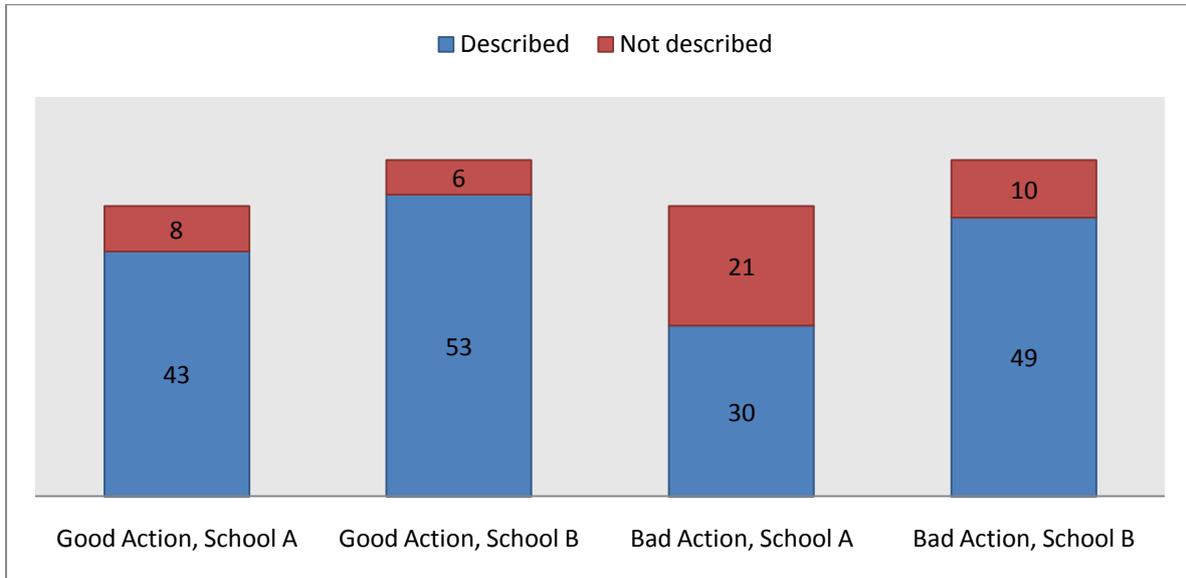


Table 7. Children’s responses describing good/bad action towards the environment

Concluding remarks

Children’s perception on sustainability

- It is difficult for children to combine ‘dispersed’ knowledge stored in their brains. System thinking ability is required to develop their abilities to combine and understand the complexities of sustainability issues.
- Intelligent progress is insignificant in height and weight scales among children of the same school. However, children from one school are ‘brighter’ than from another in accordance to Woodrow’s height and weight scales (Woodrow, 1919).

Management and delivery of environmental education

- Missing two functions of effective management (motivation and control). Authorities do not provide any motivation to schools to implement environmental education. They introduced Green Flag but did not add any value to the program, therefore schools may leave it with no attention (Bebbin, 2000, p. 56). Besides leaving the full rights to Head Master in decision to implement environmental education, municipalities miss control function, they do not check the progress of the goal;
- Schools did not introduce any clear methodology to inform children about environmental sustainability;

- Science education is not the right vehicle for environmental education. The results of this study show that children do not consider human factor as the main beneficial or harmful to environment (Robottom&Campbell, 2004). Besides, 5th grades, where science education was implemented, did not show valuable difference in understanding sustainability in comparison to 4th grades, where science education is not included in school curriculum.

6. DISCUSSION AND FUTURE RECOMMENDATIONS

6.1 Effectiveness of management and delivery of environmental education by schools

The main findings of this study showed that management and delivery of environmental education by schools in Lund city lack two important organization management function, control and motivations. Children's knowledge on and perception of sustainability is not complete. The formation of behaviour and thinking of new 'sustainable society', which seemed to be accomplished with that of effective school management and deliver of environmental education, is continued throughout the development of children's 'brightness' in sustainability, which is natural or cultivated.

To understand 'the formation' progress, this study explored children at age between ten and twelve, which regarded as the best age to cultivate certain behaviours (Comer, 1997, p.222). The results of this study showed that schools are missing clear methodology to inform children about environmental sustainability. Despite the belief that science education, which is included in school curriculum, is the only right vehicle to environmental education, this study did not show valuable 'brightness' in children of two different classes in one school, 4th grade, where science education is not included in curriculum and 5th grade, where science education is included (Gough, 2004; Woodrow, 1919). Though, children from one school, where science education is implemented from 1st grade, showed better results than their peers from another school. The researcher must admit that school, where children showed better results, pays more attention to environmental education by introducing Green Flag program and having outdoor education every week. Another result of this study is that children do not consider human factor, which is the main beneficial or harmful force for environment

(Robottom&Campbell, 2004). All these bring concern on whether science education leads to progress of children's 'brightness' in sustainability (Woodrow, 1919).

Management and delivery of environmental education by schools in Lund city lacks two functions (control and motivation) of organizational management (Fayol, 1967). Conducted interview showed that Head Master of one school is missing motivation to implement environmental education in school. Children from this school are in a risk to stay behind their peers from another school. They are in a risk to get less information on sustainability, be less aware of it, progress and integrate beyond sustainability framework. The end goal of environmental education in case of these children is not achieved. Besides, this is contradicting the universally accepted declaration on the rights of a child and Tbilisi Declaration (UNCRC, 1989; UNESCO, 1977). School management of environmental education is missing another important management function, which is control (Fayol, 1967). Authorities introduced Green Flag program, which seemed the only and valuable program, to inform teachers and children about environmental sustainability and develop 'sustainable' behaviour, but they left the full rights to decide on implementation of the program to one person, Head Master. Conducted data showed that Head Master of one school is not interested in implementing the Green Flag program at school. The end goal of the Green Flag program, to aware children and teachers of environmental sustainability and to stimulate their easier integration into new 'sustainable society' is not achieved. Therefore, this is ineffective approach to rely on one person decision, on his personal awareness and interest. Authorities loose controlling function they do not check whether the program is working effectively, whether the end goal is achieved, whether children are informed and develop their 'sustainable' behaviour and thinking.

The majority of the targeted children could explain terms (environment, pollution and sustainability) and actions related to sustainability, they have some knowledge. However, children faced difficulties in explaining sustainability term and combine their existing knowledge into coherent knowledge. Sustainability is complex issue (Rogers, et al., 2008). It includes many different systems and subsystems, which is confusing for young untrained child's brain. To understand the complexity of sustainability adults develop system thinking ability, which seemed to be needed for children (Robert, 2002). Development of system thinking ability in children would help to combine their 'dispersed' knowledge on sustainability into coherent knowledge.

6.2 Research limitation and recommendation for future research

Language barrier. From the very beginning, questionnaire for children was written in English. However, children were not capable to fully comprehend the questions. The only way to get the answers was to translate the questions into Swedish.

Written answers. The answers from Head Masters were written down in a form of notes. The disadvantage of the written answers was that some useful information could be missed. The interviewees talked and discussed different experienced stories while the researcher was focused on asked questions. In that case, it is advantageous to keep a recorder.

Student's absence. Some children were absent when the questionnaire was distributed. Though, the number of absent children is insignificant, 13 children. This is allowed rely on the derived results.

Refusals from respondents. There were some refusals to answer the questions by the children. The most common reason for the refuse seemed to be misunderstanding of what the interviewer do and why. Though, only one child did not finish the questionnaire and others did it well.

The refuse to hold an interview on time from the principal of the School A may affect the results. The research questions were addressed to the executive teacher, though the teacher could not answer on specific questions of the study. Later on, the Head Master of the school, answered on the questions, owing to the fact that the researcher continued to write emails and insist on the necessity of Head Master's participation.

Incorrect responses. Some children took a questionnaire too serious, they were afraid to be ashamed by answering that they do not know something. Children asked many questions before to write an answer. The researcher tried to hold discussion and guide them but did not provide any informative context on posed questions. However, some hints were given that could affect the results.

Verification of the answers. The researcher focused on children who did not succeed/or had difficulties in answering the questions by excluding those whose answers were correct/answered/or answered in the right direction. That may affect the results.

Imperfect questionnaire. Imperfect questionnaire caused problems for the researcher on the stage of data analysis. The imperfect specific questions limited the discussion and analytical parts of the study.

Time limit. This study excludes an important informant for children, their families. Though, the researcher refers it as the biggest limitation of the research it was impossible to explore the influence of the family on child's behaviour due to the limited time given for this study. This study due to the limited time excludes other schools located within the city area and focuses only on two schools. However the chosen schools allow the researcher to collect data necessary to answer on the main research questions.

Recommendations for future research

First of all, researcher carefully has to think and state what to explore and why. Secondly, all the arrangements for data collection have to be planned long time before the day, when data has to be conducted. A researcher has to be aware that making a research in Sweden requires knowing Swedish, especially if the researcher deals with children. Knowing language allows a researcher to hold a good conversation, be better understood by the children and state clear ideas. It is also important to make a personal and friendly contact with a child, to express interest in the child, to demonstrate readiness to help, and, no matter what, to stay calm and quite. A researcher has to be very focused and careful when choosing questions for respondents. Good questionnaire plays the decisive role both in collecting a good data and writing the entire research work. It might be useful to employ method offered by Kvale. The follow-up interview is beneficial in a way that it helps to clarify necessary points. For the better data collection and analysis all answers have to be verified.

7. FINAL CONCLUSIONS

Different leaders and stakeholders have their own communication and management style, though the basic organization management functions have to be ultimately implemented to achieve the end goal. The aim of this study was to investigate whether management and delivery of environmental education by schools in Lund city is effective. The results of this study show that school management of environmental education in Lund city lacks two important management functions, control and motivation. Children from School B are better informed than their peers from School A, because the management of School B is more

interested in environmental education than management of School A and works on integration of Green Flag program. Authorities have to consider the fact that they infringe the rights of the children studying in School B.

Green Flag program, introduced to promote environmental education at school, is seemed to be a valuable source of information. This program allows children and teachers to contribute to sustainable development of the city by actively cooperating with each other as well as developing skills and behavior of the new 'sustainable society'. There is no concrete set of educational methods to deliver the knowledge on environment, its protection and sustainability. A belief that science education is the right vehicle for environmental education is questionable. The results of this study show that children's perception on sustainability does not reflect science education included in school curriculum. They have difficulties in understanding the complexities of sustainability issues. Though, system thinking approach may develop required skill.

To achieve the end goal of environmental education authorities have to rethink the policies, programs and methods they introduce to inform and educate children about environmental sustainability.

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APPENDICES

Appendix 1. Questionnaire for children. (English version)

General question

1. What is your age, sex?
2. How much time does he/she spend at school?

Specific questions

1. Do you know what does the term environment mean? Describe
2. What do you know about sustainability?
3. Please write what do you understand under the term pollution (water, land, air), for instance air pollution, water pollution, land pollution?
4. Do you know what does plant need to stay alive? Have you ever poured water to the flower?
5. If I ask you to draw a good action towards the environment, what would you draw? Why?
6. If I ask to draw a bad action towards the environment, what would you draw? Why?

Opinion questions

1. In your opinion do you learn a lot/little about the environment at school? Why do you think so?
2. How do you know what is good or bad?
3. In your opinion what is the main source of useful information for you?
4. Do you like trees? Why?
5. Do you like to play on a green playground? Why?

Concluding questions

1. How do you get to the school (bus/bicycle/walking/ car)? Why?
2. Do you take garbage out? Do you separate garbage? Why yes/no? How do you do that?

Swedish version

Allmänna frågor

- 1 Hur gammal är du? Flicka/pojke?
- 2 Hur lång tid är du i skolan?

Specifikafrågor

- 1 Vet du vad ordet omgivning (miljö) betyder? Beskriv!
- 2 Har du hört uttrycket hållbarhet? Beskriv!
- 3 Vad vet du om nedsmutsning (av vatten, land och luft)
- 4 Vet du vad en växt behöver för att kunna leva?
- 5 Om du skulle göra något bra för miljön vad skulle du göra och varför?
- 6 Om du skulle göra något dåligt för miljön vad skulle du göra och varför?

Opinionsfrågor

- 1 Hur vet du som är bra eller dåligt?
- 2 Tycker du att du lär mycket eller litet om miljön i skolan? Varför tycker du som du gör?
- 3 Var tycker du att du får viktig information i från?
- 4 Tycker du om träd? Varför?
- 5 Tycker du om att leka på grön lekplats? Varför?

Sammanfattande frågor

- 1 Hur tar du dig till skolan (cyklar, går, bil) ? Varför?
- 2 Bär du ut (slänger) sopor? Sorterar du soporna? Hur sorterar du och varför?

Appendix 2. Questionnaire for teachers

General questions

1. What is your occupation/position at school? How many teachers in the school?
2. How many children are in the school at the age from 10 to 13/ total? How many children in one class?
3. What type of education system you have (traditional/ untraditional)?
4. Do you examine children on every subject you have in the school? Do you have a subject related to environmental sustainability?
5. Are you aware about environmental issues? What do you consider as environmental problems?

Specific question

Introduction to a number of official documents related to environmental sustainability studies, including the statement about compulsory study related to environment.

- a) **Plan för integrering av hållbar utveckling i grundutbildningen** at http://www.sahlgrenska.gu.se/digitalAssets/783/783402_SA_HUG.doc
- b) **Hållbar utveckling i skolan. Miljöundervisning och utbildning för hållbar utveckling i svensk skola**, at <http://www.smuf.org/hogskolelagen.htm>

Hållbar utveckling i skolan

Utbildningsministrarna i östersjöregionen har kommit överens om en Agenda 21 om utbildning vars mål är hållbar utveckling i regionen. En kartläggning presenteras av situationen i svensk skola vad gäller miljöundervisning och utbildning för hållbar utveckling. Sammanfattning 2:

Utbildningsministrarna i östersjöregionen har kommit överens om en Agenda 21 om utbildning vars mål är hållbar utveckling i regionen. Utvecklingen av utbildning för hållbar utveckling skall bygga vidare på nuvarande erfarenheter i miljöundervisning. En kartläggning har därför gjorts av situationen i svensk skola vad gäller miljöundervisning och utbildning för hållbar utveckling. Intervjuer med sju olika skolor presenteras även i boken. Några pedagogiskt verksamma personer har inbjudits att reflektera kring begreppen miljöundervisning och utbildning för hållbar utveckling. Baserat på resultatet av kartläggningen har åtgärder föreslagits för ett brett genomförande av utbildning för hållbar utveckling. Det som ses som viktigt är tydliga politiska signaler, en höjning av den ämnesteoritiska/didaktiska kompetensen hos såväl lärare som lärarutbildare, didaktisk forskning och en utveckling av stödet till skolorna inom området utbildning för hållbar utveckling.

1. What methods do you use to inform children about environmental sustainability? How do you inform children about environmental sustainability?
2. Do you do any outdoor education activities in natural environment?

Personal opinion questions

1. Do you have a plan of implementing the statement? If yes, how or how far you are in implementing it? If no, in your particular situation, what do you think is the problem? What do you see as the solution?
2. Would you regard environmental education at the school as poor/average or excellent now? What do you think can be improved? How it can be done?
3. Do you regard environmental studies as important from the earlier age? Why yes/no?

Concluding questions

1. How far do you live from the school (if necessary)? How do you get to the school (bicycle/bus/car)?
2. Do you separate trash? Have you ever thought of why do you do that?
3. Where does the first glass bottle/newspaper or metal can come from? How is it produced?