

# **THE COMPARATIVE STUDY OF EDUCATION FOR SUSTAINABLE DEVELOPMENT IN EARLY CHILDHOOD IN SWEDEN AND JAPAN: THROUGH “THE ENVIRONMENTAL EPISTEMOLOGICAL MODEL OF 5 ASPECTS”**

## **Abstract**

There is a general responsibility to protect the earth system to reach “Sustainability” since the earth problems grow more serious day by day. However, it is not easy for everyone to be aware of this problem and to act for protecting the Earth in daily life, because the environmental problems are not visible. This study suggests ESD as a means for raising the awareness and behavior about the Earth. And “The environmental epistemological model of 5 aspects” is presented which connects ESD of earth environment with environmental policy.

This study shows how the “The environmental epistemological model of 5 aspects” is reflected on the environmental policy and education within two municipalities which are trying to be woody biomass society as an example of the vision of “Sustainable society”. The municipalities are Våxjö city in Sweden and Keneyama-machi in Japan. As a result, it is clear that environmental policy and education at preschools in Sweden and in Japan are important institutions for promoting “The environmental epistemological model of 5 aspects” of a municipality's environmental policy.

And it is concluded that ESD at early childhood is important as the base of the life-long learning and citizen's participation.

**Key words:** *Early childhood, Education for Sustainable Development, The environmental epistemological model of 5 aspects, Sustainability,*

## **Introduction**

This study focuses on the importance of ESD in early childhood. Today, due to global warming, the “Eco-system” is changing and there is a crisis of “Sustainability”. The word of “Sustainability” has appeared at the document of Brundtlands commission (1987) in Norway to save the earth's environment first at the political level. And the importance of Education at “Sustainable development” has been at the Earth summit of United Nation, UN conference since 1992 at Rio De Janeiro. It says that important things to promote “Sustainable Development” of the earth's environment are “Education” and “Citizen's participation”. It improved to a suggestion of Decade of Education for Sustainable Development, DESD from 2004 to 2014 at Johannesburg, UN conference in 2002. So it seems to be very familiar to hear the word of “Sustainability” or “Education for Sustainable Development” in all over the world. However, it is not easy for everyone to be aware of this problem and to act in protecting the Earth in daily life, because the environmental problems are not visible.

The research question is, “How to construct ESD for human with respect to their cognitive and behavioral abilities?”

### *Problem of Research*

In the book of “Sense of wonder” Carson, R. (1965) suggested “Sense of wonder” as a childhood ability. She mentions that it is children’s “Sense” of wonder and mysteriousness towards nature that is inborn and sustainable through life. According to Carson, children are closer to nature and more curious than adults. Therefore, this ability in early childhood could be the basis for Education for Sustainable Development, for life-long learning.

And Lucus, A. (1972), Robottom, I. & Hart, P. (1993) suggested three important ways to teach EE. The first way is to explain the “Environment” (Nature, Society) focusing on the “Sense” in experiments. The second way is to focus on the “Science” by reflection and the third way is to focus on the “Practice” by physical reflection. They are important ways to teach EE however, from a life-long learning/ESD perspective, there should be some connection between the three.

### *Research Focus*

The environmental epistemological model of 5 aspects is a possible way to link the 3 ways of teaching EE as shown in the diagram. From the perspective of life-long learning, Education for Sustainable Development, ESD should start in early childhood by educating “Sense” and through the “Model” teach the “Science” of a “Sustainable society” and then “Practice” for “Sustainable society” with “Group ethics”.

A way to link “in” and “about” is “Through”. This means that there should be a model (the abstract is shown by concrete or half concrete things) of a sustainable society before we think about a “Sustainable society”. This idea of the “Model” is inspired by the teaching material called “The mini bottle” and curriculum called “The Mission” which was invented by a Swedish compulsory school teacher, Brunner, W. (1996). “The mini bottle” is a “Model” of the earth and the system of the recycling of “Sustainability”. By looking at this experiment, we understand “Sustainability” not only as abstract “Science” but also as concrete “Sense”. Furthermore, a way to link “About” and “For” is “With”. This means that there should be “Group ethics” of “Sustainable society” before implementing a “Sustainable society” which means not only individual but also group belonging. Imamichi, T. (2002) suggested “Group ethics” as “Eco-ethica”.

If children insert the plant into the bottle and put a lid on, the plant can live forever by sun and plankton in the dirt, soil. There is a balance of CO<sub>2</sub> and O<sub>2</sub> during the day. Therefore, through this experiment of the “mini bottle”, we see “Sustainability” as both abstract and concrete. If ESD in early childhood focuses on the “Sense” of a child’s experience of nature, then a basis for understanding the “Science” of a “Sustainable Earth Environment” is achievable through the “Model”.

## **Methodology of Research**

### *Empirical study*

Before describing the results of the study, this session summarize Environmental Education EE, and Education for Sustainable Development ESD for a “Sustainable society” in Sweden and in Japan from a political point of view by empirical study.

In Sweden, there is a traditional culture called “Allemansrätten”. It is the right to move in and enjoy nature. In Japan, there is also a traditional culture called “Satoyama”. It is the traditional way to live with nature dating from the Edo-period (1603-1868). This period lasted for almost 250 years. In Japan from the 1960’s there was the movement of EE through “pollution” education by high economic development. In Sweden, during the same period, there was the movement of “environmental” education by Non Government Organization, NGO such as the Swedish Nature Care Association. In 1971 The Ministry of Environment was established in Japan At the same time the “Stockholm Conference” was organized by United Nation. During the 80’s and 90’s, there was an important movement of environmental policy by NGO in Sweden. In 1992, at the Earth Summit in Rio De Janeiro, Sweden decided that every municipality or Local authority would try to implement the environmental policy called “Local Agenda 21”.

In Japan, there was an important conference about climate change in 1997 called the “Kyoto Conference” where the Kyoto protocol was adopted with the clear goal to cut CO<sub>2</sub> all over the world. After the conference, a movement started with Environment Education by universal learning lectures in schools. At a political level, the environmental government declared 2000 as the year of “Recycling Society”. The Japanese government together with NGO, declared 2004 to 2014 as the “Decade of Education for Sustainable Development, DESD” at Johannesburg conference in 2002. In 2004 in Sweden, the ministry of sustainable development was established and since then the ministry of school development established the certification of “The school of ESD” and the Swedish minister declared to “Construct a sustainable society in 2005 without fossil fuel by 2020”. In fact, since 1996 Sweden decreased the emission of CO<sub>2</sub> by 16%. This contributed to the EU goal to “Decrease the emission of global effects gas by 20% by 2020”. In Japan, The Earth Summit in Tokyo, decided on a “global goal to reduce CO<sub>2</sub> emissions by 2020”.

### *Sample of Research*

The purpose of this study is to compare the interaction of ESD in early childhood to Sustainable development in its respective municipalities in both Sweden and Japan. The goal of municipalities is to achieve Sustainable development, in particular the “Woody Biomass Society”.

One municipality is Växjö city and S public preschool located in the area of Småland in the center of Sweden. Växjö city is a member of “Baltic 21” city and in 2007, received the prize for “Energy for Sustainability in EU” . The city Växjö is named “The greenest city in EU”. The other municipality is Kaneyama-machi and Mebae private preschool which is located in the area of Yamagata principle in the north of Japan. Kaneyama-machi is a member of “Organization of Environmental Municipality” and in 2002, it received the prize “Japan Architect association”, and in 1987 it started “The movement of 100 years town-making”.

### *Instrument and Procedures*

The methods used for this study are field study and empirical study. This is the best way in order to get estimates on facts on empirical study by field study. Miyauchi, T. (2005) suggests the necessity of feedback between empirical study and field study. Concretely, the field study is based on interviews, questionnaires and observations. In Sweden, as a first step, interviews were done with key people and a second step were questionnaires to inhabitants and parents and a third

step were observations at preschools. The study term in Sweden covers 4 years, 2005-2008, and 15 study visits to Växjö city. Interviews were done with K (Environment office in Växjö) and G (The chief of S public preschool) and to 3 parents at S public preschool. Questionnaires were filled in by 30 people (participants at exhibition of “Environment policy”) and 51 people (parents at S public preschool). Furthermore, observations were done at a “forest activity” at S public preschool.

In Japan, the study period covers 6 years, 2003-2008, and 40 study visits to Kameyama-machi. Interviews were done with M (Environment office in Kaneyama-machi) and with W (Chief of Mebae private preschool) and N (Chief of “The practical research group of new energy at Kaneyama”) and 3 parents. Questionnaires were filled in by 61 people (participants at exhibition of “Environment Policy”) and 36 people (parents at M private preschool. Furthermore, observations were done at a “Fire-making activity” in M private preschool.

The contents of Interview question are;

- 1) History and actuality of “Environment policy”
- 2) History and actuality about EE and ESD
- 3) The background of beginning of work.
- 4) About citizen’s awareness
- 5) The subject of “Environmental policy” and EE and ESD to all key people.

And the contents of Questionnaire are;

- 1) Have you been interested in environmental problem long time?
- 2) What kind of impression did you get from environmental exhibition?
- 3) Are you doing something for environmental problems in school and home?
- 4) What kind of activity is it?
- 5) Did you know the environmental project at municipality?
- 6) What do you think about the environmental project at the municipality? to parents and participants of the exhibition. And the focusing points of observation are how children are related with nature and people in the activities.

Data has been recorded by IC recorder and DVD recorder.

### *Data Analysis*

All collected data from Interviews, Questionnaires and Observations has been analyzed by “The environmental epistemological model of 5 aspects” as shown in Figure 1.

### **Results of Research**

a) The results of interviews with the environment office in Växjö city (K) shows that, since the 90’s, at the political level, politicians/companies/citizens have been cooperating to build a “Fossil Fuel Free” Växjö as part of “Local Agenda 21” and they have been trying to set new goals. For example, separating garbage and buying Eco-food. So it seems that “Group ethics” and “Practice” are active. From the analysis based on questionnaires to citizens attending the exhibition (30 people), it seems that at the educational level “Sense” and “Practice” is active whereas “Science” is not.

b) The results of interviews with the chief of preschool(W) shows that by working together on the “project of the rape flower”, research group (N) and Environmental Office(M) are active on a

political level. It also shows that by implementing “Group ethics” and “Practice”, “Sense” and “Science” are active at local level. By comparison, based on the questionnaire to citizens attending the symposium (61 people), on an educational level, “Sense” and “Science” are active at local level but “Group ethics” and “Practice” are not.

c) The results of interviews with the head of S-preschool (G) shows that on a political level, S preschool has been more active in sorting garbage and buying organic food than Väjö city. By cooperating with NGO ”Green Flag” which is the certification of eco-school and S preschool has received the certification since 2004. So S preschool is also active in “Group ethics” and “Practice”. On the other hand, the results of both interviews and a questionnaire to 51 parents shows that at educational level, “Sense” and “Practice” levels are active but the “Science” level is not. Based on the results of Interviews with chief of S-preschool (G) and parents, it is clear that ESD at S preschool does promote the understanding of the “Science” of “Sustainable Society” in Väjö city. The results of the analysis of ESD at S preschool by Observing the forest activity from 10:00 to 10:30 on 25th April, 2006. Teacher 1, 2, 3 and a group of 5 years olds find the snail way from preschool to forest. At first, one girl says “Look, here is a murder snail!” The group forms a circle around the snail and starts to observe. The teacher starts to question the children and they discuss about the snail and the relation to human-beings. It seems to be clear that S preschool teachers are focusing on children’s understanding about “Science” and developing “Practice” level. But on the other hand, there is a problem to take care of development of children’s “Sense” and “Group ethics” levels as shown in Figure 2.

d) The results of interviews with the head of M preschool (W) and research group (N) working in conjunction with Environmental Office (M) shows that on a political level, M preschool has been more active in collecting used oil and recycling than Kaneyama-Machi. By working with Kaneyama-Machi on the “Rape Flower Project”, M preschool is also active in “Sense”, “Science” and “Group ethics” in order to achieve a “Sustainable society”. The results from interviews and questionnaires to 36 parents shows that at the education level, ESD at M preschool is active at “Science” level with regarding “Sustainable society” through “The rapes flower project”. The results of the analysis of ESD at M preschool by observing making a fire activity from 13:00 to 13:30 on 22 May, 2007. During the “making fire activity”, K says “It comes smoke a lot (in the smoke box) if we put in air” and analyzed how K understands by context of “air” as “Science” through changing smoke by K’s words and behavior related to person and things around. It shows that M preschool teachers focus on taking care of children’s “Sense” and “Group ethics” levels more than their understanding of “Science” level as shown in Figure 2.

As a result of comparing of ESD at preschools in Väjö city and Kaneyama-machi through field study, it is clear that Väjö city, S public preschool (Sweden) focuses particularly on educating “Science” and “Practice“ levels. But the Kaneyama-machi, M preschool in Japan focuses particularly on educating at “Sense” level. It seems clear that both preschools are focusing on opposing levels as shown in Figure 2.

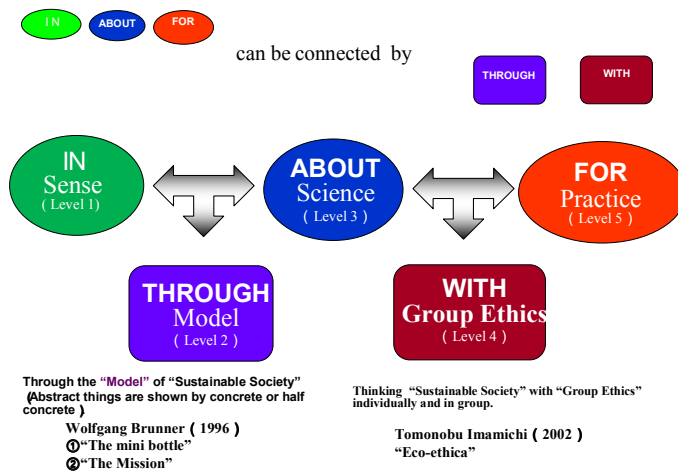
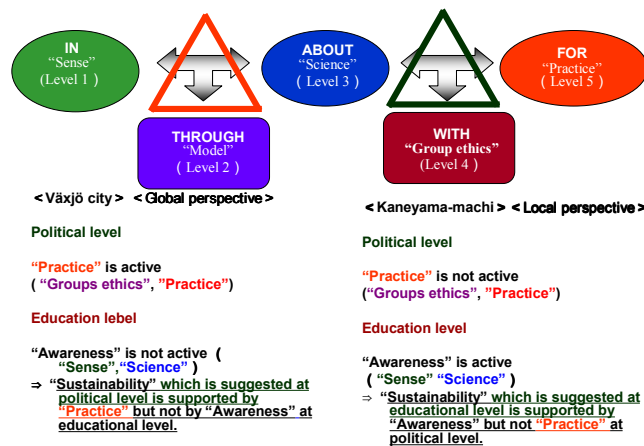


Figure 1: “The environmental epistemological model of 5 aspects”



Figure 2. Comparison of ESD at preschool by field study.



**Figure 3: Evaluation of ESD in Sweden and in Japan through “The environmental epistemological model of 5 aspects”**

Eventually, by using the “The environmental epistemological model of 5 aspects” to analyze ESD for “Sustainable society” in Sweden and Japan as shown in Figure 3, it seems clear that Väjjö city’s “Groups ethics” and “Practice” levels are active at political level and it has a global perspective. However, the “Sense” and “Science” levels are not so active at educational level, but rather at a global level. So it is clear that “Sustainability” in Sweden which is suggested at political level is supported by “Practice” but not by “Awareness” at educational level.

As the contexts of this results, it seems to be concerned the national curriculum and decentralization in Sweden. Since beginning of 90’s, national curriculum has changed to focus more on EE and ESD in Sweden. For example, the national curriculum in 1994, the context is more focusing on the “Behavior” and “Intention” for the nature than “Knowledge” about the nature. And the Swedish municipality has been taken initiative to lead educational context concerned with “Agenda 21”. So it seems to be easy to work for EE and ESD at all levels and it has changed the teaching style to focusing on “Group ethics” and “Practice” than “Knowledge” in Swedish schools.

Furthermore, it is clear that the Kaneyama-machi’s “Groups ethics” and “Practice” levels are not so active at political level and it has a local perspective. On the other hand, “Sense” and “Science” levels are active at educational level and it also has a local level perspective. Therefore “Sustainability” in Kaneyama-machi at educational level is supported by “Awareness” but not by “Practice” at political level.

In the context of this results, it seems to be concerned national curriculum and centralization in Japan as well. For example, the national curriculum in 1998, by introducing “Universal leaning time”, the context of subject in school had been more focusing on the “Behavior” and “Intention” for the nature than “Knowledge” about the nature. But the Japanese municipality hasn’t been taking initiative to lead educational context concerned with “Agenda 21”. So it seems to be difficult to work for EE and ESD at all levels together, like in the Swedish municipality.

## Discussion

As a discussion, from the perspective of the Swedish success, there is the reason that the relationship between EU and Baltic sea states, also every municipality and schools and companies, NGO is very strong. And also those institutions are independent of environment policy for Sustainable Development. Furthermore, there is an institution to connect each institutions. For example, Eco municipality Organization in Sweden, SeKom and The national Swedish association of local municipality, SALAR, and there is very important system thinking called "Back-casting system" suggested by Swedish NGO called "Natural Step" in Sweden from the late of 80's. The founder of "Natural Step", Robert.K. (2008), invented the four-system thinking called "ABCD strategy construction process" for "Sustainability" of the Earth's environment. "The ABCD system is a strategy to reflect the Earth's environment today and to build successful "Sustainability". A is Awareness and B is Baseline Mapping and C is Clear Vision and D is Down to Action. Those 4 systems is necessary to construct "Environmental Policy" for "Sustainability" of the "Earth". It is necessary to construct ESD material's and curriculum combined with Environmental Policy which is concerning with "Back-casting system".

From perspective of Educational level, there are many materials and curriculum made by Swedish municipality and companies and NGO (World Wide Fund, WWF, Nature school, Organization of Outdoor activity).Children, teacher and parents can know the way of learning "In", "About", "For". But there is a lack of way to learn "Through" and "With". So "The environmental epistemological model of 5 aspects" should be useful for ESD not only school level but also outside school level.

Furthermore from perspective of cultural difference between Sweden and Japan, study results are influenced from the typical characteristics of each of the two countries. According to Japanese philosopher, Nisida,I. (1911) in the western world, people think the subject and the object separately. On the other hands, in the eastern world, people think the subject and the object inseparable. So it seems to be clear that Swedish teachers can be stressed in teaching on "Science" more than "Sense" and Japanese teachers can be stressed in teaching on "Sense" more than "Science". And secondly in the western world, people are independent as individuals but in the eastern world, people are dependent as a group. So concerning with these cultural differencies, study results suggests that in the western world, "Model" and "Science" will be stressed in teaching but "Sense" and "Group ethics" will lacking. On the other hand, in the eastern world, "Sense" and "Group ethics" will be stressed in teaching but "Model" and "Science" will be lacking.

## **Conclusions**

It is clear that Education for Sustainable Development, ESD in early childhood is crucial to construct the basis for life-long learning both at educational level and citizens' participation at the political level in order for a "Sustainable society" to work.

Finally, a suggestion would be to work with Education for Sustainable Development, ESD for a "Sustainable society". As "Sustainability" is an international problem at a political level, it is necessary to first implement a systematic development of environmental policies concerning education based on a "Back-casting system" at local and global level. And secondly, to encourage a bottom-up movement of environmental policy and education based on NGO and Nonprofit Organization, NPO. Another idea is to look at the interaction between a "Top down" and "Bottom up" effect and from an educational level, to implement curricular material and

teacher training in “Sustainability” together with environmental policy and education through a “Model” of “Sustainable society” with an idea of life-long learning through the “Bruner model.” And therefore the utilization of “The environmental epistemological model of 5 aspects”.

And according to solve this study’s subject by promoting “The environmental epistemological model of 5 aspects” as life-long learning at every institutions in West and East countries beyond culture differences, it is not so difficult to act at least for “Sustainable society” as “Practice” for people at first.

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