The Status of Environmental Education in Sweden

— A Comparative Study between Sweden and Japan —

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Abstract

The investigation on Environmental Education (EE) in Sweden and in Japan was done through field studies and surveys. The results revealed that (1) EE predominantly exists within the sciences and social studies, and (2) there is a big difference between the informal/nonformal EE in the two countries; in Sweden, informal/nonformal education is more substantial than in Japan. Thus, this paper is a comparison of EE's current status in both Sweden and Japan, in hopes of finding ideal ways of promoting EE in both countries. International cooperation in the field of EE and of the transfer of research results to any relevant countries is essential in making the world an environmentally educated community.

I Introduction

We live in the age of global communication, when it is possible to become abreast with culture, ideas, socio-political and environmental trends from various countries across the globe. Sweden has emerged as one of the global leaders in many different fields. Many people pay much attention to the Swedish way commonly known as "Sweden Model." Sweden changed from a "Welfare society backed up with economic growths in the 1970's" to a "Welfare society for the human beings in the 1980's," reaching the stage of "Sustainable society for the human beings and the environment in the 1990's" (Ozawa, 1996). Sweden has environmentally led the world since the Stockholm Conference in 1972 and in particular the Rio Conference in 1992. Sweden has been one of the pioneering countries advocating the Welfare-System, Education for all including immigrants and the Carbon Tax Environmental Strategy. Swedish people have also developed countermeasures against atomic power plant hazards. Indeed, Sweden has manifested competence in making people take environmentally responsible actions, taking such actions to the national level. These actions and motivation for the environment came from Swedish originality; Swedish history, culture and society were fundamentally influenced by its natural environment. Therefore, we could be closer to the nature of environmental problems if we learn about Sweden's thought and actions (Ozawa, 1996). The belief is that this statement applies to Environmental Education

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(EE), too.

First of all, Swedish EE needs to be investigated because the information available is extremely limited in Japan. The study of EE in Sweden would significantly help Japan understand the nature of EE, and to keep pace with other nations. In this study, a comparison of EE trends in Sweden and in Japan will

Table 1 The questionnaires of Q1 to Q18 and their answers.

No.	Question	SWN(%)			JPN(%)		
		Y	N	?	Y	N	?
Q1-a	Do you like to go outside?	94	5	1	80	20	—
Q1-b	Where? [Forest/Mountain/River/Lake/Sea/ For a walk/Museum/Others]	—			—		
Q2	Do you know ‘Everyman’s right’?	See Fig.2					
Q3	Do you know ‘Forest Mulle’?						
Q4-a	Did you join in the ‘Forest Mulle’?	See Table 5					
Q4-b	Did you enjoy it?						
Q4-c	Do you think ‘Mulle’ is useful to learn about nature?						
Q5	What subject do you like best in school?	—			—		
Q6	Why do you like it best?	—			—		
Q7-a	Have you ever learned about environmental education in school?	96	2	2	91	8	1
Q7-b	In what subjects did you learn environmental education in school?	See Table 6					
Q8	Have you ever learned about environmental issues with your family?	See Table 7					
Q9	Do you want to learn more about environmental issues?						
Q10	Since when have you been interested in environmental issues? [Before school, Compulsory school, High school, University/College, Not yet]	See Fig.3					
Q11	Is your family also interested in environmental issues?	See Table 8					
Q12	Is your interest in the environment affected by your family?						
Q13	What is the most important environmental problem for you?	See Table 9					
Q14	Do you know about ‘Local Agenda 21’?	See Table 10					
Q15	Have you participated in those activities?						
Q16	What brought you to be interested in environmental issues?	See Table 11					
Q17	How did you learn environmental education?						
Q18	What is the most necessary activity to solve environmental problems? [Science development including the technology/ School education/ Local approach, e.g., :Local agenda 21/ Strict legislation]	See Fig.4					

*Y=Yes, N=No, ?=Not answered

find some ideal ways of improving EE in Japan. This study also attempts to search the possibility of international cooperation in the field of EE. Hence, this attempt will pave the way for the transfer of such a result to the countries that need it in the future.

II Method

1. Field Study

One of the authors (M.S.) stayed at Linköping, Sweden from the beginning of January to the end of June, 1999, and visited various museums and EE facilities. During her exchange, several interviews were conducted to collect relevant information as well as materials on EE in Sweden.

2. Questionnaires

There are 2 groups of respondents in both countries. In Sweden, the first group is composed of 92 primary school pupils whose ages ranged from 12 to 13 years, while the other group is made up of 94 high school students whose ages ranged from 17 to 18 years. The school involved in Sweden were Berzilius primary school (Grund skolan) and Folkunga high school (Gymnasium) in Linköping.

In Japan, the first group is composed of 147 primary school pupils whose ages ranged from 11 to 12 years, while the other is composed of 178 college students whose ages ranged from 18 to 19 years.

The questionnaires including the same questions were administrated to both countries. The items in the questionnaires were made in a way that Q1 to Q9 are intended for the first group and Q10 to Q 21 are for the second group in both countries. The survey in Sweden was conducted in March, 1999, while in Japan, it was done in February, 1998 and in July and September, 1999.

Table 1 shows the questions from Q1 to Q18 and their answers and Tables 2, 3 and 4 show Q19, Q20 and Q21 and their answers.

Table 2 Opinions about environmental problems

Q19	Select one of the following thoughts on environmental education which appeals to you most.	SWN(%)	JPN(%)
1	It is of nonsense to consider the environment because human beings can not live without destroying the nature.	0	1
2	We can solve the problems by taking advantage of technology in the future.	16	4
3	We board on a spaceship called “Earth”. Therefore, we have to protect the nature because human beings are also creatures.	31	50
4	Though human beings are part of the ecosystem, we are the only animals capable of thinking and acting for the nature.	22	20
5	We should not violate the rights of animals, river, stones, etc, in the same ways as humans are given rights also.	27	24
6	Others.	3	1

*$\chi^2(5)=74.88$, $P < .001$

Table 3 Opinions about ethics between generations

Q20	What do you think of ethics between the present and future generations? Select one of the following thoughts which appeals to you most.	SWN (%)	JPN (%)
1	I agree to it and it's a matter of course.	68	39
2	I'm not sure of the importance of considering the lives of the people who will live hundreds years later.	4	23
3	As we have suffered from the pollution which was caused by our ancestors, people in the future may have the same experience also.	12	5
4	As we enjoy our lives with the convenient technology developed by our ancestors, we should tackle the environmental problems to reciprocate it for the future generations.	13	29
5	It is nonsense for us to take care of the descendants and it is not necessary to think about them.	0	2
6	Others.	2	2

*$\chi^2(5)=74.88$, $P < .001$

Table 4 Opinions about the South-North problem

Q21	In view of the South-North problem, please select one of the following thoughts which appeals to you most.	SWN (%)	JPN (%)
1	It doesn't matter because developing countries are far from here	1	0
2	Despite of the distances between developing and developed countries, environmental problems should be dealt with cooperatively beyond the boundaries.	54	33
3	Developed countries should recognize the development in developing countries.	8	5
4	We should consider primarily the environment in future development particularly in developing countries.	13	20
5	Developed countries should help developing countries to progress and provide ways for technology transfer for environmental protection.	21	40
6	Others.	2	0

*$\chi^2(5)=15.67$, $P < 0.01$

III Background of EE in Sweden

1. General Review-Formal Education-

The Swedish educational system is uniformly structured. The central authority of the school system is the National Agency for Education (Skolverket, 1998). Regarding the administration of the educational system at the local level (Swedish Institute, 1998a and 1998b), each municipality plays an important role in its implementation. Therefore, every municipality is required to set out general objectives of school plans.

In "Grundskolan", compulsory education lasts for 9 years and is free. The 9 grades are divided into 3 stages; 1-3, 4-6, 7-9 grades. As the current guideline shows, two achievement tests are set at the end of

the 5th and 9th grades. After completing "Grundskolan", pupils proceed to the upper secondary school, "Gymnasium". In addition, municipalities are obliged to provide upper secondary schooling programs for all residents who are younger than 20 years old. Through the current curriculum, "Gymnasium" is flexible and offers extensive vocational options. There are 16 national programs, all of which are 3 years in duration. All programs comprise 8 core subjects : English, Art, Physical and Health Education, Mathematics, Natural Science, Civics, Swedish and Religious Education. The remarkable difference between Sweden and Japan is that Sweden teaches religious education but does not teach moral education, while Japan does.

2. Guidelines for Primary and Secondary School Education

2-1. Lpo 94 and Lpf 94

The current guideline in Sweden was set forth in 1994 with Lpo 94 and Lpf 94 (Swedish Ministry of Education, 1994). Sweden has no definite time schedule for when to change their curriculum whereas the Japanese curriculum (Course of Study) is revised about every 10 years. In Sweden the educational system can be changed whenever the officials see fit.

Lpo means "The curriculum for the compulsory school system". It covers the ordinary compulsory schools, Samic schools, schools for pupils with impaired hearing/vision and physical disability, and compulsory schools for the mentally retarded. Lpf means "The curriculum for the non-compulsory school reforms", and it covers the upper secondary school, municipal adult education, special upper secondary schools, and adult education for the mentally retarded/ intellectually handicapped.

Lpo 94 only states the basic principle of compulsory education and only defines the underlying values and basic objectives and guidelines of the school system. It also indicates the purpose, content and objectives for teaching each subject. On the basis of the curriculum and syllabi, each municipality is obliged to adopt an educational plan which takes specific conditions into consideration. It was noted that, among the objectives Lpo 94 points out, EE is significantly emphasized, as can be seen from the following quotation:

"Schools must also illuminate and open the pupils minds to nature and the environmental problems facing us today. Increasing internationalization is another change which ought to be an influence on education. Schools must give younger people an insight into international relationships and growing understanding of other cultures."

Some of the important aspects of this curriculum describe the way on how schools deal with cultural diversity confronting young people today, along with their cultural heritage, internationalization and environmental issues. As the following objectives of Lpo 94 (Swedish Ministry of Education and Science, 1994) are relevant to these 4 points including EE, directly or indirectly, we shall duplicate some of the objectives:

1. Develop fundamental mathematical ideas and applying these ideas in everyday life.
2. Know and understand fundamental standards and connections within scientific, technological, social academic and humanistic knowledge.
3. Develop excellence in creative works and increase interest towards culture by participating in cultural exchange programs.
4. Become familiar with Swedish and Nordic languages, including the Saami language, along with the Western cultural heritage.

5. Develop understanding of other cultures.
6. Know the structure of every society.
7. Standardize and know your right and duty in school and in society.
8. Acquire knowledge on a specific province and a particular part of the world where people are mutually dependent on each other.
9. Know the requirement of a good environment and understand the fundamental ecological context.

2-2. The Current Status of EE in Sweden

Generally speaking, in compulsory schools in Sweden, students learn EE in Natural Science Orientation subjects (NO) and Social Science Orientation subjects (SO). NO consists of Biology, Physics, Chemistry and Technology in a broader sense. SO consists of Geography, History, Religion and Civics. According to the time schedule for each subject, SO takes 885 hours and NO 800 hours out of the total teaching time of 6605 hours: (Swedish, 1490 hours; Mathematics, 900 hours; SO, 885 hours; NO, 800 hours, and so on.)

In the new curriculum, beyond NO and SO, pupils have more elective time compared with the old system. As a result, teachers have the freedom in deciding interdisciplinary teaching and/or project work. According to Otaka (1999), EE in compulsory schools has been implemented in Comprehensive Study and /or Special Activity, and is carried out for 6 or 7 hours a week. It is also noted that EE in Sweden emphasizes the empirical activity such as fieldwork and/or laboratory work. In many EE facilities, professional leaders are assigned, holding instruction courses and workshops. In Sweden, EE networking is consistently well organized through collaboration among various institutions and associations which consider children's appropriate learning age.

3. Informal Education

"Everyman's right"

"Everyman's right" (Allemansrätten) is the traditional right of public access in Sweden (Sandell, 1998). Similar rights are also found in other Nordic countries. In Sweden this right allows everyone including tourists to move around freely in the forests and fields. Furthermore, everyone is allowed to pick berries, mushrooms and unprotected flowers, or can make fires and camp overnight without permission.

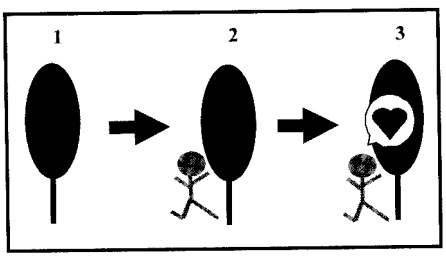

Fig.1 A primitive model of Environmental Education

"Everyman's right" originated in the old laws of Swedish kings from approximately 600 to 700 AD. The meaning of "Everyman's right" was recognized again at the beginning of the 20th century when outdoor recreation becomes popular. In "Everyman's right", people likewise have duties to protect nature. For example, it is prohibited to damage growing trees or bushes, take birds' eggs or nests or to litter. It is quite interesting to note that people have both the right and obligation. Figure 1 (Sandell, 1999) shows a simple process of how to establish a good basis for children's EE: In order to protect nature, the best way is to first become familiar with nature and then develop care for nature.

4. Nonformal Education

4-1. Study circle

Study circle (Studie främjandet) is a nonformal education group, usually with 5 to 20 people who meet regularly to pursue particular subjects. An average study circle holds 8 to 10 meetings, lasting for about a total of 30 hours. Each group decides for itself and designs a way on how its work is to be conducted. Each has a 'circle leader' role is not to teach but to administrate. (Macklinnon et al, 1997). This is a unique and traditional educational method which has a 100 year old history in Sweden. These organizations are responsible for culture projects or seminars relating to EE. The study circle provides, for example, such activities as "Animals and Nature" and "Programs with Children"

4-2. "Forest Mulle"

Lately "Forest Mulle" has become popular among preschool children as an educational outdoor activity on EE. This activity was started by Mr.Goesta Frohm and Ms. Stina Johansson approximately 40 years ago. The story of "Forest Mulle" consisted of 4 fairies; namely Forest fairy "Mulle", Lake fairy "Laxe", Mountain fairy "Fjäll Fina" and Space fairy "Nova". These 4 characters depict the natural settings around children, befriending them in both the real and fantastic world. This is considered as one of the scouting activities with fairies as characters. In general, adult leaders organize a small group, which has around 10 to 20 children. The group explores the forest several times a week (Friluftsfrämjandet, 1998).

4-3. Local Agenda 21

In Sweden, all 287 communes have been participating in "Local Agenda 21" activities since 1996 (Ozawa, 1998). These activities are organized by the national committee of Agenda 21. Each municipality has a small office, and there is a head person who deals with Agenda 21 activities. Also, this office is directly connected to the Agency of Environment Protection. Functioning as a team, these groups will meet their goal of utilizing Agenda 21 by the years 2005 to 2020. They also collaborate with various sectors; like NPO, companies, political parties and study circles. Furthermore, each municipality works with companies and citizens harmoniously. Pupils participate in various activities arranged through Local Agenda 21 programs. Lately, some students have established a composition relating to Local Agenda 21 (Linkopings Kommun, 1997).

IV Results and Discussion

Analysis of Questionnaires

Figure 2 shows the answers to Q2 "Do you know Everyman's right ?" and Q3 "Do you know Forest Mulle?". It can be seen in the figures that "Everyman's right" is widely known among most of the respondents (94%). Responses to Q3 show that about 60% of the respondents are familiar with "Forest Mulle". Many Swedish love and care the forest and the activities mentioned earlier are widely popular. This results from the contribution of "The Association for the Promotion of Outdoor Life (Frilftsfrämjandet)" towards the dissemination of outdoor life in Sweden. The aim of the association is to make the younger generation become interested in nature before entering school. Furthermore, Figure 2 indicates that "Everyman's right" and "Forest Mulle" have been widely popular, thus, its implementa-

tion may lead people to the protection of nature or the environment. In Japan, we don't have such a common concept relating to nature and the environment. It can be said Swedish people have a definite concept as a consensus.

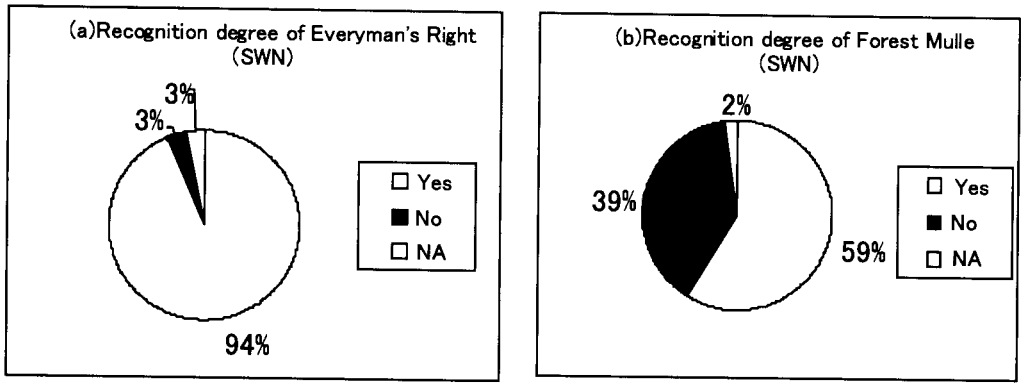

Fig.2 The recognition rate of Everyman's Right & Forest Mulle

Table 5 Rate of Participants at "Forest Mulle" and its evaluation

Q4*	Rate(%)		
	Yes	No	NA
(a)	54	46	
(b)	59	38	3
(c)	97	3	

* (a): Did you join in the 'Forest Mulle'?
(b): Did you enjoy it?
(c): Do you think 'Mulle' is useful to learn about nature?

N=SWN: 92 (Age: 12-13)

Table 5 summarizes the results of Q4, rating Forest Mulle participation and evaluating the program. We see that many children participated in and enjoyed the activity. 54% of the 92 children in the survey are familiar with "Forest Mulle", and in fact, half of the 54% have participated in it. This implies that "Forest Mulle" is well known among children in Sweden. Among the 29 children who participated in "Forest Mulle", two-thirds have recognized that it was enjoyable. The fact that one-third of participants did not enjoy "Forest Mulle" can be ascribed to those children hesitating to join new and unfamiliar group activities. Also, some children may not like being apart from their families. Some may take more time to become accustomed to "Forest Mulle". It is likely that children might be encouraged to join the group once their parents have familiarized them with the atmosphere. It is also noted that 37 children think that "Forest Mulle" is a useful activity for environmental learning. It seems that even if children did not experience the activity of "Forest Mulle", they presume that it is something related to EE.

Table 6 lists the major subjects dealing with EE in school. It is noted that NO is the subject that deals most with EE. This is followed by SO. This result is in accordance with Nogami's description (1994) that NO and SO are the main subjects that deal with EE in Sweden. Likewise, Swedish language classes use EE as a vehicle for teaching every day grammar and language.

The learning experiences on EE and its evaluation are shown in Table 7. It is revealed that about 40% of the pupils have had learning's experience about the environment with their family. About three-fourths of the pupils want to learn more about the environment. This would imply the positive attitude and will of the pupils to learn about the environment.

Figure 3 summarizes the results of Q10 "Since when have you been interested in environmental

Table 6. Subjects relating to EE in school, answers for Q7-b*

Rank	SWN	JPN
1st	NO (Natural Science Orientation)【36%】	Social Study【42%】
2nd	SO (Social Science Orientation)【22%】	Japanese【26%】
3rd	Art, Physical & Health Education【10%】	Science【22%】
4th	Swedish【8%】	Moral Education【6%】
5th	Home Economics, Textiles【5%】	Home Economics【4%】

* "How did you learn environmental education in school?" N=SWN: 92 (Age:12-13), JPN: 147 (Age:11-12).

Table 7. Learning about environmental issues

Question	Rate(%)					
	SWN			JPN		
	Yes	No	NA	Yes	No	NA
Q8*1	38	55	2	1	96	3
Q9*2	73	23	4	58	40	2

*1 "Have you ever learned about environmental issues?" *$\chi^2(1)=58.83$, $P < .001$

*2 "Do you want to learn more about environmental issues?" *$\chi^2(1)=6.41$, $P < 0.05$

N=SWN: 92 (Age: 12-13), JPN: 147 (Age: 11-12).

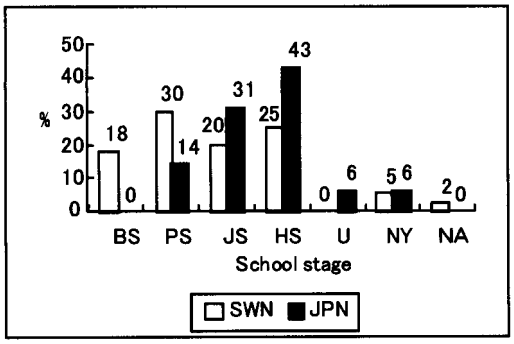

Fig.3 School stages when students were interested in environmental issues, answered to Q10

*Q10 "Since when have you been interested in environmental issues?"

BS: Before School. PS: Primary School.
JS: Junior-high School. HS: High School.
U: University/College. NY: Not Yet.
NA: Not Answered.

N=SWN:94(Age:17-18), JPN:178(Age:18-19).
*$\chi^2(5)=53.69$, $P < .001$

issues?". The result showed there is a big difference between the awareness of the respondents in Sweden and in Japan particularly, regarding the awareness before school and during primary school: younger children in Sweden become interested in environmental issues earlier than those in Japan. Such earlier concern in Sweden likely resulted from the concept/activity like "Everyman's right" or "Forest Mulle" which is commonly known throughout the country.

The responses to Q11 "Are your family interested in environmental issues?" and Q12 "Is your interest in the environment affected by your family?" are shown in Table 8. Table 8 indicates that parents in Sweden have much higher interest in the environment than those in Japan. Likewise, the rate of Swedish children who are influenced by their parents interest in EE almost doubles the rate of Japanese children. It is obvious that the influence of family relationships towards the interest in EE in Sweden is higher than that in Japan.

Table 9 lists the most serious environmental problem from the students' point of view. The major concerns are on global environmental problems such as the destruction of the ozone layer, the green house effect and deforestation. Global environmental concerns in both countries arise from the results of EE, that is, both the formal and nonformal/informal education on the environment. The higher knowledge rate on the green house effect in Japan is attributed to the effect of the so-called Kyoto Conference

on the green house effect, which was held in 1997 prior to the conduct of the survey. It is quite surprising, however, that the participants in Sweden did not recognize acid rain as a serious problem, although it is one of the biggest global environmental concerns. In addition, the concern on 'biological concentration of the pollutants' in Sweden is higher than that in Japan. Generally speaking, both countries are at pace with each other on environmental problems. This may be due to the contribution of EE world-wide which has so far been developed and disseminated.

Table 10 shows the results of Q14 about the Local Agenda 21. 60% of the respondents in Sweden were aware of Local Agenda 21. The high rate of "Yes" to this question is due to the campaign conducted in Sweden in which brochures of Agenda 21 are available at various relevant places such as Agenda 21 Local Information Center and museums. Table 10 also reflects that the rate of participation in Local Agenda 21 is lower than the rate of recognition. In the case of schools, the decision to participate in Local Agenda 21 depends on the school principle or the teachers' discretion. During the interview with teachers, the difficulties of introducing EE or Local Agenda 21 were pointed out. There were several reasons for this. One reason is the conservative nature of the school itself and

Table 8. Interest in the environment and environmental issues

Question	Answer	Rate (%)	
		SWN	JPN
Q11*1	Yes	86	56
	No	14	41
	NA	0	3
Q12*2	Yes	54	36
	No	39	64
	NA	1	0

*1 "Is your family also interested in environmental issues?"
*$\chi^2(1)=21.32$, $P < .001$
*2 "Is your interest in the environment affected by your family?" *$\chi^2(1)=26.58$, $P < .001$
N=SWN: 94 (Age: 17-18), JPN: 178 (Age: 18-19).

Table 9. The most important environmental problem, answers for Q13*

Problem	Rate (%)	
	SWN	JPN
Destruction of the ozone layer	24	24
Biological concentration	22	3
Deforestation	20	25
Green house effect	19	29
Industrial waste	7	7
Nature preservation	4	2
Recycling	2	3
Energy	1	3
Acid rain	0	1
Others	0	2
NA	1	1

* "What is the most important environmental problemfor you?" *$\chi^2(8)=28.67$, $P < .001$
* "Acid Rain" is not included in this analysis.
N=SWN: 94 (Age: 17-18), JPN: 83 (Age: 18-19).

Table 10. The dissemination of Local Agenda 21

Question	Answer	Rate (%)	
		SWN	JPN
Q14*1	Yes	60	0
	No	39	100
	NA	1	–
Q15*2	Yes	12	
	No	89	
	NA	0	

*1 " Do you know about 'Local Agenda 21'?
*$\chi^2(1)=70.55$, $P < .001$
*2 " Have you participated in those activities'?
N=SWN: 94 (Age: 17-18), JPN: 83 (Age: 18-19).
This question was not included in the first survey in Japan for 95 pupils in February, 1998.

another is that older teachers hesitate teaching new things. On the other hand, it seems that Local Agenda 21 activities were not widely known in Japan.

Table 11 summarizes the answers for Q16 “What brought you to be interested in environmental issues?” and Q17 “How did you learn EE?”. It is quite interesting to know that in both countries EE was predominantly dealt with in sciences and other related subjects. On the other hand, formal education as well as informal education through mass media like TV broadcasting has a motivational influence on the interest towards EE. In Sweden, “Forest Mulle”, which was mentioned earlier, has contributed toward the promotion of EE. While in Japan, English and Japanese language courses help to promote EE. It is also important to keep in mind that Swedish language subject education ranked 4th as an effective means of learning EE.

Table 11 The motivation and process of learning EE, answered to Q16*1 and Q17*2

Rank	Rate (%)			
	SWN		JPN	
	Q16	Q17*3	Q16	Q17*4
1st	TV【24.5】	NO【66.0】	S【24.7】	S【53.9】
2nd	NO【17.0】	TV(P)【46.8】	CS【19.1】	Eng【38.8】
3rd	FM【9.6】	SO【34.0】	TV, Eng【14.6】	J【25.8】
4th	Swe【8.5】	NP【33.0】	SS【12.4】	S【20.0】
5th	SO【5.3】	OA【31.8】	ME【9.6】	Ex【18.5】

*1 “What brought you to be interested in environemental issues?”

*2 “How did you learn environemntal education?”

*3 6th: ER (Everyman’s Right)【31.9】, 7th: FM (Forest Mulle)【27.7】

*4 6th: ME (Moral Education)【15.7】

N=SWN: 94 (Age: 17-18), JPN: 178 (Age: 18-19).

TV=TV Programme	S=Science
NO=Natural Science Orientation	CS=Comprehensive Study
SO=Social Science Orientation	Eng=English
FM=Forest Mulle	SS=SocialStudy
NP=Newspaper	ME=Moral Education
OA=Outdoor Activity	J=Japanese
ER=Everyman’s Right	Ex=Excursion

Figure 4 summarizes the answers about the main strategies for solving environmental problems. It shows that many respondents put their priorities on the strict legislation in Sweden, whereas in Japan the top priority was on local approaches. Roughly speaking, the second priority is put on the development of science and technology and the school education in both countries. Education particularly, science education and EE are important in solving environmental problems.

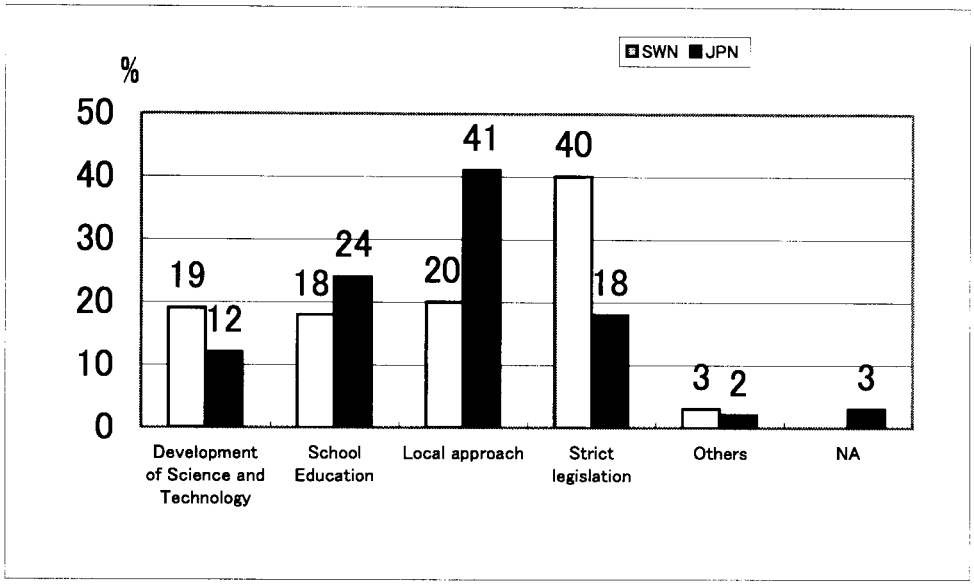

Fig. 4 Solutions to environmental problems, answeres for Q 18*
*"What is the most necessary activity to solve environmental problems?"
N=SWN: 94 (Age: 17-18), JPN: 178 (Age: 18-19).
*$\chi^2(4) = 25.92$, $P < .001$

With Regard to Q19 (See Table 2.) in which students' ideas on EE were questioned, many of the students answered that one has to protect nature, and recognize that people live on the spaceship called "Earth". The results revealed that about one-forth of the respondents acknowledge the rights of animals, rivers and stones. Table also shows that there are more participants from Sweden than in Japan who agree to that human beings can solve the problems by taking advantage of technology. Although Japan has overcome environmental pollution with the use of environmental technology, people may have some apprehensions of the risk of relying completely on technology. Also, Table 2 shows that Swedish people strongly believe the power of using technology to solve environmental problems. It is probably because, since they have their land and nature in order with only a small population density, they have not experienced serious environmental problems. On the other hand, Japan has already proven that the use of technology does not perfectly eliminate environmental problems. Therefore it can be said we should not rely on the use of technology alone.

The answers to Q20 (See Table 3.) about ethics between the present and future generations show that many students in Sweden recognize this concept of environmental ethics between the present and future generations. In Japan, fewer students agree with this point. It can be noted that in Japan, one-fourth of the respondents are not sure of the importance of considering the lives of people who will live two or three hundreds years later. Incidentally, comparing to Japanese respondents, more Swedish people will consider their actions on the environment for their ancestors. Such a low score for the Japanese may be due to the way of living of the younger generation, that the present time is important to them. This way of thinking is also reflected in the modern society where people seem to be inconsiderate for others as long as they themselves are safe.

Regarding Q21 (See Table 4.), in which the South-North problem was questioned, many of the students answered that despite of the distance between developing and developed countries, environmental problems should be dealt with cooperatively beyond the boundaries. As expected, a considerable number of students approve that capable countries should be willing to help needy countries become progressive and to assume the transfer of technology for environmental protection. Such a tendency implies that Japanese people are interested in encouraging international cooperation. As a matter of fact, the Japanese people are starting to evaluate positively their international cooperation. Perhaps it is the younger generation's positive attitudes towards international cooperation and educational cooperation that is important for the realization of the so called sustainable society.

V Current Status , Problems and the Future Perspectives

1. Sweden's Feature

Although it must be admitted that the questionnaires used in the survey revealed some limited information, we see from the analysis that EE deals predominantly with the existing subjects in Sweden and in Japan, particularly in science, social studies and so on. However, it seems that comprehensive EE has not been fully developed and spread out in both countries yet. In short, the status of formal EE in Sweden is similar to that of Japan. On the other hand, there is a big difference in informal/nonformal EE between the two countries. Concretely speaking, "Everyman's right" and "Forest Mulle" had possibly made the Swedish people start EE at an earlier stage of life.

In Sweden, in addition to the "Everyman's right", "Forest Mulle" and Local Agenda 21, museums play some role in EE. Museums are widely opened to everyone, holding exhibits, conferences and study meetings about the environment. Museums serve as core places for EE in the community because they can collect environmental information and participate in environmental activities. Figure 5 is a simple model on how children grow with such EE, and become environmentally friendly citizen.

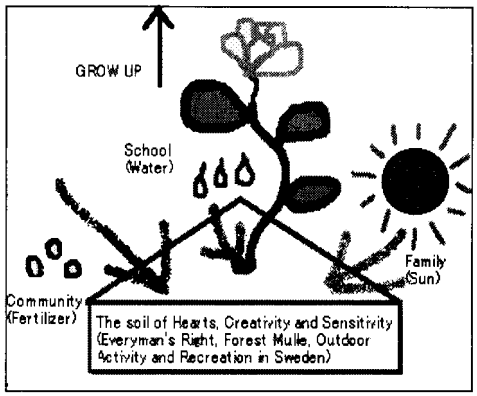

Fig.5 Children growth process through Environmental Education
(Shimizu & Tanaka, 1999)

This model tells us that the community, school and family are essential aspects of local EE. "The sense of wonder"(Carson, 1997) outlines some messages that serve as reminders in our fostering sensitivity and creativity in childhood.

＊*If facts are the seeds that later produce knowledge and wisdom, then the emotions and the impressions of the senses are the fertile soil in which the seeds must grow. The years of early childhood are the time to prepare the soil.*

＊*It is not half so important to know as to feel.*

These Carson's beliefs regarding learning EE in earlier stages of the children are in accordance with various trials in Sweden like "Forest Mulle" and/or familiar outdoor activities at the local and national levels.

2. A Guide for the More Effective EE

Formal EE in the schools of Sweden and Japan have been dependent on respective subjects like science and social studies in both countries, language education is also a springboard for learning EE. In this regard, Herrmann (1994) remarked that the mother tongue and also foreign languages are absolutely crucial in realizing their role to communicate environmental issues. Herrmann added that all kinds of novels and poetry can hide environmental messages. Chenhansa & Scheleppegrell (1998) pointed out that the language used in EE texts has linguistic features that affect students' comprehension of concepts and their ability to envision solutions to EE problems. Especially during formal education, science in school is expected to give students the right knowledge and facts about the environment at their appropriate stages. They also suggested that scientific knowledge could be provided to some extent through EE in language education at the same time. Another important factor should be environmental ethics. To be environmentally educated citizen in the society, common thoughts leading to sound environmental actions should be cultivated. Although comprehensive education including EE has been implemented in schools in Sweden, it seems that, as long as integral EE is concerned, it has not necessarily been fully developed and disseminated yet. In Japan such comprehensive studies have not been introduced in formal education. Indeed, there is a need for an integral approach on EE.

In making reference to the remedy of EE in Japan, the following points are also important:

① To start EE earlier before children enter school.
② To familiarize every teacher with children's learning process of EE.
③ To have more interactions between science and other subjects, e.g., language education.
④ To promote outdoor recreations and activities at both the local and the national levels.
⑤ To disseminate Local Agenda 21 among people and to make use of local museums and parks as core places for local EE.
⑥ To enhance family concerns for EE.

3. Educational Reforms in Japan

On the brink of the 21st century, there have been more debate and discussion than ever before regarding the future state of education in Japan. One of the points that needs to be raised is on educational responsiveness to societal changes, such as internationalization, the information explosion, advancement in scientific technology and environmental degradation. To cope with these changes, a new learning approach on "Comprehensive Learning" is to be implemented in the next revised version of "Course of Study", which will be put into practice in 2002. Cross-curricular/comprehensive EE is expected to be implemented then as well. The comprehensive learning will be given for about three hours a week from the third grade in the primary school to the third grade in the high school. The contents and ways on how to deal with the new learning may depend on the principle of the school and teachers. For this purpose, teachers of each subject must share and strive to undertake innovations for EE. To be able to teach more effectively and to strictly imbibe the aim of sustainable environment would require various professional skills. These things must be considered in order to live in harmony with the environment. Recognizing that the attainment of EE objectives depends on teachers, some measures to promote the competence and capability of teachers must be taken both at the national and municipal levels. It is important that the outcome of such approaches be transferred to other countries so as to promote comprehensive EE.

4. Educational Cooperation between Japan and Europe

As EE is holistic and interdisciplinary in nature, the mutual interaction of knowledge and thought should be active across the world. However, international cooperation in education is not specifically sufficient in the field of EE, probably because of its invisible and indirect profits. It is right to say, therefore, that we must stand on the starting point to promote EE in the threshold of the 21st century. In the Asia-Pacific region, a UNESCO-ACEID project "Learning for a Sustainable Environment" played some role in developing EE. The purpose of the project is to expand a range of innovative practices used in teacher education programs in the region by introducing teachers to the curriculum planning skills and teaching methodologies of EE (Masujima and Tanaka, 1999). It is important that other similar projects on EE should also be started and the results be shared (Tanaka, 1999) both in developing and developed countries. Extending the interaction to the other international level, collaborative work among Asian countries including Japan and European countries, such as Sweden, may be started by establishing network among relevant peoples and sharing the results of the respective programs. It is an advantage that some collaboration programs of EE studies such as "CRE" or "COPERNICS" are developed in European universities (Ginkel, 1995).

Furthermore, the authors believe that the results of the international cooperation, particularly in the field of EE, should be shared to any developed and developing countries in the world, wherever needed. In the future, all countries should promote EE networking through international collaboration. This should be emphasized to integrate opinions and strategies against environmental problems all over the world. Through such an interaction, we could be at pace with other countries in the Asia-African region, in Europe and so on, which may in turn contribute towards establishing a global partnership for the 21st century.

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