UNDERSTANDING AND BEHAVIOR OF JAPANESE UNIVERSITY STUDENTS CONCERNING THE ENVIRONMENT: A PRELIMINARY SURVEY FOR THE ASSESSMENT OF ENVIRONMENTAL EDUCATION IN JAPAN

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Introduction

Psychological aspect of public opinion concerning the environment has been extensively studied and its determinants were proposed to be rationality/self-interest (Gillroy & Shapiro, 1986), issue salience (Iyengar & Kinder, 1987), values (Skrentny, 1994) and fairness (Rasinski, Smith, and Zukerbraun, 1994), suggesting that education as well as information provided by mass-media (NIE, 1999) plays a key role in the formation of public opinion. Therefore, environmental education whose ultimate goal is to stop and eventually reverse the degradation of our natural environment has been treated as one of the important international agenda (UNESCO/UNEP, 1977). In Japan, after various attempts to establish the methodology of environmental education by interested teachers (Watabe & Ohshima, 1998), officially, the environmental education in primary/secondary schools started in 1991 under the guidance of Ministry of Education, Culture and Science. Thus, the environmental concern of today's university students is expected to reflect hopefully, to some extent, the influence of environmental education they received in schools.

In this study we conducted environmental opinion poll to the students (mostly freshmen and sophomores) of four universities and the results were compared with those of foregoing surveys in order to assess whether the current environmental education has been successful to attain its major purposes. The purposes of environmental education are defined here as acquisition of knowledge and technique to understand environment and training to participate in the action to improve the environment.

Measurements

The questionnaire used in this study was prepared with slight modification of that used in the ISSP survey (Central Archive for Empirical Social Research, 1995), in which environmental opinion poll (62 items) was given to nineteen nations including Japan. Nippon Hoso Kyokai (NHK) took the lead of the survey in Japan (Midooka & Onodera, 1996) and hereafter the survey is referred as the NHK survey. The present questionnaire was composed of 56 items and they were classified into the following four categories:

(i) Relation between human activities and environment,
(ii) Scientific knowledge about environment,
TABLE 1. COMPARISON OF AVERAGES OF SIX INDICES

<table>
<thead>
<tr>
<th>Index</th>
<th>Questions</th>
<th>NHK</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRI²</td>
<td>7A, 7E, 8A-8G</td>
<td>3.06</td>
<td>5.90</td>
</tr>
<tr>
<td>AID(A)³</td>
<td>9A-14A</td>
<td>4.18</td>
<td>6.47</td>
</tr>
<tr>
<td>AID(B)³</td>
<td>9B-14B</td>
<td>2.78</td>
<td>5.52</td>
</tr>
<tr>
<td>W1³</td>
<td>5A-5C</td>
<td>0.12</td>
<td>1.01</td>
</tr>
<tr>
<td>AI³</td>
<td>6A,6B</td>
<td>1.11</td>
<td>1.45</td>
</tr>
<tr>
<td>PI⁴</td>
<td>16A-16C, 17, 18A-18C</td>
<td>4.60</td>
<td>3.60</td>
</tr>
</tbody>
</table>

Note: ¹ No response was neglected in the calculation of the indices.
² Calculated by assigning either 2 to -2 point (True) or -2 to 2 point (False) to Answers 1, 2, 8, 3 and 4. Numbers are total of the points for the respective questions.
³ Calculated by assigning 2 to -2 point to Answers 1 to 5. Numbers are total of the points for the respective questions.
⁴ Calculated by assigning 3 to 0 points to Answers 1 to 4 (Q16) and 1 and 0 points to Answers 1 and 2 (Q17 and 18). Numbers are total of the points for the respective questions.
⁵ χ²-test (α = 0.05) indicated the response patterns were identical in both surveys for questions 6B, 8B, 8E, 8F, 17, and 18C.

(iii) Recognition of environmental problems, and
(iv) Action and opinion to protect environment.

The items omitted from the NHK survey were those not directly related to environmental problems/issues.

The measurements were carried out from July 10th to 21st, 1998 on 546 students of four universities in Tokyo area by means of convenient sampling and self-administration. The attributes of the samples are shown in Appendix. Statistic analyses were carried out on the responses scaled by the methods described in the footnote of Table 1.

Results and Discussion

For selected questions shown in Appendix, the responses were compared with those in the NHK survey to evaluate the achievement of the goals of environmental education.

Questions 7 and 8 dealt with scientific knowledge related to environmental problems. The correct response index, CRI, for each respondent was calculated from the responses to these questions. The average CRI data shown in Table 1 indicate that the university students are more knowledgeable than the respondents in the NHK survey. As scientific knowledge is expected to reflect directly the results of environmental education, the current environmental education is considered successful to enrich learners' scientific knowledge. The t-test (α = 0.05) of CRI indicated that the male students were more knowledgeable than the female students, being consistent with the result of the foregoing survey carried out in the Western countries (Smith & Lance, 1994).

In questions 9 to 14 the respondents assessed danger of the following environmental problems/issues for (A) environment in general and (B) the respondent and his/her family. Air pollution caused by cars (9), nuclear power station (10), air pollution caused by industry (11), pesticide and chemicals used for farming (12), pollution of fresh water (13), and global
warmth caused by "greenhouse gases" (14). The averages of awareness indices of danger, AID(A) and AID(B), calculated from the responses to these questions indicate that the students in 1998 are more sensitive to the environmental degradation than the average Japanese in 1992 (Table 1). The students' concern about environmental degradation appears to come from knowledge rather than their experience since most students assessed the danger of inquired environmental problems/issues was more serious for environment itself and there exists a linear correlation between AID(A) and AID(B) of each student (uncertainty is one standard deviation):

$$AID(A) = (0.759 \pm 0.020) \times AID(B) + 2.27 \pm 0.14.$$  

The responses of the majority of students to questions 11, 13 and 14 were observed to surpass the level of "very dangerous". It seems curious that they considered air pollution by industry to be serious since Japan already succeeded to abate industrial air pollution in 1980s. This false notion may arise from the fact that industrial pollutions, referred as Kougaigai (public nuisance) are still one of favorite topics of the current environmental education and has been inculcated into learners. The issue salience model can explain the students' responses to questions 13 and 14 since global warming and the pollution of fresh water by "endocrine disrupting chemicals" have frequently been covered by the mass media for a last couple of years.

Action for the environmental protection was inquired concerning willingness to bearing the cost, role of individuals and government, and individual practice for environmental protection.

Willingness to bear the cost for environmental protection was asked with respect to higher price (5A), and higher tax (5B), and lowering of living standard (5C). The averages of willingness indices, WI, calculated from the responses to these questions are shown in Table 1. Furthermore, the response data to these and the equivalent questions in the public opinion poll on global warming taken by Prime Minister's Office's (PMO) in 1997 (Prime Minister's Office of Japan, 1997) are compared in Table 2. It is noteworthy that, in spite of both NHK and PMO surveys being nation-wide the response patterns were quite different. The majorities of the respondents supported higher price in the NHK but opposed to it in the PMO survey. As for higher tax, the majority's opinion was obscure in the PMO, while the responses were split in both sides in the NHK survey. Further, the pros and cons for lowering of living standard were comparable in the NHK but the pros surpassed the cons in the PMO survey. These results suggest that Japanese public opinion for bearing the cost of environmental protection is not definitive yet. As a whole, in the PMO survey the Japanese seemed to be reluctant to bear the economical cost for the environmental protection reflecting the recent economic depression of Japan. Under the same economic circumstances, the students appeared not to hesitate to bear the cost and this can be interpreted in terms of the rationality/self-interest model. Similar proclivity was also observed in the students' view of the relation between economy and environment inquired in questions 2A, 3C, and 3F (Table 2). The students recognized economic growth inevitably accompanies environmental degradation and favored the precedence of environment over economy, but their opinions were indefinite on the need for economic growth for the environmental protection. On the other hand, in the NHK survey the respondents accepted the notion of environmental impact of economic growth, but were not so enthusiastic to put the precedence of environment over economy and hence insisted on the
Table 2. Response Data for Selected Questions

<table>
<thead>
<tr>
<th>Point</th>
<th>Question</th>
<th>NHK</th>
<th>Student</th>
<th>PMO³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precedence of environment over economy</td>
<td>2A</td>
<td>42.9/24.2</td>
<td>75.1/ .8.0</td>
<td></td>
</tr>
<tr>
<td>Need for economic growth for environment</td>
<td>3C</td>
<td>49.3/16.0</td>
<td>27.3/29.5</td>
<td></td>
</tr>
<tr>
<td>Environmental impact of economic growth</td>
<td>3F</td>
<td>56.1/13.5</td>
<td>64.4/15.2</td>
<td></td>
</tr>
<tr>
<td>Willingness of bearing cost</td>
<td>5A</td>
<td>51.8/26.4</td>
<td>58.1/25.0</td>
<td>32.1/59.4</td>
</tr>
<tr>
<td>Higher tax</td>
<td>5B</td>
<td>42.9/36.7</td>
<td>61.0/25.9</td>
<td>23.5/25.5</td>
</tr>
<tr>
<td>Lowering of living standard</td>
<td>5C</td>
<td>42.8/37.9</td>
<td>61.9/27.5</td>
<td>72.0/19.7</td>
</tr>
</tbody>
</table>

| Citizen                                    | 15A      | 70.9/14.0    | 79.7/104     |      |
| Business                                   | 15B      | 81.8/6.1     | 89.0/5.3     | 82.1/5.0 |

Note: ¹ Data are shown as the percentages of the respondent answered positively/negatively to the questions.
² χ²-test (α = 0.05) indicated the response patterns in the present and the NHK surveys were identical only for question 15B.
³ Public opinion poll on the global warming (Japan Prime Minister's Office, 1997).

need for economic growth for environmental protection. The students are not deeply connected to ordinary economic activities and are relatively free from self-interest in economy. Apparently the student's view concerning the environment/economy relation was based on their knowledge about environmental problems/issues acquired in schools and it is likely to be on the right track to abate the degradation of natural environment.

Individual and government roles in environmental protection were inquired in questions 6 and 15 (Tables 1 and 2). In the responses to question 6 the students were observed to be more confident in individual contribution for the environment than the respondents in the NHK survey, whereas there was little difference in their readiness to sacrifice time and money to improve the environment. Moreover, the vast majorities were responded, more predominantly in the students, to accept government control over individual and business in the present, the NHK and PMO surveys. The Japanese are known to favor government protection of the environment regardless of their high environmental concerns (Lovrich, Pierce, Tsurutani and Abe, 1986) and such passive attitude has persisted in today's university students. The averages of attitude indices, AI, calculated from the responses to question 6 are shown in Table 1.

Individual practice for the environmental protection in dairy life and participation in the protection movement were asked in questions 16A-16C, 17 and 18 and the practice index, PI, was calculated from the responses to these questions. The average of PI for the students is lower than that of the respondents in the NHK survey (Table 1), indicating the students were less enthusiastic to practice the environmental protection than the average Japanese in 1992. Although some excuses can be presented to this slightly disappointing result, it is hard to say that the environmental education has succeeded to attain one of its important goals until now.

As what is most important for environmental education is to train learners to practice voluntarily the action for environmental protection, it is of interest to examine the determinants of PI. However, the regression analysis, taking gender, CRI, AID, WI, and AI as explanatory variables did not yield satisfactory results (R² = 0.102). Thus, the students were divided into three groups (high, middle, and low) on the basis of their PI and the response
TABLE 3. GENDER RATIO AND AVERAGES OF FOUR INDICES FOR THREE GROUPS OF STUDENTS

<table>
<thead>
<tr>
<th>Group</th>
<th>Male/Female</th>
<th>CRI</th>
<th>AID(B)</th>
<th>WI</th>
<th>AI</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>72/69(^2)</td>
<td>5.38</td>
<td>6.80(^3)</td>
<td>1.61</td>
<td>1.76</td>
</tr>
<tr>
<td>B</td>
<td>140/116(^2)</td>
<td>6.12</td>
<td>5.61(^3)</td>
<td>1.21(^3)</td>
<td>1.68(^3)</td>
</tr>
<tr>
<td>C</td>
<td>109/40</td>
<td>6.02</td>
<td>4.18(^3)</td>
<td>0.114(^3)</td>
<td>0.758(^3)</td>
</tr>
</tbody>
</table>

Note: 1 Students were grouped based on their PI; A (PI ≥ 5, \(\bar{P}I = 5.96\)), B (PI = 3 to 4, \(\bar{P}I = 3.50\)), and C (PI = 0 to 2, \(\bar{P}I = 1.55\)).

\(^2\) \(\chi^2\)-test (α = 0.01) indicates the gender ratio was identical with that of the whole respondents.

\(^3\) t-test (α = 0.05) indicated the difference in the averages is significant.

Characteristics of these groups are compared in Table 3. Significant differences found in these groups are:

(i) Gender ratios in Group A (high average PI) and Group B (middle average PI) are close, while the male ratio is remarkably high in Group C (low average PI),

(ii) Average CRI increase in the order of Groups A < C ≤ B and is the lowest in Group A,

(iii) Average WI of Group A and B are fairly close, while that of Group C is distinctly lower than those of the other two groups, and

(iv) Average AID (B) and AI increase in the order of Groups C < B < A.

These findings indicate that awareness of danger and especially attitude and willingness to bear the cost motivate the practice for environmental protection rather than richness in scientific knowledge. Dunlap and Scares have reported environmentalism is high with the public seeing the problems as serious and threatening (Dunlap & Scares, 1991).

Conclusion

Although the present survey is preliminary in nature, it clearly demonstrates the characteristics of the behavior of today's Japanese university students toward the environment. They are relatively rich in the knowledge about the environment and sensitive to the environmental degradation, but still reluctant to act on their own initiatives. In spite of the sincere efforts devoted to environmental education, it seems unsuccessful to reverse students' passive attitude against environmental action. The current environmental education, however, is not solely liable for this undesirable situation since the attitude to tackle positively on the social problems including the environment should be trained through not only environmental but various opportunities of education.

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REFERENCES

UNESCO/UNEP (1977), Intergovernmental conference on environmental education, Tbilisi, Georgia.

APPENDIX

1. Attributes of the samples are given in the table shown below.
2. Questions subjected to the analysis in this study are shown below. Full text of questionnaire and response data are available on request.
Q.2. How much do you agree or disagree with each of these statements? (Answer type A)
A. We worry too much about the future of the environment and enough about prices and jobs today.

Q.3. How much do you agree or disagree with each of the following statements? (Answer type A)

C. In order to protect the environment, Japan needs economic growth.

F. Economic growth always harms the environment.

Q.5 (Answer type B)

A. How willing would you be to pay much higher prices in order to protect the environment?
B. How willing would you be to pay much higher taxes in order to protect the environment?
C. How willing would you be to accept cuts in your standard of living in order to protect the environment?

Q.6. How much do you agree or disagree with each of these statements? (Answer type A)

A. It is just too difficult for someone like me to do much about the environment.

B. I do what is right for the environment, even when it costs more money or takes more time.

Q.7. In your opinion, how true is each of the following statements? (Answer type C)

A. All radioactivity is made by humans.

E. All man-made chemicals can cause cancer if you eat enough of them.

Q.8. In your opinion, how true is each of the following statements? (Answer type C)

A. If someone is exposed to any amount of radioactivity, they are certain to die as a result.

B. Some radioactivity waste from nuclear power stations will be dangerous for thousands of years.

C. The greenhouse effect is cause by a hole in the earth’s atmosphere.

D. Every time we use coal or oil or gas, we contribute to the green house effect.

E. All pesticides and chemicals used on food crops cause cancer in humans.

F. Human beings are the main cause of plant and animal species dying out.

G. Cars are not really an important cause of air pollution in country.

Q.9 (Answer type D)

A. In general, do you think that air pollution cause by car is ____ for the environment?

B. Do you think that air pollution caused by car is ____ for you and your family?

Q.10 (Answer type D)

A. In general, do you think that nuclear power stations are ____ for the environment?

B. And do you think that nuclear power stations are ____ for you and your family?

Q.11 (Answer type D)

A. In general, do you think that air pollution cause by industry is ____ for the environment?
B. Do you think that air pollution caused by industry is ___ for you and your family?
Q.12 (Answer type D)
A. In general do you think that pesticides and chemicals used in farming are ___ for the environment?
B. Do you think that pesticides and chemicals used in farming are ___ for you and your family?
Q.13 (Answer type D)
A. In general, do you think that pollution of rivers, lakes and streams is ___ for the environment?
B. Do you think that pollution of rivers, lakes and streams is ___ for you and your family?
Q.14 (Answer type D)
A. In general, do you think that a rise in the world’s temperature caused by the “greenhouse effect” is ___ for the environment?
B. Do you think that a rise in the world’s temperature caused by the “greenhouse gas” is ___ for you and your family?
Q.15A and B.
If you had to choose, which one of the following statement would be closest to your views?
1. Government should let ordinary people (A) / businesses (B) decide for themselves how to protect the environment, even if it means they don’t always do the right things
2. Government should pass laws to make ordinary people (A) / businesses (B) protect environment, even if it interferes with people’s rights to make their own decisions.
Q.16 (Answer type E)
A. How often do you make a special effort to sort glass or metal or plastic or paper and so on for recycling?
B. How often do you make a special effort to buy fruits and vegetables grown without pesticides or chemicals.
C. How often do you refuse to eat meat for moral or environmental reasons?
Q17. Are you members of any group whose main aim is to preserve or protect the environment? (Answer type F)
Q.18. In the last five years, have you (Answer type F)
A. signed a petition about environmental issues?
B. given money to an environmental group?
C. taken part in a protest or demonstration about an environmental issues?

Answer type C: 1. Definitely true, 2. Probably true, 3. Probably not true, 4. Definitely not true, 8. Can't choose
Answer type F: 1. Yes, 2. No