

Environmental Education

The Significance and the Role of Science Education

Tadashi Nakajima

Faculty of Education, Kumamoto University, Japan.

Introduction

In the early part of this century, the world population was only about 16 hundred million, but today it coming up to about 50 hundred million and if the situation keeps on like this, the population will amount to more than 60 hundred million in the 21st century.¹⁾ Such speedy increasing of the population coupled with the remarkable development of science uplift on the cultural level, but on the other hand, human activities laying stress on their production has had a bad effect on the environment surrounding the earth. Therefore, if humankind doesn't awaken to the environmental problems and start action to improve them now, it is doubtfull whether humankind itself will survive.

Such being the case, environmental problems are a international matter of the utmost concern today.

As the environmental problems include wider and various affairs, the resolution of them is not so easy. But, environmental education plays an important role for the basic resolution of them.

It is understood at the international conferences such as the International Workshop on Environmental Education in Belgrade, Yugoslavia in 1975 and Intergovernmental Conference on Environmental Education in Tbilisi, USSR in 1977, that many countries in the world are making great efforts for the environmental education today.

In this paper, I described the outline of environmental education and mentioned my opinion about the role of science education in it.

I. Environmental Problems

It is very difficult to explain the environmental problems in a word, because these problems include various and complex contents. Therefore, this word may be interpreted in many ways.

For example, some people may consider this word in connection with only pollution or nature conservation and so on. But, the issue in today's debate about environmental problems means everything in external conditions which affect the existence of life. In other words, we can say the total environment which affects humankind and natural environment, for example, population, food, resources, pollution, nature conservation and so on.

Moreover, the environmental problems should be considered not only for the limited area or country, but also on the global scale.

I would like to mention here some concrete examples for the consideration of environmental education to be touched upon later.

(1) The problems of population and food

It is matter of course that much food is needed as the population increases. But, about 5 hundred million people are suffering from nourishment deficiency in the world today.

According to the presumption by the World Bank, if the situation keeps on like that, the population of nourishment deficiency will amount to about 13 hundred million in 21st century.

In passing, F.A.O. defines a meal less than 1,600 Cal in a day as scanty nourishment.

Agricultural chemicals and chemical fertilizers are used for the food production increase, but on the other hand, pollutions are aroused by these chemicals. For example, D.D.T. (dichloro diphenyl trichloro ethane) which was used as an insecticide had discharged about 100 thousand ton a year around 1970.²⁾

In spite of the fact that almost all countries in the world have stopped D.D.T. Production and its use at present, the remaining D.D.T. in fish is at a high level of concentration, and it is said that it will be 20 or 30 years

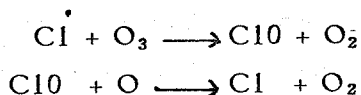
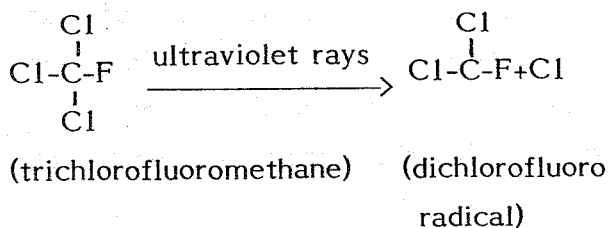
before this level falls to that of around 1970.³⁾

(2) Resources Problems

Nowadays, humankind uses vast fossil fuels (coal, oil, natural gas etc.). As a result of their burning, much CO_2 is discharged in the air and these CO_2 have influenced the weather around the earth. Furthermore, needless to say, these fossil fuels and other underground resources are finite materials, therefore, if the source of energy supply in the world depends on these materials like today, it is said that oil will be dried up within about 30 years, coal within about 2,300 years. Furthermore, many useful metal resources are in a critical situation of running dry within 100 years.⁴⁾ if the consumption continues like today.

(3) The pollution problems in our daily life

It is well known today that the environment around the earth is polluted gradually, pollutions occur from various sources and among them, there are not a few which are caused by our daily life. For example, atmospheric contamination by exhaust fumes from automobiles, break out of red tide cause by eutrophic drain water from our houses, the decomposition of ozone by chlorofluorocarbon in the atmosphere, etc, there are other similar causes too numerous to mention. In passing, chlorofluorocarbon is contained in a spouting stuff as a spray or used as a cooling gas in a refrigerator. Among them, trichlorofluoromethane (CFCl_3), and dichlorodifluoromethane (CF_2Cl_2) are used as popular compounds. In the atmosphere, ozone acts as a filter of ultraviolet rays as it were. For, the amount of ultraviolet rays arriving on the earth are decreased because of the absorption by ozone. But, according to the report of W.M.O. (World Meteorological Organization), recently, the fluorocarbon is gradually decomposing the ozone in the atmosphere. Therefore, it is feared that skin cancer will increase by too much suffering of ultraviolet rays. In passing, the process of decomposition of ozone by chlorofluorocarbon is as follows,



II. What is the Environmental Education ?

In accordance with the resolution of the United Nations Conference on the Human Environment which was held in Stockholm in June 1972, UNEP (The United Nations Environmental Program) was established and it has promoted environmental education in cooperation with UNESCO. For example, they held an International Workshop on Environmental Education in 1975, Intergovernmental Conference on Environmental Education in 1977 and so on.

In these national level meetings, the categories of environmental education objectives were made clear by discussion of participated specialists.

According to them, the following matters are recommended as the fundamental objectives.⁵⁾

- a. Awareness: to help social groups and individuals acquire an awareness of and sensitivity to the total environment and its allied problems.
- b. Knowledge: to help social groups and individuals gain a variety of experience in and acquire a basic understanding of the environment and its associated problems.
- c. Attitudes: to help social groups and individuals acquire a set of values and feelings of concern for the environment, and the motivation for actively participating in environmental improvement and protection.
- d. Skills: to help social groups and individuals acquire the skills for identifying and solving environmental problems.

- e. Participation: to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems.

After all, environmental education emphasizes bringing up the human with the sense of responsibility, morality and ability for value judgement

Therefore, environmental education should be provided not only for school education but for home education, social education also. Moreover, it should composed of a comprehensive lifelong education.

In this connection, the Environmental Education Act in United States of America which was approved in 1970, defined the environmental education as follows.⁶⁾

"environmental education means the educational process dealing with man's relationship with his natural and man made surrounding, and includes the relation of population, pollution, resource allocation and depletion, conservation, transportation, technology, and urban and rural planning to the total human environment."

III. What is the Role of Science Education in the Environmental Education ?

Judging from the foregoing fundamental idea of environmental education, it is needless to say that the environmental education should be carried out by all subjects in school curriculum, but particularly, by science which is closely connected with nature, because the subject of science study is nature.

Then, what should we do in science education ?

I think, it may be given as a conclusion following matters.

- 1) To acquire the scientific knowledge, skill and attitudes which enable one to judge the natural phenomena correctly.
- 2) To understand natural regularity and culture and a sense of gratitude for nature and a careful mind.

The ultimate purpose of science education is the understanding of natural regularity and upbringing of character with a scientific view of nature through the study of concrete natural phenomena. Such matters should be understood not only in ideal appreciation but in practical study,

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particularly through the observation and experiment, and acquired knowledge and skill should relate to the improvement and conservation of the environment.

Furthermore, it is the important role of science education in environmental education to realize the subsistence of human beings by natural benefit and to bring them up with a sense of gratitude for nature.

Conclusion

Since life has come into the earth, creatures have evolved to adapt themselves to the surroundings and lives in the natural balance. In this process of evolution, there were extinct species which couldn't adapt to the severe natural surroundings.

It is said that as one of the species of creatures, the human race appeared on the earth a few million years ago.

In the primitive age, the population was small and productive activities were simple, therefore, human activities did not affect the natural balance and disrupte the environment. But, the foregoing concrete examples show that the environmental problems debate today is caused by anthropocentric conduct.

In other words, it is not too much to say that the problems exist in the following points.

i.e. mankind who has the pride of being the lord of creation, has the hallucination that he can conquer nature by the development of natural science and to say in an extreme expression, he has looked rather toward making the environment fit human life than to making himself fit the environment.

There are many species of creatures on the earth not only mankind, and human activities affect other crearures and conversely, we share in the benefits of them. Therefore, we should be concious and act carefully that mankind himself was created in the environment, while, he has a responsibility as a former of the environment.

In conclusion, I would like to quote the word of the great scientist, Sir Issac Newton.

"I do not know what I may appear to the world, but to myself I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble on a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me."

This modest word is worthy of precept for the people who are apt to think illusionarily as if science were able to conquer nature.

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