Technical Note Report

DEVELOPMENT OF ENVIRONMENTAL EDUCATION ACTIVITY BY INTRODUCTION OF ENVIRONMENET ISO

Takanori Kumekawa[1], Yoshitaka Aihara[2], Eiji Murakami[3], Masakatsu Takakuwa[4] Yoshiharu Okada[5]

Abstract

Utsunomiya Technical High School is acquired the certification of an environment management system (ISO14001) in February, 2002. This system is to do a plan, enforcement, a check, a review. In Environment ISO, useful activity is recommended in addition to environment load reduction activity. An environment principal of the school is to bring up a green engineer. The basic idea is to be kind to a person, and it is upbringing of an eco-friendly industry engineer.

Until now two years passed. Reduction of trash was about 50%, and the quantity of electricity use was about 3% below down compared with 2000. Useful activities for environment are carried out in many educational activities. Interchange activities with a local area such as river purification activity or a performance of an environment picture-story show are progressing, too. Environment ISO has become a means to invent revitalization for a school. As a future problem, continuous improvement is important. The certain enforcement and training will be big problems.

KEYWORDS: *ISO14001, green engineer,environmental maintenance activity, local interchange*

1.   Introduction

Recently, global environmental problems have been in a serious situation. There are caused by human activities, new actions for construction of sustainable development are demanded (Ishii, 1995; Pauli, 2000). The management system on environment has been produced as a background. It is introduced in a lot of companies and public bodies, compared with it, there is a little introduction in a school. In many companies, International Standards covering environmental management are intended to provide organizations with an effective environmental management system which can be integrated with other management requirements, to assist organizations to achieve economic goals. And this system is needed continual development of society in society and harmony with environment as a purpose (International Organization Standardization, 1996). Until now, environment education is practiced in much school in Japan (Kurosawa et al., 2001), environment education using

1 Dr.Eng, Leader of ISO Project, Utsunomiya Technical High School, Utsunomiya, JAPAN.
2 Teacher, Utsunomiya Technical High Scholol, Utsunomiya,JAPAN.
3 Teacher, Utsunomiya Technical High Scholol, Utsunomiya,JAPAN.
4 Excllent education adviser , Education Center of Tochigi Pre.,Utsunomiya, JAPAN.
5 Dr.Eng, Principal,Utsunomiya Technical High Scholol, Utsunomiya,JAPAN.

an environment management system in a school is environment management system is carried out, in particular, a part of elementary schools and junior introduced (Kobori, 1999). Now, there are schools that environment education based an environment management system is carried out, in particular, a part of elementary schools and junior high schools are practicing environment education with a similar method such as a certification system of a city (Utsunomiya city, 2002). Now, there are ten several high school which is certificated, but there is a little compared with the number of high school in Japan.

The school began to take action to acquisition in October, 2000 and was certified ISO14001 in February, 2002. Introduction of Environment ISO is expected that it can be learned upbringing and morals for a high school student. In Environment ISO (ISO14001 is usually called), useful activities are recommended in addition to reduction of environment load. Especially in educational realm, these activities are expected to be a key to solve variations in environmental problems.

Continual improvement is demanded by Environment ISO. The system minimizes complicated rules and regulations and that maximizes an important point by useful implementation and operation (Nakaguchi, 2001). The school education makes much of the process that a student learns from activity. Also, it should be taken into consideration that the practical use of this system should be based on maintaining diversity and free decision-making by teachers. And it will vitalize characteristic as an educational institution. This International Standards permits the system which the original fact or condition of an organization is considered. The school recognizes that it is an educational organization and intends to develop high quality education though Environment ISO and to plan revitalization of a school with this activity.

In this study, it is examined the utility and an influence, problems on enforcement from a result for certification acquisition after two years and it is made clear introduction and development of an environment management system based on ISO14001 in high school.

2.   An outline of a built system in the school

It is with a basis turning a cycle of Plan-Do-Check-Action in the school management system, and it is attempted continual improvement in this system. This outline of our system is shown in Figure 1.

There is an environment system on the basis of top down. Therefore, the success of the system depends on commitment of all levels and functions, especially from top management. In this system, it is considered so that the commitment from top can be resembled greatly. A principal, vice principals and an office manager are the management layer at school and it is a characteristic with non-pyramid type not found in a lot of companies. There is a decision on the basis of a representative system. Decision of an organization is different from an occasion. There are a lot of decision-making on the basis of a representative system. A standard matter of environment management system ISO demands top down. So, the school built a structure shown by Figure 2. A principal is the highest management layer, one of vice principals (there are two vice principals in the school) are an environmental management representative and another is an environmental audit manager. ISO project is the center of environment activities and ISO committee is the highest decision-making organization. Each subject chief and the directors on school affairs administration are environmental safeguard representatives. Because the section where one teacher is involved is more than one, it is
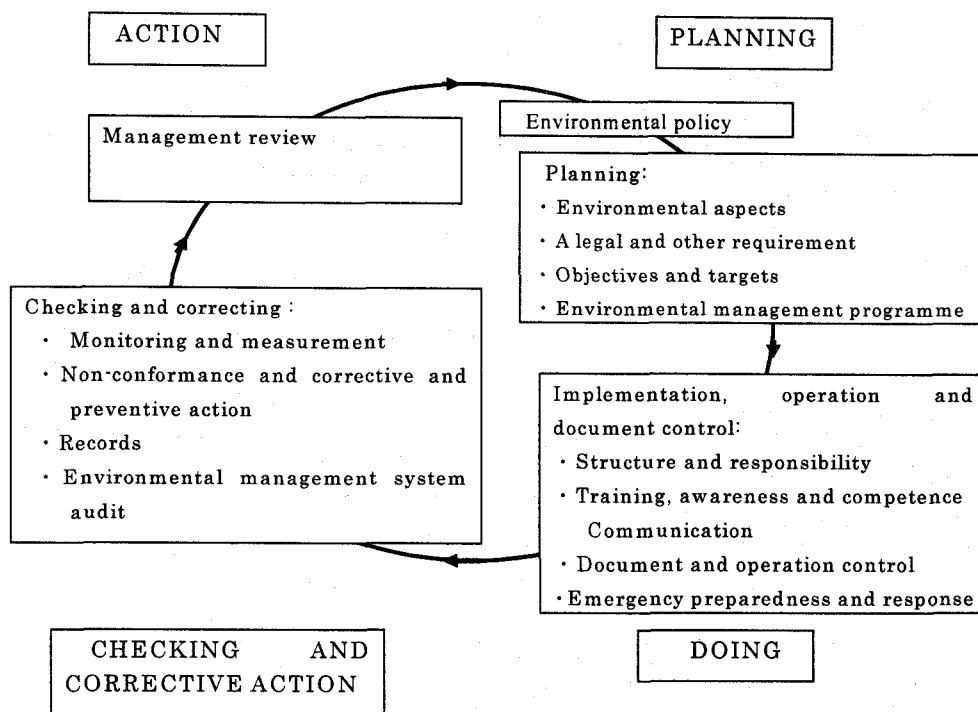
Figure 1. Outline of environmental management system

unprecedented to cut and bring down as a section of vertical series. In other words, it is thought that an organization of a school has dual structure (school affairs administration and a subject lesson).

It is able to do the deliberation in an ISO committee about environment matters and decision-making is entrusted to a staff meeting. It is agreed by a staff meeting. Therefore, a decision of ISO committee means a decision of staff meeting. Furthermore, ISO committee is permitted to give the proxy to ISO project in order to respond to various changes of age and situation outside the school. The extent of the application on this Environment Standard is limited within all staffs and school site. As one of standard requirements of Environment ISO, it is imposed duty on periodical education, awareness, and control training. Importance of training of repetition is emphasized. Accordingly it is burdened a program to carry out education and training to the staff in this system.

Taking into account developments of a student, it is supposed that introduction of ISO should be prioritized to enrich or evolute the teaching contents. From comparison with factories, it is thought that entrance student is materials, and graduates are products. It is possible that school sends students with efficient knowledge and sensitivity about environment. In other words, it could be said that inspection of environmental education is judged by students. Actually audit by an external organization, a lot of students are examined. As a result, the achievement of thoroughness in educational activity is estimated on the process above. In Environment ISO, it is needed to decide environmental policy. The top management layer devises it by oneself, and an environment policy must be documented, implemented, maintained, communicated to all staffs, and it should be available

```
┌─────────────────────────┐
│      The   principal    │
└────────────┬────────────┘
             │        ┌──────────────────────────────┐
     ┌───────┴────────│ Environmental     management  │
┌────┴────────────────┴──┐│ system audit team            │
│ An    environmental   management │──────────────────────┘
│ representative         │
└────────────┬───────────┘
             │
             │    ┌───────────────────────────────────────┐
             │    │ ISO committee                         │
             │    │  The highest deliberation on environment ISO │
             │    │                                       │
             │    │                                       │
┌────────────┴─────┐│                                       │
│ A project leader │├───────────────────────────────────────┤
└────────────┬─────┘│                ISO project            │
             │    └───────────────────────────────────────┘
             │
┌────────────┴──────────────────────────────────┐
│ An environmental representative in safeguard realm │
└────────────┬──────────────────────────────────┘
             │
┌────────────┴──────────────────────────────────┐
│                 All staffs                     │
└────────────┬──────────────────────────────────┘
             ┆
┌────────────┴──────────────────────────────────┐
┆                 All students                   ┆
└────────────────────────────────────────────────┘
```
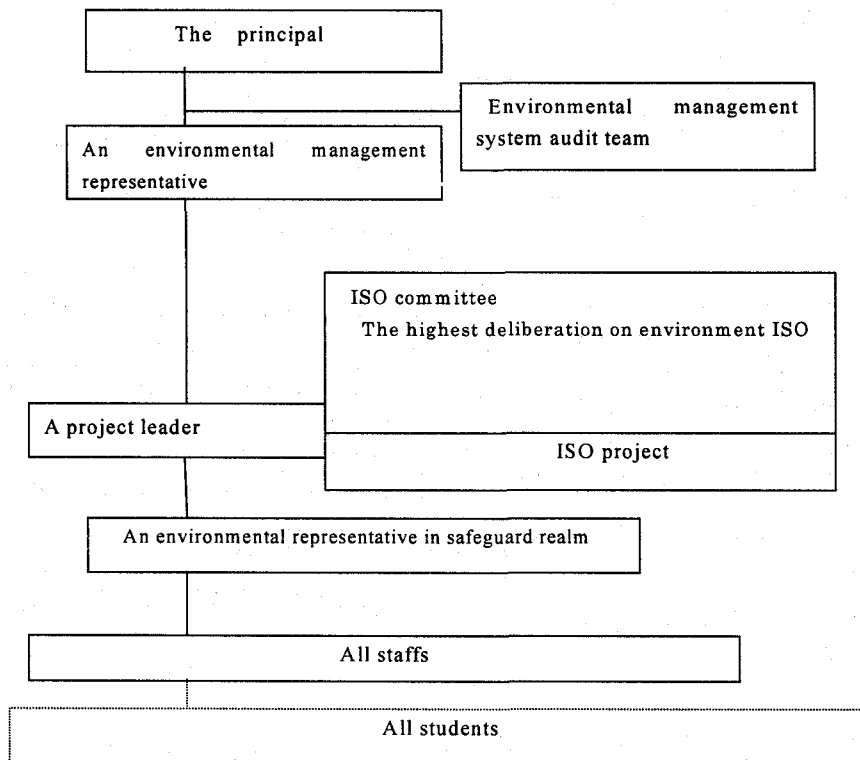
Figure 2. A figure of structure of Environment ISO

to the public. A key word forming the basis of environment policy of the school is "a green engineer".

This is original key word of the school and this means that promising students to be specialists should have awareness as citizens of the earth and the action considered environment

The times changed into new time that it is considered from making a good thing to a destination of a product. This means the making thing less loading to environment. The root of this switch includes concept "to be kind to a person." An environmental problem is not only the simple problem that can be settled technically but also has an indispensable relationship to basic part of human life. And it is also a tight problem of life. Accordingly, it should be stepped by human life and immanence value to treat an environmental problem.

As for the positioning of education of Environment ISO in the school, it includes parts of international understanding, the welfare, information, and environment education.

Concrete objectives and targets will be requested in the environment ISO. It is assumed that it is necessary for the school to quantify objective and target if possible. For example, compared with 2000 (is standard year at the school), 40% decrease of burnable trash, 2% decrease of quantity of electricity consumption, promotion of green purchase, reuse and recycling of cans and materials, promotion of environment enlightenment, and environment law system. A record based on environmental impact is shown in Table 1. Environment impact registration is decided by the

Table 1. A record of environmental impact at Utsunomiya Technical High School

Environment aspect	Environment impact	An environment aspect item											Environment aspect evaluation				A form			The remarkable environment side
		A healthy obstacle to a person	Aggravation of amenity	Air pollution	Soil pollution	Water pollution	Decrease of a tropical rain forest	Acid rain	Depletion of the ozone laye	The drying up of resources	A waste	Green house effect	Legal regulation	An environment policy	A complaint	Harmful matter	In routine	In non-routine	Emergency	
Energy	Electric energy		●							●		●		●			●			●
Consumption of materials	Consumption of copy paper		●				●			●	●		●	●			●			●
Discharge of a waste	Discharge of a waste (Wastes)		●								●		●	●			●			●
A facility institution	Harmful matter safekeeping (PCB safekeeping)	●			●								●	●		●			●	●
	A basement oil tank				●								●	●					●	●
	LP gas safekeeping			●								●		●					●	●
	Chemicals safekeeping for experiment				●								●	●					●	●
	Boiler institution use		●					●				●	●	●			●			●
			●					●				●	●	●				●		●
		●		●	●							●	●	●					●	●
The noise	Chime and broadcast		●										●	●	●			●		●
Eatting room	Drainage(oil etc)					●							●	●			●			●
Activity to be useful in environment	Spread enlightenment of environment education	○	○	○	○	○	○	○	○	○	○	○		○			○			○
	A study on garbage compost				○						○			○			○			○
	A study on water cycle use					○				○				○			○			○
	an environment website			○		○	○			○	○	○		○			○			○
	Support of environment activity in club	○	○	○	○	○	○	○	○	○	○	○		○			○			○
	Development with environment education text			○	○	○		○	○	○	○	○		○						○
	Enforcement of environment class concerned	○	○	○	○	○	○	○	○	○	○	○		○			○			○

environment aspects, and the concept is to think global environment with items that might affect outside school.

Basic concept of environment management system is construction and operation of the system which is kind to a person. A person makes an environment management system and operates it.

Accordingly, it is expected that the system which is kind to a person lasts long and enables one to carry it out easily and spread the notion in the school. In this system, there has been a serious problem that has been growing documents or records and how to deal with them. Also, it was taken it into consideration that teachers could deal with recording as daily work as possible. The implementation depends on teachers. An environment policy is the minimum aim of the school and it is feasible for teachers to implement their own way of doing than environmental policy. While a dispersion of activity is acceptable, it is assumed that it is needed to include diversity like existence, activity and consciousness as a basis of the activity. There is diversity among teachers as well as students. It is essential for everyone to accept each other's difference and to implement coherently.

3. Expansion of environment education activity

3.1 An environment load reduction effect

It is almost three years from Environment ISO certification acquisition. A lot of activity has been gathered to Environment ISO. At first it is shown a result of environment load reduction in Table 2. Compared 2000 with 2002, about 50% burning trash decreased and about 3% quantities of electricity consumption decreased, and about 40% water service decreased. The quantity of use of water service increased because of leaking of water in 2001, but turned in decrease for 2002 years after repair.

Table 2. An environment load reduction result

Year	Burning trash	A quality of electricity consumption	A quantity of water service use
Unit	kg	kwh	m^3
2000	40,390	465,829	23,698
2001	24,535	443,791	28,688
2002	21,314	453,869	19,056
2003	22,498	460,728	14,441

In addition, expense reduction of a school compared with 2000, about 4,000,000 yen (36,400 dollars; change rate is 1 dollar =110 yen) in 2002 decreased, about 1,600,000 yen (146,000 dollars) in 2001 decrease. This expense includes recycling of paper, a self-restraint of a copy, and temperature control of air-conditioning machinery and reduction of trash entirely. Now, the school is old, but by thoroughness of beautification of students and teachers, leaving alone of trash was not found in campus. Deposit system is introduced into collection of an empty can, and there is hardly what is left alone. As for the pet bottle, it is collected discretely. However, non-appropriate processing is found in one part, and it is in the future.

3.2 Activities to beneficial to environment

As for the useful activity, various kinds of activities are done mainly on club activity in environment. In addition, interchange activity in local area is done positively, too. Such activities have become experience in society for students. In the Environment ISO, it is recommended such activities positively. It is shown some examples of such activities in next Photos.

Photo 1. Thinning

Photo 2. Charcoal making

Photo 3. The river purification
using charcoal
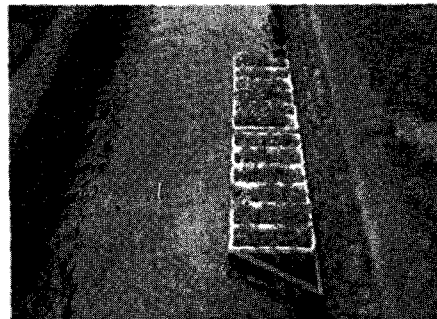
Photo 4. The river purification activity to by
preserve a beautiful sight

Photo 5. The making of compost by an
earthworm

Photo 6. A performance of an environment
picture-story show

3.3 Degree of penetration and influence on Environment ISO

The certification acquisition of an environment management system of the school should be inspected about influence inside and outside of school. About influence inside school, it is shown a result of environmental questionnaire about student's consciousness in Table 3. This questionnaire was carried out firstly in May, 2000, secondly in June, 2001 and thirdly in June, 2003. There are 1400 students and 200 staffs in school. It is shown that a lot of students wrestle with various kinds of activity by this result. In particular, economy in power consumption and discretion of trash and an enforcement rate of bringing of a lunch are high. According to the information from parents, students seemed to come to switch off a room by themselves and to save water and discretion of trash at home. In addition, there is a report that parents and children came to talk about environmental problems. And the school building has become clean since Environment ISO activity began at school.

Table 3. Result of questionnaire of all students

	1(2000.5)	2(2001.6)	3(2003.6)
Economy in power consumption	68	60	59
Discretion of trash	54	58	64
Decrease of trash	25	20	22
Recycling of a can		53	56
Bringing of a lunch	83	81	85
Units is %(enforcement rate of a student)			

Until now, there are a lot of school visits from all over Japan and they spread to 33 metropolis prefecture. These visits extended to many divergences such as the city office staff, an environment citizen group, a company, a PTA, and an ISO connected association including high schools. It is thought that this shows bigger influence on reaction of ISO14001 acquisition of the school. Furthermore, activity in the school has been taken up by a lot of media such as television, a newspaper, a magazine. This activity is utilized as an educational material. It is thought that Environment ISO fixed currently not only in local area but also all over Japan. Now, some high schools which visited to the school have launched activity for the certification acquisition of ISO14001.

4. Conclusions

Environment ISO of the school is mainly based on the activities. The idea is aimed to materialize

school motto: "Every student represents the school". Teachers are needed to accord both educational and environmental target and to try to create new educational value. Accordingly it is important that introduction of an environment management system functions as an effective means for the organization. Furthermore, inheriting saved recourses to next generation, more effective and strategic activity become possible. From such a point of view, it is thought that Environment ISO has become possible to create what is close to society.

In Environment ISO, continual improvement is always demanded. Now, it is second year after acquisition of Environment ISO, compared with just a beginning of it last year, it would be important for the school to implement such management as based on continual maintenance or improvement. Because of staff transfer to other school, importance of training is realized again for revitalization of an organization more. New staffs to the school bring new viewpoints and different experiences. Accordingly it is important to utilize human resources by continual improvement which depends on an ability of a school manager.

In the school, it has been focused on environmental problems in "comprehensive study" which started since last year. All the freshmen wrestle with this problem. It is expected that through activities and study by this lesson, students will have opportunities to think about "what should I be like?" Because of less transparency in society, students are apt to become passive. However, students are expected to have challenging mind. An environment education should be carried out by a point of view that all people expect. Teachers are also expected to challenge it, to deal with environmental problems, and to improve it from global viewpoint.

Acknowlegement

References

Utsunomiya City (2002): Environmental report of Utsunomiya City. (in Japanese)

Pauli G. (Kondo T. translated) (2000):Upsizing, Asahi newspaper publishing company. (in Japanese)

International Organiztion Standardiztion (1996): ISO 14001 Environmental manegement system – Specification with guidance for use.

Ishii K. (1995): Earth management guide, Sosei Conpany. (in Japanese)

Kobori H.(1999): ISO14001 as a tool for environmental education and reform at a Japanese university, Proceedings of American Association of Environmental Education.

Nakaguchi T. (2001):A desirable environment management system, District financial affairs Vol.567, pp.278-296. (in Japanese)

Kurosawa T. and Mezaki M. (2001): Proposal for Development in Japanese Environmental Education,Journal of Environmntal Education 4, pp.93-102, Environment and Information center of Univesity of Hokkaido education. (in Japanese)