E-learning on TVET between Japan and Germany

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Abstract: **The world of work has changed dramatically over the past decade. It has become technologically complex, demanding highly sophisticated work skills, and globalization has been expander over the world. This paper proposes International Technical and Vocational Education and Training (TVET) by using E-learning. The e-learning contents on TVET is collaborated to be developed by Japanese experts and German experts on TVET. Actually, some e-learning courses on TVET have been provided to the students in Japan and Germany. The results show that this trial would be very efficient for the TVET.**

I. INTRODUCTION

The world of work has changed dramatically over the past decade. It has become technologically complex, demanding highly sophisticated work skills, and globalization has been expander over the world.
In this age, the Technical Vocational Education and Training (TVET) has become more important than before.
In order to cope with this situation, UNESCO-UNEVOC centre (see, for example, [1][2] and [3]) was established in 2001. Their activities are concentrated on the following:

1) Training Courses to assist developing countries strengthen and upgrade their TVET system, its status in the country, and education for the world of work.
2) A clearing House to facilitate sharing of a wide range of information and materials on TVET-related matters between countries, institutions and individuals.
3) Knowledge Management which focus on promoting best practices in TVET, and
4) Construction of UNESCO networks.

This study in this paper also started as one of UNESCO-UNEVOC activities[4], but there are the following unique features:

- International Technical and Vocational Education and Training (TVET) by using E-learning
- The curriculum and contents which was developed by Japanese experts and German experts on TVET
- Expanded opportunities of qualified TVET to general workers, and
- Qualified Certification system from universities

The results show that this trial would be very efficient for the TVET.
The e-learning contents on TVET are provided from

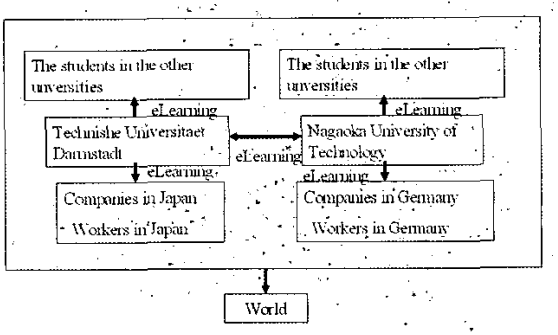

Fig 1. Design of e-learning on TVET

II. OUTLINE

Japanese university and German university.The university in Japan is Nagaoka University of Technology (NUT) the university in Germany is Technical University of Darmstadt (TUD).
The curriculum was collaborated to be developed by Japanese experts and German experts on TVET. The curriculum is shown as follows:

1. Languages and Communications
2. Management Theories
3. Vocation and Informational Networks
4. International standardization
5. Safety problems and solutions
6. Ergonomics for designers
7. Vocational Ethics
8. Human development

The outline of the TVTE framework in this project is shown in Figure 1. Basically, the students in two universities are provided e-learning contents. The workers in companies can also apply this e-learning classes. In the e-learning, the discussion board is available and the teachers, students and workers can share their experience or knowledge. In addition, the students in the other universities can also attend the e-learning classes. This means that anybody in the world has the same opportunities to attend the e-learning classes. This framework is one of e-learning models on TVET, but the model will be sophisticated more by improving it.

III. LMS (LEARNING MANAGEMENT SYSTEM)

One of authors has developed a LMS (Learning Management System) ([5] and [6]). In this session, the

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outline of the system will be introduced. The LMS consists of 1. Contents Presentation System (CPS), 2. Contents Database (CD), 3.Learning Histories Database (LHD), and 4. Data Mining System (DMS). The CPS integrates various kinds of contents and present the integrated information on the web page shown in Figure 2. Moreover, the system presents some test items which confirm learners' comprehension degree as soon as the contents has been completed. An example of a test presentation is shown in Figure 3.

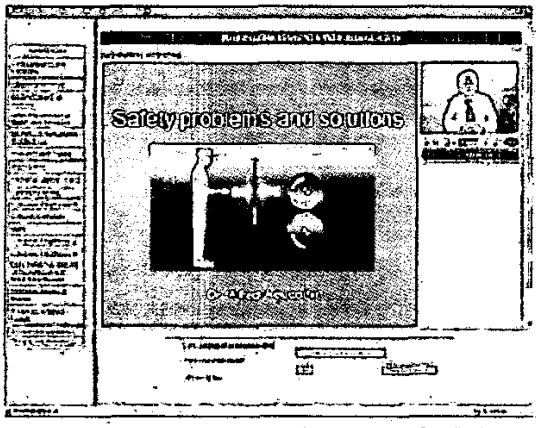

Fig 2. An example of e-learning contents for TVET

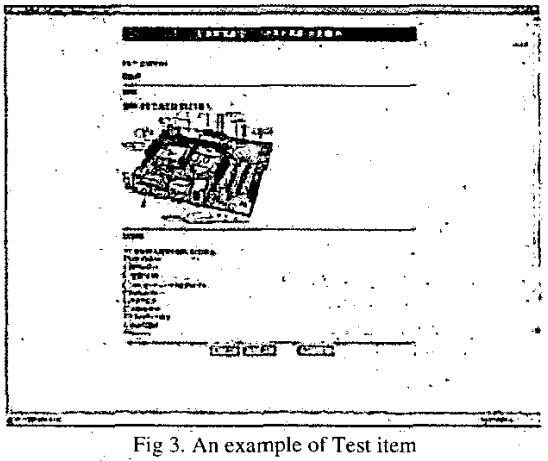

Fig 3. An example of Test item

The CD is a database which consists of various kinds of medias, text, jpeg, mpeg, and so on. The proposed platform monitors learners' learning processes and saves them as a log data in the LHD. First, teacher makes the contents concerned with his lecture, and saves them in the CD. Here, in this International TVET projects, English as the language in all contents are used.

Then, the CPS automatically integrates the contents, and presents them to learners. The learners can learn them through the internet. The learners' learning histories log data is saved in the LHD, and it is analyzed in the DMS. The DMS presents the students' learning proceeding process, the rates of understanding, learning time data, and so on (Figure 4). The teacher can know information about learners' learning processes, and he can give some comments or instructions to the learners by using e-mail.

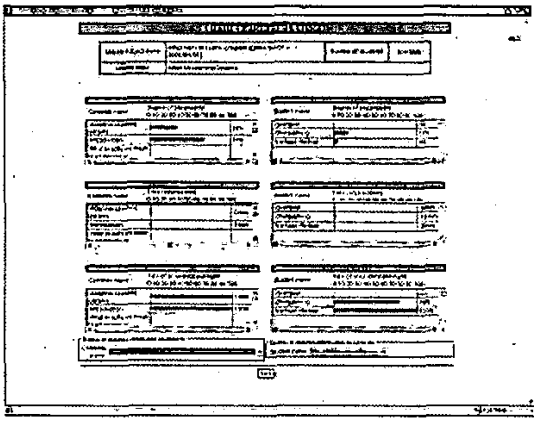

Fig 4. Students' learning historical data

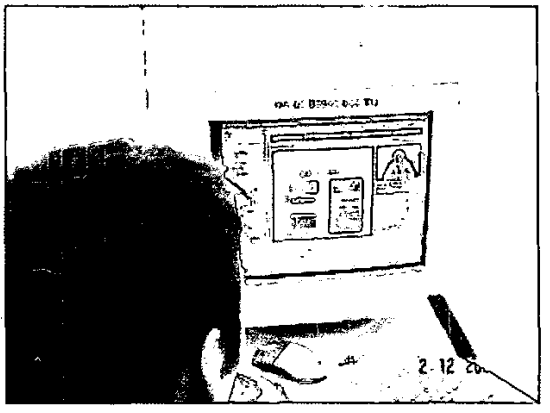

Fig. 5 A situation of self-learning in German university

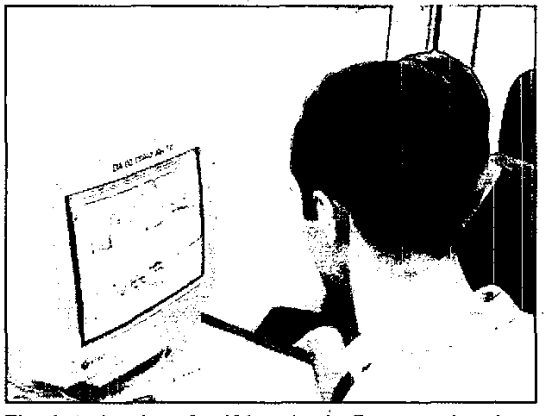

Fig. 6 A situation of self-learning in German university

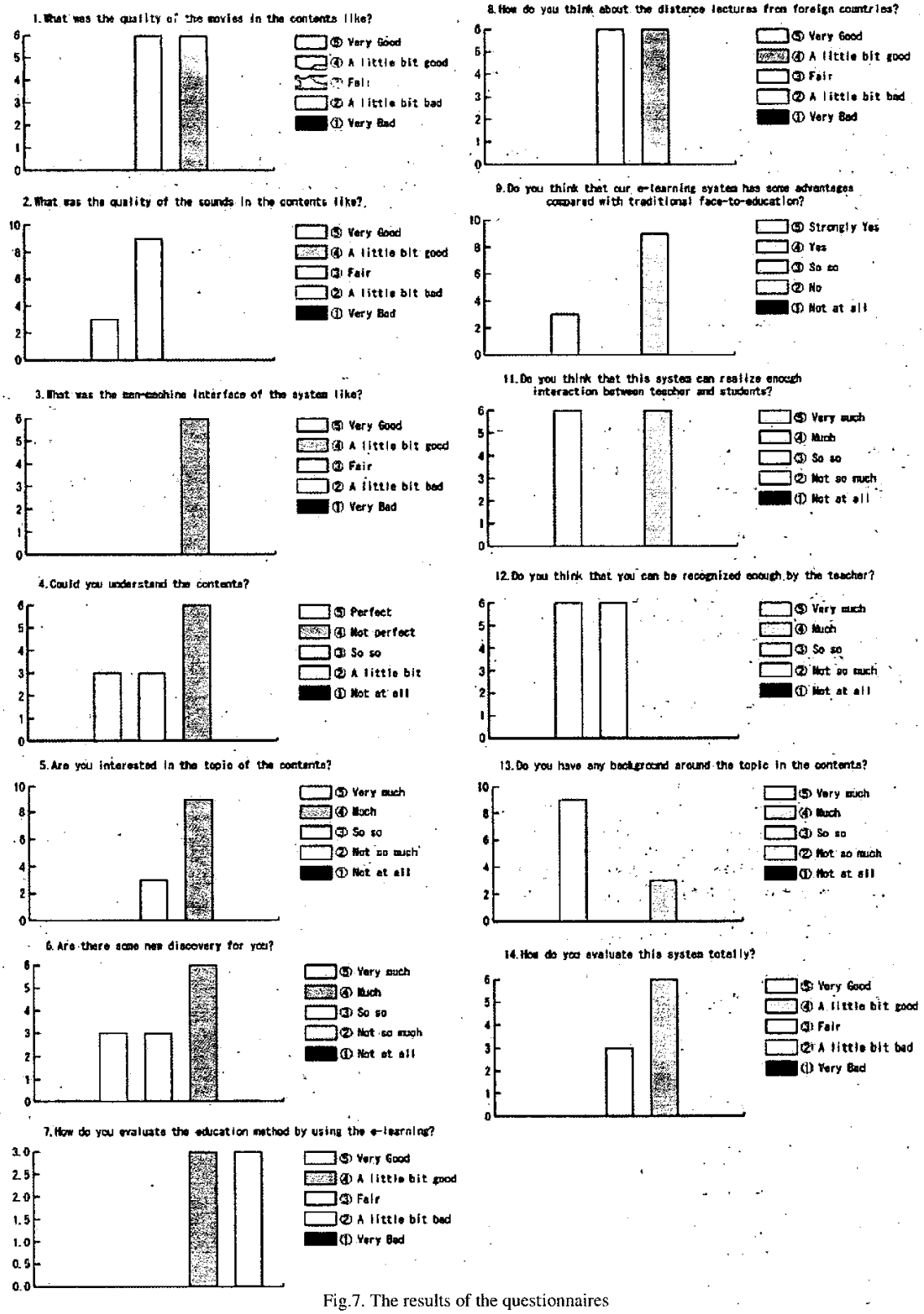

Fig.7. The results of the questionnaires

IV. PRACTICE

The e-learning on TVET started in 2003 September. Twelve graduated students in TUD and eight graduated students in NUT participated. In this experiment, the server in Nagaoka was used and it provided all e-learning contents.

The amount of the network band between Japan and German is 100Mbps. The real server was employed in this e-learning system, and it is possible to adapt the user's available amount of the band, 65kbps -1.2Mbps. It means that the system is available even if the internet network condition is a telephone line. The learning situations by using e-learning system in Germany are shown in Figure 5 and 6.In addition, it should be noted that all graduated students in Germany and Japan are from company and they still work in their company.

V. EVALUATION

In order to evaluate the proposed e-learning practice model, the following fourteen questionnaires items were provided to German twelve students. The results are shown in figure 7. From the question 1 and 2, the quality of the movies in the system has no problem but the quality of the sounds has some problem in the practice. From the question 3, the man-machine interface of the system is evaluated as a little bit good. From the question 4, the level of the contents was adequate nevertheless they have enough back-ground knowledge about the contents shown in the question 13.

From the question 5 and 6, the students are interested in the contents in TVET and discover some new things about TVET from the contents. From the question 7 and 8, we know that the students appreciated the learning method about TVET by using the e-learning. From the question 10, almost students realize the unique advantages of the e-learning system which we developed.

From the question 10, the evaluation about the interaction between teachers and students are extremely divided into two responses: That is, one group appreciates that much and another group does not appreciate so much.

From the question 12, the students dose not think that the teachers can recognize them. The previous study [7] reported that the degree of the satisfaction for the classes depends strongly on the degree of the students' feeling that they are recognized by the students. Unexpectedly, in this practice, the teachers did not use the functions of the LMS enough and they did not see the students learning processes enough.

The system was evaluated as "good" from the question 14.

The results can be summarized up as follows:

- The infrastructure concerned with the network has no problem.
- Almost students are interested in the contents and the discovered some new things about TVET.
- The LMS has some unique features and some advantages.
- There were shown few interactions between teachers and students.
- The functions of the LMS were not used enough by the teachers and students.

VI. CONCLUSIONS

This paper proposes a International TVET model by using e-leaning. The original works of this study are as follows:

1. A framework of the International TVET model was proposed.
2. The curriculum in the TVET course was collaborated to be developed by Japanese experts and German experts on TVET
3. The e-learning contents corresponding to the curriculum were developed.
4. Actual e-learning practice on TVET was provided between Japan and Germany for one semester.

From the practice, the following questionnaires results are obtained.

- The infrastructure concerned with the network has no problem.
- Almost students are interested in the contents and the discovered some new things about TVET.
- The LMS has some unique features and some advantages.
- There were shown few interactions between teachers and students.
- The functions of the LMS were not used enough by the teachers and students.

In addition, comparing the proposed framework in figure 1, the practice was still partial. And in this practice, the discussion board was not used nevertheless the collaborative learning is more effective. In future, collaborative learning will be practiced by using the LMS.

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