Implementation of a Virtual Training System on Gas Safety

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ABSTRACT

With the advent of the internet era, web-based virtual training system is gaining its importance in recent years. Because of the fact that the training can take place in any place and at any time, the virtual system is now replacing many of the conventional off-line classes. Hardware environments such as communication bandwidth and computer performance gets fast enough to accommodate the virtual education. Based on the observations on current virtual training system, this paper proposes three critical design rules required when developing a new virtual training system: i) With conceptual mapping, the menu hierarchy can be organized in a clear-cut manner, ii) Extensive use of multimedia tools can help students keep their attention to the lecture materials, and iii) Provision of interaction mechanisms helps students to gain their identity and motivation.

I. Introduction

Demands for the web-based training systems are rapidly increasing on recent years. Compared with conventional off-line training, the most critical advantage of the web-based training is that the it can be provided to a massive number of students in any place and at any time. The advantage exactly coincides with our national government policy that pursues equal opportunity in education. As a result, many colleges and universities, often in the form of consortium[1, 2], began to replace their regular courses with the virtual ones.

Undoubtedly, the most important factor in education is its educational efficiency. In contrast with the conventional off-line training, distant learners can easily lose their feel of presence in the virtual environment. They easily lose their identity as a class member, their attention during the lecture, and finally their motivation toward the study. To make things worse, instructors frequently have misconception on the virtual education. Once the course materials are loaded onto web server, they usually believe that the rest of the things are students' responsibility. They usually are ignoring the interaction requirements[3, 4, 6] for

managemental and operational endeavors to maintain the virtual training environment.

In this paper, we present a prototype system that implements an efficient virtual training. With the domain of general gas safety area, we concentrate on training only the theoretical aspects of the course. The system can find its use not only to student majoring in the area but also to the actual practitioners in that area. Moreover, this system can equally well be applied to other courses with minor adjustments. In presenting our approach, we want to state the some of the conceptual problems of the conventional design, and propose corresponding solution rules that guided our system design and implementation.

II. Design Principles

1) Conceptual Mapping

Conceptually, the web-based virtual training system must have two major parts in facilitating a course offering, namely administrative part and lecture part. This is similar to the fact that there must be administrative departments and actual classroom in real off-line class. In the conventional system, there has been no clear-cut distinction between the two, and the elements of both parts are intermingled together. As a result, the student must spend much times in finding proper menu in the complex hierarchy.

In our prototype system, administrative parts are organized with such elements as course offerings, enrollment procedures, provision of course guidelines and additional information. Only the general information or the information applicable to multiple courses are allowed in the administrative part as shown in Fig. 1.

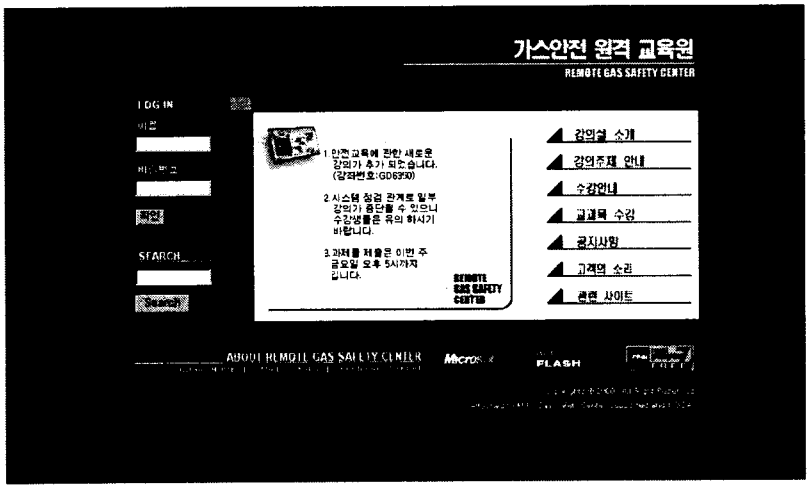

Fig. 1 Administrative Part of the Prototype System

The lecture part of our prototype system is made up of two subparts, namely presentation part and activity part. Actual learning by reading or watching the course-ware occurs in the presentation part. Study-related activities such as question and answer, material

downloading, and report submission happens in the activity part as shown in Fig. 2.

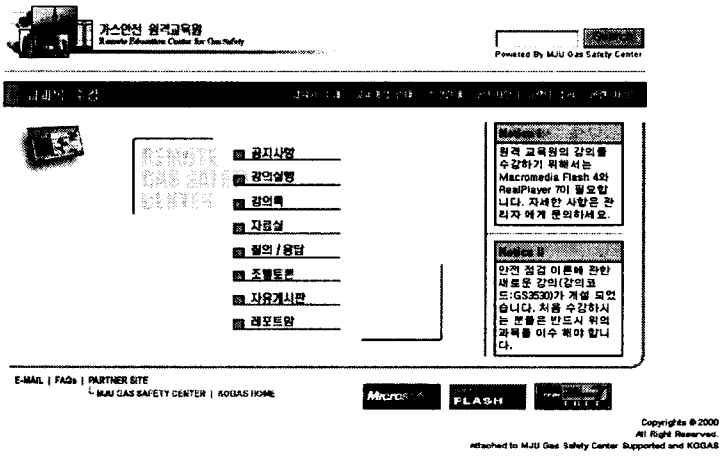

Fig. 2 Activity Part of the Prototype System

The lecture part of our prototype system can be implemented one for each course, and different course can have different menus. Therefore, we can greatly simplify the menu design process by mapping our general concepts on learning environment into corresponding menu parts.

2) Maximize Multimedia Usage

Compared with the off-line class, students tend to lose their attention in the virtual training. Especially in the text-based training, it is the student's responsibility to scroll down the text and read the instructional contents. Usually, it is hard to expect for a student to remain concentrating on the text for an hour or so. In recent years, some of the virtual training solution vendors offer voice encoding tools[5]. Now the students are provided with the text material and the narration, and the chances for losing attention gets reduced.

In our prototype system, all the available mono-media are combined into a single form of multimedia presentation. They include text, graphic, video informations. In our approach, the presentation continuously stimulate the students to keep awakened and focused to the lecture contents. The multimedia usage is one of the greatest advantage of the virtual training, which is usually impossible in off-line training. Fig. 3 shows our presentation screen, where top-left window is for video, right window for text/graphic slide, and bottom window for navigation.

Most importantly, the flipping of the slides in our system is completely synchronized with the video. That is, when the lecturer begin to say about a next topic, the slide automatically advances and changes to the next topic. Additionally, the contents could be encoded at 56Kbps rate so that students in their home experience no discontinuity in viewing the video , only with the modem. This was possible by optimizing a series of parameter involved in the

pipeline of the encoding procedures.

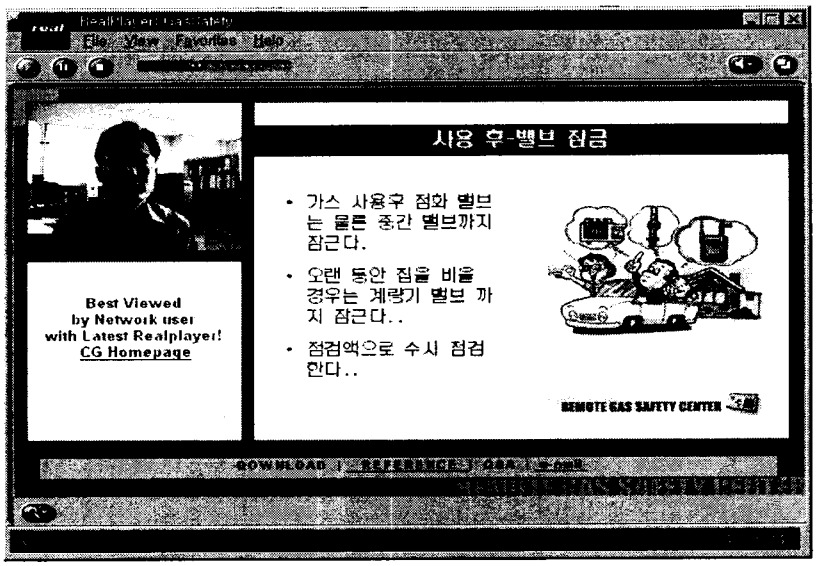

Fig. 3 Presentation Part of the Prototype System

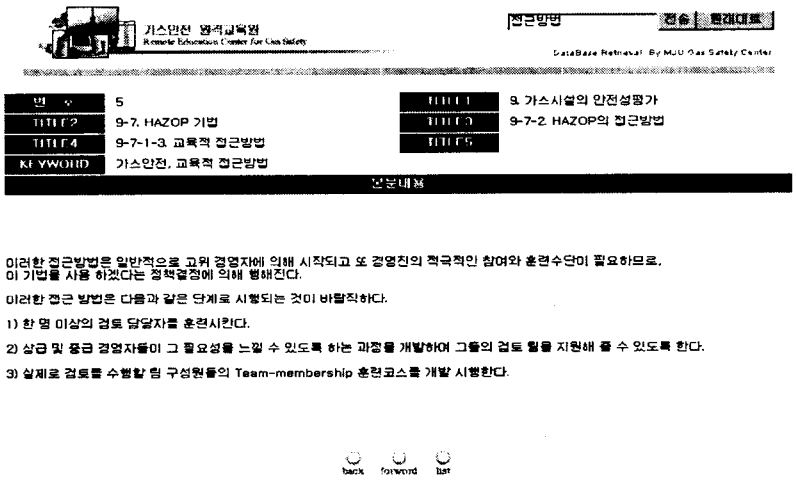

Fig. 4 Database Searching Part of the Prototype System

3) Support Diverse Interaction

Maintaining interaction with students is also a crucial factor in increasing educational efficiency in virtual training. The interaction can be classified into two categories: student - instructor interaction and student - student interaction. In dealing with the first type of interaction, caution must be taken before organizing the class. If too many students are registered for the class, individual question may not be handled on time by a limited number of instructor or the instruction staff members.

The lack of response can directly leads to the degradation of the student motivation.

Usually, university registration body prefers to allowing more students than the instructor handle for the reason of financial advantage. As a partial solution in our prototype system, we restricted the number of questions that can be raised during one day.

Not all the question and class activities are directed to instructors. The role of the instructor in virtual training system should be limited to helper rather than the lecturer. Our prototype system recommends the team activities by providing a menu called "group discussion." By encouraging the interaction between the students, the burden of instructor part can be released and students can get involved in a more active learning. Fig. 4 shows one way of helping student to find the instructional materials by keyword search or categorized search. Offering this type of supplemental tools can also help students to get involved into an active study environment.

III. Conclusion

This paper proposed some critical guidelines in designing a virtual training system. In designing menu hierarchy, separate menu screen must be used for corresponding functional components. This approach can greatly reduce the student's effort to find the required information. Maximum use of multimedia is important in that it can help the students continuously focused on the course presentation. Finally, as an aid to the class activities, we emphasized the role of limiting the enrolled students, provision of group discussion, and the provision of self-study tool. Researches on the virtual training system is still in its infancy and further studies aiming at the education efficiency must follow in the future.

References

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