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Web-based Distance Lecture and its Evaluation

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Abstract

It became possible to give students credits by a web-based distance lecture from March 30, 2001 in Japan. As a preparation of full-scale introduction of the web-based distance lecture, a trial of web-based distance lecture was done for junior students from October, 2000 to February, 2001 at Kumamoto University. The subject is "laser Engineering." The 16 students had selected the distance lecture, and 83 students the normal lecture. Since most of students use a modem of 28.8 kbps or 56 kbps in home, the lecture materials were made to fit a slow modem system. The transfers from the power point to pictures and its explanation by sound using the real server were done. We compared two groups with the difference between the average marks of each group, and also with the means of questionnaires.

1. Introduction

Web-based distance learning systems have been developed in the world. These systems have an opportunity for everyone to learn at any place and at any time. In Japan, web-based distance learning systems have been developed mainly for the employees' education, since the credit by using the web-based distance lecture was not allowed in all universities. A law for the education method was changed on March 30, 2001, and the credit by the distance lecture using multi-media was approved in Japanese Universities. The conditions of the web-based distance lecture to give students credits are as follows,

(a) The effects of education using the web-based lecture are comparable to ones of the facing lecture (which is normal lecture) using the classroom.
(b) The sound, character, still picture and animation must be integrated in the web-based distance lecture.
(c) The questions and answers, correction and guidance, and the exchanges of opinions of students should be included.

We have tried the web-based distance lecture from October 2000 till February 2001 before the extensive use of the distance lectures. The main aim is to investigate whether the condition of (a) is satisfied by the web-based lecture using a streaming technology. The same content as the facing lecture in the classroom was used on the Internet. A bulletin board on the web was used and the lecture documents were distributed through the web. The report was requested every week with an attached file of E-mail. The effects of education using the web-based lecture are compared with the facing lecture using classroom.

2. A Trial of Web-based Distance Lecture

The junior students of Department of Electrical System Engineering have a subject of "Laser Engineering" as one of elective courses. The 99 students registered to take this subject. Following their requests, 16 students selected the web-based distance lecture, and the others selected the facing lecture.

The same figures using Microsoft PowerPoint were used for both lectures, using a video projector for a classroom group and a Real Player (RealNetworks com.) for a distance group. The same explanation for both lectures was done, even though there is a difference of voices using the microphone in front of the students and using the Real Player on the computer. If we dare to say the difference, a lecturer talked a small talk to stimulate students in the case of the facing lecture. The office hours were arranged for both groups once a week. The bulletin board was prepared on the Web for questions to lecturer and discussions among students. The students were able to download documents made by the PowerPoint, and had to answer simple questions every week. The final test with the same questions for both groups was done at the same classroom at the same time.

The structure of network is shown in Figure 1. The RealServer (RealNetworks com.) was used, and the students used computers connected to it with 100 Mbps inside the campus, or computers with Modem of 28.8 kbps (or 56.6 kbps) or ISDN of 64kbps.

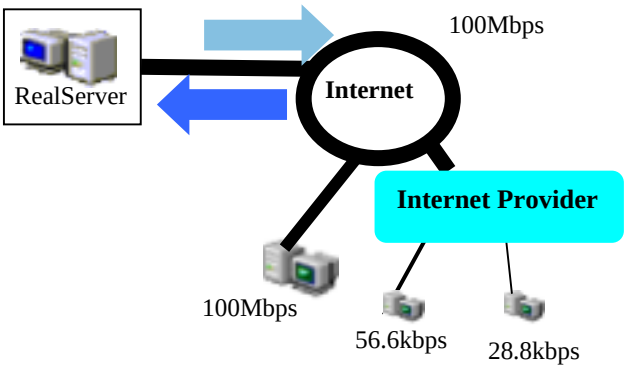

Figure 1. The structure of network

Figure 2. The picture displayed on students' computers

Figure 2 shows the picture displayed on students' computers. If they click one of 16 lectures,the figures are shown with lecturer's voice.

3. Evaluation of Web-Based Distance Lecture

The web-based distance lecture was evaluated from results of a final test and questionnaires. The final test was done for both groups with the same questions at the same classroom at the same time. The questionnaires were collected from the students of the distance lecture, and then we discussed with them just after knowing the results of final tests.

Figure 3 shows the cumulative relative frequencies for the distance lecture students (dotted line) and the facing lecture students (solid line). The students with poor records for the distance lecture students are a little more than ones for the facing lecture students. We cannot conclude from Fig. 3 that the facing lecture is better than the distance lecture, since the students taking the distance lecture were decided from their demand. The junior students had the facing course of "Pulsed Power Engineering", which one of authors Prof.Akiyama taught. The results of final tests of both courses are compared in Table 1. The average points of distance lecture students (group A) and facing lecture students (group B) are shown for both courses. Only the facing lecture was used for the course of "Pulsed Power Engineering". The distance lecture students in the course of "Pulsed Power Engineering" mean that the students who took the distance lecture in the course of "Laser Engineering" are picked up. The difference of the points between the distance lecture and facing lecture for "Laser Engineering" is smaller than that for "Pulsed Power Engineering". Therefore, the effects of education by the web-based distance lecture are comparable to ones by the facing lecture in a way for looking at the points of final tests.

The results of questionnaires are shown in Figs. 4-6. Figure 4 shows when the students studied using the web-based distance lecture. The students of 20 %, 20 % and 27 % studied at 23:00 - 8:00, 19:00 - 23:00 and the time of facing lecture respectively. Over 86 % of students studied over twice, and over 40 % studied over three times. Figure 6 shows which lecture method is easier to learn, distance lecture or facing lecture. The 80 % of students said the distance lecture is easier to learn than the facing lecture.

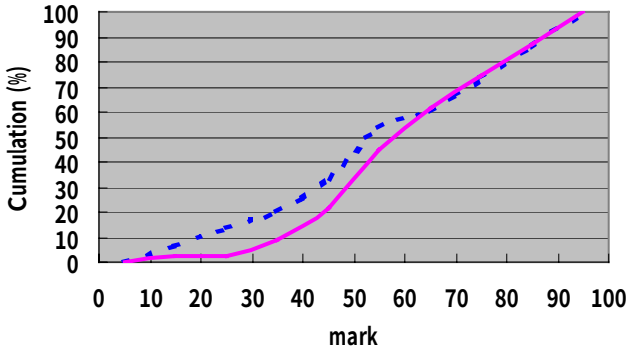

Figure 3. The cumulative relative frequencies for the distance lecture students (dotted line) and the facing lecture students (solid line)

Table 1. The results of final tests

	Laser Engineering	Pulsed Power Engineering
Group A	60.9%	59%
Group B	65.8%	73.8%
Difference	4.9%	14.8%

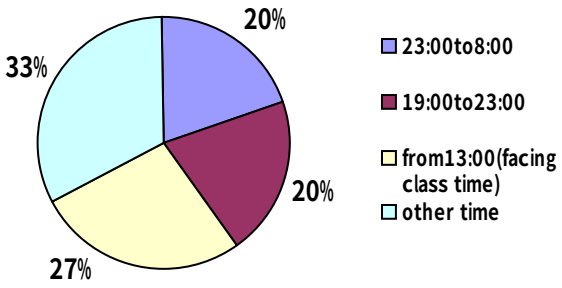

Figure 4. When did the students study using the web-based distance lecture?

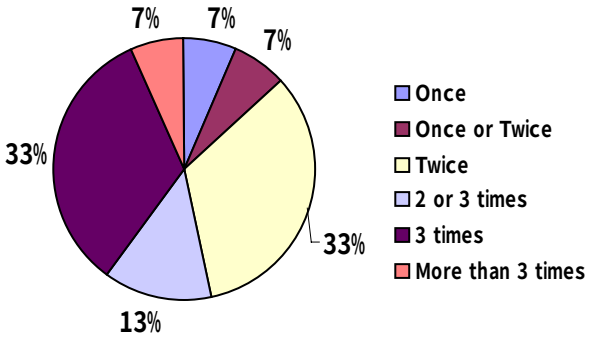

Figure 5. How many times did students study?

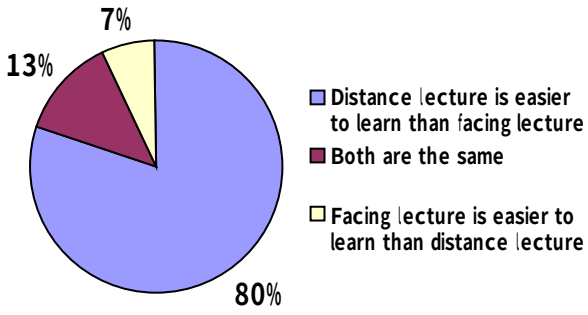

Figure 6. Which lecture is easier to learn, distance lecture or facing lecture?

4. Conclusion

We tried the web-based distance lecture from October 2000 to February 2001 before the extensive use of the distance lectures. The main aim of this trial is to investigate whether the effects of education using the web-based distance lecture are comparable to ones using the facing lecture. The satisfaction of this condition is important to determine whether credits by the distance lecture are approved or not. The students were separated two groups, one is the facing group and another is the distance one. The web-based distance lecture was evaluated from results of a final test and questionnaires. Finally, we have evaluated for the subject of laser engineering that the effects of education in the web-based distance lecture are comparable to ones in facing lecture.

5. References

[1]Joel R. Jackson, David V. Anderson and Monson H. Hayes Ⅲ, “Effective and Efficient Distance Learning over the Internet: Tool and Techniques”, International Conference on Engineering Education, Taiwan, August 2000.