Remote Lecture Based on Instruction with Blackboard Using High-Quality Media Systems

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Abstract
Recently, various kinds of high-quality media systems have been developed. It is expected that these systems can be used to remote lectures. We are adopting these systems including high-speed network to construct a remote lecture based on "Instruction with Blackboard", which provides old-fashioned but very common style of lecture. This instruction style has been often avoided in remote lecture so far, because it requires high-quality data transmission. However, it is no doubt that this style of instruction is very popular teaching way still now. Therefore, it is educationally meaningful that this teaching way is realized on remote lecture. This paper describes a construction method of the remote lecture based on Instruction with Blackboard and the experiment on the remote lecture using high-quality media systems.

1: Introduction
Recently, information network has been rapidly developed so that there have been a lot of academic research and activities about remote lecture[1]. In the remote lecture environment, teachers generally tend to use computer-based presentation tools because of the use of narrow bandwidth networks. As for the traditional lecture style, use of blackboard is very popular. In the style, instructors construct their lecture with writing educational contents on the blackboard. We call this style "IB2: Instruction with BlackBoard" hereafter. It is no doubt that IB2 is very popular way for teaching still now. Therefore, it is educationally meaningful that IB2 is realized on remote lecture.

More recently, several high-quality media systems have been developed in both domains of hardware and software. In addition, we can now use high-speed network such as gigabit networks which can transmit high-quality image data. These technical advantages can suggest that IB2 can be adopted in remote lecture. However these systems and high-speed network are not originally oriented to constructing remote lecture. This is our main motivation to investigate how to construct remote lecture based on IB2 using high-quality media systems, and we have proposed the construction model of remote lecture based on IB2 and done the preliminary experiments using DVTS[2] on LAN environment[3, 4].

As for the latest our experiment, we have realized a remote lecture based on IB2 using Digital Video devices with IEEE1394 interface[5], notebook computers installed DVTS and JGN(Japan Gigabit Network)[6] between Saga University and Tokushima University in Japan. In this paper, we describe the method of remote lecture based on IB2 and the latest experiment on the remote lecture using high-quality media systems including high-speed network.

2: Outline of our remote lecture
We experimented on remote lecture base on IB2 between Tokushima University and Saga University in Japan. The instructor was in a studio of Tokushima University and gave 90 minute lecture to students in a lecture room of Saga University via JGN.

Figure 1 shows the total system configuration of the remote lecture. Saga University and Tokushima University are connected through JGN. We can use 135Mbps network at Saga University and 50Mbps network at Tokushima University. We used DVTS for transmitting voice and image data. DVTS can transmit DV frames (including voice and image data) encapsulated into UDP packets via Internet. DVTS does not compress data so that the data transmission requires approximately 32Mbps bandwidth. In this experiment, huge data transmission could be realized by using mainly DVTS and JGN.

Figure 1: system configuration of remote lecture
3: Circumstances of the remote lecture

Figure 2 shows a snapshot of the circumstances of the lecture room. The remote lecture successfully progressed as same as normal lecture. Our experiment staffs tried to compare the atmosphere of the remote lecture with that of normal lecture, but they could not find obvious differences between two lectures in the level of subjective evaluation.

Figure 2. Circumstances of lecture room

4: Evaluation

After our experiment on the remote lecture, we sent out questionnaires in order to investigate students’ impression to our remote lecture. Main items of the questionnaires are about quality of image and sound (voice), and necessity of the Sub-screen. We did normal lectures before this remote lecture. As for the quality of image and sound (voice), we had them to compare these two lectures. Table 1 shows the results of our questionnaires.

From the questionnaire results of the item 1, 2, and 3, it is found that many students did not feel the quality of image and sound was different between two types of lectures. We think high-quality data transmission by DVTS has influence on the evaluation result. We can also suggest that DVTS can provide high-quality data transmission enough to construct remote lecture based on IB2. From the questionnaire results of the item 4, we can strongly argue that the Sub-screen is necessary for remote lecture based on IB2. From these results, we can say this remote lecture was well-designed in this experiment and high-quality media systems worked well in the remote lecture.

Table 1: Results of questionnaires

<table>
<thead>
<tr>
<th></th>
<th>Bad</th>
<th>Not so good</th>
<th>Same</th>
<th>Good</th>
<th>Very good</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Easy to watch written characters?</td>
<td>1</td>
<td>10</td>
<td>13</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>2. Easy to identify colors?</td>
<td>2</td>
<td>10</td>
<td>10</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>3. Easy to listen the instructor’s voice?</td>
<td>1</td>
<td>4</td>
<td>11</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>4. Need sub-screen?</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>8</td>
<td>23</td>
</tr>
</tbody>
</table>

5: Summary

In this paper, we described the experiment using high-quality media systems including high-speed network. In this experiment, we have confirmed remote lecture based on IB2 can be constructed using high-quality media systems and our lecture construction design could provide similar lecture environment with normal lecture. However, this remote lecture does not put emphasis on the rich interaction between the instructor and students. As for our future work, we must improve the remote lecture style focusing on enhancing rich interactions and we also consider how to adopt high-quality media systems for satisfying this requirement.

References

[1] Engineering Outreach at the University of Idaho, "Distance Education at a Glance", http://www.uidaho.edu/evo/distglan.html