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Lecture Improvement based on Twitter Logs and Lecture Video using p-HInT

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Abstract: We have developed an interactive function named "student voice" on p-HInT system. The p-HInT is an educational environment including game terminals in order to improving large-scale lectures. The "student voice" function consists of three element functions; a sending messages function like twitter tools, "OK-understand!" and "?-Not understand!" buttons, and a red-card function. The "student voice" function was adapted to lectures of 10 subjects. In addition, we have also developed an analysis tool based on twitter logs (student voice logs) and lecture video. We tried to improve lectures of System Development theory subject based on results of analysis in the tool. As a result, teacher was able to communicate interactively with students, and the number of pushing "?-Not understand!" button decreased. 68% students felt more motivation and more interests in lectures.

Keywords: Lecture improvement, game terminal, twitter, student voice

Introduction

From April of 2008, Hannan University has used a p-HInT(portable Hannan Internet Education Tool) in order to improve large-scale lecture with 200 or more students. The p-HInT is an interactive education environment for large-scale lectures with NINTEDO DS(R)(we say it "DS" in this paper) [1] , Sony PSP[2], iPod, or various portable terminals. The basic functions of the p-HInT are interactive test, attendees' list with seating location, and attendance management. We evaluated educational effectiveness of the p-HInT with comparing examination results in two classrooms; one used the p-HInT, another did not use the p-HInT. The educational effectiveness of the p-HInT was clarified[3][4].
In addition, we have developed a new interactive function for improving lectures on the p-HInT. The new function is "student voice". The new function consists of three element functions; "OK-Understand!" button and "?-Not Understand!" button, sending messages like a twitter tool, and sending red-card. These new functions are to increase interactive actions between students and a teacher. Students can always send their impressions to teachers through DS during lectures. A teacher can quickly grasp students' thinking while a teacher gives speech. The function of the sending impressions is like a twitter tool. The quick improvement of lecture is available using these new functions. Moreover, the student voice function like a twitter tool records logs including data such as who sends, what impression, when they send. Therefore, we developed an analysis tool of reviewing lectures with twitter logs and lecture videos. A teacher can review past lectures. For example, a teacher can check lecture contents when negative impressions of students increased. Teachers see what students were not able to understand. Next lecture, the teacher will explain again the lecture contents.
In this paper, we show examples of lecture improvement using the new functions of the p-HInT. Importance of the interactive education in large-scale lecture is shown. In addition, we describe usefulness of the new functions named "student voice". Section 1 shows related

works, section 2 explains an outline of the p-HInT system and the new functions. Examples of usage of the "student voice" functions are shown at section 3, section 4 shows an analysis tool based on twitter logs and lecture videos, then, lecture improvement using the results of analysis. Section 5 shows summary and future works.

1. Related works

At first, we show studies of usage of mobile terminal in education. Cisic et al. have proposed Mobile Game Based Learning environment called "mGBL system" [2]. The environment includes server computers and client computers and mobile computers. Game software for learning is installed to the mobile computers. Students with the mobile computers can learn at anywhere, anytime. Hamid proposed a mobile game called Skattjakt (Treasure Hunt in Swedish) for kids [3]. Children learn environmental awareness while children play the mobile game on mobile computers, or mobile phone. Spikol developed mobile edutainment games for acquiring C++ programming knowledge [4]. These games are for self-study sake. Our p-HInT and a new interaction function "student voice" are for interactive education between teachers and students in large-scale lectures.
Next, we show practices of twitter usage in education. Unfortunately, because twitter is a new tool in this year, the basic theory of interactive education using twitter has not been proposed yet. Then, we show practices of education using twitter. Grosseck et al. developed a platform of twitter for learning[5]. Based on commercial twitter tool, they made an original twitter tool that has been customized to their curriculum. Dickens also proposed a MicroBlogging in DigitaLang for language learners [6]. Although these tools are useful specific learning scenes, evaluation and effectiveness of the platforms and environments are not clear. Parry used a twitter tool in his classroom [7]. 13 impacts of the twitter in his classroom were clear. For example, student conversations continue inside and out side of classroom, and development of classroom community. However, he did not mention impacts on lecture improvement. Based on analysis results of data of the student voice like twitter, teacher can improve their lectures. Therefore the student voice function is different from these educational twitter tools in a viewpoint of lecture improvement.

2. p-HInT system

2.1 Outline

Figure 1 shows a usage image of the p-HInT at a large-scale lecture. Each attendee brings DS to a lecture. At the beginning of a lecture, attendee does log-in to the p-HInT through DS. The p-HInT records the attendee names and seating locations in the classroom. The p-HInT generates an attendees' list with seating locations (See "Display of an attendees' list" of Figure 1). Because a teacher can see each name of attendee with a seating location, the teacher can match a attendee's face with his/her name. The teacher can keep attendees' names in mind even if the number of attendees is two hundreds or more. In addition, through DSs, a teacher can do tests at lectures. After attendees answer tests on DSs, the teacher can show results of the answers as bar charts (See "Results of test" of Figure 1). The teacher can review the tests and the answers while seeing the bar charts. In addition, students can privately send messages to a teacher at any time though DSs, like twitter tool. The message are "Agreement", "not-understanding", or "difficult seeing characters on blackboard". Of course, the p-HInT is useful at non-computer classroom. Especially, the p-HInT is valuable when the scale of classroom is large like a hall.
Effectiveness of the p-HInT was evaluated by comparing examination results between two classrooms; one used the p-HInT, another did not use the p-HInT. In essay-type tests, examination results of the classroom using the p-HInT were better than examination results

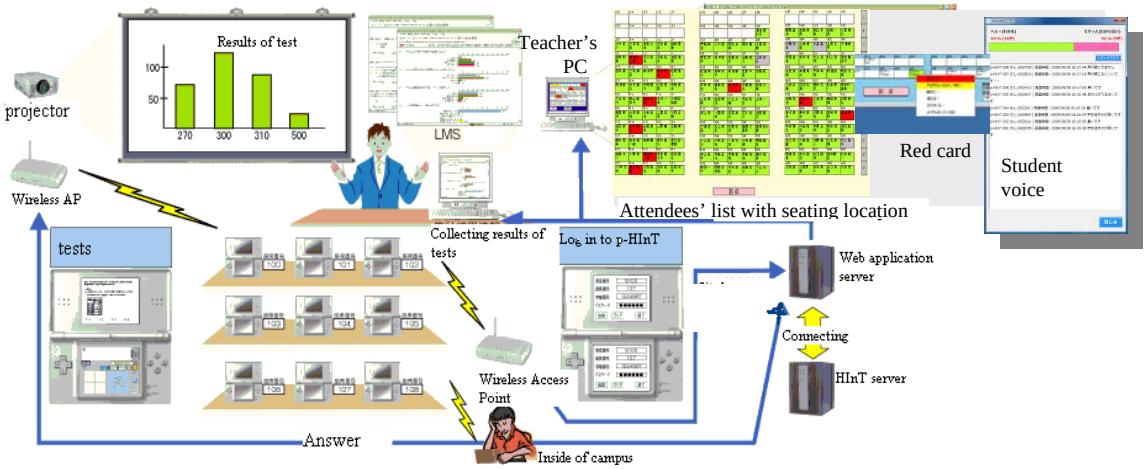

Figure 1 An outline of the p-HInT system at a large-scale lecture

of the classroom without the p-HInT. The gaps of the examination results were tested by t-test. Because other conditions such as a teacher and materials, lecture speech were same, the p-HInT system might influence to the examination results (significant difference 5% by t-test). In addition, we confirmed that students' private talk during lectures decreased, and teachers' explanation time during lectures increased because of decreasing miscellaneous tasks such as distributing materials.

In addition, we did questionnaires to students who attended lectures using the p-HInT system when all lectures finished. The number of valid responses was 753. The 70 % students answered that their understandings increased by the p-HInT. The 63 % students felt that they were able to review lecture contents by the p-HInT. The 52 % students were able to concentrate more to lectures. In short, the students thought that the p-HInT system was useful, and their understandings improved by the p-HInT system. The details of the p-HInT and the evaluation are described at [3][4]

2.2 New function "student voice"

We have added a new function named "student voice" to the basic function of the p-HInT. The "student voice" function is consists three element functions. First one is "OK-Understand!" button and "?- Not Understand!" button. Second one is sending message like twitter tools. Third one is to send red-card for warning.

2.2.1 "OK-Understand!" button and "?-Not Understand!" button

We developed two buttons on DS (See Figure2). In Japan, "Heh.." button is a very famous toy (See Figure 2). Japanese people often say "Heh.." when they are convinced. For example, when a person was convinced with the other person's speech, the person says "Heh..". The "Heh.." button toy is used in such situation. If you are convinced, you push the "Heh.." button. The button beeps "Heh.." like person pronunciation "Heh..". Students

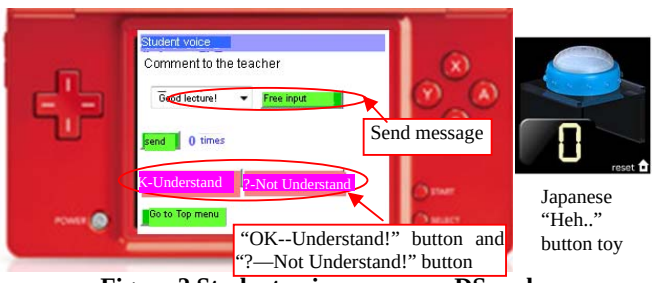

Figure 2 Student voice screen on DS and Japanese "Heh.." button toy

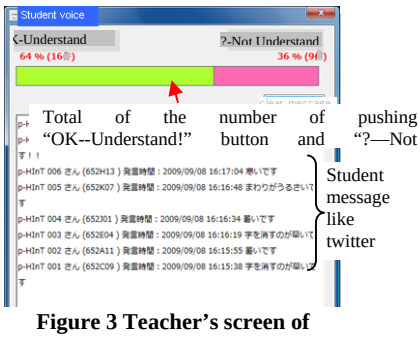

Figure 3 Teacher's screen of student voice

repeatedly push “OK-Understand!” button on DS when the students are convinced with teachers’ speech during lecture. The pushing the button is always available during lectures. Teachers do not control students’ pushing. Similarly, students repeatedly push the “?-Not Understand!” button when students can not be convinced with teacher’s speech.
Teachers are able to see the number of pushing “OK-Understand!” button and “?-Not Understand!” button. Figure 3 shows a student voice window on a teacher’s computer. A bar-chart of the number of pushing “OK-Understand!” button and “?-Not Understand!” button is shown at upper side of the window. Because the student voice window is always displayed on a teacher’s computer, teachers can always see changes of the bar-chart.

2.2.2 Sending messages like twitter
Students can send messages to a teacher at anytime during lectures. In Figure 2, “send message” area is the send message function. Several messages are prepared on DS. For example, “Good lecture”, “Please speak full voice”, “Please write bigger characters on the blackboard”, “Please repeat the explanation”, “Please speak slowly”, “Thanks”. These messages are decided based on results of interviews to students. Of course, if students want to send the other message, students can input free sentences. Mainly, students send their impression of lectures at anytime. Teachers can quickly see the students’ messages on the student voice window (See Figure 3). If a teacher confirms a message “Please write more big characters”, the teacher will quickly rewrite bigger characters on the blackboard. Teachers can quickly put into practice of easy improvement such as rewriting characters on blackboard through the “student voice” function

2.2.3 Red card
Red card function is to send warning messages to a specific student. Figure 4 shows the red card function. The red card means a final warning to students who are not serious. For example, a student plays a game during a lecture. Although a teacher says “Don’t play” many times, the student does not stop playing. The teacher sends a final warning message to the student’s DS. The screen of DS suddenly changes a warning screen (See Figure 4).

3. Usage of the “student voice” function

3.1 Usage of the p-HInT and the “student voice” function in regular curriculum
The p-HInT system has been running from April of 2008. Until now, 26 teachers used the p-HInT system, a series of 14 or 28 lectures of 28 subjects (34 classes) used the p-HInT. Total number of lecture using the p-HInT is 614 (one lecture spends 90 minutes), total number of students who used the p-HInT is 3511. The number of calling the roll by the p-HInT is 446, the number of doing tests by the p-HInT is716. Fields of the subjects are various; Information Technology, social science, financial theory, economics, and psychology. Especially, the maximum number of attendees of a lecture is 234. The subject is “Introduction of IT” for freshmen. 234 students accessed at once the p-HInT system through their DSs in a lecture room (See Figure 5).

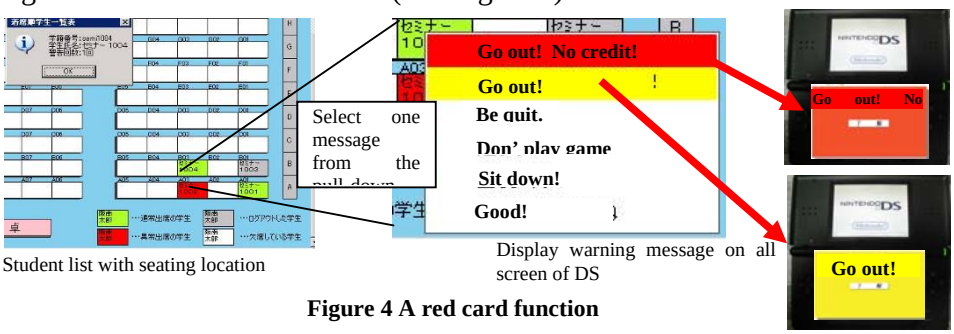

Figure 4 A red card function

Figure 5 Lectures using p-HInT at IT Introduction

The new function "student voice" has been running from October of 2009. The new function has been used in lectures of 10 subjects. Total number of pushing the "OK-Understand!" and "?-Not Understand!" button is 18,990. Total number of sending messages in the student voice function is 2,047, the number of sending red-card is 154.

3.2 An example of usage of the "student voice"

We focus on usage of the new function at System Development theory subject. The number of attendees is 64, a series of lecture consists of 14 lectures. 2 lectures were guest speakers' presentations. The attendees are the second degree students of Information Management faculty. The students freely pushed "OK-Understand!" button and "?- Not Understand!" button at anytime. The students freely sent messages at anytime. The teacher did not control the students according to the student voice function.

Total number of messages and pushing the two buttons is 2997. Total number of sending the red card is 2. An average of the number of student messages a lecture is 214. A student sends 4 messages at one lecture in average. Typical messages are "Can not see characters on the blackboard", "I understand.", "Has the software been already released?". Several messages were not related to lecture contents, for example, "Today is beautiful", "Now sleepy", "It's hot". The student messages were certainly twitter tool. Their impressions during lectures send to a teacher through DS.

On the other hand, lectures of Multi Media theory used the p-HInT and the new function. The teacher of Multi Media theory subject controlled the student voice function. The teacher did not arrow that students sent messages at anytime. The teacher always used the student voice function when the teacher asked an ease question. Therefore, the teacher asked three questions per a lecture in average. The students answered through the student voice function. For example, the question was "Do you understand GIF format?". The GIF format was a main theme of the lecture. To grasp percentage of students' understanding, the teacher used the student voice function. There were few free-send-messages in the lecture of the Multi Media subject.

Figure 6 shows an example of changes of the number of pushing the two buttons in the two subjects; System Development theory, and Multi Media theory. In System Development theory subject, the students freely pushed the two buttons at any times. Therefore, students' actions of pushing the buttons ware scattering during the lecture. However, around at 17:50 and 18:00, the number of pushing "?- Not Understand!" button increased. What the teacher spoke at 17:50 and 18:00 were about "Von neumann" and "EDVAC, EDSAC". In short, it was difficult for the students to understand "Von neumann" and "EDVAC, EDSAC" in the lecture. In contrast, at the lecture of Multi Media theory subject, actions of pushing the buttons were concentrated to two points; around at 17:20 and 17:50 (See Figure 6). At 17:20, the teacher asked "Do you feel that red is cooler than blue?". The question is a cue of lecturing color impression. Of course, almost students pushed "?-Not Understand!" button, that is, they said "No". At 17:50, the teacher asked "Do you understand PARA language?". Just before, the teacher spoke about PARA language. The teacher wanted to confirm

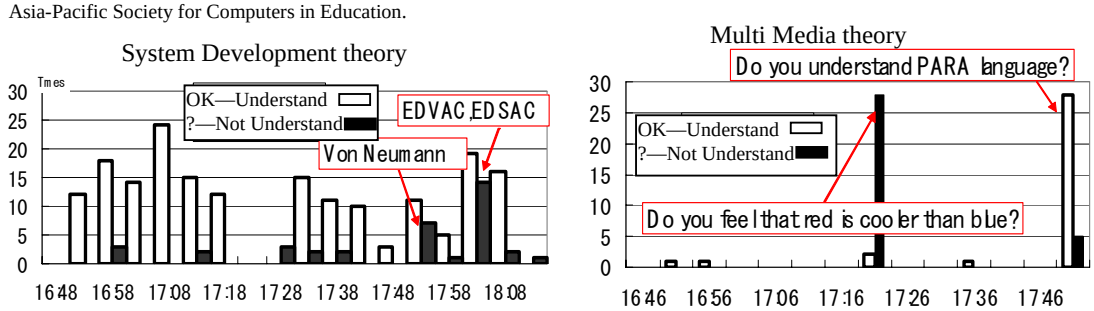

Figure 6 Graphs of the number of pushing "OK—Understand!" and "?—Not understand!" buttons

percentage of the students' understanding. About 85% students pushed "OK-Understand!" button, that is, almost students understood. In this way, the two buttons; "OK- Understand!" and "?-Not Understand!" were used in the lectures.

4. Discussion

4.1 An Analysis tool using the twitter logs and lecture video

We have developed a tool for analyzing lectures based on logs of the student voice and lecture videos (See Figure 7). The tool consists of three parts; slide show area for materials such as PowerPoint, teacher speech images of replaying lecture video, and a graph of the number of pushing the "OK-Understand!" button and "?-Not Understand" button on time series. The tool was based on commercial tool named "UB Point!"[8]. The UB Point is a kind of recording and replaying tool for lectures video. The replaying of lecture video can be synchronized with slide show of PowerPoint materials. We added a graph area of student voice to the "UB Point!". The graph shows changes of the number of pushing the "OK-Understand!" and "?-Not Understand" button on time series. If a user clicks a point of the graph, the replaying scene smoothly change to a scene of the clicked point of the user.

4.2 Results of analyzing by the tool

Using the tool, we analyzed how students push the "OK-Understand!" button and "?-Not Understand!" button in 12 lectures of the System Development theory subject. Figure 8 shows the results of the analysis. The tool totals up the numbers of pushing the two buttons every 5 minutes. White bars mean the number of pushing "OK-Understand!" button, black bars mean the number of pushing "?- Not Understand!" button. In addition, by clicking the graph area of the tool, the lecture contents were investigated. In Figure 8, the lecture contents are added to the graph in manual. For example, on 10/5, from around at 17:06 to

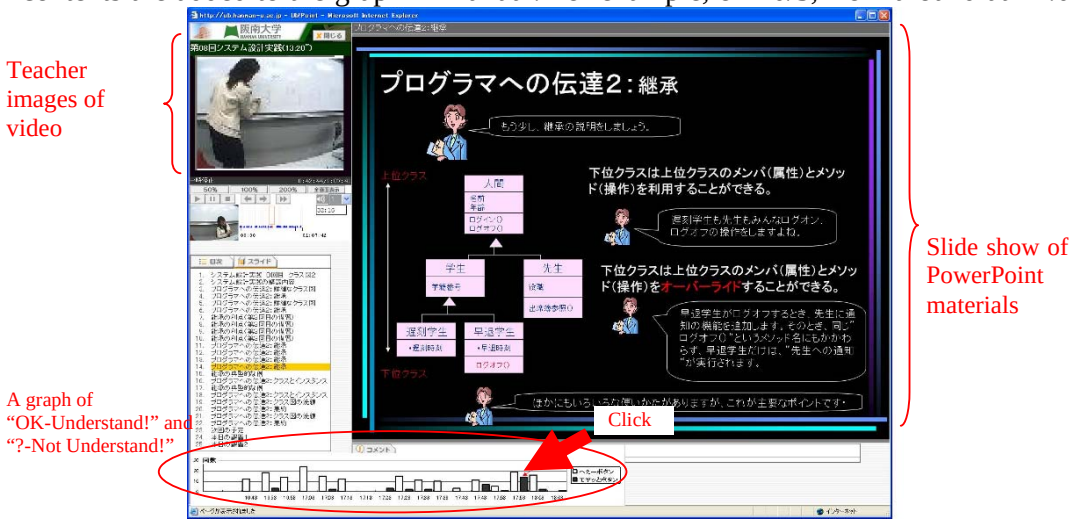

Figure 7 An analysis tool for lecture improvement using twitter logs and lecture video

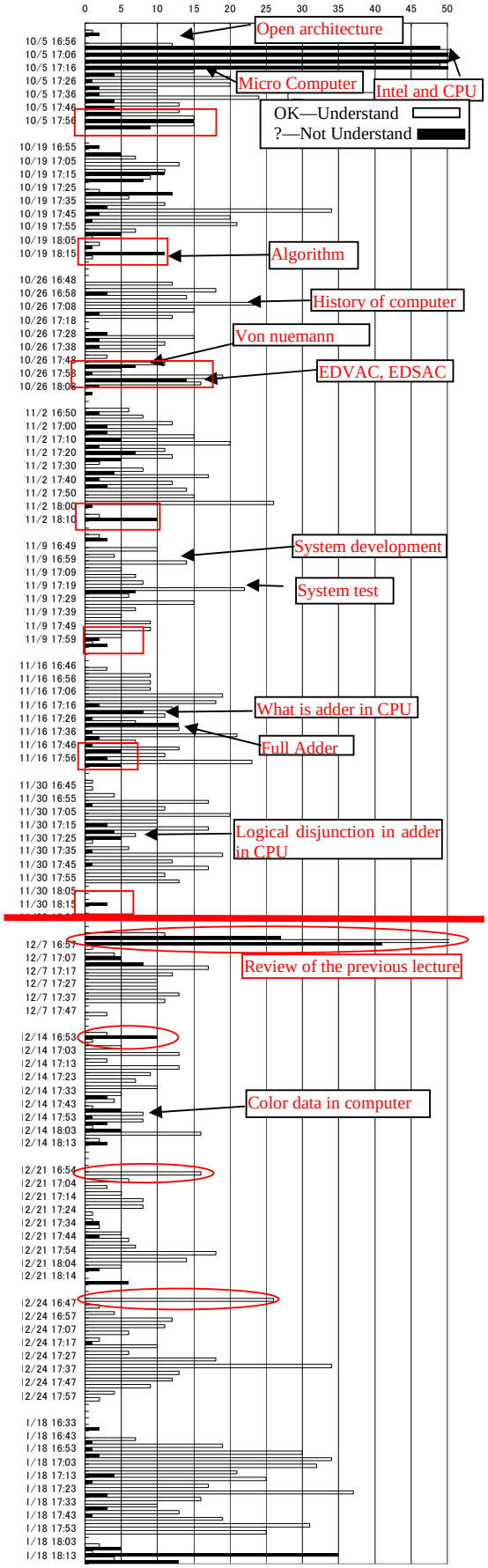

Figure 8 Change of pushing the two buttons

17:16, the students frequently pushed the both buttons. The teacher spoke about "Open Architecture", "Intel and CPU", and "Micro computer". On 10/26, from 17:58 to 18:08, when the teacher explained about "Von neumann" and "EDVAC, EDSAC", the students frequently pushed "?- Not Understand!" button. In contrast, at a first half of the lecture on 10/26, the teacher spoke about "History of computer". The students frequently pushed "OK-Understand!" button. Therefore, teachers can review their speech and materials after lectures. Contents that students did not understand easily were clear, contents that students understand easily were also clear. In the same way, we can easily judge good speech or bad speech of teachers.

4.3 Lecture improvement using the logs

Using the tool, we tried to improve lectures of the System Development theory subject. On 11/30, the teacher reviewed the past lectures. The review was based on graphs such as Figure 8 and student messages of the student voice function. The teacher knew two points of lecture characteristics. One point is that the number of pushing "?- Not Understand!" button increased at near the end of a lecture. For example, on 10/26, students frequently pushed the "?-Not Understand" button from 17:56 to 18:06 (finish time of the lecture is 18:10). In Figure 8, red rectangles means the increment of pushing the "?- Not Understand!" button. In short, at near the end of a lecture, students did not understand easily. A reason was clear when the teacher repeatedly replayed the videos of the lectures. At near the end of a lecture, the teacher hurriedly spoke in order to finish all lecture contents that were scheduled in the lecture plans. The hurry speaking leads the difficulty of understanding for the students.

The second point is about review of the previous lecture. The teacher always starts speaking today's lecture contents at the beginning of a lecture. However, there were some students' messages about the previous lecture contents. Moreover, the students were disappointed because the teacher did not reply to their messages of the previous lecture. The

non-reply leads decrement of the students' motivation.
Therefore, the teacher improved two points of lectures. The first is improvement of hurry speaking at near the end of a lecture. Even if the teacher was not able to finish all lecture contents, the speech speed does not change. Second is to set time for reviewing the previous lecture at the beginning of a lecture. In the reviewing time, the teacher presents students' messages at the previous lecture. At the same time, the teacher replies to each message even if the messages were not related to the contents of lectures. In Figure 8, red circles means the reviewing times of the previous lecture.
As results of the improvement, the number of pushing "?- Not Understand!" button decreased from 12/7 to 1/18 (See Figure 8). Especially, at review time at the beginning of a lecture, students frequently pushed "OK-Understand!" button. The review time was value time to communicate between the teacher and the students. In addition, as a result of student quaternaries, 68% students answered that the student voice was useful, and their interests and motivation increased.

5. Summary

We have developed an interactive function named "student voice" on the p-HInT system. The student voice function consists of three element functions; a sending messages function like twitter, "OK-Understand!" button and "-Not Understand!" button, and a red card function. 10 subjects (196 lectures) were used the student voice function of the p-HInT. In addition, we have also developed an analysis tool based on twitter logs (student voice logs) and lecture video. In System Development theory subject, using the tool, the lectures were able to be improved based on twitter logs. In future, the analysis tool will be adapted to various lectures. Then, a general improvement way will be proposed using the analysis tool. After that, we will quantitatively evaluate usefulness of the "student voice" function.

Acknowledgements

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