Development of an Analysis System and Class Recordings linked to More than One Course Evaluation Data using Smartphones

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Abstract: In this present research, we have developed a class analysis system with the goal of lesson improvement. The system is web-based application, and works by general hardware, for example standard laptop, USB cameras, and smartphones. The characteristics of this system are, while recording the lesson with two USB cameras, more than one classroom observer can record lessons using three buttons (“good!”, “what?”, “!?”) and one text field with the smartphone as an information evaluation input terminal. Using this lesson analysis system, you can reduce the specialized equipment that is needed when recording and analysis of the class. So, when the teacher is reflecting back on his own class and making refinements to the lessons, they can do it quickly and easily. In this study, at an actual elementary school in Japan, for the teacher to reflect upon their lessons, it will be beneficial in actually using this system to make improvements to the class.

1 INTRODUCTION

"Lesson Research" has long been conducted in Japan. In lesson research in Japan, after the class is over, it's common for the teachers who conduct classes, and the person who sits in on the lesson (for inspection) to have an open meeting reflecting back about the lesson that took place. In the meeting, the participants will have a discussion about the good points and bad points of the lesson. Through this review, the teacher is able to refine the technology for conducting lessons in a class. The technique of using audio-visual equipment for the analysis of classroom lessons came into the field of educational technology in the 1970s. Since that time, methods to record lessons using a video camera and for reflecting on those lessons using video have been developed. This method that had been used of the teacher and class inspector reflecting on the lesson after class using recorded video was called “class analysis by stop motion method”. In particular, "VTR interruption strategy" several video cameras are prepared, recording teachers and students at the same time, then at the class review meeting that video footage is paused for discussion. With a method of using recorded video lessons like this, many can share the video scenes more concretely. So, rather than a meeting about the lesson that relies solely on memory, it can be discussed based on the images that can be commonly understood by everyone which is an advantage. However, looking at the video from the beginning to the end of class requires more time, or about the same as the class time. And, even if you want to see only the class scenes of concern, it is difficult even to fast-forward to the scene in the video. When recording with a single camera, you can only record from one point of view. In the introspection meeting, it’s important to grasp not only what the teacher is doing, but also what the students are doing as well.

For that reason, it certainly is better if multiple video cameras were installed in the classroom. But eventually, because the preparation is an enormous task, there is no opportunity to use this setup on a daily basis. It is in these recent years by a dedicated data input terminal that marking above the recorded video’s timeline to cue distinguishing scenes and a system that can also look back on the each lessons evaluation information has been developed (Photron, 2012). This is available for a wide range of training, such as teaching nursing practice and job interviews. However, although the function is good however

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because of the high price it is not easily available in the general education setting. Furthermore, in addition to the evaluation information input terminal and special equipment, you must purchase the required number of devices.

In this study, we aimed to develop a class analysis system that can use ordinary smartphones as evaluation information input terminals

2 SYSTEM OVERVIEW

2.1 Development Concept

The concept of this development system is to reduce the burden on the user as much as possible without the use of a special environment or equipment. Therefore, a Centrino spec Windows laptop with a Core2 CPU, and 1 GB of memory, can run iPhone and Android smartphones or phones as a cheap ordinary USB camera, and evaluation of information input device. The operating environment was composed of all freeware. As a development idea, we expect to formulate a "good!" lesson and to promote the improvement of teaching classes. So we named this system Good Processor.

2.2 Structure of the System

The system configuration can be broadly divided into the following components:

1. Web server
2. Recording process
3. Screen drawing
4. Evaluation input process
5. Composed of the data storage unit

As mentioned previously, the system is configured with all freeware. The Web server is using Apache, the recording process is managed using Red5; the data storage is handled by PHP and MySQL, and Flex is used for graph drawing and operation screen (Figure 1). Once installed, it's not necessary to adjust the settings for everything in order to start the OS service level. When you want to use the system, if you connect a USB camera to a PC it's possible to start taking recordings of the lessons.

By way of a Wi-Fi connection, possibly a 3G, evaluation data is sent to the system from the smartphone or mobile phone in use by the inspector. Since the system provides no constraints with regard to the number of connections, it's possible to make connections up to the limit of the physical Wi-Fi

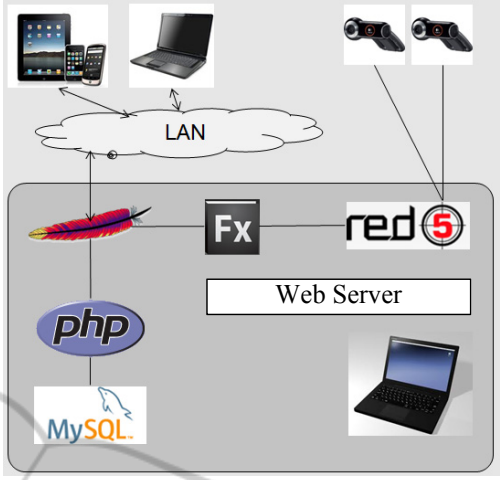

Figure 1: Structure of the System.

2.3 System Functionality

The system consists of a component that displays the analysis result from the recorded data and a part that records the lesson data. In order to record data, the person inspecting the class holds a smartphone or tablet PC and an evaluation input page for instructional use is display (Figure 2).

Figure 2: An evaluation input page on a smartphone.

The evaluation input page, has 3 kinds of buttons, and a comments field. The inspector while observing the lesson presses the "good!" button when they think it's good and presses the "what?" button when they think it's not so good, and after it's confirmed the "!?" is pressed when they think it's good. If, when you want to record something of note, you can also send comments. While receiving evaluation data from each terminal, the systems records what kind of evaluation data was sent, when, and from which terminal into a database. When the class concludes, the analysis results screen appears (Figure 3).

Figure 3: A sample of an analysis results screen.

At the analysis screen, evaluation information that was recorded is added up, and a comment and graph display is performed. By the data display, there is a recorded video lesson and comments, a chart that can add up each data at any time interval and, one can grasp the state of the class by the time series line chart graph that's connected with that. When each data is clicked, the video is cued to the scene that was sent to that data. The evaluation information time that was sent is recorded in seconds in order to make a graph seek the aggregate results minute by minute by the initial settings. This time, the options are modifiable depending on the purpose. For example, if a graph is made for the aggregate results every 10 minutes, one is able to grasp the rough state of the class. On the other hand, if we aggregate every 30 seconds one will understand the lesson in finer detail. By clicking on the video, graph or comment the display can be enlarged. By using this, one can see easier when reflecting on class lessons (Figure 4).

Figure 4: Views of enlarged each element.

3 CLASS ANALYSIS CASE

Good Processor has been adopted as a means to improve the teacher's lecture in Miyagi Prefecture Iwanuma city school. In this paper, a case that took place on 9/28/2012 is described. The class was a second grade Japanese language class. In this class, "watch for scenes in the story, and being able to read the feeling and state of a person" are the goals. There were 22 teachers who sat in on classes and entered the evaluation information. Evaluators, with smartphone in hand, visited classes while taking notes with a pen, as shown in figure 5.

Figure 5: An evaluator, with smartphone in hand, inputting comments and remarks while taking notes with a pen.

Figure 6 shows the state of class in an actual situation. In the foreground, a notebook that has the system installed is pictured.

Figure 6: A state of class in an actual situation.

After the lesson, all the teachers who sat in on classes had a meeting reflecting on the lessons at the Board of Education. At this conference a description was given about the classes that day from the teachers that made the first lessons.

Next, the teachers who participated were divided into groups and discussed good points, improvements and the points that have been devised based on the results of the analysis about the lessons. And then we present the results that were discussed, and a concrete improvement plan was discussed with all the participants. Finally, we received advice from the Board of Education committee.

Figure 7 is a line chart shown in a time series of the lesson evaluation data.

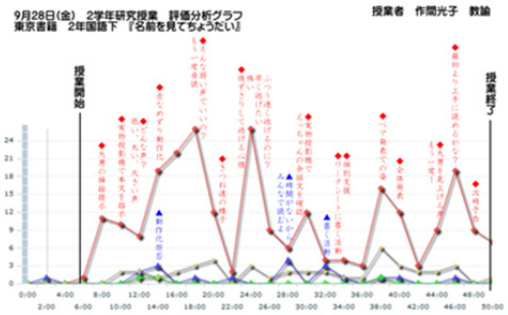

Figure 7: Time series line graph.

This diagram has the aggregation set for every 2 minutes. The line has changed considerably; however “good!” shows changes that were pressed. Although we see there are some mountainous peeks, those parts mean the places many people thought were " good " scenes. Near the bottom of the diagram, another graph can be seen. “what?” button is the state of how little has changed can be seen at the bottom of the figure.

In this class, around 20 minutes after the start of the lesson, there is a scene in which the inspectors received a "not so good" impression. We know that there was something wrong with that part of the lesson, since the graph of “good!” has fallen. On the other hand, around 38 minutes after the start of the lesson, despite the increasing number of “good!” we have found many people who received the ”not so good” impression.

In summary, since the evaluation is divided, this scene can be said to be a scene that is worth discussing concerning what someone would think. In the class, there are times where the best scenes that were evaluated where in the middle of the first half of the class. Here, some scenes the teacher questioned the students regarding reading. These scenes are an important influence that greatly affects the success or failure of this class. These scenes, which are the top rated, can be said to have the desired results. On the other hand, after 28 minutes, the number of “good!” reduces and “what?” increases. This part is, is the place many people in the class thought “what?” since we have less time than the rest of the lesson plan, this part is a scene in which the teacher has changed the schedule of classes. Before this scene, the students were talking about when reading, how to tell a story vividly to the listener. However we were not able to take advantage of the results of that discussion.

In the case of the debate by the inspectors, when using the system it was easy to understand if it were a scene where you needed to hold discussions. But if this system is not used, the inspectors would just say the point that they were worried about and would have spoken only what they thought. However, using the system, the differences of opinion and other people's thoughts appear in the shape of a graph. When using a survey by questionnaire available in a 5-point scale, the readability of the screen had an average rating of 4.4, and the readability of the results was 3.9. The main comments of “it’s interesting and could be evaluated quantitatively in class”, “other teachers could understand how their feelings changed while observing the class”, and “they could grasp the most critical point of the lessons” was the positive assessment of the class. On the other hand as for improvement points, “because I’m not accustomed to the operation of a smartphone I wouldn’t know how to use it”, “the weight of the smartphone is a bit heavy”, “I want to also see the analysis result screen on a tablet PC” were some of the things mentioned.

4 CONCLUSIONS

In this study, a system for analysis and reflection of class lessons was developed. The goal was to make it easy as possible in a practical classroom and for an investigative review committee to examine. The system can record lesson from two point of view and evaluation data from more than one classroom observer inputted by smartphone. By using a smartphone made to correspond to the input terminal, the preparation was possible in a short time even when using a laptop and USB camera. From the graph and chart that aggregates the data, the flexible visualization of the class could be realized.

At an actual elementary school, it was used as a means to look back on the lessons and I was able to get high ratings from teachers. And, the main comments from teacher were the positive assessment of the class. However, there were several comments as for improvement points of the system. For that reason, In the future, it is necessary to proceed with the support in the form of a tablet PC and other devices.

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