

# Proposal of a System that Supports Improvement of Lectures in Lesson Study at Teacher Training University

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**Abstract:** In Japan, lesson study is actively conducted in teacher-training universities and in any schools. It is important to constantly improve on lesson research. However, implementing such a method in self-reflection and peer-review scenes is difficult. For example, during one's self-reflection, an individual may find it difficult to judge the difference between the scenes in the previous lesson from that of the second and the subsequent lessons. In addition, if notes are not shown during peer review in the second and subsequent lessons, evaluators will not be able to assess them. In this research, we propose a system to support lecture improvement in lesson study in teacher-training schools. To this end, we designed and proposed two functions. In the first function, lecturers can check self-reflection scenes while comparing them to the previous scene. In the second function, evaluators can conduct a peer review while checking lecturer notes in the second peer-review scene. We examined the use of this system in lesson study and concluded that we could have effective positive opinions and improvement points.

**Keywords:** Video Annotation, peer review, mobile learning, lesson study

## INTRODUCTION

Video annotation using information and communication technologies (ICT) is currently used for teacher-training research. Since most university students have portable mobile devices such as smartphones (Mainabi 2016), these can be incorporated to support lesson study with video annotation. There is systems development research to support lesson study with video annotation, including development of video annotation support systems for expansion and focus of discussion (Christo 2015, Suzuki 2010) and development of video annotation support systems for deepening awareness (Wakimoto 2010, Ogawa 2011). On the contrary, Stigler (2009) noted that it is important to improve recurring activities in lesson study. Furthermore, it is important for teachers to evaluate and select what is of value to improve the lecture (NCLS 2005). There are two instances that learners feel are the most difficult when trying to improve their lecture: self-reflection and peer review. First, it is necessary to confirm that the contents of second lesson practice were improved compared to the reflection points of first lesson. However, it is difficult to self-reflect without a comparison to the first lesson. Second, when learners are watching videos to evaluate the second lesson and are acting as evaluators in peer review, they may not notice any change unless improvement scenes are

shown. For the above reasons, the teachers may not be able to be conscious of improvements.

Kurata (2018) developed a system to realize peer review using portable mobile devices in self-rehearsal. We realized functions to promote awareness on portable mobile devices in self-rehearsal, but there is no function to support improvement of lectures in that system.

Therefore, the purpose of this research is to propose a system using video annotation, which supports improvement of lectures on portable mobile devices in teacher-training universities. To this end, we will develop a prototype system with a function to support the improvement of lectures in self-reflection and peer review scenes, based on the system of Kurata (2018). Additionally, we will analyze the strengths and improvements in trial practice..

## LEARNING DESIGN

The learning design of the prototype system is shown in Fig.1, which incorporates the process of a teacher self-rehearsing the lecture twice, based on the method of lesson study by Stigler (1999). This learning is a practice before demonstrating a class that a learner of a child role exists in face to face. The learners conduct peer review while alternately switching between learners in the role of teaching (teachers) and learners in the role of evaluating the rehearsal of lecture (evaluators). Thus, learning repeats the following three processes twice:

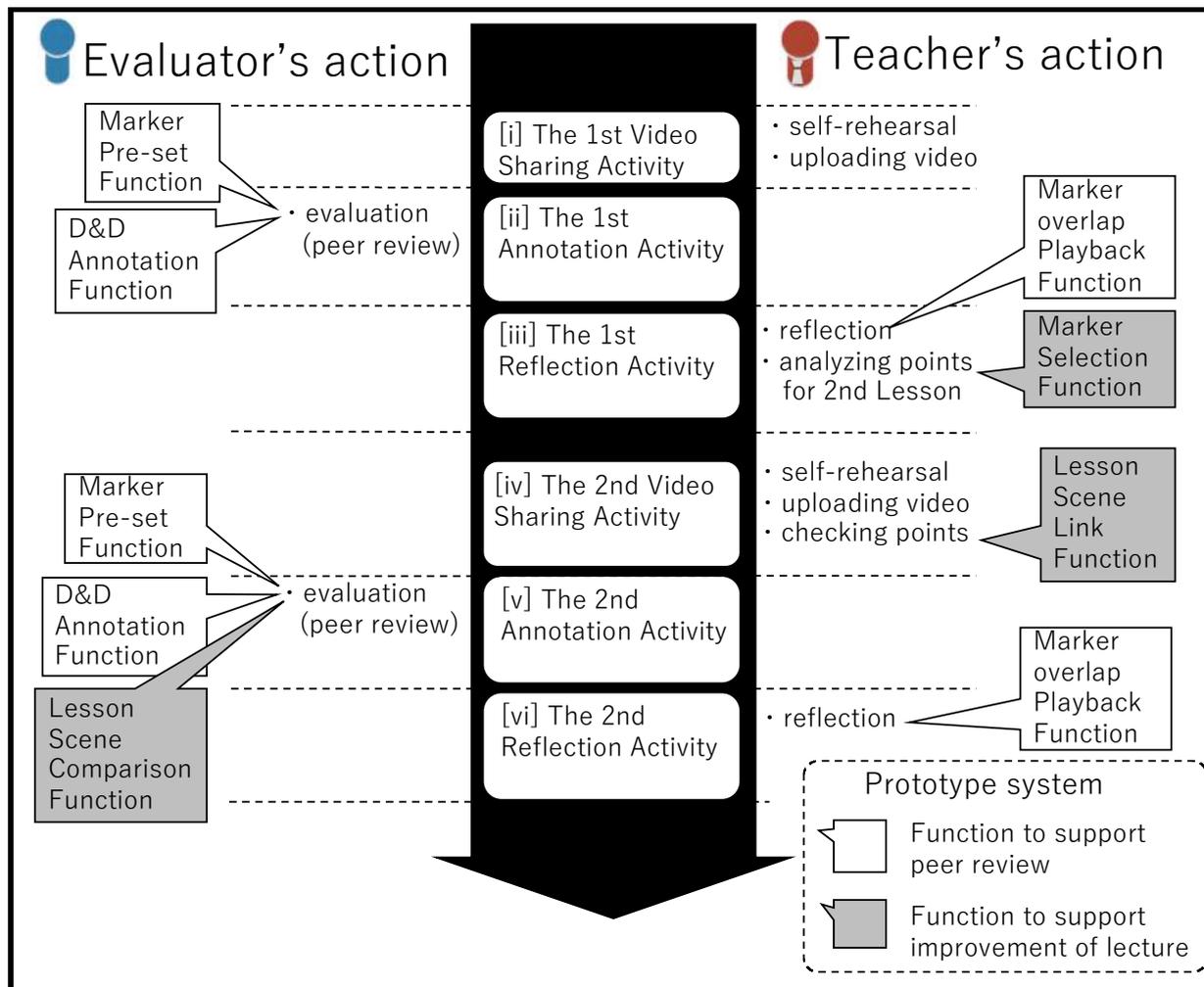


Fig. 1 Learning Design on the prototype system

- (1) The video sharing activity
- (2) The annotation activity
- (3) The reflection activity

First, teachers perform a self-rehearsal of their lecture and record the situation in the video as part of step (1). They then share the recorded video to evaluators. Next, evaluators view and evaluate teachers' video as part of step (2). Further, teachers review the evaluations and their own video and reflect on them as part of step (3). During reflection, teachers analyze the points they want to improve or points they want to repeat, and accordingly, they redesign their lesson plans. Then, they begin the process of learning again from step (1). The prototype system has six functions to support this learning: marker pre-set function, D&D annotation function, and marker overlap playback function to support peer review and marker selection function, class scene link function, and lesson scene comparison function to support the lecture's improvement. Marker pre-set function and

D&D annotation function support learning in [ii] and [v]. The marker overlap playback function and marker selection function support learning in [iii] and [vi]. The class scene link function supports learning in [iv]. The lesson scene comparison function supports learning in [v].

The annotation activity screen is shown in Fig. 2; an example of the screen for using markers is shown in Fig. 3; the reflection activity screen is shown in Fig. 4; the marker selection function is shown in Fig. 5; the lesson scene link function is shown in Fig. 6; and the lesson scene comparison function is shown in Fig. 7. The following is a description of learning and support functions at each step in detail.

### The first video sharing activity

Teachers perform self-rehearsal of their lecture and upload the video of their first lesson as the first video sharing activity.

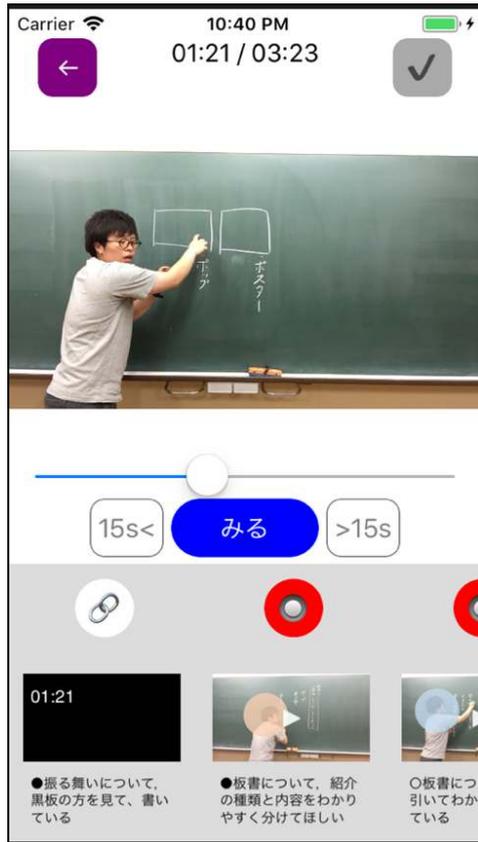


Fig. 6 Scene of lesson scene link function in the second sharing video activity

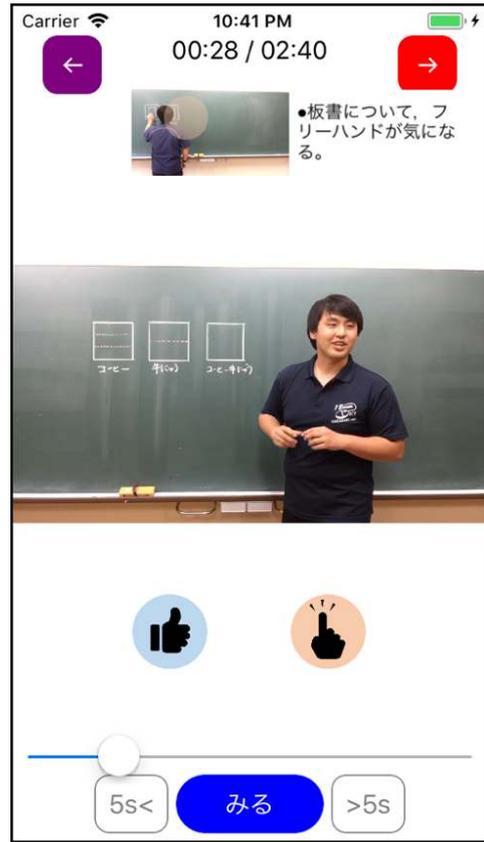


Fig. 7 The second annotation activity

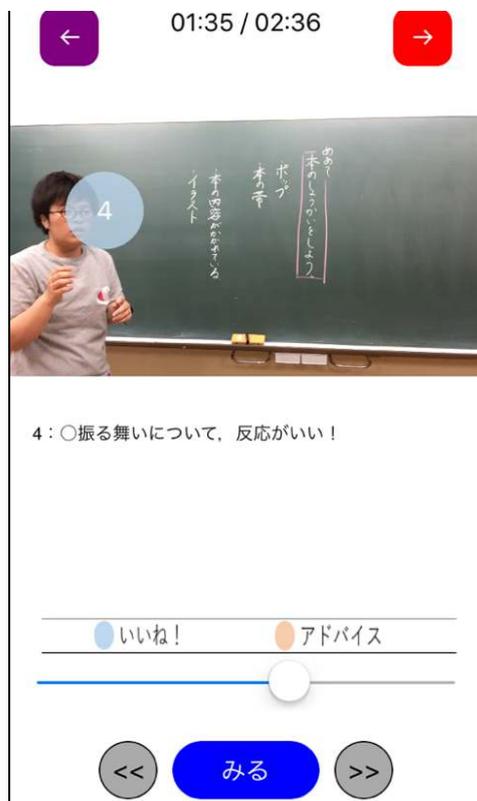


Fig. 4 The first reflection activity

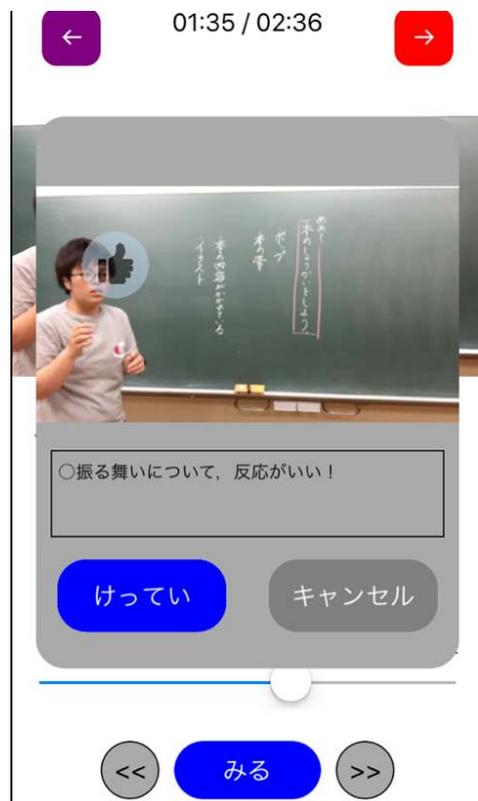


Fig. 5 Scene of marker selection function in the reflection activity

### **The first annotation activity**

Marker pre-set function and the D&D annotation function on this prototype system. The marker pre-set function supports the peer review content by categorizing peer review types and viewpoints for evaluation and setting them as markers. The D&D annotation function supports the operation of peer review by dragging and dropping markers. The screen layout by this prototype system in the annotation activity consists of one video screen and two types of markers (good and opinion) by marker pre-set function as shown in Fig. 2. The method of video annotation by the evaluators is to drag and drop markers to the position of the video screen that they want to point out and input comments by using the D&D annotation function. Furthermore, after the evaluators drag and drop the marker onto the video screen, six categories are displayed by marker pre-set function as shown in Fig. 3 (voice, blackboard, teacher's behavior, instructional timing, ease of understanding, and others). The evaluators select by tapping one of them. Then, a window for comment input is displayed for the evaluators to input comments in text.

### **The first reflection activity**

Teachers confirm their own video and opinions from others using the marker overlap playback function as shown in Fig. 4. Teachers can then record what they wish to improve or replay from the evaluation from others, using the marker selection function. When the marker that teachers want to improve or replay is displayed, they tap this marker. Then, a confirmation window is displayed so that they can record the contents to be improved or replay as shown in Fig. 5.

### **The second video sharing activity**

Teachers perform the second lesson and upload the video of their lesson. They then use the lesson scene link function to correspond to the first lesson scene that they wish to improve or replay and the second lesson scene that they previously improved or replayed. A list of the first lesson scenes checked with the marker selection function is then displayed at the bottom of the reflection activity screen as shown in Fig. 6. Therefore, evaluators check the contents of the second lesson with a video while checking the teacher's improvement point or replay point. If the teachers actually confirm the improvement or replay scenes, they select it and link the relevant scene from the list of the first lesson scene. When they tap the lesson scene from the list, it is played for ten seconds as a video.

### **The second annotation activity**

The learners peer review the second lesson using the marker pre-set function, the D&D annotation function, and the lesson scene comparison function. In this activity, teachers reflect on their lesson in the same way as in the first reflection activity. Additionally, if it becomes an improving or replaying scene during video playback, it is automatically notified by the lesson scene comparison function. The aim of this function is to prevent evaluators from overlooking the scenes that teachers have improved or replayed when evaluating the second lesson. In other words, lesson scenes checked by using the marker selection function are displayed timely for three seconds at the top of the video screen as shown in Fig. 7. This display supports the evaluation by evaluators done by comparing the second lesson to the lesson scenes improved or replayed by teachers.

### **The second reflection activity**

Teachers confirm their own video and opinions from evaluators, using the marker overlap playback function. More importantly, they can confirm scenes that they want to improve or replay. Teachers can thus know whether their second lesson had improved.

## **RESEARCH DESIGN & METHOD**

The strengths and improvements of the prototype system were analyzed by conducting a trial practice using the prototype system. A trial practice was performed with the flow of [i] to [vi] in the learning design by using system. The subjects were two graduate students of a teacher-training university, who peer reviewed each other's lecture rehearsal. Further, we interviewed them regarding the strengths and possible improvements of each function of the prototype system and analyzed the results; the lesson time in the trial practice was about two to three minutes.

## **RESULT & DISCUSSION**

Results of the interview survey for each function found the following: the marker selection function is simple and easy, and there was no opinion on improving it. However, the markers were not overlapping in this trial practice, so it is also necessary to have support for the scene where markers overlap. It was found that the lesson scene link function was able to support the reflection activities while confirming the contents of the previous lesson. There was also the advantage of recalling the previous lesson. However, there was a comment regarding improvement that a list of items related to the previous lesson was better presented chronologically so that it would be easier to reflect. Another improvement was that items cannot be linked to multiple scenes in the second lesson from items

related to a previous lesson. One particular strength was that the lesson scene comparison function was easy to understand, especially when improving or replaying. However, there was a chance to improve it as learners cannot compare the first and second lessons with a display for only three seconds. Thus, it is necessary to have the support function to compare the first and second lesson in a short time. Furthermore, there was also a need to improve the image for the first lesson scene that was too small. Therefore, it is necessary to also re-design the screen layout.

## CONCLUSION

In this research, we developed a prototype system using Web-based video annotation to support improvement of lectures in lesson study and examined functions for the same purpose from an interview survey. The results are summarized below:

### Positive opinions

- The marker selection function supports that learners can be easily evaluated when markers are not overlapped at the reflection activity.
- The lesson scene link function supports teachers to link similar scenes while comparing the first and second lessons in the video sharing activity.
- The lesson scene comparison function supports to indicate the improved scenes or replayed scenes from teachers at the reflection activity.

### Improvement opinions

- The lesson scene comparison function is difficult to compare each lesson scene by the evaluator in a short time of about three seconds.

## ACKNOWLEDGEMENTS

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## REFERENCES

- Christo P. et al (2015) Video annotation software application for thorough collaborative assessment of and feedback on microteaching lessons in geography education. *Journal of Geography in Higher Education*, 39(3) : 420-436
- eLearning Industry. (2013). <https://elearningindustry.com/top-tips-start-successful-elearning-career> (2018/6/20).
- Hisashi OGAWA(2011) Practical Consideration about Balloon Type Video Annotation in a Case Discussion Support System to Improve the Problem Behavior of Autistic Person. *Japan Society of Educational Information*, 35(Suppl.), 157-160. (in Japanese)
- Kurata et al(2018) Development Video Presentation Mutual Evaluation Support System with Portable

- Mobile Device. *Japan Society of Educational Information*, 41(Suppl.), 201-204. (in Japanese)
- Mainabi Co., Ltd (2016). [http://www.mynavi.jp/news/2016/02/post\\_10835.html](http://www.mynavi.jp/news/2016/02/post_10835.html) (2017/6/20)
- Mariko SUZUKI et al(2010) Development and Evaluation of a Web-based program “eLESSER” toward a Network Community for Lesson Study. *Japan Society of Educational Information*, 33(3), 219-227. (in Japanese)
- NCLS(2005) *Network\_leadership\_in\_action:Getting started with networked research lesson study*. <https://education.gov.scot/improvement/documents/sacfi4f-support-materials-getting-started-with-lesson-study.pdf>
- Stigler, J. W., & Hiebert, J. (2009). *The teaching gap: Best ideas from the world's teachers for improving education in the classroom*. Simon and Schuster.
- Takehiro WAKIMOTO(2010) Development of Mentoring System FRICA for Novice Teacher. *Japan Society of Educational Information*, 33(3), 209-218. (in Japanese)
- Cho, K., & Jonassen, D. H. (2002). The effects of argumentation scaffolds on argumentation and problem solving. *Educational Technology Research and Development*, 50(3), 5-22.