# Enhancement of the Interface of Cell phone for an Active Learning with High sophistication Engrossment

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***Abstract*—our previous work suggested an Improvement learning process, which uses the students' study records in order to improve the students' learning and the self- learning time. To improve the progress speed of a lecture and excitement the efficiency of the Self-learning, we proposed an Active Learning System (ALS) using Cell phone. we suggested the group Convention system of Active learning System. However, the previous interfaces for interactive learning had limited adequacy in maintaining participants' Engrossment when their skill levels vary. To solve this problem, we propose the interface of Cell phone on our Active learning System to improve the learning endorsement. In this paper, we describe the flow of the interactive lecture. Moreover, this paper indicates the interface of the mobile device on the Innovative lecture.**

***Keywords—active learning system; self-made; innovative learning; mobile computing***

## I. INTRODUCTION

In the conventional lecture style, the knowledge was transmitted from a lecturer to a student using one-way communication. Recently, in many universities the information terminals such as note PC, workstations, servers and mobile phones are used successfully during the lectures. Also, there are many e-learning systems [1-9] that use these devices. The amount of information that a lecturer transmits to the participant during the lecture can be improved by using different information terminals. However, in a lecture, if participants' motivation for learning is low, the learning results are not good. However, in universities is required to increase the learning motivation using information terminals.

Usage of the desk-top computers and notebook PCs for lecture may be inconvenient and they occupy a lot of space. Therefore, it will be better that students use small and lightweight terminals like PDA devices. Also, because of wireless networks are spread over university campuses, it is easy to connect mobile terminals to the Internet and now the students can use mobile terminals in many lecture rooms, without needing a large-scale network facility.

We considered a method of acquiring / utilizing the study record using smartphone in order to improve the students learning motivation [10]. During the lecture the students use the Cell phone for learning. The results showed that the proposed study record system has a good effect for improving students' motivation for learning.

For the professors of the university, it is difficult to offer all necessary information to the students. In addition, they cannot provide the information to satisfy all students because the quantity of knowledge of each student attending a lecture is different. Therefore, for the lectures of a higher level than intermediate level, the students should study the learning materials by themselves.

In our previous work, it was presented an interactive learning process in order to increase the students learning motivation and the self-learning time [9]. However, the progress speed of a lecture was not good. To solve this problem, we proposed an Active Learning System (ALS) for student's self-learning [9, 10]. Also, to improve student's self-learning procedure, we proposed some functions for the ALS [8]. We performed experimental evaluation of our ALS and showed that the proposed ALS can improve student self-learning and concentration [10]. Although, the self-learning time and the examination score were increased, the number of student that passed examination didn't increase significantly. To solve this problem, we proposed the group discussion procedure to perform discussion efficiently [5].

Learning system that has been proposed so far, was only to give a feedback a record of student's learning in lecture to lecturer. We propose a mechanism to enhance the learning effects by using a record of students' learning in the whole process of learning system [4].

The previous interfaces for interactive learning had limited adequacy in maintaining participants' concentration when their skill levels vary. In addition, we improved the previous system interfaces to obtain information based on which to effectively divide participants into groups for group discussion. In this paper, we propose the interface of Smartphone on our ALS to improve the learning concentration and the group discussion.

The paper structure is as follows. In Section 2, we introduce the related work on learning systems and present ALS. In Section 3, we indicate the flow of the interactive

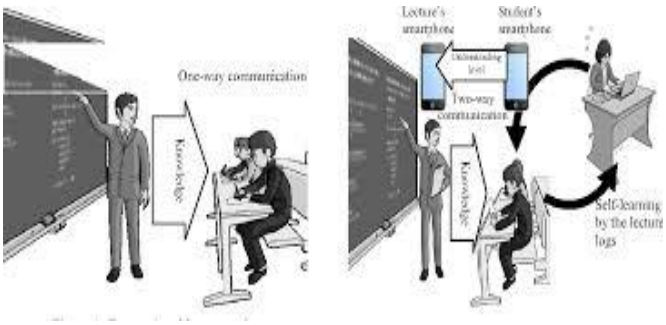


Fig. 1. ALC using a smartphone in the previous work

lecture. Then, in Section 4, we show the interfaces of the mobile device on the interactive lecture. Finally, in Section 5, we give some conclusions and future work.

## II. ALS: Active Learning System

In Figure 1, we show Active Learning Cycle of the proposed ALS. The student and the lecturer confirm the movement by setting each cycle and information by the smartphone. As a beginning of ALC, the lecturer performs the interactive lecture by confirming the understanding degree of the student using their smartphone in real time. Therefore, a lecturer can transmit the knowledge to the student effectively. After the lecture is finished, the student can read the lecture log by their smartphone. The student can review the lecture content using the lecture log anywhere and anytime.

Then, the student discusses the lecture content in small groups. In the group discussion, the students discuss what they did not understand in the lecture. Then, they submit the result of the group discussion to a lecturer as the reports. The formation of the group and the schedule of the group discussion is done automatically by smartphone application.

At the beginning of the next lecture, the student groups and the lecturer carry out open discussions based on the submitted repots and solve the problems that students may have. After the open discussion, the lecturer performs the next interactive lecture.

In this ALC, by adding the group learning and the open discussion the understanding is increased and the lecturer can keep a fixed progress speed of the lecture.

Learning data of students are given in Table I. Learning data is classified based on the "study point" set by lecturers into identification number (ID), title, content, related small examinations, understanding level (5 levels) and lecture speed. The learning system automatically create the identification number. Title, content and related small examination items are set by lecturers. The understanding level and lecture speed is recorded with the result of evaluation decided by students during the lecture.

TABLE I. Learning Data of Students by Study Point

| Item | Content | Creator/Editor |
|---|---|---|
| identification number (ID) | Study Point ID | ALS/invalid (Logging System) |
| Title | Title of Study Point | Lecturer/Lecturer |
| Content | Overview of Study Point | Lecturer/Lecturer |
| related small examinations | Related examinations and it's results | Lecturer/invalid |
| understanding level | Understanding level of Study Point (5 levels) | Student/Student |
| lecture speed | Lecture speed for students | Student/Student |

## III. Flow of the Interactive Lecture

In this section we are going to explain the flow of "interactive lecture" we propose.

With the traditional system, the information on learning points shown in Table I is directly communicated between the lecturer and the students attending the class (show Figure 1).

However, with the traditional method, only the rough status of each student can be grasped by the lecturer. Also, the greater the interval (time) between these learning points, the focus of the student is lowered. This tendency becomes clearer especially when learning level is varied among students. To solve this problem, we are trying to improve flow of class as shown in Figure 2. The mobile terminal interface used there is described in the next section.

With this system we propose, in addition to the information on learning points shown in Table I, the logs on terminal

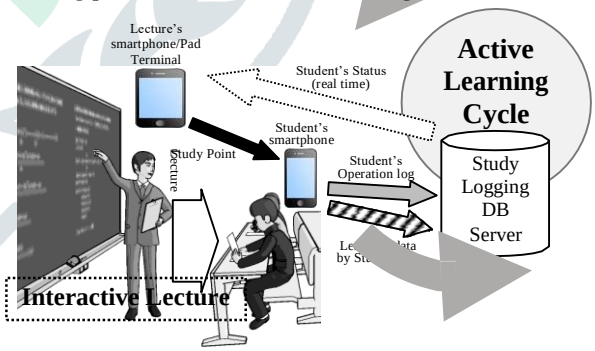


Fig. 2. Interactive Lecture using the Smartphone/Pad device on ALS

TABLE II. STUDENT'S OPERATION LOG ( DATA )

| Item | Content | Creator/Editor |
|---|---|---|
| identification number (ID) | Student's Operation ID | ALS/invalid (Logging System) |
| Type | Operation Type ( slow, fast: lecture speed; difficult, easy: lecture level; touch, sleep: student's status ) | Student/invalid |
| | | |
| Study Point ID | Current Study Point ID | ALS/invalid |
| Location | Sheet number in the lecture room | ALS/invalid |

operation by each student shown in Table II are aggregated in server. Based on these information, the status of each student is displayed on the lecturer's screen in real time. A student's seating position (the item "Location" in the Table II) is specified by the Wi-Fi antennas which are set at the four corners of the lecture room. The type of the operation (the item "Type" in the Table II) indicates a type of operation performed by the student. If the "Type" is slow or fast, it indicates that the student feels the progression of the lecture is fast or slow. If the "Type" is difficult or easy, it indicates that the student feels the contents of the lecture is difficult or easy. If the "Type" is touch or sleep, it indicates that the student is performing some operation on their device or not performing any operation at all.

## IV. THE INTERFACE FOR THE INTERACTIVE LECTURE

This section describes the display screen and operation of the system interface found in the proposed interactive lecture.

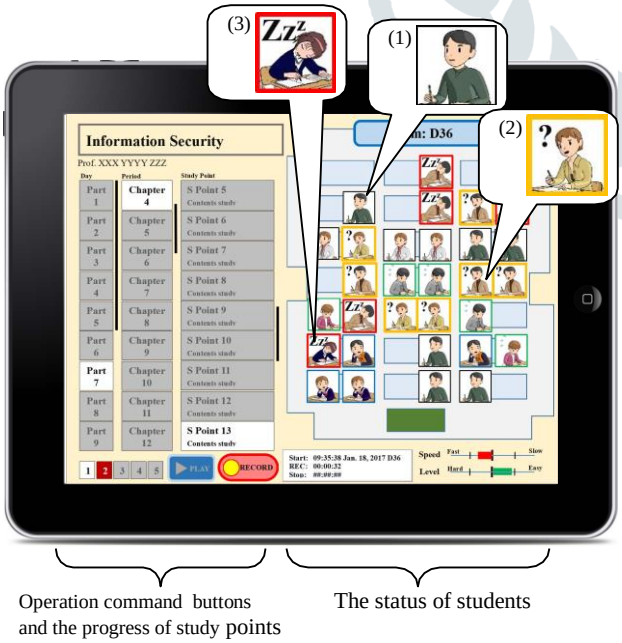


Fig. 3. Interface for the teacher on the Interactive lectuer

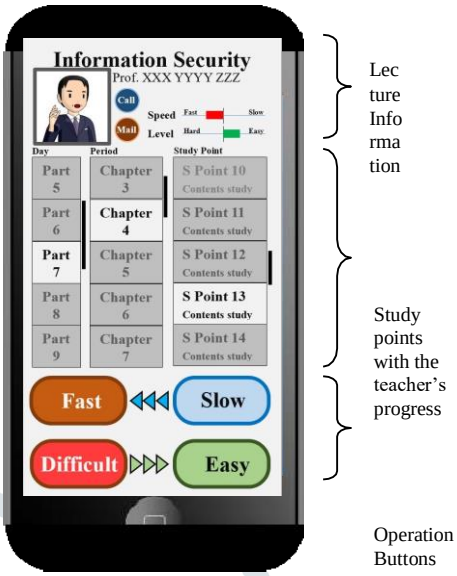


Fig. 4. Interface for the student on the Interactive lectuer

Figure 3 shows the display screen for teachers. This figure shows the display in the case of a mobile device turned sideways. On the left side of the teacher display screen various operation command buttons and the progress of study points is displayed. On the right side of the teacher's display screen there is a display which shows the current status of students in real time which is sent from the server. Students highlighted as (1) in Figure 3 are indicated to be progressing well with their study, whereas students highlighted as (2) are indicated as having difficulties in understanding lecture content. Students highlighted as (3) are indicated as neglecting classes. By seeing the current status of students in this manner, teachers can adjust the speed of progress in a lecture or the timing for providing questions, and as a result student concentration can be maintained.

Figure 4 shows a display screen for students. On the student screen, typically "difficult", "easy", "slow", and "fast" buttons are displayed on the lower portion of the screen, and this allows students to indicate their feelings towards a lecture. The button press is sent to the server in the format shown in Table II and the information is then recorded (show Figure 2). The upper portion of the student screen shows study points with the teacher's progress.

## V. CONCLUSIONS

We introduced an interactive learning process in order to increase the students learning motivation and the self-learning time. Then, we presented an active learning cycle for student's self-learning. In the proposed system, the students and the lecturer confirm the movement by setting each cycle and information by the smartphone.

However, the previous interfaces for interactive learning had limited adequacy in maintaining participants' concentration

when their skill levels vary. To solve this problem, we propose the interface of Smartphone on our ALS to improve the learning concentration and the group discussion. In this paper, we described the flow of the interactive lecture. Moreover, this paper show the interface of the mobile device on the interactive lecture.

As a future topic, the system proposed in this document will be applied in a real class, with the results evaluated as a trial. In addition, recorded student study records will be used for dividing groups in discussions, and there are plans to develop a collation algorithm in order to increase study effectiveness.

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