The effectiveness to improve lecture by using students' keywords on "Instructional Kitchen Studio (IKS)" system.

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Abstract: In this paper, we describe about our developed LMS (Learning Management System) for mobile devices and its effectiveness for a teacher to improve lecture. We developed this system as a pure web based application and we designed to use in a face-to-face class without students' PCs. We named this system "Instructional Kitchen Studio (IKS)". The IKS has eight functions for instruction. In particular, this paper mentions five functions for a teacher. According to practical usage and research in a university, we found that "collection keywords" function was useful for a teacher to estimate which students have possibility of becoming remedial students. Moreover, frequency of using this system related to a point of examination, higher achievement and stronger satisfaction.

Introduction

In 2006 year, 541 universities – which mean about 74 % of all universities in Japan – carried out the class evaluation for Faculty Development (see The Ministry of Education, Culture, Sports, Science & Technology). Most of these evaluations, questionnaires which were printed on a paper are carried out only once at the end of the semester. Certainly, this way is valuable in part because it was whole evaluation about the class. To watch a result, a teacher will be able to arrange the way of teaching. Nevertheless, in another sense, it is too late for "current" students. To

avoid it, he/she should grasp conditions of students' learning and remarks about the lecture at every class as possible. In particular, it is one of the most important works for a teacher to explore students' individual levels of understanding. To grasp students' understanding, the most popular way is a short test or writing report. However, this is much demanding way for a teacher because he/she has to make questions and mark papers every time. To solve these problems, many university teachers and researchers are suggesting it is useful to using LMS (Learning Management System) (see Blackboard, Okada & Funabiki & et al. 2007, Hikawa & Nakanishi & et al. 2006). However many cases of the situations which the LMS can be used are in e-Learning. In spite of wider prevalence of computers and computer-networks, "Face to face class" is basically style to teach for a lot of teachers. There is still not any computer in many classrooms. Against this issue, some Japanese researchers tried to use "mobile phone".

In Japan, mobile phones penetration rate is 95%, in particular 99% of university students own one (see Cabinet Office Director-General for Policy Planning). Moreover, all Japanese mobile phones are installed the functions of an e-mailer, a web browser and a digital camera. It is so easy for every student to connect to the internet, browsing web pages and send e-mails with an attached of a picture via only a mobile phone. We have studied to use actively a mobile phone as a teaching tool and a LMS since 2003 (see Ando & Abiko & Kinefuti 2003, Ando & Morimoto 2009). In this paper, we describe our new development system that supports teachers and students while a class. Moreover, we address the functions to grasp a round student's learning inclination.

Design and Implementation toward the IKS

Our system consists of mainly eight functions (see table 1). A teacher uses five functions of them and students use three of them. For a teacher, this system is help to improve own instruction because he/she can get many clues. The system is similar to "kitchen" at the pint of arranging stuffs to make valuable things. Therefore, we named this system "IKS (Instructional Kitchen Studio)". In this paper, we mention about functions for a teacher. We developed the IKS as a pure web-based system. Students access to the IKS using own mobile phone. Figure 1 shows a flow of using system and proceeding lecture. The target class was "Information Science" class in women's college in 2008. Students were 105 persons in the class. All students were freshmen.

The functions for a teacher	The functions for students
confirm numbers of attendance	Anonymous comments
pre and post test	Visual presenter
evaluation of lecture	Real-time question
collecting students' notes	
collecting students' important keywords	

Table 1: Installed functions

Collecting important keywords, impressions and comments

A teacher uses the function of "collecting keywords" at the end of each class. This function can indicate frequency that kinds of keywords students wrote. Figure 2 shows an example of screen shot. This means that more keywords are more important for students just like tag-clouds on the web2.0 technology. It is a good situation if keywords which a teacher thoughts its importance are same keywords which were written by students. Nevertheless, if a teacher's keywords were a bit different from students' keywords, a teacher must worry about own lecture and check the way of teaching on the day. Another function is collecting students' writings e.g. note or memo – using a digital camera on a mobile phone. If we can use this function, we can grasp students' writings or drawings on a note immediately (see figure 3). Although we collect their actual "real writings" as not a digital way, it will spend long time and be troublesome. To combine these two functions, we would like to estimate which students have possibility of becoming remedial students. Then, to know the effectiveness of these functions, we survey the conditions of students learning in a practical use and conduct a survey in the form of a questionnaire. Table 2 shows a part of questions.

Figure 2: This is an example of showing students' important keywords as a bar graph.
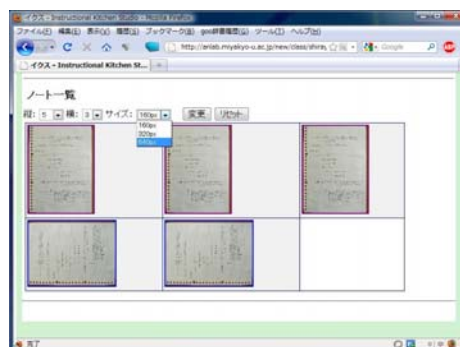

Figure 3: A screen shot of showing students' notes which a digital camera on their mobile phones took. There were sent to a teacher via an e-mail attached the picture.

Q1	How often did you use this system ?
Q3	Do you think that your comments had much effect on lecture?
Q6	Do you think that pre and post test were useful ?
Q10	Did you feel it was useful to collect your note or memo?
Q11	Did a teacher try to understand the conditions of students' learning?
Q12	How do you feel the way to confirm attendance using a mobile phone?
Q14	Was this lecture useful for you?
Q15	Did you feel totally it was useful on your study to use this system?
Q16	Total evaluation value of this system

Table 2: A part of questions

Result and discussion

At first, in order to consider relation three elements - corresponding number of keywords that students wrote and a teacher hoped, examinations and questionnaire -, we carried out a multiple regression analysis of the test point, using each question. We adopted "step wise" method. We calculated the standard partial regression coefficient (β). Table 3 and table 4 show meaningful results. In these tables, "corresponding number of keywords" means how many students' keywords corresponded with a teacher's hope keywords. "Hope keywords" means that a teacher considers these are important terms and he/she wants to teach in each lecture. According to table 3 and table 4, we found the relation the point of examinations and "corresponding number of keywords". In brief, students who cannot understand what keywords are important would get lower point of examination. If a teacher notices many students could not describe "hope keywords", maybe he/she should review the lesson. Next, there is a negative coefficient about Q3 - Do you think that your comments had much effect on lecture? Students who answered, "I don't think so" were six persons. They wrote, "I minded some students were a bit noisy". Surely, a teacher tried to make the students quit but it was not enough. This point might be an only fault on the teacher's lesson. Finally, we examined the relation point of each test, a level of students' achievement and a level of students' satisfaction.

Explantory variable	standard partial regression coefficient	t value	p value
Corresponding number of keywor	0.417	7.097	0.000
A level of satisfaction	0.215	2.472	0.015

Contribution rate: 0.243 (p < 0.01)

Table 3: Multiple regression analysys toward a midterms examination

Explantory variable	standard partial regression coefficient	t value	p value
A level of satisfaction	0.246	4.897	0.013
Q3: Do you think that your comments had	-0.268	2.536	0.005
Q14: Was this lecture useful for you?	0.267	-2.87	0.007
Corresponding number of keywords	0.229	2.487	0.015

Contribution rate: 0.283 (p < 0.01)

Table 4: Multiple regression analysys toward an end of term examination

According Q1, Q12, Q15 and Q16 in table 5, we can know a tendency that students who had higher level of achievement and satisfaction felt this system was better and used this system more repeatedly. Besides, on Q10 - Did you feel it was useful to collect your note or memo? -, we can know a tendency that students who answered, "It was useful" stronger had higher level of achievement and satisfaction. In this lesson, a teacher returned students notes or memos with checking at the important parts and their wrong descriptions.

question no.	correlation coefficient		
	an end of term examination	a level of students' achivement	a level of students' satisfaction
Q1	n.s.	0.22*	0.22*
Q6	n.s.	0.27*	0.24*
Q10	n.s.	0.27**	0.25*
Q11	n.s.	0.29**	0.24*
Q12	n.s.	0.32**	0.31**
Q14	0.31**	0.31**	0.25*
Q15	n.s.	0.22*	0.20*
Q16	n.s.	0.36*	0.34**

significance probability: $p<0.001$***, $0.001 \leqq p<0.01$ **, $.0.01 \leqq p<0.05$ *

Table 5: Correlation coefficient between questions and students' learning conditions

Conclusion

It is important for a teacher to keep interaction with students. However, most teachers are so busy to do so at every lecture. Our IKS system can help and reduce their work load without trouble by its some functions. In particular, mainly two functions are effective to improvement a lecture and know students' learning conditions. The first function of them is "Collecting important keywords". Watching a result of comparing students' keywords with a teacher's hope keywords, a teacher can grasp whether students could understand important points nor not at the

lecture. In our case study, the teacher could review the lecture again. The second functions are "Collecting students' comments" and "Collecting a level of achievement and satisfaction". Combining these results, a teacher could get clues to arrange a lecture. In case study, a level of satisfaction got lower because the teacher could not keep all students noiseless. In addition, the function of "Collecting students' notes or memos" is useful to keep in touch with students.

It is easy and immediately to know the result by using this system. Our method has a benefit on everyday use. As the future work, we are planning to develop the function to indicate automatically who has possibility to be remedial students.

References

The Ministry of Education, Culture, Sports, Science & Technology. A report of the condition about teaching contents in universities. (2008). http://www.mext.go.jp/b_menu/houdou/20/06/08061617/002.htm

Blackboard. http://www.blackboard.com/

Okada, G., & Funabiki, N., et al. (2007). Extensions of an web-based learning management system "NOBASU", *IEICE Technical Report, ET2007-38*, The institute of electronics, information and communication engineers, 75-80.

Hikawa, K., & Nakanishi, K., & et al. (2006). A practical method of attendance management in a class utilizing cellular phone, The institute of electronics, *IEICE Technical Report, ET2006-63 (2006-11)*, information and communication engineers, 73-78.

Cabinet Office Director-General for Policy Planning. Fifth Research report of consciousness about information society and young people, http://www8.cao.go.jp/youth/kenkyu/jouhou5/2-1-3.html#2-1-3-1

Ando, A., & Abiko, H., & Kinefuti, M. (2003). Enhancing Interaction in School Hours by Using Cellular Phones, *International Ergonomics Association Vol3*, IEA2003 (published as a CD-ROM).

Ando, A., & Morimoto, K. (2009). How Mobile Interaction Motivates Students in a Class?, *Springer- Human Interface, Part II, HCII 2009, LNCS 5618*, 621-631.