

Facilitation of Intentional Learning and Formative Assessments in Large-Scale University Courses with ICT

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Abstract: The purpose of this study was to design a university course with an ICT for students to more positively engage in learning by receiving useful formative assessments. A large-size course entitled “information ethics and laws” was designed based on pedagogical principles of learning environments [1]. The comparisons of students’ performance, and questionnaire/interview data manifested several types of scaffolding effects of ICT.

Keywords: large-scale university course, intentional learning, formative assessment, design of learning environments

Introduction

When we implement e-learning just as a courseware where educational materials are digitized and stored at web sites, and expect *intentional* students to manage their activities to complete their studies, we cannot help accepting the fact that many students would drop out. We are currently concerned with blended curricula in which face-to-face and online activities are integrated for improving the quality of our instruction [2-5]. We no longer expect students outside the campus to visit our web sites **ONLY** and self-regulate their learning processes, but we rather attempt to facilitate students’ intentional learning and their metacognitive awareness on their own learning processes through the use of e-learning courseware as scaffolding for face-to-face learning and instruction.

Although the blended learning would be a new promising style of e-learning, we have not yet known how we design the blended learning curriculum for improving students’ cognitive and metacognitive performance. In addition to this, we also have to be concerned with mass-education. We usually have to manage large-scale classes (more than hundred students) in undergraduate programs in Japan. Considering the issues above, we conducted a design-based research on the blended learning in a Japanese university course with more than 100 students for the exploring design principles of the blended learning in the large-scale courses.

1. Pedagogical Design Principles

1.1 Learner-Centered Principle

This principle is the most basic one in the constructivism approach to human learning [1]. We assume that learners voluntarily activate their preceding knowledge related to the study topic. Therefore, we have to design the course so that students build new knowledge on what they have already known or through their inquiries activated by learning materials.

1.2 Knowledge-Centered Principle

Knowledge meant in this principle is deep comprehension in other words [1]. Learning should be inquiry-based problem-solving activities so that students can be aware of how to

use (transfer) the knowledge in different contexts. Explaining their understanding in problem-solving activities is considered to be a key to deeper comprehension.

1.3 Assessment-Centered Principle

Assessment is not only a work by instructors but also that by learners [1]. In this principle, the formative assessment is important and guaranteed by providing appropriate opportunities and methods to assess learning. The timing of formative assessment is more frequent than we normally think, and the methods are more informal than we normally think.

1.4 Community-Centered Principle

Knowledge is socially constructed through exchange of ideas by participants in a community [1]. For facilitating such knowledge construction in the classroom, we need to consider the task structure for students to report and share their ideas on problems, and provide ICT to store their ideas and trace their development.

2. Course Design

2.1 A Targeted Course and Students

We designed a course entitled “information ethics and law” for undergraduate students in the Faculty of Informatics. Instructional goals of the course were to: (1) make students understand laws related to electronic communication, (2) consider their ethical perspectives to related incidents, and (3) use their knowledge to solve the future problems. More than two hundred students took the course in two classes (so, around 100 students in each class).

2.2 Implementation of an ICT

Every student had her/his own laptop computer. We prepared a wireless LAN for them to use the Internet. The ICT system used for the course was Blackboard Academic Suites™. We prepared educational materials such as lecture videos, short quiz, and BBS for their discussion in the class and question-asking after the class. The lecture videos were delivered in the streaming format. The video of each lecture had been recorded in the previous year, and segmented into several parts depending on the content. On the courseware in Blackboard system, media links for the video clips were provided with a list of content descriptions. The short quiz was provided with students every time as their first activity in the class. The instructor gave students questions related to study topics students had studied in previous classes, and they discussed the problems online during two selected class (called "the benchmark classes"). We also opened BBS for students to ask any questions on their study topics so that the instructor answered them and they discussed after the class.

2.3 Lesson Plans

The basic sequence of student activities in the class was designed as follows: First, they were required of viewing video clips of lecture for the next class beforehand. The instructor specified which clip(s) they had to see for what purpose(s). Second, they completed the short quiz for the self-evaluating their understanding of topics learned in previous classes and being prepared for studying new topics. The instructor gave his talk after monitoring students' answers to his prepared quiz so that he could adjust the content of his talk. In two benchmark classes, the instructor gave a problem on a real court precedent and asked students to discuss what they thought on the precedents. After the discussion, the instructor commented on students' ideas from his perspective. Finally, the instructor announced that he opened BBS for students to ask questions on their studied topics.

Thus, we satisfied the four design principles by: (1) evaluating students' knowledge and beliefs by conducting the short quiz (*learner-centered*), (2) giving real court precedent problems and emphasizing problem-solving activities (*knowledge-centered*), (3) frequently conducting students' self-evaluation with meaningful tasks (*assessment-centered*), and (4)

making students share their ideas to improve their solutions to authentic problems with ICT (*community-centered*).

3. Assessments on the Course Design

3.1 Qualities of Final Essays: Comparison to Qualities in a Previous Year

The improvement of the course design was evaluated by comparing students' performance in their final essay examination with those in the previous year. Table 1 shows numbers of students with different grades in the two years. A *Chi-square* test

Table 1. Numbers of Students with Different Grades in the Final Essays

	A	B	C	D
2005	51	75	31	43
2006	93	77	30	4

manifested that year 2006 when we designed the course was much better in students' performance on their final essays than that in year 2005 (the control year), $\chi^2 = 44.62$, $df = 3$, $p < .05$. In year 2006, significantly more students earned highest grade (A) and less students did not get credited (D).

3.2 Survey on the Use of the ICT through Questionnaire

168 students answered the questionnaire. First, about 60% of students reported that they had not viewed video clips of lecture *before* they came to the class. Secondary, more than 50% of students viewing the video clip before the class reported to view the whole content in specified video clips. Finally, about 60% of students reported to view the video clips for the exam preparation rather than the class preparation. 37% of students reported to view videos for reviewing. 29% students were found to view videos for compensation of their class missing.

3.3 Log Analysis of the Use of BBS

In the benchmark classes, students used BBS for their discussion on authentic court precedents. There were 609 postings (the mean was 2.99) and 336 postings (the mean was 1.65) in the first and the second benchmark class, respectively.

3.4 Structured Interviews with Students

Eleven students voluntarily participated in our interview session. Their opinions were summarized as follows:

- They did not view video clips for preparing the next class because: (1) they realized that the instructor gave his talk on the same topics; (2) they were provided with handouts on the lecture; and (3) it was too demanding for them to view all the required content.
- Some students recognized the effectiveness of the use of BBS for their discussion in the benchmark classes ("It is really interesting to see what others think of the same problems.") whereas others were questioning on the effectiveness ("Not everyone does receive feedback from the instructor.").
- Unexpectedly, students told that BBS for their question-asking did not work well because of the difficulty of the problems.

4. Discussion

4.1 Effectiveness of the Blended Learning with ICT designed by four pedagogical principles

The result of the comparison between the designed year and the previous one suggests that our course design was successful in improving students' learning, particularly their deep conceptual understanding of the study topic. One of the remarkable findings was the drastic decrease in students not getting credited. Because the content in the course was not easily understandable for students, they dropped the course out easily when we did not provide them with any scaffoldings for expanding their intentional learning. ICT implemented in

the course was found to give students a variety of opportunities for themselves to manage their learning by using digitalized materials.

4.2 *Did We Succeed in Expanding Learning Opportunities?*

From their answers to the interview, students were found to use digitalized materials with different purposes from our intentions. They used them for final exam preparation rather than evaluating their initial levels of understanding. Reasons were really intriguing. They thought that they could learn by listening once to the instructor's lecture. Some students thought that they could learn from prepared handouts only. These comments on their own learning suggest that they had little metacognitive awareness of repeated learning. We need more scaffolding for them to pay attention to their own evaluation on their initial level of understanding for future learning.

4.3 *Effectiveness of the Formative Assessments*

Scaffoldings for facilitating formative assessment by students were designed as a sequence of viewing video clips and doing short quiz, and BBS discussion through problem solving on authentic court precedents. As we discussed before, video materials were used by limited number of students to prepare themselves for the instructor's lecture. This designed scaffolding was effective when students were metacognitively aware of the importance. BBS discussion in the benchmark classes, on the other hand, was an instructional intervention directed by us. Students were encouraged to engage in the activity even if they were not aware of the importance. After experiencing their BBS discussion, many students recognized the importance of negotiation of their own ideas with others' for improving their understandings. However, students did not necessarily have appropriate strategies for managing their discussion on BBS system. We need to further considerate how to develop their learning strategies through collaborative problem solving.

Acknowledgements

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