Design of Blended Learning with WBT in Higher Education

Hiroshi ICHIKAWA¹, Yasuko HAYASHIBARA¹, Hiroo HIROSE², Yoshito YAMAMOTO³
¹ Faculty of Home Economics, Otsuma Women’s University, Chiyoda-ku, Tokyo, JAPAN
² Faculty of Management of Administration and Information, Tokyo University of Science Suwa, Chino, Nagano, JAPAN
³ Faculty of Science, Tokyo University of Science, Shinjuku-ku, Tokyo, JAPAN

Abstract - The effectiveness of e-learning is being examined in higher education with the support of the advanced Information and Communication Technology (ICT) and the educational policy research. However, e-learning is not steadily becoming popular due to a large number of processes for creating the e-learning contents, the e-learning cost problems and the public’s lack of understanding of the importance and necessity of e-learning. On the assumption that especially the students in regular day school programs will attend classes on campus, we cannot explain completely the importance and necessity of e-learning only under the time and space advantages that the students can learn whenever and wherever they want. Hereafter, we will report the practical use of “Blended Learning” combining the web based training (WBT) and the face-to-face class that could be a solution to the above problem.

Keywords: blended learning, e-learning, WBT, department of library and information science, information equipment research

1 Introduction

The e-learning system has become popular in not only the business education and higher education but also the elementary/secondary education along with the most up-to-date ICT since the latter half of 1990s in the USA. In Japan as well as in the USA, the introduction of e-learning has been conducted rapidly since around 2000 on the occasion of the network infrastructure maintenance including Internet connection in the elementary/secondary education performed under the leadership of IT Strategy Headquarters of Japanese Government and the education system to approve credits in the lectures using the Internet, reformed by the University Council of Japan.

Furthermore, the effectiveness of e-learning is being examined to cope with an interest in lifelong education and knowledge management and the hard competition between universities caused by the decrease in the number of children.

While the progress of e-learning is now planned in higher education based on the educational policy research, the percentage of universities and junior colleges that use e-learning are 46.1% and 19.7%, respectively. Because the percentage of universities and junior colleges among them that approve credits are 28.8% and 5.8%, respectively [1], we assume that the corresponding lectures are not recognized as the formal ones and e-learning is used for supplementary teaching in the face-to-face class and for self-learning to obtain a qualification. Even in the university including some teachers who responded “we use e-learning”, most of them are supposed to do so from their own personal viewpoint. There seems to be a lot of universities that have introduced the Learning Management System (LMS), created the e-learning contents in several classes and used them for supplementary teaching at the beginning, without having achieved the university-wide e-learning spread.

The obstructions to e-learning spread are summarized as follows: (1) a large number of processes for creating the e-learning contents and the e-learning cost problems and (2) the public’s lack of understanding of the importance and necessity of e-learning [1]. Because the universities and graduate schools that the students can graduate from through e-learning only are limited to the correspondence students as the conventional model, it is easy to gain public understanding of the importance and necessity of e-learning introduction. However, it can easily become unclear how we should integrate e-learning into a curriculum for the students in regular day school programs. On the assumption that the students in regular day school programs will attend classes on campus, we cannot explain completely the importance and necessity of e-learning only under the time and space advantages that the students can learn whenever and wherever they want. In addition, we have not still succeeded in motivating the students to learn
continuously, which seems to be a major problem of open university, even with the conventional printed teaching materials and the newly developed e-learning system using multimedia technologies. The advantage of e-learning that the students can learn whenever and wherever they want is also regarded as its disadvantage that the students may not learn as well.

2 Blended Learning

Some researchers have already reported the practical use and effectiveness of blended learning in class [2][3][4]. At present, the e-learning materials are not used independently in education sites including the business education and higher education institutions, so that a new education system that e-learning is combined and used with group training in the classroom has been generalized. It can be said that blended learning is a learning method that has both the advantage of the face-to-face class between a teacher and students in group training and the advantage of e-learning that is free from the time and space limitations.

Before creating the class program in the face-to-face class, the teacher select the proper teaching method from the lecture, exercise and discussion to enhance educational effectiveness in accordance with the learning contents. In the e-learning system, it is also possible to grasp the understanding levels of the students through the lecture in classroom learning and the drill and practice program or the tutorial exercise and to run a group discussion in the cooperative learning situation. However, a large number of processes for designing and creating the e-learning contents and the high cost of supporting them are required to try to produce the same learning effectiveness as the face-to-face class by introducing the above elements into e-learning.

Recently, blended learning that makes useful the characteristics of e-learning and face-to-face class and blends both of them has attracted a great deal of attention. Blended learning could be a solution to a large number of processes for creating the e-learning contents and the e-learning cost problems that are considered to be the obstructions to e-learning spread.

The e-learning contents should be created mainly to allow the students to acquire basic knowledge using the images and videos as multimedia objects and the drill and practice questions or the tutorial questions. The students will be able to have higher learning effectiveness by deepening the acquired basic knowledge while the teacher runs a group discussion or asks the students some questions in the face-to-face class.

3 Development of Blended Learning

3.1 Framework of Blended Learning

Our university’s standard formula for 2 units of credits is 15 times x 90 min. of instructional time in a regular lecture class. In blended learning designed in this paper, we framed and used 10-time asynchronous learning with WBT and 5-time synchronous learning that corresponds to the face-to-face class. The class program was created by separating the knowledge acquirement part suitable for the WBT from the question/group-discussion part suitable for the face-to-face class. Our university has already prepared the “System

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![Fig. 1 Framework of blended learning](attachment:image.png)
to Display Data of Students’ that various functions such as the bulletin board system (BBS) are integrated, but the learning management for each student’s history of accessing the e-learning contents and each student’s score of questions cannot be carried out on the information system because the LMS is not introduced. In order to check the students’ learning contents, we determined that the students should submit a report 3 times before taking an intensive course as shown in Fig. 1. Concerning the students’ questions about the WBT materials, the subject teachers and the media education center’s staff answered their questions about the learning contents and those about the method of using the WBT materials on the BBS and teacher’s office hour system, respectively.

### 3.2 Preparation of WBT Materials

When the class scene is imaged and recorded, the actual class may be filmed directly in a classroom, or a temporary class may be filmed in a studio. In blended learning, it is supposed that higher learning effectiveness will be produced by creating the class contents that meet the characteristics of synchronous and asynchronous classes. For this reason, it is not appropriate that the conventional face-to-face class filmed is used as the WBT materials. Therefore, the subject teachers have prepared the WBT materials using a presentation software program (Microsoft PowerPoint) at the beginning, and they have also filmed the WBT materials completely in a studio.

As described above, the serious obstructions to e-learning spread are a large number of processes for creating the e-learning contents and the e-learning cost problems. When asking a contractor to film the actual class in a classroom or a temporary class in a studio, we must generally pay a heavy cost. Because an unnecessary part must be cut out from the actually filmed image and the editing tasks including video insertion is indispensable, we will have to pay really additional costs. In this study, the learning materials were displayed on the PC screen and the WBT materials were prepared using the general-use, in-home appliances that can be mixed with a videoed image of teacher, so that a low cost was needed for the imaging devices. However, only one imaging staff had to perform a task in the studio for switching the PC screen with the image of teacher and recording the teacher’s voice. With a large number of processes for preparing the WBT materials, the editing tasks took approximately three times as long as the class time. However, a newly developed class recording method has been introduced to enable only one subject teacher to record and edit the class by controlling simultaneously the PC screen and the web camera image of teacher with video capture software. The class recording devices consist of low-price video capture software, personal computer and web camera only, which are very easy to operate, and they enhance effectiveness of both the cost and the number of processes.

### 3.3 Practical Use of Blended Learning in “Information Equipment Research”

The “Information Equipment Research” in the Department of Library and Information Science of our university is a subject to approve 1 unit of credit. The above “framework of blended learning” is to approve 2 units of credits, but with the same basic policy employed, we framed and used 6-time asynchronous learning with WBT and 2-time synchronous learning that corresponds to the face-to-face class as shown in Fig. 2. We made the students submit a report 2 times before taking an intensive course and maintained bidirectional flow based on the teacher’s office hour system and the BBS during learning with WBT.

We put in order the relationship between library and information equipment and the components of information equipment including the personal computer as the main element as shown in Fig. 3 and created the class program of “Information Equipment Research” (Table 1). We entered the approx. 10-min library tour program in the class No. 1. by taking advantage of the WBT. This program is planned to make the students confirm the information equipment used in the library and
Table 1 “Information Equipment Research” class program

<table>
<thead>
<tr>
<th>No.</th>
<th>Class Title</th>
<th>Class Contents</th>
<th>Subject Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Library and information equipment</td>
<td>• Outline of subject/Lecture contents&lt;br&gt;• Library and information equipment (Library tour)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Mechanism of PC</td>
<td>• Information display&lt;br&gt;• Data processing</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>PC hardware</td>
<td>• PC configuration&lt;br&gt;• CPU and memory</td>
<td>1st subject report submission</td>
</tr>
<tr>
<td>4</td>
<td>Auxiliary storage</td>
<td>• Magnetic disk (hardware disk, floppy disk)&lt;br&gt;• Auxiliary mass storage (CD, DVD, etc.)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Peripheral equipment</td>
<td>• Input device&lt;br&gt;• Display unit/Printer</td>
<td></td>
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</tbody>
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Fig. 3  Relationship between library and information equipment

the learning contents in the lectures, feel the information equipment more familiar, and continue their subsequent learning.

Fig. 4 shows the images of WBT materials. The left and right sides of a screen display the teacher image or streaming image and the static image of
learning materials created using PowerPoint, respectively. Because the WBT materials stored in the campus server can be used on not only the PC on the Net but also the PC that has downloaded a

Fig. 4 Image of WBT materials

Fig. 5 Results of questionnaire investigation carried out for students (N = 26)
file of the WBT materials from the Net, this increases freedom of time and space in learning to the students.

3.4 Assessment Given by Students

We carried out the questionnaire investigation on learning with the WBT materials for the students (N = 26) taking lectures on the “Information Equipment Research”. Thirteen (13) questions were put to the students and their 5-level answers were made to each question as follows: “I think so” is 5; “I think so a little” is 4; “Yes and No” is 3; “I think so little” is 2; and “I do not think so” is 1.

Although the reliability of this questionnaire investigation is not so high due to a small amount of data, it may be possible to grasp the students’ learning tendency. Fig. 5 shows the results of this questionnaire investigation. The mean value of all questions was 3.03. The high-score questions are more than 3.5, asking the students if “the WBT materials are useful for your learning” and “the WBT materials can be used to learn comfortably”. These students seem to praise the characteristics of e-learning that they can learn whenever and wherever they want if the PC is available.

On the contrary, the low-score questions ask the students if “the WBT materials are friendly to you”, “the WBT materials motivate you learn”, and “the WBT materials do not tire you during learning”. These questions indicate that it is hard for each student to continue learning by himself in spite of the advantage that he can learn whenever and wherever he wants if the PC is available. The questions asking the students if “the WBT materials can be used to learn pleasantly” and “the WBT materials interest you” are also low score in the same way. Because each student must learn by himself on the PC as well as above, it is considered that he is not motivated enough to learn. The question asking the students if “the WBT materials do not fatigue you” is also low score, and this always becomes a problem in learning on the PC using the web image. This status indicates that we must examine the design of screen or interface to prevent the students from being fatigued or bored.

Because the students seem to feel relaxed in learning with WBT at their own pace and also to have a monotonous sense from the results of our questionnaire investigation, we must develop the interactive teaching materials that not only we supply one-sided information to the students but also they can do something to us. In addition, the question asking the students if “the WBT materials do not fatigue you” is a low score, and this always becomes a problem in learning on the PC using the web image. This status indicates that we must examine the design of screen or interface to prevent the students from being fatigued or bored.

Our university’s standard formula for 1 unit of credit is required to keep 45-hour instructional time (in a subject of study to lecture, 15-hour class in classroom and 30-hour learning outside classroom). Thus, blended learning is also effective as a means of allowing the unit of credit to be approved by applying learning with WBT to learning outside the classroom.

Furthermore, blended learning can enhance the learning effectiveness by changing flexibly the rate of blending between learning with WBT and face-to-face class according to the characteristics of classes such as the knowledge acquirement, exercise and discussion. We are going to introduce the LMS to check each student’s history of learning contents, use practically the LMS as a means of allowing the unit of credit to be approved in not only the subjects of study to lecture but also those to exercise, and develop more effective blended learning in future.

4 Conclusion

We surveyed the advanced e-learning in higher education and explained completely the effectiveness of “Blended Learning” that could be a solution to a large number of processes for creating the e-learning contents and the e-learning cost problems, which are the obstructions to e-learning spread for the students in regular day school programs, and to the public’s lack of understanding of the importance and necessity of e-learning. We developed the framework of blended learning by using practically the BBS and teacher’s office hour system and making the students submit the subject reports, without introducing the LMS. Based on this framework, we created the WBT materials to conduct the class program of the “Information Equipment Research” in the Department of Library and Information Science.
5 References


