Designing a Mentoring System for Pre-training Preparation in a Blended Digital Badge Program

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Abstract— The purpose of this study was to redesign a mentoring system and verify its effects. The research field involved a blended instructional design (ID) course conducted as a university extension course composed of prior online assignments, face-to-face workshops, and post-learning assignments. The results demonstrated that the redesign of the ID course may improve the completion rates of online pre-training and post-learning assignments altogether. Additionally, the findings showed that motivational e-mails were useful for facilitating participants' access e-learning. Furthermore, some participants' reports suggested that the syllabus provided on the website gave participants a perspective of the course and motivated them to learn during the course. In addition, motivational e-mails were helpful in making participants feel a sense of belonging in the ID course. Based on these results, we proposed three design principles for supporting participants' completion of lifelong learning activities that do not provide incentives such as university credits and job promotions.

Keywords—Mentoring Support, Pre-training Preparation, Blended Digital Badge Program

1 Introduction

Since 2011, Kumamoto University has offered an instructional design (ID) course as part of its university extension courses in Japan. This course was an open lecture for working adults. Thus far, a broad variety of professionals from various fields, such as university faculties, medical doctors, nurses, human resource professionals in companies, and Japanese language teachers, have attended the course. In 2015, these courses were redesigned from being just one-day face-to-face workshops to a blended style comprising online prior assignments, one-day face-to-face workshops, and online post-learning assignments [1]. The purpose of this improvement was to ensure that the time used in face-to-face workshops is invested for establishing interactions between participants and instructors, as well as among participants, and that participants spend less time listening to the instructors and more time applying the learning contents in some cases, by acquiring the basic knowledge during prior online learning phases. The aim was also to confirm each participant's learning outcomes during the online post-learning phases; this could not be realized in face-to-face workshops before redesign due to time constraints. In addition, participants who met the passing criteria for post-learning assignments received a digital badge as a certificate of completion.

Although this redesign was expected to provide a better learning experience, not many participants worked on the online prior-learning assignment due to the following problems: 1) Participants were unable to identify the requirements of the assignment because the pre-assignments were not set very often during the seminar or training; 2) Some participants experienced difficulty in accessing the online learning environment due to a lack of IT literacy; 3) Participants were not motivated to work on assignments. Therefore, the purpose of this study is to design a mentoring system to improve participants' work on pre-training preparation. The study also discusses their reactions to the improved design of the mentoring system. Further, the lessons learned are demonstrated to guide the introduction of pre-training preparation in the blended learning program through reflection on our experience.

2 Literature Review

In this research, mentoring is defined as a support method for the learning process of participants by those who are familiar with the learning contents and a variety of learning methods. The method of mentoring has been made more sophisticated to prevent e-learning dropouts [2]. The person responsible for mentoring is called a mentor. Mentors answer questions from learners, and sometimes help learners by advising about study methods and time management [3]. In other words, the role of a mentor is to provide support to the participants, except for the learning contents and instructional design, for which subject matter experts and lecturers are responsible. Chang (2004) proposed that a mentor has the following three roles [4]:

1) Teaching assistants: supporting the faculty's role as subject matter experts; mentors provide students with extra help toward clarifying and comprehending course contents.
2) Social connectedness: helping students develop an e-learning connectedness.
3) Technical supporters: solving participants' technology-related problems.

The timing of need for help from mentor is found in previous findings. For example, a UK open university found that participants are most likely to drop out of e-learning before the first assignment [5]. Specifically, the participants drop out at the timing of registration for e-learning or before working on the first assignment. From these findings, it is suggested that support at the beginning of the learning is important. In this study, we refer to these findings as the UK open university's retention model (Figure 1).

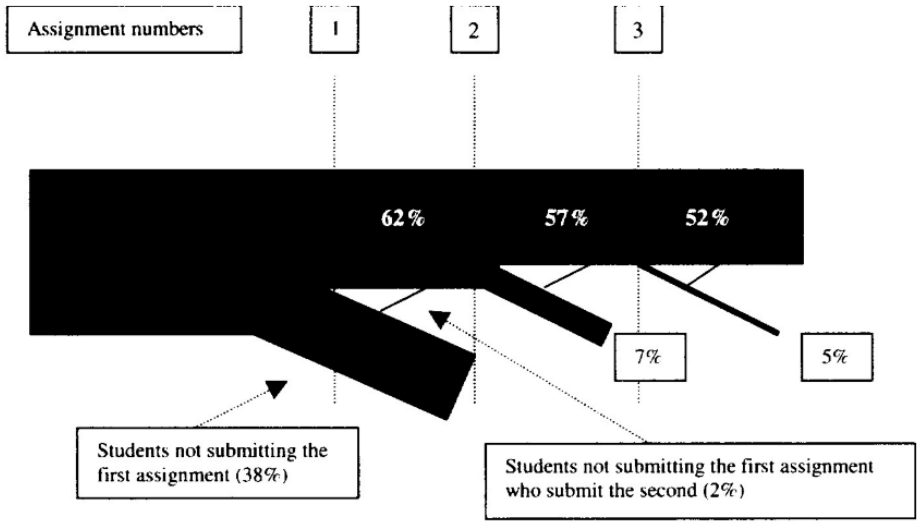

Fig. 1. UK open university's retention model (Retrieved from Figure 4.1. of Simpson 2003 [5])

It is recommended that motivational messaging is effective in facilitating the learning of participants. Visser (1998) proposed the design principles of message design to motivate participants to complete the educational courses based on the ARCS motivational model [6], which involves four steps for promoting and sustaining motivation during the learning process: Attention, Relevance, Confidence, and Satisfaction (ARCS) [7]. The design principles are collectively called MMSS (Motivational Message Support System). Visser indicated that motivational messages are needed to increase the sense of belonging to the course and to make the participants feel empathized with while facing difficulties in working on the assignments. Furthermore, Visser's research demonstrated that personalized messages are not effective compared to collective messages that are delivered to a group of participants. If the message is designed and systemized collectively, collective message might be collective. This enables the efficiency of education. The effects of Visser's MMSS were only verified in a university formal education setting, and not in lifelong learning settings.

There is little research regarding how mentoring can facilitate participants' completion of lifelong learning activities that are not prerequisite for university credits or job promotions. Based on the UK open university's retention model and Visser's MMSS, we redesigned the mentoring system to support participants' completion of the ID workshop.

3 Course and Mentoring Systems Design

3.1 Overview of the ID course

The research setting was the "Introductory class of ID (ID course)," which was part of the extension courses provided at Kumamoto University. In this course, learners acquire basic ID skills and consider improvement proposals for educational cases presented by lecturers. The learning objectives and evaluation method are shown in Table 1. We aimed to not only enable participants in memorizing the knowledge of ID, but also in mastering the intellectual skills that allow them to apply ID theory to education improvement. The ID theories taught in the ID course are demonstrated in Table 2. We tried to meet the diverse needs of the participants and helped them in solving their educational problems by including various ID models such as learning evaluations, teaching strategies, motivational strategies, and process models for improving education.

Table 1. Instructional Design Course Objectives and Evaluation Methods

Introductory course
■ **Learning objectives** • Demonstrate how to use basic instructional design (ID) skills to improve education programs • Identify the problems in specific cases of educational programs and select appropriate solutions based on the Attention, Relevance, Confidence, Satisfaction model ■ **Evaluation methods and criteria** • A score of 80% or more on the comprehension test • Submitting the final report and scoring 80% or more based on the grading criteria. Based on the course content, summarizing the following items in the final report: 1) Analysis and improvement proposal from ID course participants 2) Action plans to use learning outcomes 3) Three things that participants learned most in the course • Comments on other participants' final reports in the discussion forum on Moodle

Table 2. 10 ID Models Learned in the Workshop

・ADDIE Model
・Carroll's Model of School Learning
・ARCS Model
・Gagne's Nine Events of Instruction
・Mager's Three Questions
・Gagne's Five Categories of Learning Outcomes
・Kirkpatrick's Four Levels of Evaluation
・Andragogy
・First Principles of Instruction
・TOTE Model

3.2 Blended Design of the ID course

This course consists of prior learning activities (online), a face-to-face program (one day), and post-learning activities (online). The entire composition of the ID course is demonstrated in Figure 1. The learning management system (LMS) used for the e-learning courses was Moodle. The online phases allowed participants to effectively utilize the day of the face-to-face program. These online activities were required for submitting coursework items; therefore, they were a prerequisite for evaluation, enabling participants to select the best learning path. Finally, participants would acquire a digital badge if they fulfilled the evaluation criteria along with the prerequisites for evaluation in the course (Amano, Suzuki, Tsuzuku, & Hiraoka, 2017). The badge was designed to display the accomplishment of learning objectives, with evidence such as online report assignments and an asynchronous record of discussion forum posts created during a blended educational program (Figure 2). By introducing the digital badge, the researchers improved the certification of program completion from seat-time-based to mastery-based, allowing them to verify whether the learners reached their learning objectives at the end of the program, and to ensure the quality of the program.

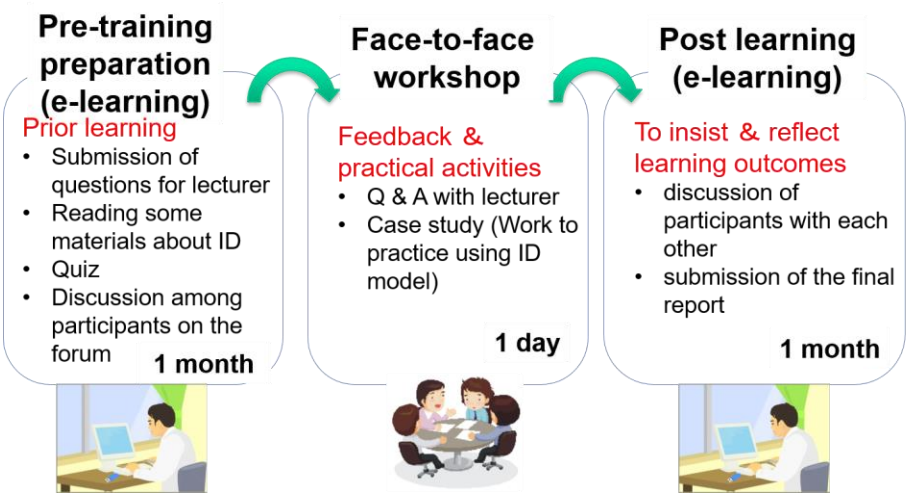

Fig. 2. The Composition of the ID Course

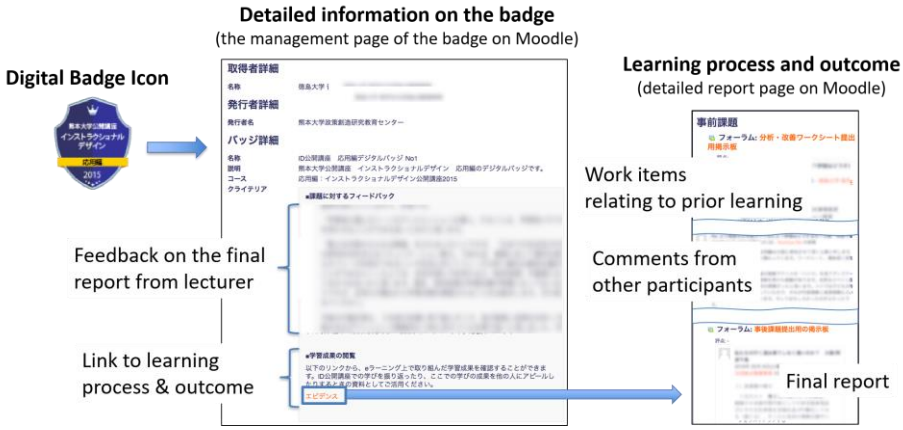

Fig. 3. The Digital Badge that was Linked with the Learning Portfolio

3.3 Improvement of Mentoring Systems to Support Participants' Online Pre-training Preparations

We first introduced the blended digital badge program in 2015, but because problems still remained, and we gradually improved them. The strategy introduced for supporting participants' work on online prior assignments are demonstrated in Table 3.

Table 2. The Improvements in the Mentoring System

No.	Items	Before (2015)	After (2016)
1	Description of promotion websites	Only the course outline was written.	A syllabus, which specified the learning objectives, evaluation, and learning methods, was added.
2	Step-by-step manuals	None	Step-by-step manuals on how to login to e-learning sites and work on online assignments were introduced.
3	Motivational emails	Only the announcements regarding assignments were delivered	In addition, the progress on assignments of all participants, such as how many participants were working on their assignments and how many had finished them, was shared.

In 2015, the participants were given two weeks for the pre-training assignment. However, not many participants worked on the pre-training assignment. One of the causes of this problems is considered to be the short period given for pre-training assignment. Therefore, the time for

working on the assignment was extended from two weeks to one month. This constituted the logistical improvement of the ID course.

Additionally, we improved the way of providing information related to the ID course design. In 2015, we only announced information about the online pre-training assignment. As this seemed insufficient, we tried to inform the participants about the course design intent. For example, the detailed syllabus was delivered to participants through promotion websites (Figure 3). Step-by-step manuals on how to login to e-learning sites and work on online assignments were also prepared for participants. These manuals were created in the PDF format. In addition, e-learning screen capturing and operation instructions were provided visually (Figure 4). Furthermore, motivational e-mails were delivered to participants. Motivational information included the progress of all participants in the assignments, including the numbers of participants still working on their assignments and those who had finished them. In order to make this possible, information on who was logging in to the e-learning site and who was working on which assignments was recorded on the LMS. The requirements of the assignments were confirmed and encouragement messages were sent through e-mail (Table 3). These emails were delivered to students one week before and one day before the deadline for the assignment. The purpose of the e-mails was to improve the pacesetting of the learning process and inform the participants that they were not alone, and many other participants were going through the same experience as them. In this way, an effort was made to inform participants about the requirements of the assignments and the complex learning flow of the blended ID course.

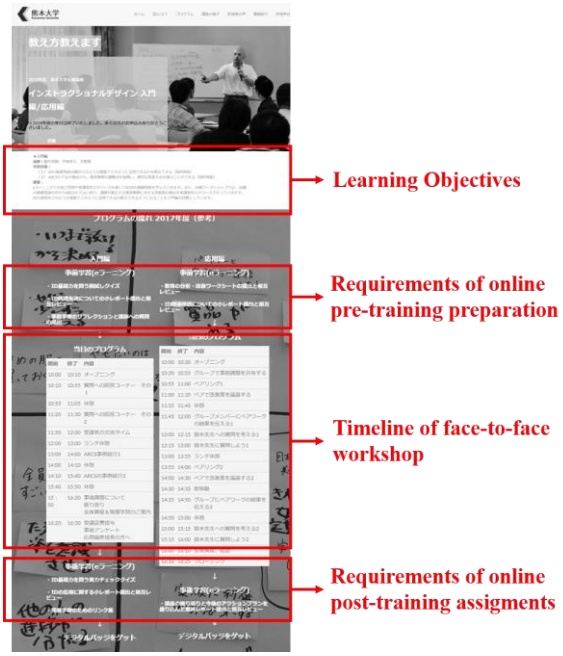

Fig. 4. The Promotion Websites of the ID Course that Explained the Course Syllabus

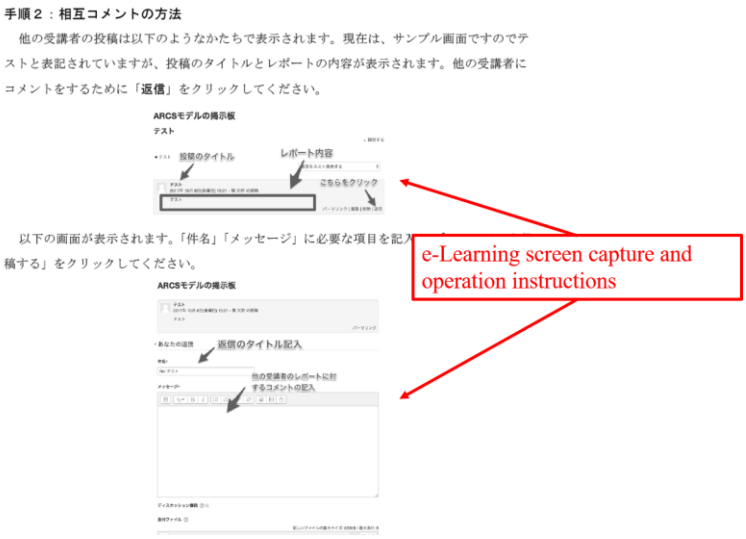

Fig. 5. Sample Pages of the Step-by-Step Manuals

Table 3. A sample of the Motivational E-mails

※(1) showed empathy with the participants' difficulties while working on assignments.

※(2) showed facilitating a sense of belonging to the community.

Subject：【10/16 deadline!】 Request for submission confirmation of the prior assignment of the ID course
Dear participants who will be attending the ID course,
Thank you for your cooperation. My name is Kei Amano from Kumamoto University. I am responsible for managing the ID course.
(1) The deadline for submission of the prior assignments is October 16 (Tuesday), next week. As you might be busy with work, I think some of you will be able to take the time this weekend to work on the assignment. The assignment is not difficult because it is related to your job, but requires some time to work on. E-learning activities in advance are a prerequisite for attending the face-to-face workshop. Please confirm your work on the pre-training assignment.
(2) Regarding e-learning for the pre-assignment, 148 out of 180 participants from all venues are currently participating. A total of 154 people have taken the quiz, and 57 have submitted their short reports on the discussion forum. There is a lively discussion occurring on the discussion board. Please participate in this discussion. It may be helpful for your professional development as you can learn about other participants' educational cases.
If you have already finished the task, please provide us your review comments on other participants' posts on the discussion forum. This may be helpful for knowledge sharing in the community of the ID course.
If you face any troubles while working on the assignments, don't hesitate to contact me. I look forward to seeing you at the face-to-face workshop. Thank you.

4 Method

The effectiveness of improvement of the mentoring system was determined by comparing the data from before (2015) and after (2016) the interventions. The participants and the data used in this research was described.

4.1 Participants

Blended ID workshops, which combine face-to-face seminars with online and at-home preparations, were held in several districts both in 2015 (Tokyo, Osaka, Nagoya, Fukuoka) and 2016 (Tokyo, Osaka, Nagoya, Fukuoka, Kumamoto). Although their locations varied, each workshop followed the same program, and all participants participated in and discussed the same e-learning course. A total of 180 participants in 2015 and 202 participants in 2016 attended the ID course. The ratio of participants' attribution is shown in Figure 5. Participants from various backgrounds attended the ID course, with some engaging in the course or training as part of their jobs. Although the total number of participants varied, the trends in the ratio of their job types were almost similar between 2015 and 2016.

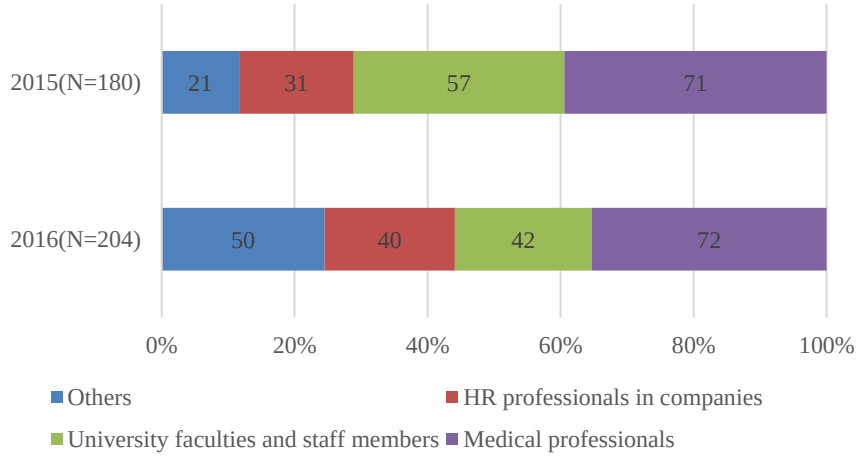

Fig. 6. Ratio of participants' attribution

4.2 Data

Three research datasets were gathered. The first data was regarding the completion rates of online prior assignments and post-learning assignments in order to verify the overall improvement of the mentoring system. The second included logs recorded in the LMS. These datasets were collected to determine the trigger that leads participants to participating in the learning process. The third comprised free descriptions of the final reports. The participants were required to write their impressions of the ID course based on the ARCS motivational model [6]. The purpose of this data was to examine the perceptions of the improvement strategy used for

the ID course. The ARCS model may be suitable to determine participants' perceptions from the viewpoint of motivation.

5 Results and Discussions

Detailed results from 2015 to 2017 will be reported in proceedings of this presentation. The completion rates of online prior assignments increased from 66% (118 out of 180 participants) in 2015, 100% (202 out of 202 participants) in 2016 to 100% (181 out of 181 participants) in 2017. The completion rates of the entire program also increased from 35% (63 out of 180 participants) in 2015, 71% (144 out of 202 participants) in 2016 to 77% (140 out of 181 participants) in 2017. These results suggested the effectiveness of the strategy for learning accessibility introduced in this study. A log stored on the LMS would be shown as a result of the reaction to each strategy in detail. Some participant comments in the questionnaire and final reports that were part of the post-learning assignments also demonstrated positive reactions to some interventions.

5.1 Completion rates of online pre-training assignments and post-learning assignments

The completion rates of online prior assignments increased from 66% (118 of 180 participants) in 2015 to 100% (202 of 202 participants) in 2016. The completion rates of the entire program also increased from 35% (63 of 180 participants) in 2015 to 71% (144 of 202 participants) in 2016. These results suggest the effectiveness of the strategy for learning accessibility that was introduced in this study. The strategy introduced in this study included support during the processes at the beginning of the course, such as account registration and pre-training assignments before the face-to-face workshops. These findings are in agreement with the previous findings, which demonstrated that support at the start of the learning is important to enable the completion of assignments, as shown in the UK open university's retention model [5]. The results in this study confirmed that the strategy for supporting the process at the start of the learning is effective in the mentoring system of the ID course.

5.2 Access logs of e-learning

The access logs for e-learning were verified as a result of the interventions. Figure 6 shows the transition of access to e-learning websites before the face-to-face workshops. While stable e-learning access was demonstrated in this duration, we found that access was increasing when we sent motivational e-mails to participants. Some of this timing was included when we sent the participants motivational and reminder e-mails, as shown by the red dot in Figure 6. These results suggest that motivational e-mails facilitate participants' sense of community and feeling empathy for other participants facing difficulties in working on the assignment, as shown in Table 3. In addition, the e-mails were effective for encouraging pace-setting of the participants' learning. These results imply that the motivational e-mail design based on Visser's MMSS [6] may also

be effective in supporting completion of lifelong learning opportunities in addition to formal education.

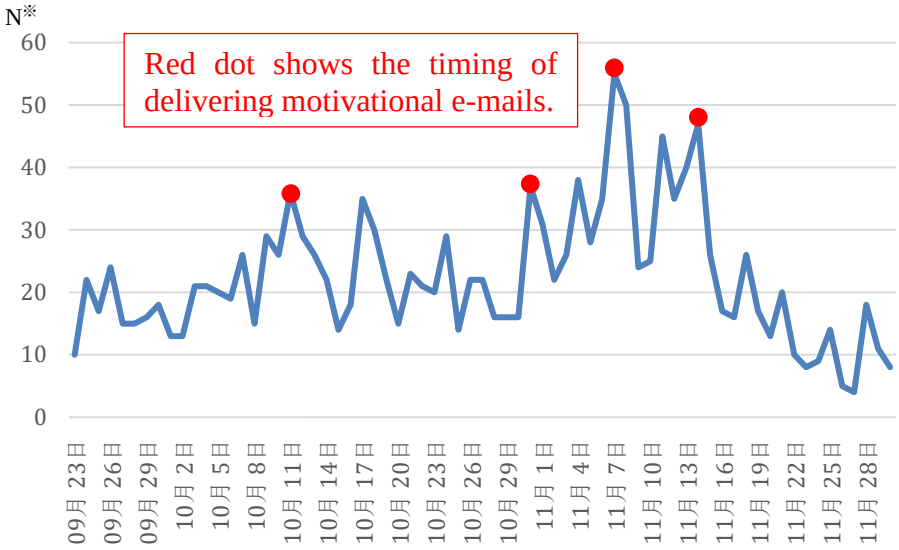

Fig. 7. Access logs to e-learning in the LMS in 2016
※N showed the numbers of those who accessed e-learning website.

5.3 Participants comments in the final reports

Participants were required to post short reports on the discussion forum, which included an analysis and improvement proposal from the viewpoint of motivation, based on ARCS model. Here, we introduce some participants' comments regarding the mentoring system in the ID course.

Some participants reported that the promotion websites encouraged them to learn in the ID course: "The learning objectives were clearly shown in the syllabus of the promotion websites. It was also possible for me to recognize the learning requirements of what I was required to do through the ID course"; "The phrase 'teach how to teach' written on the websites was attractive for me because I want to learn teaching methods for training. In addition, the evaluation method and course program are displayed on the websites, enabling me to imagine what I should do in the course. This made me feel familiarity with the course."

In this manner, the syllabus provided on the websites gave participants a perspective of the course and motivated them to learn during the course.

Furthermore, other participants commented the following regarding motivational emails: "I did not forget the pre-training assignment because the motivational e-mail reminded me to work on the assignment. The progress of other participants helped me feel that I am not alone as there are other participants."; "The motivational e-mails reminded me of the purpose of attending the

course. Thanks to the e-mail, I knew there were many participants who encountered the same problems with their jobs as me."

These comments suggest that motivational e-mails were helpful in enabling participants to feel a sense of belonging to the course in the online learning platform.

6 Lesson Learned from the Experience

In this research, we redesigned the mentoring systems of the ID course and verified its effects. The characteristics of the research field was a university extension course that was not part of the formal education necessary for credits at the university, but of lifelong learning opportunities that did not give participants incentives for completing the course. The results demonstrate that the redesign of the ID course may improve the completion rates of the online pre-training assignments and post-learning assignments altogether. Additionally, it was shown that motivational e-mails are useful for facilitating participants' access to e-learning. Furthermore, some participants' comments suggest that the syllabus provided on the website gave participants a perspective of the course and motivated them to learn during the course; in addition, motivational e-mails were helpful for pace-setting of the participants' online learning.

Based on these results and reflections on our practices, we present our conclusions. The features of this research setting were that the workshops were held as open seminars that did not offer incentives such as university credits or promotion at work. The learning contents also followed an instructional design, targeting those who had engaged in some education. The following are the lessons learned and implications for those who attempt a similar study in similar settings, to improve the mentoring support of pre-training preparation in a blended digital badge program.

1. Create step-by-step manuals to work on online assignments, clarifying the learning path. It might be effective for supporting participants' work and increase the completion rates of online pre-training and post-learning assignments (UK open university's retention model [5]).
2. Provide explicit learning requirements through syllabus on the promotion website before application. This gives participants a perspective of the learning process and clearly informs them about the learning requirements (UK open university's retention model [5]).
3. Deliver motivational e-mails for sharing other participants' learning progress to facilitate pacing. This increased the access to e-learning and enabled participants to feel a sense of belonging (Visser's MMSS l[6]).

These findings show that effort to inform the participants of the learning processes facilitated their working on the assignments. However, these design principles were not examined in educational cases other than the blended digital badge in this study. Further investigation of this point is therefore recommended for refining the design principles through trials in various training programs.

7 Acknowledgment

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8 References

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