Three-stage Design of a Question-making Activity to Refine Pre-training Preparation in a Blended Training Program

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Abstract In this paper, we report improvements made and their effect on the design of pre-training preparation in a blended instructional design workshop. Through practical research, the design was refined to include a three-stage question-making activity (QMA) for pre-training preparation. The stages included 1) Submitting a question before the commencement of learning, 2) Working on teaching materials, and 3) Submitting a question based on reflection on pre-training preparation. After verifying the effects, it is suggested that question quality saw an improvement owing to the introduction of the QMA, with some cases becoming more concrete and focused. It was also confirmed that this method can encourage learning motivation by enhancing participants’ confidence, satisfaction, and familiarity with learning content.

Keywords: question-making activity, pre-training preparation, blended learning

1. Introduction

Since 2015, Kumamoto University has been offering a blended training program on instructional design (ID) called “Introductory Class on Instructional Design (ID workshop)” as part of a lifelong learning activities initiative. The ID workshop consists of a one-month preparation phase (online), a one-day face-to-face program, and a one-month post-learning phase (online)(1). This ID workshop is open to anyone engaged in teaching or human resource development. To date, professionals from various fields, such as university faculty members, medical doctors, nurses, human resource professionals, and Japanese language teachers, have attended it. To meet the diverse needs of participants, we introduced a question-making task for lecturers as part of the application process for the ID workshop in 2015. Then, in the face-to-face workshop, the lecturer answered the questions that were submitted by the participants. This blend of pre-training preparation and face-to-face workshop aimed to provide more customized learning content for each participant.

The Q&A activity received positive evaluations from some participants who were intrigued by the lecturers’ approach to answering questions submitted by participants as part of the pre-training preparation(2). However, the quality of questions, which were quite vague and general (such as “What is most important aspect of learner motivation?” and “Is there any ID model to evaluate corporate training?”), posed a challenge. Although participants had very different backgrounds, they were unable to incorporate such variety into their questions and answers, which would have been useful in deepening learning. In addition, their responses appeared to have been taken from sources such as textbooks or the Internet. In this way, our challenges included improving the quality of questions submitted by participants as part of their pre-training preparation in order to use the face-to-face time effectively.

In this paper, we describe the improvements made to the pre-training preparation. To improve the quality of questions, we developed and implemented a three-stage question-making (QMA) procedure for the blended workshop. Changes in question quality and participants’ reactions to the three-stage QMA are also reported.

2. QMA by Participants

As a pre-training preparatory step, it is common to ask participants about what they want to learn or the problems they have encountered. For example, needs analysis using interviews or questionnaire surveys is an important phase prior to the design of a training program(3). Analyzing these data can help in the development of a program that corresponds to participants’ interests.

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Allowing participants to create questions not only is useful from the perspective of needs assessment, but also can have positive effects on learning. QMAs enhance understanding of learning content, increase motivation and confidence to learn, and hone meta-cognitive skills, which can be useful for becoming autonomous lifelong learners (4).

Although QMAs can serve these functions in learning, their effective use in educational settings depends on the participants’ prior subject-matter knowledge. Previous studies have shown that the amount of prior knowledge had an impact on participants’ ability to formulate questions (5, 6). In other words, participants were unable to formulate questions if they were not sufficiently knowledgeable about the subject matter. Van der Meji also illustrated that the content of questions is less specific and more general when participants have less prior knowledge about the learning content (6). These findings suggest that the effective introduction of QMAs requires providing participants with a prior input of the required knowledge. Therefore, it is necessary to determine how to combine QMAs with the input of subject matter like teaching materials.

As a way to combine QMAs with exposure to teaching materials as part of the pre-training preparation, it can be effective to allow participants to provide answers to the questions they themselves have formulated after reading teaching materials. It has been shown that having participants answer questions formulated by themselves after having read a textbook at the end of the pre-training preparation increases more higher-order learning outcomes such as causal explanation than lower-order learning outcomes such as remembering (7). Moreover, although this form of Q&A activity by participants is also expected to make questions deeper or sharper, this effect has not yet been verified.

Based on this idea of QMAs that involves participants creating and answering questions after they have read the teaching materials, we improved the pre-training preparation in the ID workshop.

3. Introducing a Three-stage QMA

3.1 Context

Blended ID workshops, which combine face-to-face seminars with online and at-home preparations, were held in several districts in 2015 (Tokyo, Osaka, Nagoya, and Fukuoka) and 2016 (Tokyo, Osaka, Nagoya, Fukuoka, and Kumamoto). Although their locations varied, all workshops followed the same program and all participants took part in and discussed the same e-learning course. To make optimal use of the limited face-to-face time and align the participants’ level of knowledge before the face-to-face workshop, online assignments were developed as pre-training preparation (Figure 1). By designing this blended learning, we attempted to provide more practical and customized learning experiences than would be possible in a one-day lecture-style seminar.

The goal of this workshop was to enable participants to analyze education cases and present proposals for their improvement using ID models. At the workshop, participants learned the 10 ID models shown in Table 1 and were expected to illustrate when, where, and how they could be used to enhance education in terms of impact, efficiency, and appeal.

3.2 Improvement in Pre-training Preparation

In 2015, prior to the improvements in pre-training
preparation, participants submitted the questions they wanted to ask to lecturers before starting the learning process, when applying for the ID workshop. The lecturers answered these questions and demonstrated how to use ID models to solve the problems faced by educators in various fields. However, as participants’ questions were vague and general, the learning content provided by lecturers in response to these questions were not focused; rather, they included a wide variety of topics on educational improvement based on the participants’ different backgrounds. In addition, the answers to these questions could have been found online.

Based on previous findings, the lack of specificity of the questions was attributed to the lack of subject matter knowledge; an effective way to curb this issue would be to allow participants to answer questions of their own making. By combining these ideas, we modified the pre-training preparation for the QMA, as shown in Figure 2. The three stages of this activity were as follows: 1) participants were required to review the syllabus of the training program and submit questions they wanted lecturers to answer to; 2) they were then required to read papers about ID and, to have their understanding tested, post a short report about how to use one or more of the 10 ID models to improve their particular educational situations, which also allowed them to clarify their needs; 3) participants were required to review the questions they submitted in Stage 1 and determine whether or not they received an answer to them during Stage 2. Based on this reflection, participants were then required to resubmit the questions they would like to ask the lecturer.

3.3 Development of the Three-stage QMA Using Moodle’s Default Features

We developed the three stages of the QMA using some online tools. In Stage 1, an online application form constituted of basic online survey tools, such as multiple-choice and free-description questions, was used. Administrators could download a list of answers in CSV file format. In the online form, participants were required to note down what they wanted to ask about the learning content when applying for the ID workshop, as shown in Figure 3.

In Stage 2, participants were required to work on an online assignment constructed on Moodle, an open-source learning management system (LMS). This online assignment included reading materials such as textbook PDFs and a collection of online links for the 10 ID models, automatic scoring quizzes, and a discussion forum.

In Stage 3, participants were required to review the questions submitted in Stage 1 (Figure 1) and reflect on whether or not they had been answered through knowledge acquired in Stage 2. To enable each participant to browse the questions they submitted, we used the assignment activity on Moodle. By using the feedback function on assignments, it was possible to provide
individualized information for each participant and to upload data in CSV format. Using this individually distributable function, we decided to allow each participant to once again go through each question submitted at the time of application. In addition, we instructed participants to list the questions solved through the 10 ID models and submit unsolved and new questions generated in Stage 2. The third stage of the QMA is shown in Figure 4.

4. Results

4.1 Completion Rates and Evaluations of Impressions on the ID Workshop

We verified that completion rates were 33% in 2015 (63 out of 179 participants submitted questions) and 71% in 2016 (144 out of 200 participants submitted questions). The requirements for completing the ID workshop are shown in Table 2 and included not only memorizing the learning content, but also mastering intellectual skills®, which demonstrates the applicability of ID models to some educational cases.

There are two possible reasons why the three-stage QMA resulted in improved completion rate. First, the three-stage QMA provided effective support for understanding the concepts of the ID models. The learning of these concepts was the foundation for the development of the intellectual skills® set in the learning objectives of the ID workshops. Moreover, we provided participants with opportunities to reflect on their understandings of the ID models by introducing the QMA. This activity can help participants build the concept of ID models, that is, classifying what they know and do not know. Therefore, it was suggested that one of the factors that improved the completion rate was the promotion of understanding and learning concepts through the introduction of the QMA.

Second, the QMA can facilitate participants’ learning processes. As Rothstein and Santana® indicated, getting participants to conduct a QMA by themselves is an effective method to encourage them to become autonomous learners. Based on this finding, it is believed that the QMA provides a scaffolding to push forward participants’ learning processes. In this way, these two factors may be the reasons why the QMA improved completion rates. However, a limitation of this argument is that the relationship between QMA and improvement in completion rate has not been demonstrated empirically.

4.2 Questions Submitted in the QMA

We verified a change in the quality of questions after the introduction of the three-stage QMA. Overall, there appeared to be three types of cases.

The first was the Generated type, in which a question was created through the pre-training preparation (Table 3). This case illustrated that the work on a pre-training assignment and the enhancement of the understanding facilitated the formulation of questions by participants. This result aligns with previous findings®, which demonstrate that the number of questions formulated depends on the amount of prior knowledge.

The second was the Changed type, in which a question was altered as a result of the pre-training preparation (Table 4). This type involved questions submitted at Stage 1 and solved through the pre-training online assignment (Stage 2). In addition, more concrete questions on the use of ID models in educational practice were generated.

The third was the Refined type, in which a question was refined through the pre-training preparation (Table 5). In this case, participants discovered the answers to the questions in Stage 2 and refined the questions, accounting for potential problems. In this way, it was confirmed that the three-stage QMA had the potential to enable participants to make their questions more specific and concrete. Therefore, it is suggested that, overall, the questions were improved.

We classified the 189 question comments submit-
Data classification was conducted independently by the first author and an individual with a master’s degree in educational technology to ensure its credibility. The agreement rate between the two analysts’ classifications was 90%. The analysis results after the agreement and based on the consultation are shown in Table 6. These results suggest that the overall quality of the questions was improved because more than 70% of the comments were categorized into the Generated, Changed, and Refined types, while 24% of the question comments were categorized as “Others.” Further efforts may be necessary to solve this problem.

### 4.3 Participants’ Reactions to the Three-stage QMA

In the final report, which showed how participants critically analyzed the ID workshop using the ARCS model, some participants pointed out that the added QMA motivated them to learn. One participant stated that this activity made him feel confident and satisfied, as follows: “As for me, reviewing the question at the time of the application was what made me learn the most. At the time of application, I did not understand the content enough to ask questions; thus, I was only able to write a comment about my passion for participating in the workshop. However, regarding the content learned through prior learning, it was clear that my understanding had advanced enough to allow me to ask the lecturer questions.” Another participant described how thinking about the questions made him feel more familiar with the learning content and its relevance, as follows: “By reconsidering my own question, my awareness of participation in the ID workshop has increased. At the same time, I gained familiarity with the content.” Thus, it appears that the design improvement of adding questions has encouraged motivation for learning by increasing participants’ confidence, satisfaction, and familiarity with the learning content.
5. Conclusion

In this paper, we reported the redesign of a QMA as a pre-training preparation in a blended ID workshop. Previous practice presented problems such as the lack of specificity in participants’ questions. As the workshop involved questions made by participants and the lecturers’ answers to them, we redesigned the previous QMA into a three-stage QMA: 1) submit a question before starting learning, 2) work on teaching materials, and 3) submit a question based on the reflection of the pre-training preparation.

It is suggested that the quality of questions was improved with the introduction of the three-stage QMA since the three types of question comments accounted for more than 70% of the total number of questions. We also confirmed that some participants demonstrated positive reactions to the three-stage QMA in the final report, as this activity motivated them to learn. From some cases and comments, it appears that this improvement had a positive effect on learning. These results suggest that the three-stage QMA can be an effective pre-training preparation that combines online assignments and face-to-face workshops. In addition, we used Moodle’s standard features, which is an open-source LMS, illustrating that this technique can be run at a low cost with a little bit of ingenuity.

There were some issues in standardizing the quality of question comments, such as the introduction of checklists, since 24% of the comments were not submitted as questions. It is also necessary to verify the effect of introducing the three-stage QMA on the qualities of learning outcomes, such as in how the type of questions or changes in questions impacted assignment quality. To refine this method, further investigation is required.

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