Formative Evaluation Report

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Purpose

According to AUSTIN website, "in formative evaluation, programs or projects are typically assessed during their development or early implementation to provide information about how best to revise and modify for improvement." Also, Dick and Carey (2001) assert, "a series of evaluations is conducted to collect data that are used to identify how to improve the instruction" (p.16). Thus, in order to present an effective digital lock training material, this formative evaluation was conducted for collecting feedback from SME and participants for revising the content errors and making instructional improvements. The formative evaluation was divided in two stages. First, the material designer invited a SME of digital lock to conduct an expert review. Croxton and Chow state (2015), "during the evaluation phase, the course designer must determine if the objectives have been met" (p.87). As a result, the SME was focusing on correcting the accuracy of contents and the effectiveness of website design since new engineers will do self-instruction through this website. Second, participants who were invited in the evaluation were tested the satisfaction of using this website because "learning is promoted when new knowledge is applied by the learner" (Merrill, 2002, p.43). Based on their responds, the material designer could improve the structure and learning tools in this instructional project.

Participants

Since "sample is considered representative when either sample characteristics or inferences from the sample approximate population values" (Hoeven, Janssen, Roes and Koffijberg, 2015, p.2), one SME of digital lock was invited for expert review and five electrical engineers were recruited for one-to-one evaluation. First of all, the SME who was technology department manager in the proxy company of Samsung digital lock cooperation in Taiwan was

invited because the job of SME was "to check for currency and accuracy" (Piskurich, 2015, p.340). In other words, the technology department was established for repairing Samsung equipment and providing technology training to engineers; for this reason, the manager of this department usually contacted and discussed with Samsung cooperation frequently in order to obtain the latest information which were about digital lock. Also, the manager created and maintained a website which allowed the proxy company to introduce Samsung digital lock and interphone products to customers in Taiwan, so he was able to provide valid feedback for this instructional website. Secondly, for the purpose of corresponding to target audience's characteristics, electrical engineers who possessed the circuit concept as basic knowledge were selected, and all of them had less five months of work experience in smart-home system company or semiconductor company which recruited employees who had engineering background. See the table below:

Participants	Types of job	Period of work experience
Expert review	Technology department manager	8 years
One-to-one Learner 1	Door access security system engineer	2 months
One-to-one Learner 2	Digital lock engineer	1 month
One-to-one Learner 3	Semiconductor designer	3 months
One-to-one Learner 4	Semiconductor designer	4 months
One-to-one Learner 5	Security camera system engineer	1 month

Materials and instruments

Interview and Likert-scale survey were used in formative evaluation process. Specifically, the purpose of interview was for clarifying the participants' characteristics which were matched with target audiences; therefore, the questions in the interviews were regarded to the participants' personal information and there were six questions which included two opened-ended questions and four Yes/No questions. Further, the interviews were conducted by SKYPE. Based on the responds of the interviews, six participants (including one SME) were selected for reviewing the website and giving feedback on Likert-scale surveys through email. In Likert-scale, SME and learners should respond rating (1 to 4 points) for each statement; for example, 1 was strongly disagree, 2 was disagree, 3 was agree, and 4 was strongly agree. Furthermore, there were 4 statements for expert review and 15 statements for one-to-one evaluation. Additionally, according to ACRL website, "program organizers should consider providing contact information for participants to follow-up if they have questions or additional comments", so the SME and learners were allowed to write comments or improvements in the email.

The questions of interview

1. What is your job?

2. How long have you worked in this job?

3. Do you have engineering background? (Yes/No)

4. Can you read electronic circuit? (Yes/No)

5. Do you need to apply electronic circuit concept on your job? (Yes/No)

6. Would you like to review an instructional website which is regard to digital lock, and give us feedback? (Yes/No)

The statements of expert review

Scale 1~4, 1=Strongly disagree, 2=Disagree, 3=Agree, 4=Strongly agree

1. The content were accuracy.

2. The learning objectives were clear.

3. The website had an appropriate structure.

4. The introduction motivated learners effectively.

The statements of one-to-one evaluation

Scale 1~4, 1=Strongly disagree, 2=Disagree, 3=Agree, 4=Strongly agree

1. The content was directly applicable to my job.

2. The content met the stated learning objectives.

3. The content was logically organized.

4. The material was appropriate to meet my needs.

5. The navigation of the material was easy for me to follow.

6. The structure supported my learning.

7. The images were meaningful and helped me to understand the contents.

8. The timing of video was appropriate for introducing the content.

9. The auditory description in the video helped me to understand the content.

10. I can apply the knowledge that I learned to my job.

11. The content recalled my electronic circuit concept.

12. The practices reinforced my learning.

13. The handout supported my works.

14. The quantity of question in assessment was appropriate.

15. The color of font made key words outstanding.

Procedures in the evaluation

First of all, instructional designer invited the SME of digital lock and explained the goal

and learning objectives of this website in order to make sure that the contents were appropriate

for learning digital lock functions. Then, the SME were asked to rate the statement which the

designer wanted to be focused on Likert-scale survey and give feedback through email.

Furthermore, the designer interviewed 8 people for recruiting the participants of one-to-one

evaluation. After the interviews, 5 participants were selected because their prior knowledge and

entry skills were similar to target audiences. Also, the 5 participants were new engineers in their

company too. Then, the instructional designer explained the goal, objectives, and the purpose of

the evaluation to each participant, and asked them to rate the statements on one-to-one survey.

Besides, the participants were pleased to write comments and suggestions through the email in

order to make improvements on the website. Finally, after all the responds had been collected,

the designer highlighted the responds which presented the disadvantages of the contents.

Additionally, analyzing the feedback and comments from the SME and participants for

identifying the improvements that could be made in this project.

Present & discuss the data

Expert review

The SME were being focused on content accuracy, learning objective, website structure,

and motivation. Further, the SME strongly agree that learning objectives were clear, and agree

that contents were accuracy and website structure and motivation were effective for learners

(1=Strongly disagree, 2=Disagree, 3=Agree, 4=Strongly agree). See Figure (1)

Figure (1)

Expert Review

On the other hand, the SME provided two feedback for the website. First, there were too many videos in section 3, and the videos decreased readers' concentration. Second, there was a content error in the circuit, "close door action" should be replaced by close door sensor.

One-to-one evaluation

In the Likert-scale survey of one-to-one evaluation, the average of five participants for each statement was calculated in figure (2) and (3). According to the result, twelve statements were agreed or strongly agreed (M= 3 or M>3) by the participants, and each average of the rest of three statements were lower than 3 (M of Statement 1= 2.8, M of Statement 7= 2.6, M of Statement 9= 2.4).
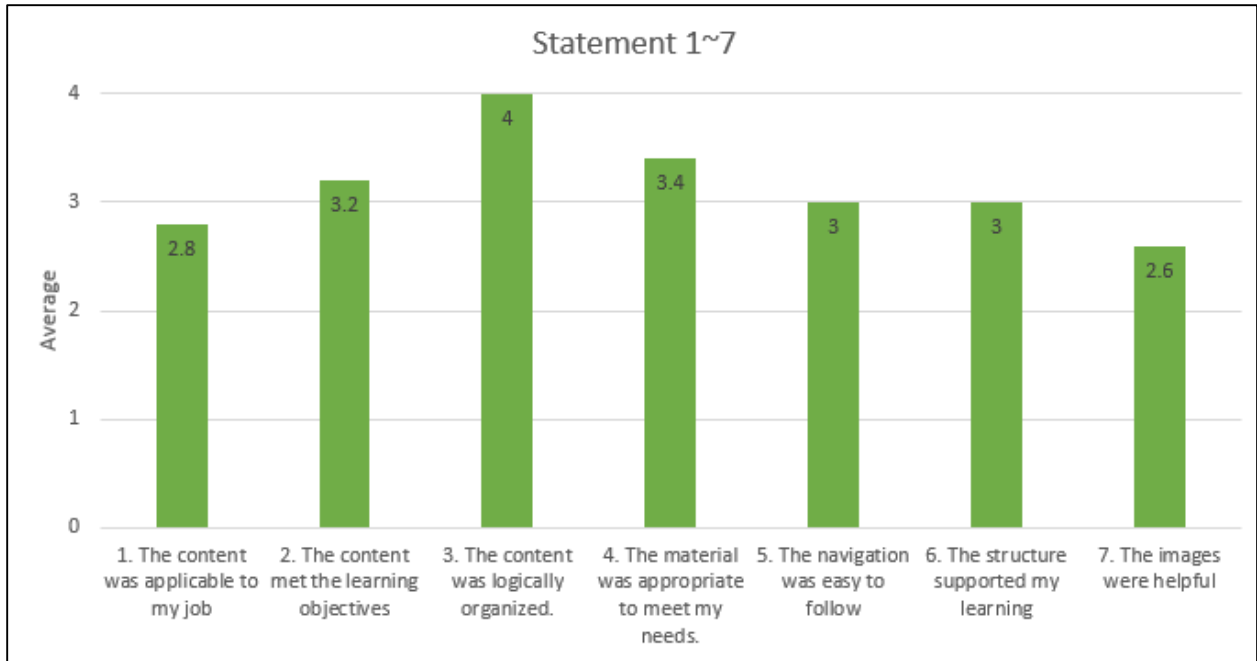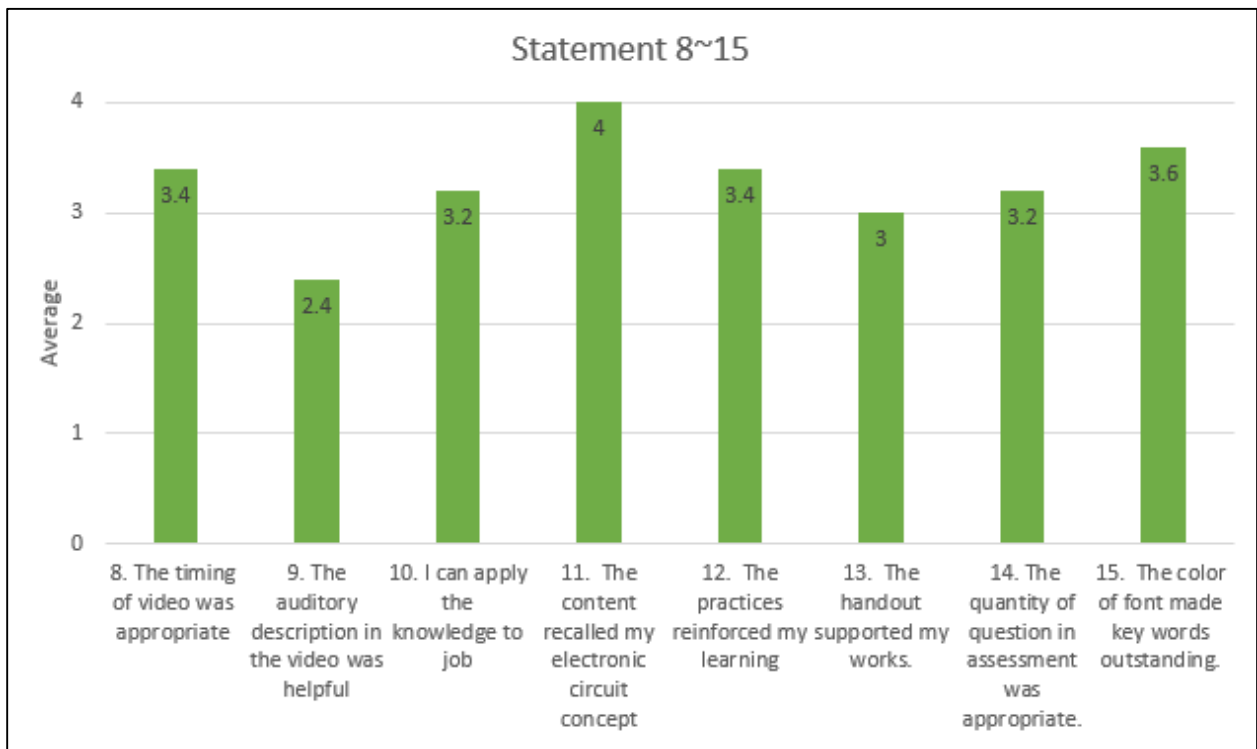
Figure (2)

Figure (3)

For Statement 1, two participants who work in semiconductor company considered that determining malfunction process of digital lock was not applicable to their jobs, but they could use the circuit concept of series connection and parallel connection which were in section 2 to improve their works. For Statement 7, the participants suggested that the images in section 1 could be replace by anatomy of digital lock; it would explain the location of each main component clearer. Also, based on the participants' comments, they could not understand the auditory description in videos, but they could understand the contents briefly by animation in the videos. However, the participants commented that there were too many videos to watch in this website.

Revision plan

Based on the SME and participants' feedback, the revision will be focused on three aspects: content errors, images, and video. First, "close door action" which was mentioned in the electronic circuit will be modified to close door sensor, and it will be added into main components. Second, add a picture of installed digital lock and mark the location of each components or use AutoCad to draw an anatomy of digital lock. Finally, use images to replace videos in section 3, and make one video to introduce the crucial content which is electronic circuit concept. Further, rerecord the auditory description in the video and add title in order to provide better instruction to learners.

Reflection

Since my goal is to be a trainer in engineering field, this project gives me an opportunity to go through the process of creating training material. During this course, I had developed the materials that only I expected sometimes, rather than learners' expectation, so it decreased the effectiveness of the materials. Thus, by conducting ADDIE, I realize that analysis and evaluation

stages are very important phases in instructional design because both of these two stages include

not only my ideas but also experts and learners' feedback and comments which can improve the

materials significantly. Overall this project, making video was a new challenge for me. I had had

only one experience before I made the video in this project, and it was pretty hard for me to

explain electronic contents in English. Therefore, I had spent several days to research video

software and practiced presenting in English. Also, video is a common tool in instructional

design field, so it can be beneficial when I am developing other materials in the future. Although

everything was not wonderful, I was really happy that I heard my participants could understand

my instructional design and gave me glorification. As an instructional designer, this was my

enjoyable part which can help learners to solve their problems by my designs.

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