Practice of Subject Report Revision Process Following Class and Learning Materials Design Method Based on Instructional Design

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Abstract: Authors have proposed the class and the teaching-materials design method based on the instructional design processes, and developed the support tool for the learning materials development following our method. One of the goals of this research is realizing student assistant participation to the learning materials development. In this research, the revision procedure of the subject report was devised as the part of our learning materials design and development method. Following this method, we have revised the subject report by student assistant participation.

Keywords: Learning materials development, class design, instructional design, e-learning

Introduction

To design learning materials for self-learning courses, instructional design (ID) concepts and systematic models are vital and helpful. However, the development of learning materials that strictly following the ID models can be extremely difficult and time consuming. Therefore we propose a class design and the learning materials development method based on the ID models. In our method, we introduce the "contents outline" that focuses especially on the contents in addition to the "class outline" that covers the activities of the overall class.

In general, learning materials are repeatedly used in universities and the same problems are consistently shown on subject report, then students might simply share their answers and hand in a copy. Therefore, we need to revise the issues of subject reports for each class to resolve this problem. The class design procedures based on the ID concepts include an evaluation and revision process [1, 2]. In this case, learning materials are revised if needed as a result of verification and the revision of the subject report is performed. It is expected that the ID methods for the evaluation and revision process are useful in the revision of subject reports. We have devised the revision procedure of report subjects based on our learning materials development method in which the class outline and the contents outline are used. We have carried out the practice of the subject report revision with student assistant participation following our method.

1. Background of the practice

Authors have been developing learning materials by student assistant participation [3]. At the beginning, we asked the student assistants for creation of learning materials based on the

class outline, which focuses on the activity of the entire lesson. However, since the performance of those contents did not reach the level that the teacher had expected, the learning materials were not used in the classes.

To avoid such a situation, we introduced a “contents outline,” which focuses specially on the details of learning materials, in addition to the class design. With this methodology, the learning materials developed by the student assistants were closer to what the teachers had expected and the overall development was clearer.

Since the two design outlines were revised to develop learning materials and carry out the evaluation and revision process, the revision work had becomes complicated. Therefore, we developed a support tool titled “Class/Contents Outline Editor” (COEdit), which linked the related items so that they can be edited together [4].

2. A class design and the learning materials development method

The ID concepts and systematic design models have been the subject of significant focus, especially in regard to the development method of e-learning course design and learning materials. In systematic models, such as ADDIE model, the output from the prior step is used as an input to the following step. In the systematic process of the ADDIE model, there are feedbacks from the "Evaluate" step to the other steps. Dick and Carey’s model is a famous systematic model that contains feedbacks from the formative evaluation step [1].

However, it is difficult to strictly follow all the procedures in the systematic ID models. Morrison, Ross and Kemp proposed the nine element ID model, in which their order and selection are not predetermined [2]. This model appears useful when utilized it in a real situation because the ID models can be arranged according to the actual conditions and environment.

Nakai et al. described the nine step model [5], which was based on Dick and Carey’s model [2]. Their procedures are systematic and suitable for class design at the university level: Steps from 1 to 5 cover the design of the entire course; Steps from 6 to 8 focus on the design of each class; and Step 9 evaluates the learning materials.

For our method, the class outline was created following the procedures of Steps from 6 to 8. Then the proposed contents outline was created based on the class outline, which focuses on the learning activities. The composition of the class outline is shown in Figure. 1.

- Objectives of the class
- Test items of the class
- List of the items that should be explained to achieve the objectives
- A flow of the module
  - Introduction
  - Contents of the learning material
  - Learner’s activities
  - Test items of the class
  - Progressive studies

Figure 1. Composition of the class outline

On the other hand, the contents outline emphasizes on the composition of the learning materials as the primary goal. The flow of creating the contents outline based on the class outline is as follows.

1. Design the composition and the flow of the learning materials themselves for the entire class.

2. Based on the composition and flow of the learning materials, design the composition and the appearance of the page, as well as clarify the details of the items that should be explained.
3. Develop the contents of each page such as explanations and assessments.

It appears that to make the contents outline similar to the concept of rapid prototyping [6] by Jung et al., we must, first, clarify the details of the learning materials.

Numerous ID models include an evaluation process. Since the evaluation and revision process only describes about the problem analysis and measures, it rarely describes the procedure of concrete revision. For this research, the revision of learning materials through student participation has been created, and learning materials for subject reports have been revised along with the procedure.

3. Support Tool for Class and Learning Materials Design

The authors of this study have developed a support tool for the design of class and learning materials (COEdit). One of the main goals of this tool is to edit corresponding items in the two outlines (class and contents) through an evaluation and revision process. If a new line is added, then the information is linked to the line. Since linked information is simultaneously copied, the items that have the same linked information can also be simultaneously edited. This is a convenient function for the revision of the class outline and the contents outline.

4. Procedure of Subject Report Revision

The revision of the subject report was performed through the procedure shown below. Step2 *(2)*, *(3)*, and *(4)* were conducted during the meeting with the student assistants.

(1) Evaluation of subject results (the degree of achievement)
When the class is completed, the results of the subject reports are evaluated.
(2) Check the terms that are required for the subject
Based on the class outline, the aim of the class is confirmed, and the terms that are required to achieve the goal are checked. These are shared between the teachers and the student assistants.
(3) Create the class outline
The idea, based on the information acquired by the procedure *(2)* and the existing subject reports, is shared by the teachers and the students.
(4) Create the contents outline
The contents outline is created based on the class outline in the procedure (3).
(5) Create the learning materials
Based on the class outline and the contents outline, student assistants create the contents of a subject report page.
(6) Evaluate the created learning materials
Teachers evaluate the subject report page created by the students. They also verify whether explanations or expressions differ widely from what they had originally envisioned, and if required, they correct them.

5. Results

A “Programming 4” course was offered for second-year students in the department of human information systems, and the contents included Java application programming. The subject report of “Programming 4” was revised in the procedure shown above. The learning materials of the course were developed by student participation [3] and the class outline and the contents outline were created before content development. Two students, both graduate students, participated in the development process. A practice result is shown along with the procedure described above.

In Step *(1)*, the results of the subject report in 2010 were verified with no significant problems. In regard to Steps *(2)*, *(3)*, and *(4)*, teachers and student assistants held a meeting and discussed the overall goal of the class, the terms, and the questions from the former subject reports. This was achieved by displaying the class outline on a computer using the COEdit tool. To allow the difficulty of the questions to be comparable to the former ones, small revisions were made to the older questions. The ideas of the questions were recorded on the clause of the “subject report” in the class outline.

Next, the information on the contents corresponding to the modified part in the class outline was added to the contents outline. Again, the COEdit tool was used for editing the class outline and the contents outline. The time spent for the meeting of Steps *(2)*, *(3)* and *(4)* was approximately from 20 to 30 minutes per subject for each class. In addition, three patterns of the subject report were created for each class.

In regard to Step *(5)*, the students created the subject reports based on the class outline and the contents outline. The contents of the subject report were created and written in HyperText Markup Language (HTML). Finally, the contents and the source codes were submitted to the teacher.

For Step *(6)*, the teacher evaluated the contents of the subject reports. Only minor details such as the notation of the variables in the Java program or certain expressions were pointed out by the teacher.

After completing the subject reports, the students were interviewed about their creation of the subject report contents. In regard to the ease of creating the contents and the workload, there were opinions such as “there were enough directions to create the contents,” “it is very clear what kind of thing should be made,” and “I thought that the gap between the teacher’s idea and the students’ idea was decreased by the meeting.” In addition, there were the following positive opinions: “the knowledge which was uncertain until now could also be studied making the program of a subject, and an understanding was able to be deepened,” and “although having investigated about Java was serious, making the contents was easy.”

According to these positive reactions, it appears that the students were able to also acquire knowledge about Java programming, and the workload was reasonable for them.

6. Discussion

We have revised the design of the class activities and the learning materials in connection with the subject reports. In addition, the contents of the subject reports were developed through student participation and the learning materials developed in this study were used in actual classes.

In practice, reasonable workloads were applied to both the teachers and student assistants. In this case, the teachers were required to check the design of the class and propose the idea of a subject report during the meeting with the student assistants in Steps *(2)*, *(3)*, and *(4)*. However, it appears that the teachers’ workload was sufficiently eased since they left the entire creation process up to the student assistants. On the other hand, the contents of the subject reports created by the student assistants were actually used in the class. Although the student assistants did not devise unique learning materials, they did

complete their work efficiently and acquired some aspects of learning materials development. Therefore, it is suggested that the proposed method was effective and the teachers and student assistants were convinced during this practice.

In addition, the function in that teachers and students could share and edit the class outline and the contents outline was also very useful and such functions will be implemented to the COEdit tool in the future. Finally, since the procedure introduced in this practice was specialized for the subject report revision; this procedure should be extended as a future revision method applicable to general classes that focus on learning materials revision.

7. Conclusion

In this study, the subject report revision procedure of existing class design and learning materials was proposed based on the class design and the learning materials development method following the ID concepts. By working through this procedure through student participation, high-quality learning materials that could be efficiently used in classes were developed. In the subject report revision process, the class and the learning materials design support tool COEdit proved to be helpful and time efficient for the teachers as well as the students. Perhaps in the future, the subject report revision procedure would be extended as a method applicable to general classes that focus on learning materials revision.

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References

[1] Dick, W., Carey, L., and Carey, J.O. (2001) Systematic Design of Instruction (5th ed.), Addison-Wesley Educational Publishers Inc.
[2] Morrison, G. R., Ross, S. M., and Kemp, J. E. (2004) Designing Effective Instruction (4th ed.), John Wiley & Sons Inc.
[3] Sasaki, S., Arai, M., Furukawa, F., and Watanabe, H. (2008) Web-based Learning Material Development with Less Experienced Staffs' Participation, Proc. of International Conference on Computers in Education 2008 (ICCE 2008), 445–450.
[4] Sasaki, S., and Watanabe, H. (2010) Development of Class and Learning Materials Design Tool based on Instructional Design, Proc. of International Conference on Computers in Education 2010 (ICCE 2010), 265–269.
[5] Nakai, T., Yamasato, T., Nakajima, H., and Okada, T. (2003) e-Learning Handbook, Manahouse, Japan.
[6] Jung, I., Kubota, K., and Suzuki, K. (2008) Instructional Design by the OPTIMAL Model–Effective Method for Blended Type e-Learning, Tokyo Denki University Press.