

Title	コンセプトマップを用いた電子教材の評価に関する研究
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Citation	
Issue Date	2001-03
Type	Thesis or Dissertation
Text version	author
URL	<a href="http://hdl.handle.net/10119/1449">http://hdl.handle.net/10119/1449</a>
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Description	Supervisor:落水 浩一郎, 情報科学研究科, 修士

# Research on the Evaluation of the Electronic Teaching Materials with the Concept Map

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February 15, 2001

**Keywords:** Distance Learning, Electronic Teaching Materials, Concept Map.

## 1 Background and Purpose

Conventionally, a teacher teaches students in a classroom. This classroom learning approach is not the best way to provide lifelong education. It requires that students be in specific place at a specific time, which is difficult for working people. Several higher educational institutes have begun investigating ways to teach students in several age brackets. Distance learning over a network does not impose this condition. It thus opens up educational opportunities for people in wide range of circumstances(ages, income, location, gender, etc). Distance education using a Web browser over the Internet supports distributed and asynchronous learning. Recently, the Internet, broad-band network and low-price and high-performance personal computers have come into wide use. In such situation, Web-based learning approach is growing more popular, and many Web-based learning systems have been developed. Currently, various researches are made to support the Web-based learning. For example, there is the research based on the collaborative learning to solve the problems of the self-learning. However, a appreciate method of evaluating many Web-based learning systems is not developed.

In this paper, I propose a method of evaluation the Web-based learning systems by using a concept map. It is described by the relationship among the concepts which exists in the contents. I assume that a learner will recognize their insufficient understanding by the difference between the concept map made by him/her and the one by the teacher. The difference will also cause his/her self reflection. This result of self reflection make use of the feedback to the electronic teaching materials. So we think that the clues to find the poor function and insufficient contents will become clear.

## **2 The method of the Evaluation**

### **2.1 Concept Map**

The concept map is tool to represent the relationships among the concepts which exist in the contents. Building a concept map for a contents is an excellent way to become familiar with that area. It is another way of presenting information than writing a paper. Constructing a concept map helps in discovering conceptual units and the relationship among them.

To make the concept map, learners have to understand not the meaning of the concepts but the meaning of the relationships among the concepts. Now, I define that the concept map made by the teacher is Teacher-Concept Map, and the concept map made by the learners is Learner-Concept Map.

The method of evaluation the Web-based learning systems is as follows.

- Research the differences of the both concept maps, and estimate the place which learners don't understand well.
- Show the differences of the both concept maps to learners, make learners encourage their self reflection.
- After the study again, do the feedback to the electronic teaching materials, and evaluate the electronic teaching materials.

## **3 The evaluation of the electronic contents**

### **3.1 The definition of the electronic teaching materials**

In this paper, I define the electronic teaching materials as follows.

- Teacher-Concept Map
- Presentation
- System

### **3.2 The electronic teaching materials**

The electronic teaching materials which make use of this research is the Artificial Intelligence which is taught by the Prof. Satoshi Tojo, School of Information Science, Jaist. This is developed in Virtual University Project by Jaist, Kyushu Institute of Technology, and National Institute of Multimedia Education.

### 3.3 Learner-Concept Map Editor

The Learner-Concept Map Editor is the supporting tool of the making learner's concept map. Because the purpose of the Learner-Concept Map Editor is the supporting Web-based distance learning system, I implemented it by JAVA language which has the Applet which is possible to embed in the Web.

### 3.4 Evaluation experiment

I executed the evaluation experiment to verify the proposed evaluation method. In this experiment, I decided in advance the course of study from 1st lecture(Introduction) to 3rd lecture(Search2/2) in the Artificial Intelligence. Before this experiment, I made the Content Concept Map having the advice of the Prof. Tojo. Next, I made a testee that is seven student of Jaist, then made them study with this electronic teaching materials, and I decided the final result is the Learner-Concept Map.

After the experiment, I had compared the Learning-Concept Map with the Content-Concept Map, and dug up the differences from each learners. As the result, I estimate the place of learner's insufficient understanding. Next, I asked the question to the testee face to face about the cause of the differences in this concept map. Last, I made testee study with this electronic teaching materials again, and I made learners do the feedback to this electronic teaching materials.

As this result of the Learner-Concept Map mistake and this analysis result of the question and answer to the testee and questionnaire, I could clear the problems of the system and presentation.

## 4 Summary and Future Works

In this paper, I proposed the method of the evaluation of the electronic teaching materials to use the concept map which represent the relationships among the concepts in the contents. Then I verified that effectiveness.

The subjects for farther are considered as follows:

- the improvement of the problems in the electronic contents which was cleared by this evaluation
- the development the function of the automatic difference extract between the concept maps
- the practice of the evaluation experiment targeting the wide testee