Design of Learning Hyperspace Construction System for Knowledge Refinement in Self-Directed Learning

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Abstract: In self-directed learning, learners often finish their leaning with insufficient or incomplete knowledge. This is a serious problem for learners because they could not have an opportunity to improve their knowledge. One approach to improve their knowledge is to present them to others. In our research, we have focused on both of acquisition and publishing processes of knowledge and propose a method to specify and revise the errors in the acquired knowledge. In this paper, we describe the design and the development of the learning hyperspace construction system which based on the method to specify the incomplete or insufficient knowledge through a computerized presentation.

Keywords: self-directed learning, knowledge refinement, presentation rehearsal

Introduction

In self-directed learning, a learner chooses a learning object and a method for accomplish it. Recently, the learners can learn a many different kind of things via web. Additionally, they need to judge whether the learning is finished or not and select a resources for the learning. Therefore, to success the learning, learners must be able to judge whether acquired knowledge is sufficient. On the other hand, in the learning, it is hard for the learners to meta-recognize as these. Thus, the learners often finish their learning in an insufficient and incomplete knowledge state [1].

For the issue, to refine the learner's knowledge state, some previous studies have been supporting to promote their meta-recognition. Kashihara et al. have pointed out the possibility of supports for a learner's publication and a peer review of externalized knowledge [2]. In the peer review, the learners make an improvement of their knowledge state by criticisms from peers. We selected method of the presentation rehearsal as a type of peer review (e.g. correction of a paper, review on web). Because, this method enhances that the understanding of reviewer’s comments through discussion process. Additionally, we focused on the support for a review work to get a lot of reviewer’s comments [3].

For knowledge refinement, it is important for the learners to recognize an insufficiency or incompleteness of their knowledge correctly. The reviewer’s comments are not necessarily showing the parts of the presenter’s incomplete knowledge. Therefore, the presenter can not recognize the cause of the reviewer’s comments correctly from the indication obtained in the review. Additionally, the presenter may revise the slides in the insufficient and incomplete knowledge state. Thus, we focused on the back review process to enhance knowledge refinement. In our research, we propose the framework to specify the causes of the insufficiency or incompleteness of presenter's knowledge, and we also have designed a support system based on the framework.

1. Enhancement of Knowledge Refinement through Presentation Rehearsal

1.1. Main Concept

We focused on the back review of presentation rehearsal, because we attempt to enhance the learner's knowledge refinement by effectively utilizing of reviewer's comments. In the back review, the comments from the peers are not necessarily a representation of the parts of the presenter's incomplete or insufficient knowledge definitely. Therefore, the learners should find out what to refine with peer's comments. If the learners can verify the process to publish and learn, they can refine their knowledge by recognition of the parts of the knowledge. To achieve this, it is necessary to be verifiable their process. On the other hand, in many case, it is hard for the learners to verify them because of the invisible process.

1.2. Process Model for Specification of Insufficient or incomplete Knowledge

We proposed the process model of the knowledge refinement according to the creation process of the slides publishing [4]. This model is consists of knowledge publishing process and knowledge verification process.

In knowledge publishing process, the presenters make explicit representations of their knowledge. These knowledge representations are stored and utilized as resources to compose the presentation slides. In knowledge verification process, the presenters verify the creation process and their knowledge state with the comments has acquired in the rehearsal. If the presenters find defective knowledge, they should refine their knowledge through the relearning process. In this process, the learners relearn about necessary thing to refine their knowledge.

2. Learning Hyperspace

Kashihara et al. is described that annotating the web pages used in web-based learning is the effective method of knowledge reflection [5]. Therefore, when he/her accomplish the learning object, the learner associates a shorts note and bookmarks by a creating concept map. "It called summary of learning" (SL). Additionally, the concept map is used to organize and store the SL, because the learning objects have difference in level of abstraction. In the authoring process of a presentation slides, the learner chooses the concepts which are included the map and assembles them. At first, they make the presentation structure with the titles of the presentation and the concepts of SL. Then, they write a draft by relating a sentences with the structure, and make a script or slides. The learning hyperspace is a network built in such a method. We propose learning hyperspace as a method of representation and management the presenter's knowledge state.

3. Learning Hyperspace Construction System

To develop a prototype of the learning hyperspace construction system, the system consists of three tools. In knowledge publishing process, the learner uses "Knowledge Organizing Editor" and "Presentation Slides Editor". The first is used in the learning. The learner publishes their knowledge which is acquired in the learning. They store memos or bookmarks with tags which are the keywords of learning contents. When the learners accomplish a learning object, they organize stored resources by creating the SL using the tags. Thus, the resources are organized and stored in hierarchical way as a concept map. The

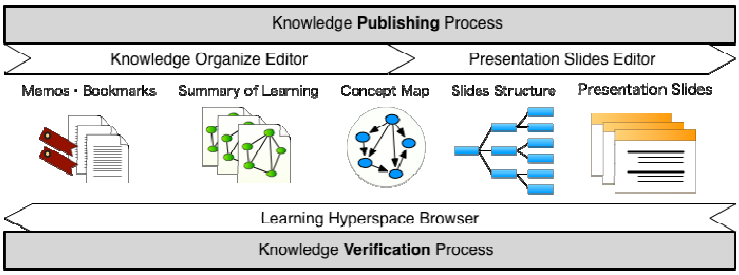

Figure 1: System Configuration

second is used in presentation slides authoring process. This editor can be used to create the presentation structure and compose presentation slides. The learner selects the required concepts from the learning hyperspace and creates the presentation structure using the concepts. Then, they write down details in the structure and create the presentation slides.

In knowledge verification process, the learners use “Learning Hyperspace Browser”. The learners recognize incomplete parts in the knowledge by browsing the leaning hyperspace. They can verify the knowledge state by to use learning hyperspace, because learning hyperspace is related with the resource used in the slide authoring process. Therefore, they able to refine their knowledge through slide verifying process and relearning process. We have been developing a prototype system of the learning hyperspace construction system. Figure 1 shows the configuration of the system.

Conclusion

In this paper, we design the learning hyperspace construction system based on the knowledge refinement model through presentation rehearsal. And we also describe the prototype system which we have developed based on the model. This project is ongoing. For consideration of the reflection method, we develop the Learning Hyperspace Browser continuously.

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