An e-Learning Library on the Web

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Abstract

The main topic addressed in this paper is how to help learners select some instructive hypermedia-based learning resources according to their learning contexts from the Web. Our approach is to provide a digital library for web-based learning called e-Learning Library, which includes learning resource repository, local indexing, and adaptive navigation support. This aims to promote their learning with diverse learning resources involving a certain topic.

1. Introduction

Learning with existing web-based resources has become popular and important. Especially, there are diverse learning resources with the same learning topic, which are designed by different authors [6]. Properly using these web-based resources, learners can learn the topic from diverse points of view. However, most resources do not usually have clear description such as what kind of learners should use, what kind of learning goal can be achieved and so forth. This makes it difficult for learners to select web-based resources suitable for their learning contexts.

Our approach to this issue is to provide a digital library for web-based learning called e-Learning Library in order to promote learning a certain topic from diverse points of view. In the following sections, we propose three key ideas towards realization of the e-Learning Library.

2. e-Learning Library

2.1 Learning with Existing Resources on the Web

In this paper, a learning resource means hyperdocuments, which describe a learning topic within a web site. It provides learners with hyperspace that consists of a number of web pages and their links. Learners can explore the hyperspace to learn domain concepts/knowledge [2]. On the Web, in addition, there are a number of learning resources with the same topic, which could facilitate diverse learning phases such as augmenting or applying domain concepts/knowledge. Properly using these learning resources according to learning contexts, learners can learn the topic from diverse points of view. This paper especially describes a web-based learning that makes use of diverse learning resources embedding a certain topic to promote learning.

Following Bloom’s taxonomy, we classify the learning phases into accretion, understanding, and stabilization [1]. We view web-based learning as learning a topic in three phases and as the transition among the phases. The transition among three learning phases is expected to occur according to completion or impasse of learning in a phase. Learners can start learning from any learning phase according to their knowledge states, and are expected to finally stabilize their knowledge.

2.2 Framework

In learning a topic, learners would select a learning resource according to their knowledge states. When learners use search engines or collections of learning resources with a keyword representing the topic, they may get too many resources as search results and such results information do not usually have clear description about which learning phase could be facilitated. Therefore, these make it difficult for learners to select instructive resources according to their learning contexts. One way to resolve these problems is to provide a digital library so that learners can select more proper learning resources.

The digital library is a digitized collection of material that one might find in a traditional library. There currently exist many digital libraries, which collect, store, and organize a large number of multimedia resources on the Web. These libraries are mostly focused on the tools for indexing, retrieval and visualization [3]. In order to construct a digital library for web-based learning discussed in above, especially, indexing and retrieval in the digital library are very important. So, we propose an e-Learning Library, which consists of learning resource repository, local indexing, and adaptive navigation support in Figure 1.

3. Learning Resource Repository

Learning resource repository is a collection and storage module of a great number of web-based learning resources reorganized by indexes called resource indexes representing their characteristics.

3.1 Resource Index

There exist many web sites gathering URLs of web-based learning resources. These sites use resource indexes, which mainly represent learning topics/subjects to classify the learning resources. These indexes allow learners to select learning resources from a “what to learn” point of view. However, such indexes are not enough in selecting learning resources since the learners would
usually think of not only "what to learn" but also "how to learn" especially in which learning phase they can learn.

We have consequently provided resource indexes that consist of How To Learn (HTL) indexes in addition to conventional What To Learn (WTL) indexes, and have proposed a way to reorganize learning resources. In helping learners select learning resources proper for the transition between learning phases, learning phases is first most important as HTL indexes. In helping learners continue learning in a phase, second, some HTL indexes are necessary for differentiating some learning resources that could facilitate the phase. Considering web-based learning resources with the same topic, media types (such as text, diagram, chart, illustration, etc.) and communication channels (such as simulation, chat, BBS, etc.) would have an influence on how to learn (See [4] for more detail).

3.2 Global and Local Repositories

An important issue towards the reorganization is how to apply WTL and HTL indexes to web-based learning resources. The resources should be generally indexed with indexes given by the authorities concerned, which indexes public learners can share. However, we have difficulty in following this idea. Although WTL indexes, media type, and communication channel indexes can be shared, it is quite difficult to share learning phase indexes since learning phase specified by a web-based learning resource depends on which knowledge level the learners have.

Following the above discussion, we have proposed a framework for developing the learning resource repository. We have first implemented a global repository whose resources are classified with WTL indexes, media type, and communication channel indexes. The learning resources have been gathered from registrations of learning resources and from some resource collection sites on the Web. In our framework, teachers/instructors next take their learners into account to apply learning phase indexes to the global repository, reorganizing a local repository. The way of such indexing is discussed in the next section.

4. Local Indexing

In order to apply learning phase indexes to the local repository, we propose a practical approach that individual teachers/instructors assess the learning phase indexes from their points of view. We call this approach local indexing. In the local indexing, each teacher/instructor can index learning resources on the assumption that his/her learners use them. Different teachers/instructor may accordingly index a learning resource with different indexes. The local repository built from the global repository with the learning phase indexes helps the learners select more instructive learning resources according to their learning contexts.

In indexing learning resources, teachers/instructors may have difficulty in assessing the learning phase indexes since the indexing often requires careful reading of the contents of learning resources and since there exist a great number of learning resources. This paper accordingly proposes a support module for the local indexing, which allows teachers to assess learning phase indexes in a simple and consistent way.

How to compose learning resources would generally depend on a learning phase assumed by designers of the learning resources. This suggests that the learning phase indexes can be assessed from the structure/function of learning resources. In order to make this indexing possible, we make clear the correspondence between the structure/function and the learning phase. The items of structure/function are presented to teachers/instructors in the form of checklist, by which they can assess the learning phase in a simple and consistent way (See [4] for more detail).

5. Adaptive Navigation Support

Although the resource indexes allow learners to search learning resources they want to learn, it is still difficult for them to select a learning resource in accordance with their learning contexts to promote learning from knowledge accretion to knowledge stabilization. We have accordingly proposed a navigation support, which recommends learning resources to be learned next according to learners’ knowledge states and needs.

The main aim of this support is to promote learning of a specific topic with diverse learning resources so that learners’ knowledge can be stabilized. For this aim, in particular, the support attempts to facilitate the transition among learning phases and to change media types and communication channels for promoting learning in one phase.

In navigation support, we consider two knowledge states: impasses and completion of learning a resource. Learners are asked which knowledge states they reach after learning the resource. If necessary, they can also demand change of media types and communication channels for a learning resource to be learned next as their needs.

The learning resource recommendation uses learners’ knowledge states and needs given by them to make a list of learning resources to be learned next. The learning resources are put in the order of priority. The aim of the recommendation is not to give the learners the most instructive resource from the repository. The list provides them with a guide in selecting a learning resource next (See [5] for more detail).

6. Conclusion

In this paper, we have described e-Learning Library with learning resource repository, local indexing, and adaptive navigation support, which makes use of diverse learning resources involving a certain topic to promote web-based learning.

In the future, it is necessary to evaluate the e-Learning Library. We would also like to develop a more practical system and make it public as web-based learning portal site.

References