# Resource Organization System for Self-directed/Community-based Learning

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**Abstract:** The main topic addressed in this paper is how to find and organize learning resources in Web-based learning. In this paper, we propose a multi-layer map model which provides learners with structure of the resources explicitly and to share the suitable resources via the map representations. We also develop a system, based on the model proposed, enables not only individual learners can easily organize related learning resources as personal topic maps but also they can share a community topic map which merges the personal topic maps created by the individual self-directed learners.

**Keywords:** Web-based Learning, Resource Map, Self-directed Learning, Personal Topic Map, Community-based Learning, Community Topic Map

## Introduction

With the rapid development of the internet, it has become possible to overcome the restrictions of time and place for self-directed learning. Such learning has been demonstrated to enhance the learning process [5], but often requires learners not only to navigate Web pages to find proper resources but also to control the navigation and knowledge construction processes [3]. As a result, Web-based self-directed learning has become an important research issues in the recent decade. Our approach to resolve this issue is to integrate self-directed learning into community-based learning in which the learners have informal community-centered communications [2]. Community-based learning also attracts much attention along with the fast development of the Web technology. However, it is difficult for the learners to get suitable learning resources to their learning process from community-based learning without suitable communication platform. In order to solve this problem, we propose a resource organization system which makes the connections between the actual Web contents to the learning topics by multi-layer map visualization. In this paper, we describe the design of the learning environment and the current research situation concerning the system development, which is aimed to provide supports in the process of self-directed learning and community-based learning seamlessly.

## 1. Issue Addressed

### 1.1 Difficulties in Self-directed Learning

In the process of web-based self-directed learning, learners can navigate a vast amount of Web-based learning resources to achieve their learning goals. Such resources usually

provide them with hyperspace so that they can navigate in a self-directed way by following links among the pages. However, the large amount of available information on the Web makes it very difficult for the learners to locate suitable resources about particular topics of interest. Secondly, it is difficult for them to organize the found ones. Beginners at self-directed learning sometimes lose sight of their learning goal because of the complexity of the hyperspace. Such navigation problems are major issues, and have been discussed regarding the developments of educational hypermedia/hypertext system [1].

*1.2 Self-directed Learning and Community-based Learning*

Community-based learning means a process of communication by the community members with the similar learning goals for the purpose of encouraging each self-directed learning activity, and makes it possible to conduct informal communication as feedbacks for the individual self-directed learning processes. Therefore, such features of community-based learning have possibilities for solving some problems in self-directed learning. Instead of searching on the web, it would be greatly helpful especially when it comes to locating suitable learning resources, the suitable ones might be already collected by other users. However, it is also difficult to integrate self-directed learning into community-based learning and be aware of the suitable ones collected by the other users. In order to solve this problem, Multi-layer Map Model is proposed in this paper.

## 2. Approach

Multi-layer Map Model [4] is the core of the learning environment proposed which is intended to perform as a GUI for self-directed and community-based learning. Figure 1 shows the four layers model with different functions dependent on the services provided by their nearest layers. The model provides the community members with communication basis via superposed map representations. It mainly focuses on visualizing the structure of learning contents in term of resource maps, and then enables learners to edit or reconstruct personal maps according to their learning processes. Moreover, this model includes community topic map where the personal topic maps are merged, viewed and used by other community members.
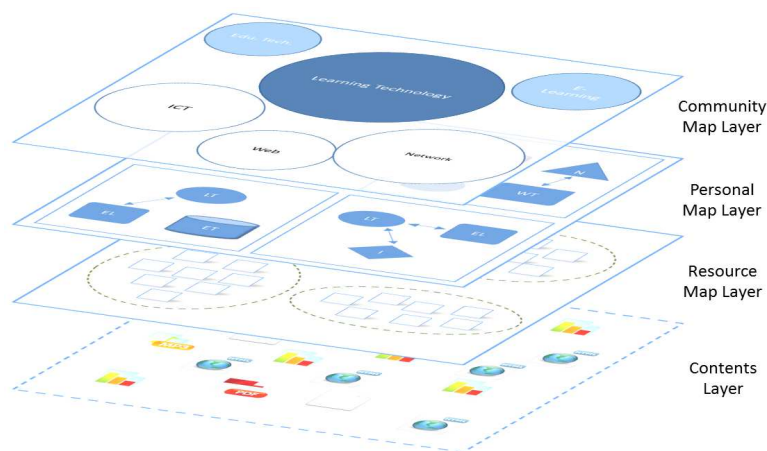


**Figure 1 Multi-layer Map Model**

## 3. System development

Figure 2 shows interfaces and workflows of the developed system. Learners can first use the embedded search engine API to select links with most relevance of their interest from the Web. Local crawler next gathers information from the chosen links to web pages in a much deeper level. And then the system generates spatial maps as the resource map automatically based on the results crawled by the local crawler. It shows the structure of the crawled URLs in form of nodes labeled with page titles. By clicking each node, the learners can access to the real contents behind it. Then, the system enables the learners to collect nodes by related topics, and learners can edit their personal topic maps simply by dragging and dropping selected nodes.

The system next merges necessary information (number of users under one topic, number of learning resources under one topic, and number of shared learning resources among topics) of the personal topic maps and presents it in the form of the community topic map. Relevance with learner's topic (Colors of bubbles), relevance among topics in the community topic maps (distance between bubbles) and the number of learning resources under one topic (size of each bubble) give the learners hints for making choices. After clicking selected bubble, learning resources will be represented with nodes labeled with title. Users create their personal maps by referencing the resource map and the community topic map. And on the contrary, the personal topic maps contribute to the community topic map too.
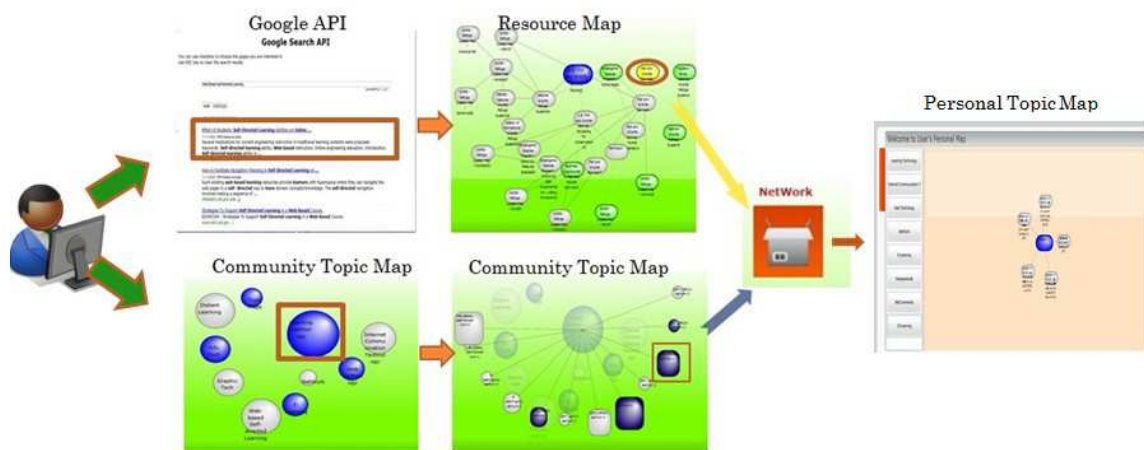


**Figure 2 System Flow**

## 4. Conclusions and Future Work

By using Microsoft .NET framework and Silverlight interface, the development is nearly finished. In the near future, we will conduct experimental case studies to analyze every step of the learning process when using this system.

## References

[1] Brusilovsky, P., (1996). Methods and Techniques of Adaptive Hypermedia, *Journal of User Modeling and User- Adapted Interaction*, 6, 87-129.

[2] Fujimoto, R., Hasegawa, S, Miura, M, & Kunifuji, S, (2006). Development of Community Based Learning System at a University, *Information and Creativity Support Systems (KICSS2006)*, 66-71,.

[3] Kashihara, A. & Hasegawa, S, (2005). A Model of Meta-Learning for Web-based Navigational Learning, *International Journal of Advanced Technology for Learning* (pp.198-206). Vol.2, No.4, ACTA Press,

[4] Li, H., & Hasegawa, S., (2010). Multi-layer Map-oriented Learning Environment for Self-directed &Community-based Learning, *International Workshop on Models, Methods, and Technologies for Learning with Web Resources (ICCE2010),* 109-116.

[5] Thuering, M., Hannemann, J. & Haake, J. M., (1995). Hypermedia and cognition: Designing for comprehension. *Communication of the ACM*, Vol.38, (8), 57-66.