SCORM Based LMS Design for e-Learning

Seoksoo Kim, Wooyoung Soh
Hannam University, South KOREA
sskim@hannam.ac.kr

Abstract-The core purpose of the system proposed in this paper is to help learners pursue proactive and self-oriented education by allowing learners to proactively configure their own content, that is, learners no longer have to be restricted by prescribed sequence of lectures.

Although a variety of standardization and Learning Management System (LMS) were produced to develop and effectively manage web contents in response to active diffusion of internet application, practical changes to assist online learners are not yet to be found.

In this paper, I would like to introduce a LMS that can support self-leading education by providing various types of learners at Virtual University with delicately organized educational contents for maximum efficiency. The system allows a learner to select a lecture or a chapter which has been presorted to meet his educational needs and intellectual ability.

In general, most LMSs cannot meet every individual's educational needs because they structure their programs by letting learners simply choose from a list of available lectures at prescribed level or difficulty. However the Self-Leading LMS eliminates such boundaries by allowing learners to choose contents and difficulty within the limit set by their own educational competence.

Keywords: SCORM, LMS, e-learning, database, multimedia.

1. Introduction

Responding to the growing popularity and interest that online education has gained, solutions for effective online education system and standardization which allows compatibility of contents among different systems were developed. Among them, the most prominent standardization is proposed by Sharable Content Object Reference Model (SCORM) developed by Advanced Distributed Learning (ADL). Online education systems and contents, when developed based on the SCORM standard, can be implemented in other systems without needs for configuration and organization of contents can be easily edited. Content is composed of a SCO and SCO contains chapters which constitute contents. Based on the standardization of SCORM, maintenance of contents can be easily done and SCORM can be configured and customized by learners to meet their specific educational needs[1,2]

However, although contents are delicately divided, it is the administrators or contents producers who have the control over the organization of contents. In reality, learners have to follow prescribed steps regardless of their knowledge or level of educational competence. When it comes to a virtual college where levels of educational competence among learners greatly vary, it is very tough for instructors to offer contents that can meet individual educational needs. For instance, those with sufficient knowledge in a specific subject would not want to learn basic or introduction portion of the subject. Unlike offline education which requires face to face interaction, virtual university can give a variety of people an opportunity to take advantage of self-leading education by selecting contents that meet their specific educational needs. By selecting contents of their needs, learners can heighten their self-satisfaction and enjoy academic achievements at the same time[3,4]. This paper addresses the problem stated beforehand and presents relevant research and implementation of solutions that can allow learners to set their own difficulty of the contents they select.

2. Strengths and Weaknesses of Online Education

"Open Education" can be possible within an environment where everybody can learn wherever they are and whenever they want. Today's highly developed computer network makes "Open Online Education" possible by combining the offline "Open Education" and benefits of internet technology. "Open Online Education" is considered a very effective means of education because it frees people from physical and time limitations that

employees face: For example, employees can set their own time for education which makes it a proactive learning experience. Many researches done on this subject and numerous case studies assert that computer network, which has an ability to overcome space and time and help learners exchange information cooperatively, can establish learner-oriented educational system.[5,6]

Unfortunately, except for the fact that individuals can learn in their home instead of a classroom and set their own time instead of following a prescribed schedule, difference between online education and offline education is minimal. So far, the most common type of online education has targeted only at the majority of people and unilaterally delivers educational information to its learners. However, educational achievement can be possible when contents can be prescribed to meet specific educational needs of an individual.[7,8]

3. Suggestions and System Requirements

As I have presented, the needs for standardization of online education has become increasingly important and SCORM has been positioning itself as the standard of online education. As of now, using search and category functions, reorganization and maintenance of contents became easy, however, service provider organizes contents for his learners to search and register a lecture of their choice. In this paper, I would like to present a solution that can allow learners to choose lecture contents for each subject[9,10].

The figure #1 illustrates a SCORM based LMS which is supplemented with the self-leading type of process management service.

In fact, the LMS discussed in this paper is based on the implementation of features related to self-leading type of process management service because not all SCORM based LMS share same type of database organization and contents management implementation via meter information.

The purpose of this paper is to build a system that can allow learners to choose contents of their educational level, learn to achieve educational goals, and move onto the next level. The system offers detailed information, such as completed courses and prerequisites of lectures that a learner has to know before registering a lecture. Once he selects a subject, the system illustrates subject contents that are categorized by chapter and difficulty. With the given information of the subject, he can confidently select his own contents to be studied. Organization of the proposed system is as follows:
1) DB server which contains SCO information
2) Module which allows administrators and instructors to input detailed contents
3) Webpage module that can illustrate detailed information of each subject and its contents for learners to choose.
4) Module that can organize educational process for each subject according to the specific requirements and needs that a learner requests.
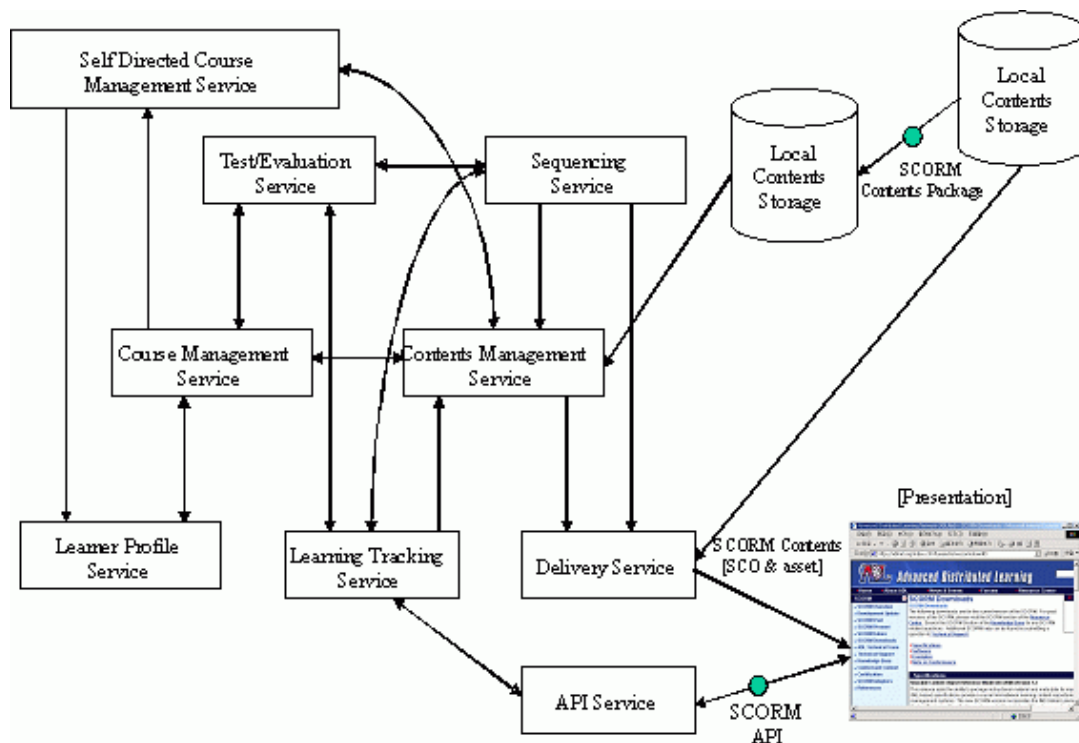5) Module that can operate in conjunction with LMS and contents for learners to use.

Figure 1. LMS System Service Diagram

Author names and affiliations are to be centered beneath the title and printed in Times 12-point, non-boldface type. Multiple authors may be shown in a two- or three-column format, with their affiliations italicized and centered below their respective names. Include e-mail addresses if possible. Author information should be followed by two 12-point blank lines

4. System Organization

As shown in the figure #2, contents information is uploaded using the information input module. Based on the information of the learner in DB server, he can choose contents that the system allows. "Information Input Module" inputs and edits detailed information of contents in DB server. " Learner Request Module" , based on the learner information, shows a list of available subjects to the learner.

Then the learner can compose his own contents according to the difficulty level that he chose. "Learning Process Generating Module" generates a learning process for the contents selected by the learner and stores the result in DB server. Lastly,

" Learning Module optimally services the selected contents to the learner.[11,12]

4.1 SCO Information Input Module for Administrators and Instructors

This module registers contents of lectures established by LMS administrators or instructors and inputs the registered contents. Detail contents information would possess the following information: learner's year in school, completed subjects, open lectures, available level, and grades after completion.

The sequence the module's information input, as illustrated in a flowchart of the figure #3, starts off with the page where a learner's ability is confirmed and available categories, which can be registered, are displayed. For administrators, all available subjects are displayed and for instructors, categories in progress are displayed. When selecting specified category's subject, administrators and instructors can input or edit detailed information for each chapter. Once the input is completed, information stored in DB is renewed. If there are no errors, the system will direct to the categorical page and if there are errors, the system will direct do the contents registration page.
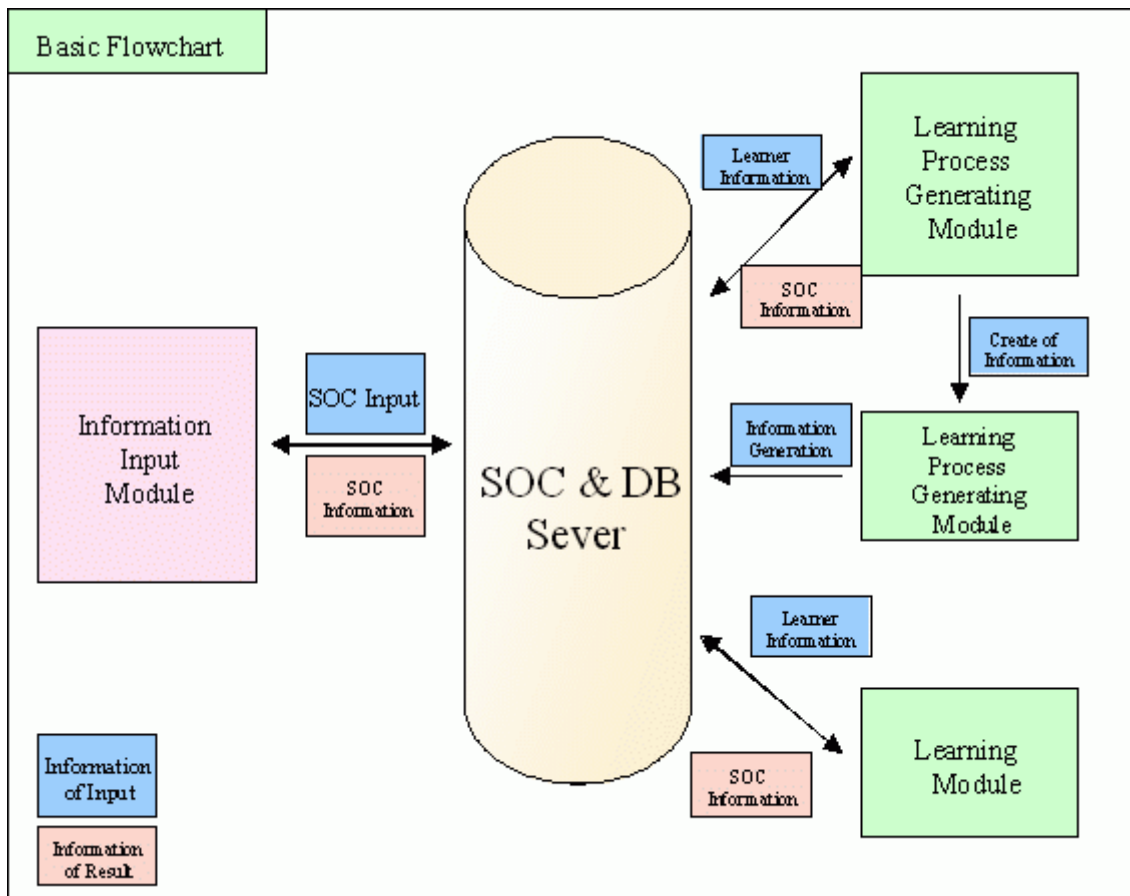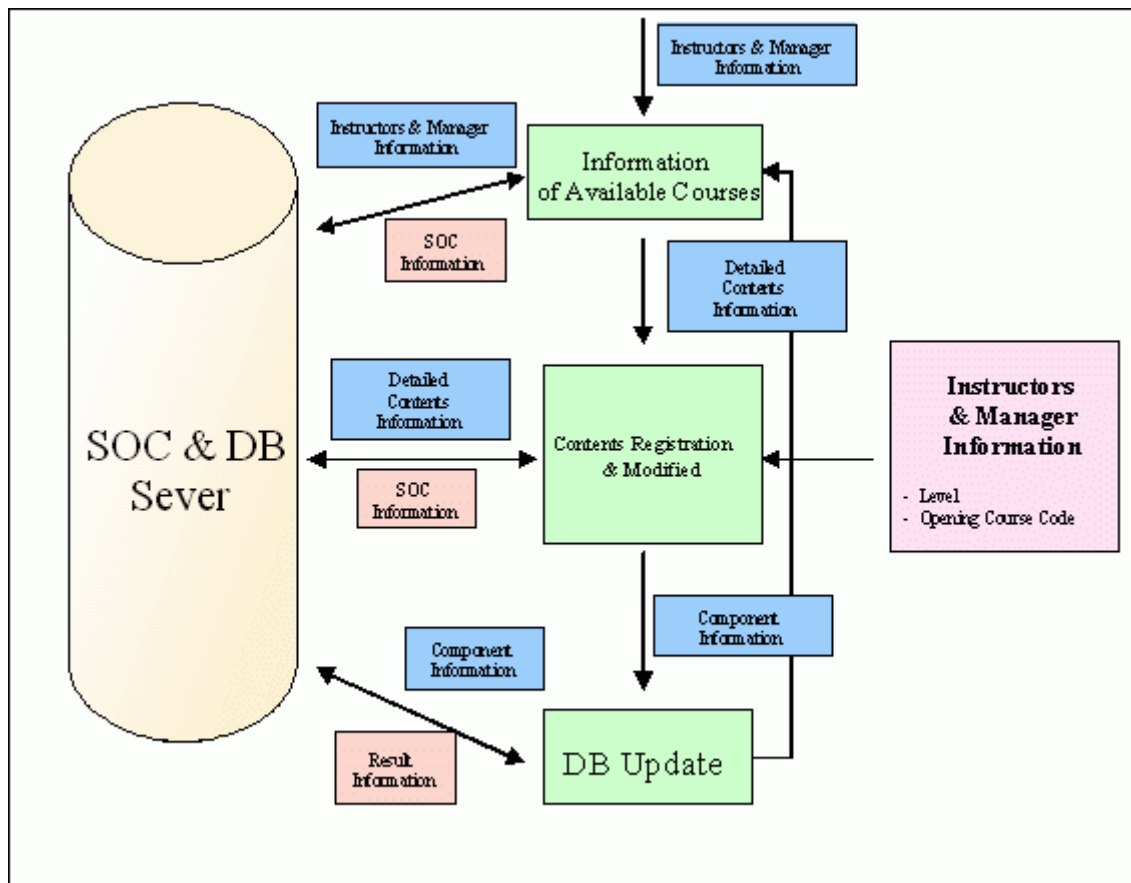

Figure 2. System Basic Flowchart

Figure 3. Input Information Module Basic Flowchart

4.2 SCO & DB Servers

SCO & DB servers are database servers that contain required information for the proposed LMS. They basically manage information of contents and instructors and learners. ① Detailed Contents Information, ② Instructors Information, ③ Learners Information, ④ Information of Available Courses.

Detailed contents and information of available courses are shared among instructors because it is not always just one instructor who makes up the entire contents for a course.

Thus, learners can easily find out about other courses that are complementary to their selected courses. To determine competence level, points are given discriminately based on learner's occupation, major, depth of knowledge of the selected subject. As a learner completes a course and move on, he will gain points and eventually get to the higher level. Educational competence levels are A, B, C, and D and levels based on occupation are A for professionals, B for students, C and D for others based on their depth of knowledge and job descriptions.

4.3 Learning Process Request Module

Learning Process Request Module displays available subject for learners. Once a subject is chosen, the module will show detailed information for each chapter of the contents so that learners can choose that fits his level and complete his registration request. For those who do not want to organize the contents, instructors will determine basic organization contents.
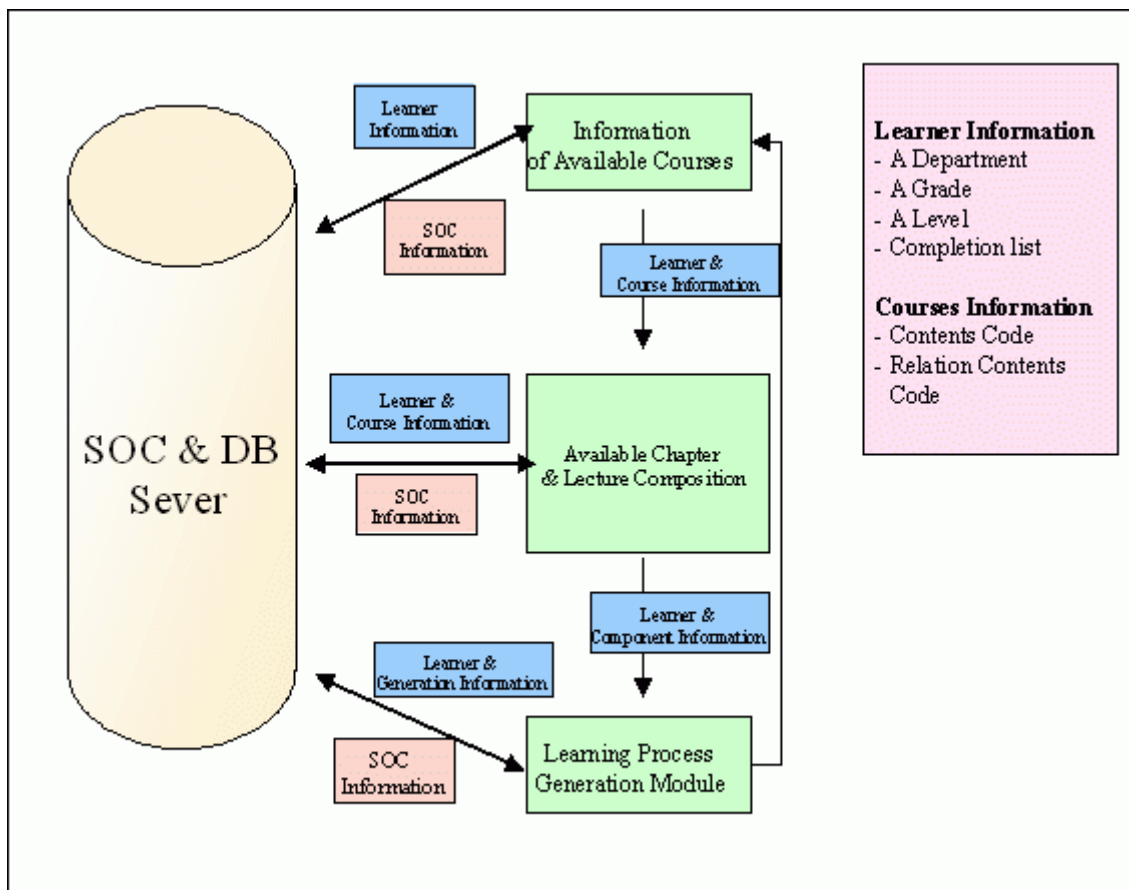
Figure 4. Learning Process Application Module Basic flowchart

Learning Process Request Module is activated once a learner requests course registration. Based on the information submitted to DB server, which includes major, year in school, and competence level, the module displays available courses and their information on the "Available Courses Page" and prerequisites for non-available courses. If a course is selected, the learner is taken to the page where available chapters are displayed based on the contents information and his background information. There, only the available courses for his level are displayed for him to choose and organize. Once registered courses are confirmed be the learner, he can call up the subject organization page using information of selected subject and his background information. Based on the detailed contents information received from DB server, Learning Process Request Module generates contents sequence in the order requested by the learner and moves to the "Available Courses Page" after storing the sequence into DB server.

4.4 Learning Process Generating Module

Learning Process Generating Module organizes selected categories in order. The module helps the server operate more efficiently and minimizes responding time by storing contents information into the registered subject DB, thus, eliminating needs for searching and organizing contents repeatedly.

As shown in the picture, Leaning Process Generating Module stores contents information selected on the lecture configuration page. Using the information, the module searches for the requested detailed chapter contents in DB server and generates SQL prompt. If SQL is executed without error, the search is repeated until the selected category is completed.

4.5 Learning Module

Learning Module allows learners to take courses by displaying selected lectures. Learning Module displays categorized registered subjects using the learners information. Once a subject is selected, available lectures are displayed. Lecture window is launched upon completion of lecture selection process.

5. Conclusion

Although a variety of standardization and Learning Management System (LMS) were produced to develop and effectively manage web

contents in response to active diffusion of internet application, practical changes to assist online learners are not yet to be found.

In this paper, I would like to introduce a LMS that can support self-leading education by providing various types of learners at Virtual University with delicately organized educational contents for maximum efficiency. The system allows a learner to select a lecture or a chapter which has been presorted to meet his educational needs and intellectual ability.

The further research areas include the followings:

1) Subdivision of selected educational contens.

2) Restriction on selectable chapters in regards to educational achievement.

3) Reorganization of remaining contents during learning process.

The features discussed above should assist learners in case they choose difficulty without a full knowledge of their educational ability by allowing them to choose difficulty again according to their ability. Further research on Self-Leading LMS should be done to decide how much subdivision of subject contents should be done to achieve maximum efficiency.

References

[1] standard,http://www.onstudy.com/ CyberNews /CyberNews_view.asp?no=56

[2] SCORM, http://www.edupd.com/learn/standard 05.htm

[3] XML : my.dreamwiz.com/aphise

[4] Long, H. B. and et. al.. Self-directed learning: Research and application. Norman , OK: The Oklahoma Research Center for Continuing Professional and Higher Education, 1992.

[5] Flora Chia-I Chang, "Intelligent assessment of distance learning", Information Sciences, Vol.140 No 1, pp 105-125, 2002.

[6] B.Willis, "Effective Distance Education Planning: Lessons Learned, Educational Technology," Vol.38, No.1, pp.57-59,1998

[7] Barry Kort and Rob Reilly, An Affective Module for an Intelligent Tutoring System,"ITS 2002, LNCS 2363, 2002.

[8] Frasson, C et. Al, "LANCA: A distance learning architecture based on networked cognitive agents," Intelligent Tutoring Systems, pp. 593-603, 1999.

[9] Critical Business Benefits of an LCMS, LCMS Council Panel at the Online Learning 2002 hall.com.

[10] Hall, B., & LeCavalier, J.(2000). E-learning across the enterprise: the benchmarking study of best practices. CA:Brandon-hall.com

[11] Banan, B., Miheim, W.D.(1997). Existing web-based instruction courses and their design, in B. H. Khan(Ed). Web-based education. 381-388. Englewood Cliffs, NJ: Educational Technology Publication.

[12] Harasim, L.(Eds.). (1990). Online education : Perspective on a new environment. New York: Praeger.