

u-Learning UCC Contents Authoring Systems based on Learning Activities

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ABSTRACT

With the development of information communication and network technologies, ubiquitous era that supports various services regardless of places and time has been advancing. The development of such technologies has a great influence on educational environments. As a result, e-learning concepts that learners use learning contents in anywhere and anytime have been proposed. The various learning contents authoring systems that consider the e-learning environments have also been developed. However, since most of the existing authoring systems support only PC environments, they are not suitable for various ubiquitous mobile devices. In this paper, we design and implement a contents authoring system based on learning activities for u-learning environments. Our authoring system significantly improves the efficiency for authoring contents and supports various ubiquitous devices as well as PCs.

Keywords: u-Learning, Learning Activity, LMS, Contents authoring System

1. INTRODUCTION

Over the last few decades, information and communication technologies have been improved greatly and computers have become more widespread. In particular, ubiquitous computing is a new trend of information and communication technologies, in which we embed a huge number of tiny computers into an invisible part of the fabric of everyday life. Ubiquitous computing provides computing for all: access to anything, by anyone, at anytime and anywhere. As a result, education has undergone major changes in recent years[1],[2]. E-learning is the concept including all system of educations that are provided by using the electronically simulated environment including the web. E-learning is done at a computer that is usually connected to a network and gives us the opportunity to learn almost anytime, anywhere as an alternative to a traditional classroom education. E-learning takes place in an electronically simulated environment. E-learning falls into two categories. Such as: Asynchronous training and Synchronous training. With asynchronous training, students can interact with other students

or instructors through e-mail, online discussion groups and online bulletin boards. Synchronous training is a real-time method of e-learning with live interaction between the instructors and students. It is called so because students have to log in at a specified time and the classes will be held for a specified period of time. With e-learning, students don't have to physically attend classes, seminars or training programs. E-learning is web-based so participants don't have to spend a lot of time away from their work. E-learning also allows for more participants than traditional learning methods since the number of participants is not considered by venue limitations[9].

Now, the assimilation of ubiquitous computing in education marks another great step forward, with the advances of ubiquitous learning through the concept of ubiquitous computing[3],[4]. This is called as u-learning, the concept of the next generation of the e-learning concept. The u-learning is a compound word of the ubiquitous and learning[5]. U-learning is an online learning system which can after the education with low cost at anytime and anywhere. That is, the e-learning service can be received in a home, the school, and an office and in transit through the various digital media and devices with an embedded training as well as the web based learning, and etc. The ubiquitous environment was gradually developed so that the education can become possible without the limit of the time

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and space. The effectiveness of education is able to be obtained by grafting the technology onto the environment of education.

The e-learning authoring tool for producing the contents is one part of the e-learning solution field[6]-[8]. The efficient e-learning contents authoring tool is one of the important factors in the e-learning contents society, since it helps to easily make the various contents. The authoring tool for making the education contents has instructors easily make and register their learning contents to a server. The complicated and difficult authoring tool gives the difficulty of use to instructors which aren't accustomed to a computer. Consequently, the teaching designer has again to make the lecture program which an instructor provides. This method is used for the more special instructional design. However, it is impossible that teaching designers understand the special content of the various fields. If an instructor is directly able to make the lecture contents with the offer of the authoring tool in which is easy to use, it can enhance the quality of the lecture contents as well as the cost.

In this paper, we design and implement a contents authoring system based on learning activities for u-learning environments. Our authoring system significantly improves the efficiency for authoring contents and supports various ubiquitous devices as well as PCs.

The rest of this paper is organized as follows. Section 2 analyzes the existing learning contents authoring tool and describe their problems when they are applies to the u-learning environment. Section 3 describes our proposed system. Section 4 describes an example and result about the content that it is implemented. Finally, we discuss conclusion in Section 5.

2. RELATED WORKS

2.1 The Contents Authoring System

LAMS is one of the most popular contents authoring tools. LAMS is collaborative learning activity management system for designing the learning activity on online and to manage it. LAMS provide visual multimedia data construction environment for generate, store, and was created learning activities that together and sequentially by quarter. The learning process can be easily configured by using drag & drop. This work flow model is a characteristic of LAMS. LAMS provides sequential learning environment that distinguished from other contents based learning management system. The advantage of sequential learning management system is the point that a learner learns as author designed it. Therefore, students do not lose direction during the learning. LAMS provide the interactive environment and design environment for online cooperative learning.

Figure 1 shows contents authoring environment of LAMS. LAMS provides visual learning design environment. Author can make lecture with move activities on the left side of the screen to the right canvas, and enter the property. The possible activities are *Submit Files*, *Chat*, *Notice board*, *Journal*, *Q&A*, *Voting*, *Forum*, *Share Resources* and *Survey*.

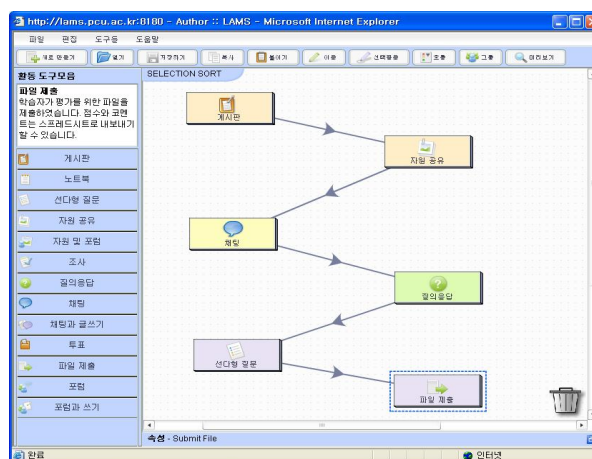


Fig. 1. Learning contents authoring environment of LAMS

2.2 The problems of the existing system

The problem of the existing system can be divided into three kinds.

First, the learner comes to accomplish learning activity generated by author in LAMS. By the flow of sequential learning activities, students is possible by a direction of the learning that author decided. However, each learning activities will be allowed only to the sequential approach from start learning activity to last learning activity. Therefore, accomplishment of a review and the repetition learning activity is impossible for learning activity completed in the past.

Second, multi-media data(such as video and images) that posted to the Web site are available for learning activities. However, LAMS do not provide a own video and an image editing tool. Therefore the user must make content by a separate video and image editing program.

Finally, the u-learning environment, which is used in the devices such as PDA, cell phone and PMP is different from PC environment in screen resolution, data processing capabilities, processing power, network speed, and in terms of hardware. However, the learning contents produced in LAMS consider only the Web browser environment of the general PC, and the service for the u-running environment is not good.

In this paper, we resolve these problems and propose u-learning contents authoring system with ubiquitous environment.

3. U-LEARNING CONTENTS AUTHORIZING SYSTEM

3.1 System Architecture

Figure 2 shows our supposed Learning Contents Authoring System. Users can access u-Runner server by web, then admittance of users is separated with role of user. u-Runner server determines graphic interface of each user due to device types. If the device of a user can support high screen resolution and high data processing performance, then u-Runner system provides proper layout of a page. If device of user is PDA or Cell phone that supports low screen resolution and low data processing performance, then u-Runner system services page of low quality and data of low level. Joined user can use both the Learning Contents Creator and the Learning

Contents Viewer with purpose.

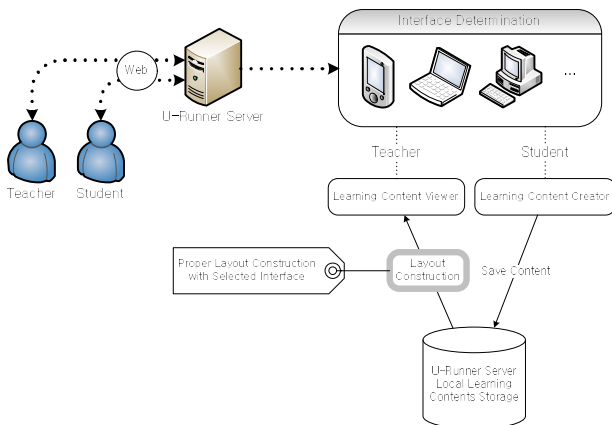


Fig. 2. Operation of the proposed system

In our system, user can access as professor for create learning content. A professor designs learning sequence based on learning activities and describes content of each activity using Learning Contents Creator. Figure 3 shows XML data of learning content using our system that include learning sequence and content information. Sequence of each the learning activities is represented by arranges of XML elements and content of each learning activities is represented by attribute values of XML elements.

Students use the created learning contents by Learning Contents Creator with Learning Contents Viewer. Learning Contents Viewer can attend specified learning contents in database. Layout Construction functions of Page Builder in Learning Contents Viewer make user interface page based on XML data of learning content. This processing method can reduces redundancy of learning content and manufacturing load of producer because making interface of many devices is unnecessary.

```

<? xml version="1.0" encoding="utf-8" ?>
<Activity_List>
  <Note_Book>
    <Context_No>10</context_No>
    <Linked_File>http://203.255.92.100/...</Linked_File>
    ...
  </Note_Book>
  <Chat>
    <Context_No>11</context_No>
    <Room_Name>Lecture 01</Room_Name>
    <Subject>Future of the u-Learning</Subject>
    <Date>20081101</Date>
  </Chat>
  ...
</Activity_List>
  
```

Fig. 3. XML based learning content structure

3.2. Multimedia Editing Tools

Our system includes a multimedia editing tool that improves the utilization of multimedia contents over the existing systems. Figure 4 shows operation of multimedia editing tools in our systems. At first, User upload original multimedia source on temporary directory of server. At next, User edit original source on temporary directory using editing module in tools and update. Finally, these multimedia data is serviced to users.

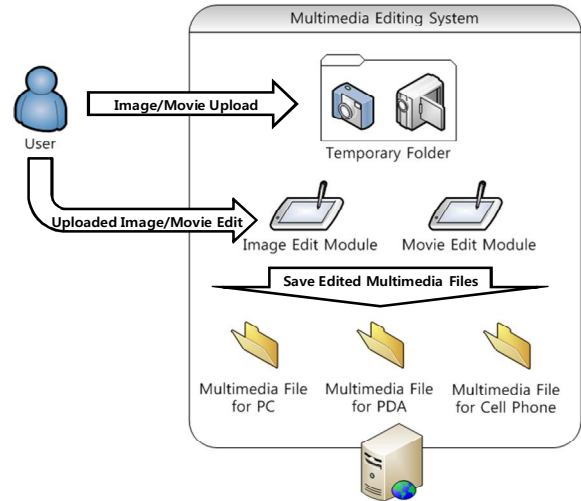


Fig. 4. Operation of Multimedia Editing Tools

3.3. Learning Contents Creator & Viewer

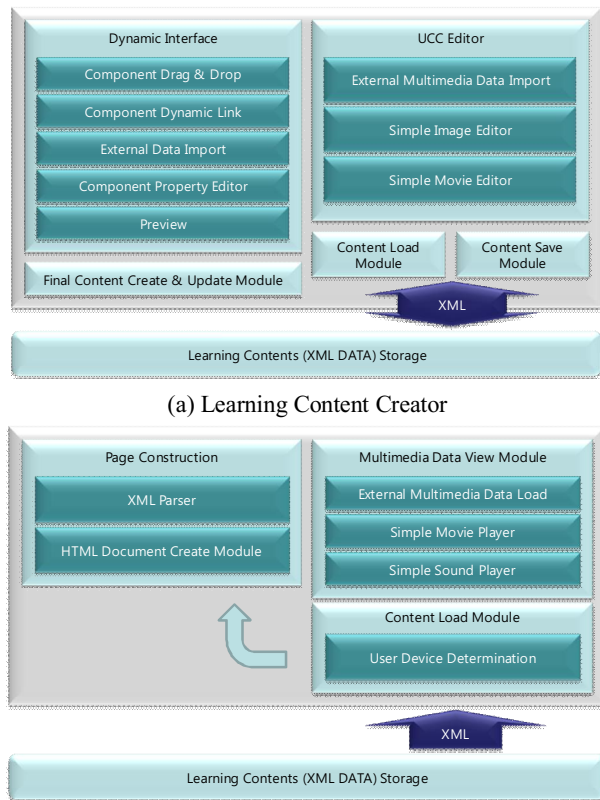


Fig. 5. Learning Content Creator & Viewer

Our system is composed of two sub systems, such as Learning Contents Creator and Learning Contents Viewer. Users make learning contents using the creator and view learning contents using the viewer.

Figure 5 (a) shows composition of detail modules in Learning Contents Creator. Modules consist of 3 large parts such as Dynamic Interface part, UCC Editor part and Contents I/O part. Dynamic Interface part provide intuitive and interactive design environment. This part supports useful

functions, learning activity arrangement using drag & drop, content registration easily and import external multimedia data. UCC Editor part provide using Multimedia Editing Tools. Contents I/O part provide access to the Learning Contents Database and convert designed buffered data to XML data or XML data to buffered data.

Figure 5 (b) shows composition of detail modules in Learning Contents Viewer. Modules also consist of 3 large parts, such as Page Construction part, Multimedia Data View part and Contents Load part. Page Construction part makes layout and content of webpage using Learning XML data in database. Each device of users has different screen resolution and CPU performance. Therefore, Page Construction part provide different construction of page with different device. Multimedia Data View part is in charge of loading Movies or Images on service webpage. Content Load part get Learning Content in Database.

4. SYSTEM IMPLEMENTATION

4.1 Implementation Environment

U-learning contents authoring system based on learning activity was built on Microsoft Windows Server 2000. We ran a MS-SQL 2003 for a database system. To build U-learning hub site, we use ASP.NET at work. And u-learning contents creator and viewer for professors and students was built by using Flex2 that based on flash, and runs within the ubiquitous flash9 player. We implement multimedia editing tools using JAVA net beans ver5. Table 1 shows the running environment.

Table 1. Running Environment

Item	Value
Operating System	Windows XP
CPU	Intel Core2 Duo 2.4Ghz
RAM	2Gbyte
HDD	300Gbyte
Web Browser	MS Explorer 7.0

4.2. Result

In this section, to demonstrate the relative usability of our system, we build sample pages of proposed system and compare our proposed system with existing system. Figure 6 illustrates the Learning Contents Creator provided by hub site. The Learning Contents Creator provides producing and comprising function for a lecture. Instead of complicated structure of preexistent LAMS, our system provides instinctive and convenient environment. The activity required for a lecture is added by drag and drop to learning area. After including Activity in the learning area, the formation of an activity is completed by setting up detail attributes of the corresponding Activity. By using the connection tool, the composed Activities decide an order, efficient attending of students can be induced.

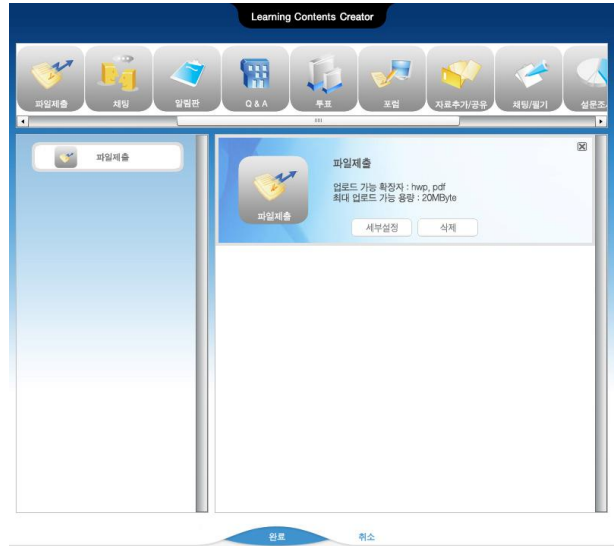


Fig. 6. Learning Contents Creator and Arrangement of the Activity

The main screen of Learning Content Viewer to perform learning activities has been shown in Figure 7. Learning Content Viewer loads XML documents corresponding to the lecture in which a teacher opens, serves learning contents converted for the connection device of students. Learning Content Viewer helps students to perform activities that a teacher makes up.

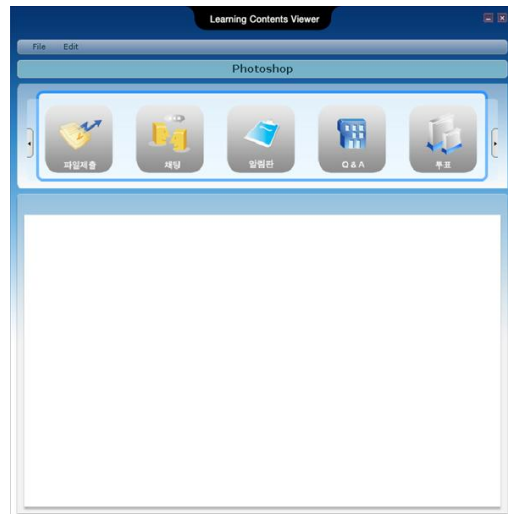


Fig. 7. Learning Contents Viewer



Fig. 8. Result of Learning Content



(a) Image Editor (b) Movie Editor
Fig. 9. Multimedia Editing Tools

Figure 8 displays students carry out activities in Learning Content Viewer. Activities are performed by the order that a teacher determines. The Activity list in which a teacher comprises is seen on the top of the Learning Contents Viewer. In the learning activities area, the learning content of the Activity required for a lecture is indicated. Those contents are studied by students.

Figure 9 shows interface of inner multimedia editing tools. Author can uses these tools for include multimedia data on learning content. Figure 9 (a) shows interface of image editor. This tool provides various functions (crop, resize, effect, picture frame and so on). Figure 9 (b) shows interface of movie editor. This tool also provides various functions (range selection, sampling thumbnails and so on).

5. CONCLUSION

In this paper, we designed and implemented Learning Contents Authoring System. We have developed RIA system that provide easy, efficient and intuitive user environment using Flex2. We remove unnecessary functions of existing system and solve problems of LAMS. We also improve multimedia function using multimedia editing tools within our system. We proposed XML based Learning Contents data structure. This structure can make various layout of webpage with different device immediately. Therefore, our system completely removes data duplication and reduces contents creation time.

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