

Courseware Development Using Influence Diagram with SCORM Compatibility

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Abstract

Web-based distance learning becomes more popular and convenient, it provides flexible environment for learners. However, it is hard for teachers to design the distance course and assess students' learning. To overcome this drawback, a systematic assessment mechanism is proposed to enhance interaction between students and teachers. The theory of concept and influence diagram combined together as a new courseware diagram with useful tools. Finally, this mechanism can be easily used by instructor and student because of its user-friendly interface and it transforms the course content to SCORM standard compatible.

Key words: assessment mechanism, courseware diagram, conceptual map, influence diagram, SCORM

1. Introduction

The Internet using percentage is getting higher and higher with the convenience and reliability. High technology and basic infrastructure for Internet promoted the Internet usage for many activities. Distance learning on the Internet provides students a flexible, convenient and stable environment [1]. Various kinds of course content like animation, video, audio, and image file formats are supported in distance learning. While people welcome the more flexible learning environment provided by the Internet, web-based distance education faces numerous challenges. In this paper, we strongly argue that the biggest challenge faced by distance learning is the lack of a powerful and scalable evaluation mechanism to support interaction among students, instructors, and school, and to provide feedback for three parties. Thus, our study falls into the area of measurement of student's learning performance.

2. Course Diagram Design

Influence diagram [2] is very useful for designing distance-learning courses. Due to the nature of designing courses, few adjustments should be made in order to meet

the final goal – a maximized student learning result. Transformation from influence diagram to courseware diagram is described in this section.

Nodes used in our courseware diagram are evaluation nodes and course nodes that are very similar to decision nodes and chance nodes used in influence diagram. Decision nodes can represent *evaluation nodes*. And chance nodes can represent *course nodes*. The value node can represent the *final value* of student's learning performance.

There are six possible connections among three types of nodes. However, not all of them are all allowed in our courseware diagram for the sake of the violation of normal practice. Two types of links are prohibited. First, links from course unit to final value unit are prohibited because knowledge value can only be measured by taking exam. Second, links from evaluation node to evaluation node are constrained. Links from course unit to both course unit and evaluation unit and links from evaluation unit to final unit are defined as *informational link* represented as a solid line with arrowhead. Regarding links from evaluation unit to course unit, it is defined as *conditioning link* represented as a dash line with arrowhead.

Terms used in the courseware diagram are defined as follows,

Definition 1: A *Course Knowledge Weight* (CKW) is a value associated with every course unit. A Course Knowledge Weight reflects the importance of knowledge presented in the course unit. The more important the course unit is, the larger the value of CKW is. Instructor decides the value of CKW. The total value of CKW of all course units is always to be one, meaning 100%.

Definition 2: An *Acquaintance Degree* (AD) is an accumulated course knowledge weight associated with a course unit. It is represented with a pair of number. An example of AD is "AD [0.4,0.6]". The number on the left shows the learning performance of the worst performed group of students or students who receive relatively lower score on an evaluation up to a certain course unit.

Definition 3: A *Group Percentage* (GP) is a pair of values associated with an evaluation unit and indicates the percentage distribution among students who receive lower,

average, and higher score in an evaluation. An example of GP is "GP [25,50,25]", meaning students are divided into three groups, 25 percent of students who receive relatively lower and relatively higher score and the rest of students, 50 percent, who receive an average score in an evaluation.

Definition 4: An *Discount Rate (DR)* is a value associated with every discount bar placed on conditional links. An example of Discount Rate is "DR=0.9". We assume that student's score on an evaluation reflects the degree of his/her perception on previous taught knowledge.

Definition 5: An *Individual Performance (IP)* indicates an individual's actual performance after a series of courses and evaluations. Like Acquaintance Degree that represents the range of the whole class's performance, Individual Performance represents a single person's actual performance.

3. Implementation

SCORM Base Courseware Editor Version 2.0 is implemented by Java which provides teachers to draw the courseware graph. In Figure 1, the upper dotted line area is the function table. The button  is used to move the node position. The button  is the course node. Course node has two types. One is general course, the other is remedial course. The button  is the evaluation node. Teacher can choose the exam content to this evaluation node. The button  is the final node. It counts the final value of the evaluation progress. The button  is the arrow from node to node. The button  provides package function which will transform the courseware diagram into SCORM compatible package. The button  provides clear screen function. In Figure 2, the dotted line area shows the course node attribute setting. The Advanced Distributed Learning (ADL) provided SCORM Version 1.3 Sample Run-time Environment (RTE) Version 1.3 Beta-3. This version of the Sample RTE was implemented as a Web-based client/server application using HTML, JavaScript, JavaServer Pages (JSP), Java Applets and Java Servlets. In order to prove our packaged file is compatible with SCORM, we put the generated package file in the test environment. The result was successful in the test.

4. Conclusion

The tool proposed in this paper provides teachers to design courseware easily. It not only allows the instructor to receive prompt feedback from students but also transforms the last course content to SCORM compatible.

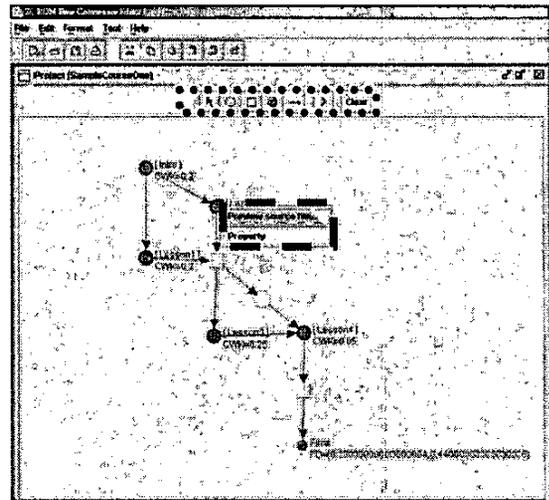


Figure 1: The dotted line of the upper area is the drawing tool buttons. The dotted line of the lower area is the individual course node property. It also provided preview content function.

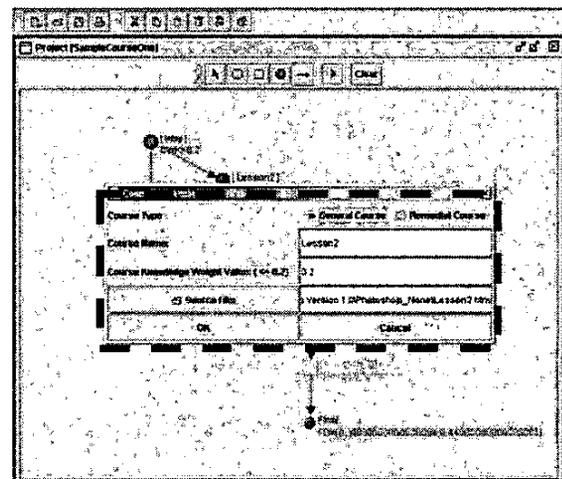


Figure 2: The dotted line area is the individual course node attribute table. There are general and remedial course.

5. Reference

- [1] US Department of Defense, Advanced Distributed Learning (ADL) Initiative. Web site at <http://www.adlnet.org/> [Last access September 13th, 2002]
- [2] Shih, T.K. and Lun-Ping Hung, 2002. Multimedia courseware development using influence diagram, Multimedia and Expo, 2002. Proceedings. 2002 IEEE International Conference on , Volume: 2 , Page(s): 377 -380 vol.2