Defining a Simple Sequence for RLOs

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Abstract

In this article, the necessity of introducing theories of instructional design into the field of reusable learning objects (RLO) is discussed. One of such examples is sequencing, to convey instructional design need to students by organizing and delivering RLOs in a predefined sequencing strategy. A layered sequencing model is proposed in this research, and its implementation using XML is explained. The model is being validated in a computer introduction course.

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Introduction

The idea of reusable learning objects (RLOs) originated as an element within a new type of computer-based instruction grounded in the object-oriented paradigm of computer science. Object-orientation highly values the creation of components (called "objects") that can be reused (Dahl and Nygaard, 1966). As early as the mid 90's, it was recognized that Web based learning systems lacked the support of a common framework. One of the efforts to solve this problem was initiated by Cisco Systems (Barritt and Lewis, 2000). Cisco proposed the so called Reusable Information Strategy to move from creating and delivering large inflexible training courses, to database driven objects that could be reused, searched, and modified independently from their delivery media. Additionally, the Department of Defense along with some other Federal and private sector organizations initiated efforts to develop common specifications and standards for technology-based learning. These efforts led to the development of a suite of technical standards referred to as Sharable Content Object Reference Model (SCORM). The value of SCORM is that it incorporates many of emerging standards and/or specifications into one common reference model.

While these initiatives tried to develop the range of technology standards necessary to support reusable learning object based systems, there was little discussion around theories of pedagogy or Instructional Design concerns as they applied to RLOs. One problem that emerged was that there was no specification in the standards on how to sequence these RLOs in ways that would enable a learner to attain a particular learning goal.

According to the definition given by Barritt and Lewis (2000), a RLO is based on a single objective, derived from a specific job task known as a Reusable Information Object (RIO). Each RIO is built upon an objective that supports the RLO's objective. Therefore, the RLO-RIO structure is a two hierarchy. In reality, a RLO is not the higher layer. It can be grouped into a larger hierarchy depending on the author, business

requirements and packaging of the "offering" on the learning management system. A possible hierarchy is listed as below:

- Curriculum
  - Unit
    - Module
      - Lesson (RLO)
        - Topic/Page (RIO)

When lessons are selected for grouping into a module, they have to be grouped in a way that makes instructional sense, or in instructional design terminology, should be "sequenced" based upon the needs and prior knowledge the learner brings into the learning environment. Appropriately sequenced RLOs enable an instructional designer to develop a personalized learning experience, which is one of the ultimate objectives of developing RLOs.

In this research, a layered sequencing model implemented in XML is proposed to deal with the problem.

A Layered Sequencing Model and Its Implementation

In a layered sequencing model, the first level is created by giving RLOs a priority number while the second layer is created by giving the RLOs a sequencing strategy or strategies. The first level is created when the instructor selects several lessons (RLOs) for grouping into a module and then gives each RLO a priority number. The priority numbers follow a numerical order. Therefore, a smaller priority number, such as a one or two, indicates that those RLOs should be sequenced in front of an RLO with larger priority numbers, such as a twelve or a thirteen. If there is no sequence requirement in some RLOs, these RLOs will share the same priority numbers. With this layer of specified sequencing, instructors can define some intrinsic relationship among RLOs.

The second level of sequencing is specified when instructors have completed selecting RLOs, and are ready to deliver the assembled modules, or lessons. At this level, an instructor can implement various instructional strategies discussed in the SCORM photoshop sequencing examples (ADL, 2000) such as No Sequencing rules; Linear;

Linear Choice; Knowledge Paced; Remediation. Competency Assessment can be implemented over RLOs with the same priority numbers. The layered sequencing model is illustrated in Figure 1.

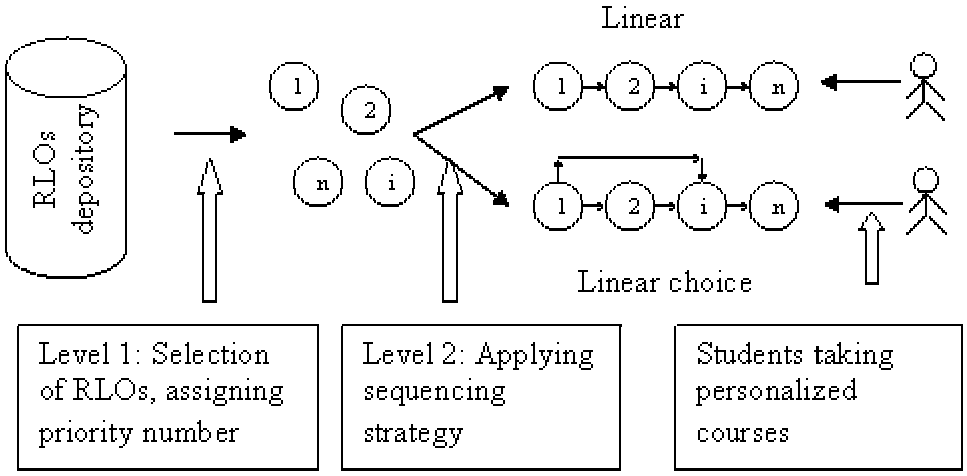

Figure 1. The Layered Sequencing Model

This process of setting two levels of specified sequencing gives instructors the flexibility to define the exact sequence they prefer in a module or a course in order to meet stated learning objectives and at the same time enables instructors to ensure that the course or module meets an individual student's personalized learning style through applying different sequencing strategies. Another advantage this model provides is a platform to discover an optimal learning style for a group of students.

The implementation of the layered sequencing model can be achieved by defining an XML file. The file is not part of any RLOs; it is associated with a module, or a course, when sequencing becomes meaningful.

An example of implementing a layered sequencing model using XML is shown in Figure 2. According to the example, the linear sequencing strategy is applied only to lessons 4, 5, and 6. The possible sequence for students to follow could be: 1 2, 3, 4, 5, 6, or 1, 2, 3, 4, 6, 5 etc.

```
<item identifier="MODULE1">
   <title>Module 1 -- Basics</title>
   <item identifier="LESSON1" priority="1">
      <title>Lesson 1 -- Introduction</title>
   </item>
   <item identifier="LESSON2" priority="2">
      <title>Lesson 2 -- How to start a word</title>
   </item>
   <item identifier="LESSON3" priority="3">
      <title>Lesson 3 -- How to open a word documentation</title>
   </item>
   <item identifier="LESSON4" priority="5">
      <title>Lesson 4 -- How to how to insert a table</title>
   </item>
    <item identifier="LESSON5" priority="5">
      <title>Lesson 5 -- How to insert a picture</title>
   </item>
    <item identifier="LESSON6" priority="5">
      <title>Lesson 6 -- How to close a documentation</title>
   </item>
   <sequencing>
      <strategy value="LINEAR"/>
   </sequencing>
</item>
```

Figure 2. Linear Sequencing specification for Module 1

Discussion and Conclusion

In this research, the importance of applying instructional theories towards reusable learning objects, especially the issue of achieving the most effective sequence for students is explored. A layered sequencing model is proposed. The sequencing model allows a description of the inherent relationships among reusable learning objects, while not compromising its capability to deliver the objects in designated sequencing strategies. The model also has the potential to provide a platform for discovering the optimal learning style for a group of students. The effectiveness of this model is being implemented and tested in the MIS 105 Introduction to Computers course offered by MIS Department at Northern State University, in South Dakota.

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Reference:

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