An Issue of Granularity: Decomposing Redesigned Courses on Different Levels of Details

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The THECB LOR Project

The Texas Course Redesign Project initiated by the Texas Higher Education Coordinating Board (THECB) aims to develop and distribute instructional resources to improve student learning outcomes and lower the costs of higher education. The redesigned courses will be freely available to all public institutions of higher education in the State of Texas. To assist the THECB in reaching its goals, the Texas Center for Digital Knowledge (TxCDK) at the University of North Texas proposed the development of a learning object repository (LOR).The THECB LOR will facilitate the discovery, evaluation and reuse of not only the entire redesigned courses but also components of the course content. In Phase I, a TxCDK project team developed a proof-of-concept repository that used the content from a redesigned course, U.S. History I, to demonstrate the functionality and potential of a LOR for reusing and repurposing learning objects. The redesigned course content was decomposed into nearly 300 learning objects varying in levels of granularity. Phase II is a two-year effort that is addressing not only a next version of the LOR but also administration, workflow, and policies necessary for a production system.

Granularity used in the LOR

A key issue in the development of learning object repositories is how to decompose materials into pieces at different levels of granularity that are useful for different instructional needs. Granularity is a term used in instructional design to describe the size of a unit of learning (Wiley, 2000). As the level of granularity increases, the likelihood of a learning object being used as intended by the originator increases. However, smaller learning objects are less likely to be used as intended, and they could be reused in this capacity with little effort (Harvey, 2005). While the literature indicates that more granular learning objects have an increased potential for reuse (Harvey, 2005; Wiley, 2000), there is little empirical data about which levels of granularity are appropriate for different purposes. The decision regarding learning object granularity is a trade-off between the possible benefits of reuse and the expense of cataloging (Herridge Group, 2002; Willey, 2000).

In the case of the THECB LOR, the focus is on providing the complete course as one learning object as well as providing discrete learning objects derived from the complete course. A major task in Phase I was making decisions about the levels of granularity for the derived learning objects. The U.S. History I course has a relatively traditional structure, and the project team used that structure to determine the levels of granularity. The contents were broken down and reorganized into five levels of granularity: Course, Unit, Lesson, Topic, and Free-Standing Learning Objects. Each Course consists of several Units. Each Unit includes multiple Lessons, each of which covers several Topics. The repository is also populated with discrete yet valuable

learning objects, such as flash animation. These objects are called Free-Standing Learning Objects and are stored and described separately. They are the smallest discrete learning object (i.e., finest level of granularity) in the repository.

Each of these learning objects consists of one or more files. The project team worked with the course creator to organize individual files into each of these levels of granularity and to submit them into the repository with a metadata record for each learning object. The level of Free-standing Learning Object provides a mechanism to describe and make available specific learning objects (e.g., self-tests, glossary review, interactive maps, etc.). Although created for a specific course, these learning objects can be reused or repurposed in other history courses or courses in other disciplines (e.g., anthropology, geography, political science, etc.) as well.

Emerging issues concerning levels of granularity

Designing learning objects that have the potential to be reused or repurposed is an important characteristic of future course development. The current effort of building a learning object repository to leverage the Texas Higher Education Coordinating Board's investment in redesigned courses is directly related to the reuse of learning objects. This involves breaking down the content of the redesigned courses at varying levels of granularity. Yet the course developers may not have designed the learning objects to be decoupled for reuse as discrete components of instruction. In addition, the course structure varies from discipline to discipline. Even for the same course, different instructors from different colleges may structure it in different ways. These situations complicate the process of decomposing and reorganizing course contents.

The first issue concerning granularity occurred when the project team was bundling files for U.S. History I during Phase I. Some materials were important to provide but did not fit into any level of granularity described above. These materials include: Course Structure (i.e., a syllabus and course map that outlines the components of this particular course), Course-wide Assessments (i.e., assessments in the form of mid-term and final examinations), and Case Studies and Case Study Teaching Guides (i.e., interactive learning materials that may be associated with a particular Unit, Lesson, or Topic, but comprise a separate, course-contextualized learning object).

More issues emerged in a user study of the Proof-of-Concept during Phase I. The researchers observed users retrieving and accessing learning objects for a particular instructional purpose. When interacting with the repository, many participants had difficulties understanding the levels of granularity and the relationships between these different levels. For example, some participants had trouble distinguishing between a Topic, a Lesson, and a Unit. Some had questions about how a Topic relates to a Lesson.

This observation indicates a lack of neutrality between learning objects at different levels of granularity. The labels for different levels of granularity may need to be made clearer or presented as a hierarchy. The observers suggested changing the label "topic" for the Topic level, as this word means different things to different people and in different contexts. However, to find single, descriptive words that clearly describe these levels and their relationships would be a challenge.

The participants' frustration might be partially due to the fact that the five granularity levels and corresponding labels were developed based on assumptions of users' needs for flexibility, in terms of the materials' size and potential role in a course designing process. The research team

expects to gain more insights into users' real needs through a user requirement study in Phase II. It would also be fruitful to spend time developing clearer definitions for the levels of granularity and/or investigate the value of substituting a different label for one or all of the different levels of granularity.

Acknowledgments

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