Learning Objects: Seeking Simple Definitions, A New Zealand Experience

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Abstract: A learning object is generally a reusable digital resource that exists in a repository and can be retrieved over the Internet. Learning objects have the potential to reduce costs and improve the quality of content presented to learners. However, there appears to be confusion on what a learning object actually is. This paper describes how the project team of the Open Source Learning Object Repository, a Tertiary Education Commission of New Zealand, funded project, looked for simple definitions.

Introduction

In 2005 the Waikato Institute of Technology received a significant grant from the e-Learning Collaborative Development Fund, administered by the Tertiary Education Commission of New Zealand, to investigate and deploy an open source learning object repository to meet the needs of the diverse cultural populations of Aotearoa/ New Zealand. One of the key outcomes of the project is to be the identification and deployment of a number of learning objects to test-bed the selected systems robustness and ease of access. From the beginning of the project it was accepted the debate on the definition of a learning object was widespread, inconclusive and ongoing. However, the project team adopted a view there was general agreement Learning Objects (LOs) should be reusable, be durable, be affordable, be searchable, be retrievable and be stored for others to use. This paper explores how the project team worked through the process of defining a learning object.

Defining a learning object

Background

When discussing the concept of LOs the project team was faced with a dilemma. While there appeared to be general agreement LOs were cost effective (Downes, 2001) and an efficient and meaningful way of creating content for digital learning environments (Polsani, 2003) there was no similar consensus on what a learning object actually was or who would benefit from their availability. For example can LOs be regarded as any entity used in technology supported learning (IEEE Learning Technology Standards Committee, 2005), are they grounded in the object-oriented paradigm of computer science (Wiley, 2000) or are integrated chunks of material based on clear learning objectives (de Salas & Ellis, 2006)? Are LOs designed as small chunks to be used to create learning sequences by instructional designers or course developers (Christiansen & Anderson, 2004) or are the to be accessible for students to personalize there learning environment (Martinez, 2000)? It appeared to the team the definitions of a learning object could range from a single piece digital material, a

combination of digital materials to form a module or an entire course. It was critical the team clearly identified what they considered to be learning objects.

Assets

At the start of the journey the project team found in some cases the "metaphor" of LEGO was used to explain underlying concepts of LOs (Long, 2006). In short small blocks of instruction (learning objects) could be clipped together to create a structured event (learning activity or sequence). You could, if you wanted re-use the small block in other structures. For example a map of New Zealand could be used as resource to indicate the physical relationships of a student's personal location with other towns or city's in New Zealand. The map itself could be re-used to indicate the location of rivers, streams and lakes or alternatively be used to describe geographical features such as wet lands, plains, hill country and mountains. These thoughts of re-use of discrete pieces of digital material appear to be based upon computer science object-orientated design (Downes, 2001) and because of this they had been labelled with the computer term of an asset.

Figure 1. Assets: The cogs

However, we asked ourselves can the map (the asset) on its own be considered to be a learning object? The project team argued the map should, indeed must, be associated with other pieces of content, for example a key, to make it useful in learning. The team concluded the reusable assets should not be considered to be learning objects They should be regarded as the prime content "cogs" of learning objects (see Figure 1 on the left).

Knowledge Objects

Let us examine our map of New Zealand once again. Firstly, by linking of one asset, a graduated key showing town and city population sizes, with a second asset, the map of New Zealand, we have created digital content to illustrate population settlement patterns in New Zealand. Alternatively, we could link one asset, the map of New Zealand, with a second asset, a coloured key showing altitude. In this scenario we have created content that is design specifically to enhance student understanding of the physical features of New Zealand. In both scenarios we have created digital content designed for a specific purpose. It could be argued (Gibbons, Nelson, & Richards, 200) would classify these linked assets as instructional objects while (Merrill, 1998) could classify them as knowledge objects. The team, solely from an educational perspective, preferred Merrill's definition. The team agreed when content is designed for a specific instructional purpose we can be seen to be creating a knowledge object. In essence the resulting content created by the linking of two or more assets to create content for a specific purpose is called a knowledge object.

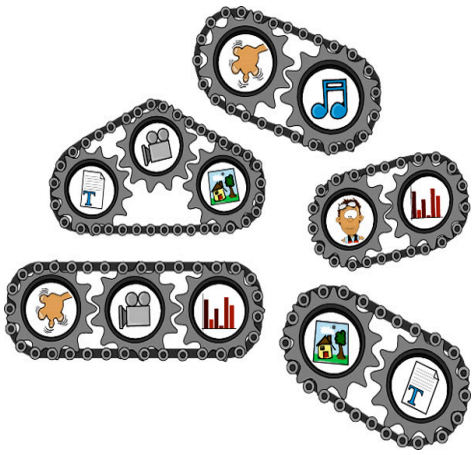

Figure 2. Knowledge objects: The chain links

However, are the maps of New Zealand and associated keys, the knowledge objects, on there own a learning object? The project team discussed the issue and to them knowledge objects should, indeed must, be linked with specific student activities for them to be useful. For example in the scenarios described above there might be included student activities such as identify the four largest urban areas or significant physical features in New Zealand. In short knowledge objects are designed for a specific purpose and on there own are incomplete. If assets could are the cogs of learning objects knowledge objects could be the links in a chain that holds them together (see Figure 2 on the left)

Information Objects

In the previous section it was argued knowledge objects were created for a specific purpose and they were the links in the chain to hold assets together. Let us examine our map of New Zealand again. By linking one knowledge object, a combination of the granules map and key, with a second knowledge object, a combination of the assets a textual explanation using map keys and a list of student identification activities, we have created a learning event engaging students in understanding their physical location in the world and the principles of using maps and keys. Alternatively we could link one knowledge object, a combination of the granules map and key, with a second knowledge object, a combination of the asset a textual explanation of "urban and rural" and an asset of list of student interpretive activities, we have created a learning event engaging students in exploring the concept of population density. In can be argued in each scenario we have created events designed engage students in specific cognitive tasks. In essence by linking two or more knowledge objects together we are creating an activity to **inform** students of a specific principle, process, procedure or concept. Although a number of writers have addressed the concept of assets (Long, 2006) and instructional objects (Gibbons et al., 2000) there is limited literature on how the creation of digital collections described above can be labelled. The team decided these digital collections should be labelled information objects; they were however conscious a heated debate will occur on this definition. In essence the resulting object created by the combining of two or more knowledge objects to create learning event to inform students of a specific principle, process, procedure or concept, was called an information object.

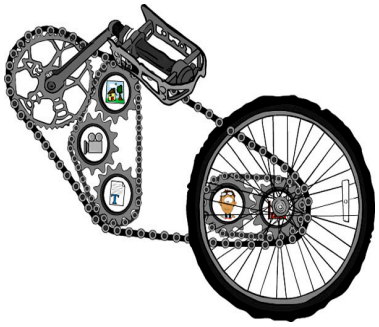

Figure 3. Information objects: The chain

However, are the digital collections created by the combination of two or more knowledge objects, the information object, a learning object? The team argued information objects should, indeed must, be linked with specific student outcomes for them to be useful. For example in the scenario described above there might be included student assessment activities designed for tutors and teachers to monitor and report on student progress against a specific learning objective. If knowledge objects are the links in the chain of learning objects information objects are the **chains** driving understanding (see Figure 3 on the left).

A Simple Solution

In the previous sections it was argued assets were the cogs of LOs, knowledge objects were the links in the chain of LOs and information objects were the chain of LOs. Let us examine our map for the final time. By linking one information object, informing students of the concept of population density, with an assessment activity, identification of major urban areas of New Zealand, to monitor student progress against an identified learning objective, students will understand the concept of population density and be able to identify four regions of high density, we have created a learning activity clearly linked to a specific learning outcome and we are able to firstly, measure and report on student achievement and progress and secondly we are able to identify areas of strength to build upon or areas of weakness to address. The team argued we had finally created a learning object; again the team is conscious a heated debate will occur on this definition. In essence the team had created a definition they could know work with to identify LOs to be deployed and distributed in their learning object repository.

Conclusion

It has been argued in this paper the term *Learning Object* has its roots nourished from two disciplines, education and computer science.

- In computer science the reuse of discrete sections of code (components or *objects*) in multiple settings is highly valued. This is referred to as object-oriented programming.
- In education a learning objective is a brief statement of the desired outcome of a learning activity.

From the OSLOR teams perspective it appeared confusion resulted if only one discipline was used as the basis for defining a learning object for educational purposes, a holistic approach is needed.

Figure 4. Learning Objects: The bicycle

To the OSLOR project team the characteristics of learning objects are firstly, it is a learning activity with **strong internal cohesion** (it measures one and only one learning objective) and secondly, it is an independent entity with **weak coupling**, (the measurement of progress is not dependent other learning activities). Learning objects are the **pedals and wheels** controlling student achievement progress and reporting (see Figure 4 on the left).

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