Commentary on Rob Koper, 'Combining re-usable learning, resources to pedagogical purposeful units of learning, Chapter 5 of: "Reusing online resources: a sustainable approach to elearning"

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Chapter 5: Combining re-Usable Learning Resources to Pedagogical Purposeful Units of Learning

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Summary

The first part of this review discusses the issues raised in general terms, focusing on a contradiction in educational practice identified by the author. It is proposed that this is disguised by the pervasive "conduit" metaphor for communication, and in the face to face context partially resolved by the interventions of teachers. The specific approach described by the author is then discussed in the light of these comments. In particular the distinction between resources and Learning Objects is discussed. The need for a three level hierarchy of resources, Learning Objects and Units of Learning is identified as an issue for debate.

This stimulating and authoritative chapter raises a number of major issues related to eLearning, Learning Objects, and reuse of resources. In order to place this debate in its context I would like to start by making some general remarks on the nature of the problem, and the metaphors which we use when trying to make sense of it.

Why should reuse be a problem?

Reuse is the norm in face to face, non electronically mediated education, at all three of the levels identified by Koper. Individuals reuse their own activity sheets and lesson plans, schools and education authorities reuse resources and textbooks in various schools with differing profiles and needs, and texts, poems, resources and learning activities are used for a wide variety of purposes in different contexts. With the advent of the web government agencies such as the UK Teacher Resource Exchange have provided an environment where these exchanges can take place online, and hundreds of reusable resources are made available¹. Commercial publishers such as Nelson Thornes also provide access to reusable resources². When we move from face to face education to the various forms of education mediated by computers, and in particular by networks (hereafter referred to as eLearning) we find that the issue of reuse becomes problematic, and the authors of the chapters in this book are wrestling with the problems raised.

A contradiction in traditional educational practice

Why should the move from face to face to eLearning involve these problems? I believe that the answer is to be found in contradictions within traditional educational practice. Koper indicates where this contradiction is to be found, stating that:

¹ See http://tre.ngfl.gov.uk/
Cognitive research has shown that knowledge cannot be transferred, but is (re-)built within a cognitive framework (schema, mental model) in the long term memory by each individual (Mayer, 1992, p.431; Winn & Snyder, 1996). 3

while later in the chapter he also notes

Vermunt and Verloop (1999) have identified that the majority of teachers employ an implicit design idea based on ‘knowledge transmission’.

This contradiction is invisible to many teachers, learners, and also to technologists involved in implementing eLearning systems, who seem to treat this cognitive research as belonging to a quite different domain from their own practice.

What makes it possible for a practice to be maintained which is in direct contradiction to what we would expect from the facts of human biology and cognition? There are two parts to this answer.

The power of the "conduit" metaphor
The first part of the answer lies in the way in which we think about communication is formed by a complex metaphorical structure. As Lakoff has explained:

A more subtle case of how a metaphorical concept can hide an aspect of our experience can be seen in what Michael Reddy has called the "conduit metaphor". Reddy observes that our language about language is structured roughly by the following complex metaphor:

IDEAS (or MEANINGS) ARE OBJECTS,
LINGUISTIC EXPRESSIONS ARE CONTAINERS,
COMMUNICATION IS SENDING.

The speaker puts ideas (objects) into words (containers) and sends them (along a conduit) to a hearer who takes the idea/objects out of the word/containers. Reddy documents this with more than a hundred types of expressions in English, which he estimates account for at least 70% of the expressions which use for talking about language.4

This metaphor is very pervasive, and within our culture we often have difficulty thinking outside it. It has also proved to be an effective facilitator of communication in many situations, and in particular has been the foundation of what has become an entrenched education system. When the learning process is seen to be sub-optimal or breaks down the appropriateness of this metaphor is not usually questioned. The teachers and learners involved typically respond to the difficulty in two ways. Firstly, the problem is typically situated in the way in which ideas have been put into objects (e.g., "it's a bad text book"), or problems in the conduit (e.g. noisy classroom), or situated the hearer (e.g. lack of attention, laziness, stupidity).

The analogy of encapsulation
The widespread conduit metaphor for communication is reinforced by a particular metaphor built in to much of the discussion of eLearning. As Koper describes in his introduction, Over the last decade scholars in the field of learning technology have introduced the concept of the reuse of resources in education, analogous to software reuse and object oriented approaches. In object oriented programming the objects are encapsulated, that is they operate independently of the environment in which they are

3 The idea that knowledge can be transmitted is also biologically unfounded, as shown by Maturana and Varela. The most accessible statement of their approach is to be found in The Tree of Knowledge. They also provide a valuable alternative description of communication and language.

situated, and they respond in predictable and prescribed ways to the inputs which they receive. Thus this analogy, which is in perfect accord with the conduit metaphor, runs contrary to much of what we know about how human beings construct meanings from language, texts, images, etc. on the basis of their previous experience, which varies from individual to individual.

The invisible support offered by teachers to learners
The second way in which the contradiction between classroom practice and cognitive science is resolved is through a wide variety of interventions made by teachers to help overcome breakdowns in the learning process, often within the most traditional classroom settings. These lead learners to reach an understanding not by opening a conduit, but rather by supporting learners in their own construction of knowledge. These strategies involve impromptu questions, problems setting, referring to the learners own experience, etc. They may or may not be part of a conscious constructivist pedagogy, and many of these interventions are invisible because they may never be recorded in a lesson plan or report.

When the role of the teacher is reduced, as it often is in electronically mediated education, the strategies available to teachers to overcome breakdowns in the learning process, are radically reduced or entirely removed. That is why the problems created by the contradiction between the dominant metaphor for communication, and the nature of human cognition as established by cognitive science are so much more acute in eLearning than in face to face education. From this perspective it seems that the debate on how to describe learning resources in eLearning systems may produce more or less effective systems, but it cannot resolve the underlying difficulties caused by applying the conduit metaphor to the learning process.

So far I have made some general comments on the nature of the problem we are dealing with, and the metaphors we use in understanding and describing it. I have highlighted the contradiction between cognitive science and educational practice identified by Koper in this chapter, and proposed that these metaphors mask the contradiction. I have also suggested that the practice of the teacher in face to face teaching resolves many of the problems which the contradiction creates. I have then observed that when the teacher's role is reduced or removed, these problems are exacerbated, and are the cause of many of the difficulties experienced in implementing eLearning and reuse of resources. I will now move on to consider some perspectives on the specific solutions proposed in this chapter, in the light of the above considerations.

The need for metadata describing learning activities
As Koper has observed, most educational metadata does nothing to describe and define the learning process. The result has been that learning was, by default, conceived of as lying in the content itself. The decisive contribution made by Koper in meeting this need has been his work as lead architect of the Open University of the Netherlands Educational Modelling Language (OUNL EML). OUNL EML has now been adapted by IMS as its new Learning Design specification, and represents the best available alternative to the conduit metaphor in eLearning. Learning no longer has to be situated in the resources used, and can be viewed as being constructed in interactions and activities carried out by the learner.

EML sets out to be pedagogically neutral, and Koper wants eLearning to support as wide a range of pedagogies as possible.

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5 See Chapter 12, Learning Content Interoperability Standards, Bill Olivier and Oleg Liber
In our view, a modern e-learning environment, including the underlying learning technology specifications and standards, should support pedagogies coming from both ends of the spectrum. Not by being ignorant of the pedagogy, not by being prescriptive in any of the hundreds of different pedagogical models around (for example Koper, 2001), but to allow the pedagogical model to be explicit.

This is surely the correct approach. In the first place it is pragmatically wise to let a thousand schools of pedagogy contend, rather than to attempt to resolve these conflicts and in the process alienate a large numbers of potential users. Secondly there are times when even the most enthusiastic constructivist recognises that reading specified texts, and rote learning, are appropriate, and when practice drills are necessary. Nevertheless, if knowledge cannot be transferred, as Koper suggests, then we need to avoid situating the knowledge in the text being memorised, or in the material being practiced. If we do not make this clear then we will reduce the capability of EML to provide an alternative to the conduit metaphor. In this respect the concept of the Learning Object sometimes plays an ambivalent role.

The role of Learning Objects
In this book Learning Objects are defined in a number of different ways, and the roles which they play in the author's frameworks also differs. Koper defines a learning object as any digital, reproducible and addressable resource used to perform learning activities or learning support activities, made available for others to use. He goes on to clarify that when a learning object is aggregated to a learning activity, then the aggregate is no longer a learning object, but it is now a 'unit of learning'. This is, as he points out, a more restricted definition than that used by The IEEE LTSC (2000), or by Wiley. There are, however other approaches, and Rehak and Mason, in Chapter 3 of this book maintain that A common definition is something like, “A small chunk of learning which serves a learning objective”. This view says that the Learning Object itself must have a learning objective – not just be part of a learning opportunity. They later suggest that among the aspects of learning objects which need to be described are
- What it can be used for
- How learners will interact with it
- How it fits into the larger learning experience
It seems that Rehak and Mason's Learning Objects are closer to Koper's Units of Learning than they are to his view Learning Objects.
In Chapter 7 Laurillard and MacAndrew develop a very different analysis in their Conversational Framework for learning, in which the role of the academic is to provide Digital document/resource with internal structure defined; a set of analytical tasks; the structure for the discussion around those tasks. In this description Learning Objects do not seem to be distinguished from resources. Thus the issue of what constitutes a learning object is very much open to debate.

The need for a three tier hierarchy: resources, learning objects, units of learning
In his definition of Learning Objects and Units of Learning, Koper establishes a three level hierarchy. At the bottom level are resources, such as files and documents. At the next level up these are transformed into Learning Objects. At the top level Learning Objects are combined with learning activities to create Units of Learning. Given the lack of agreement on what constitutes a Learning Object, it is perhaps worth considering whether we need them at all. Perhaps all we need is the top and bottom levels of the hierarchy: resources and Units of Learning. This is the approach taken by
Apple in their teacher resource exchange using their well established Unit of Practice methodology. 

To illustrate the issue, consider a poem on a web page. This fulfils the first part of Koper's definition by being digital, reproducible and addressable, and made available for others to use. If I want to know if it is a learning object, how can I find out? According to the definition I need to establish if it is used to perform learning activities or learning support activities. How can establish that? I need to look at the history of interactions in which the object has taken part. I cannot tell by looking at the file itself. If we need to look at the learning activities carried out with a Learning Object in order to distinguish it from a resource, then the distinction between a Learning Object and a Unit of Learning becomes blurred. This is obviously a complex technical issue on which there are many perspectives, but my own view is that there may be advantages to flattening the hierarchy to two levels, and removing Learning Objects. Resources could be large (e.g. a book) or small (e.g. a paragraph), and Units of Learning could be nested. What would the result of this flattened hierarchy be for reuse of educational resources? It would it is true mean abandoning the hope for encapsulated chunks of knowledge or learning, independent of pedagogy and context. The issue to be debated, however, is if this is a realistic ambition. Reusability in eLearning would become parallel to that in face to face learning, that is to say, we reuse resources (books, texts, illustrations, maps...), and we reuse Units of Learning (activities, lesson plans, modules, courses...).

**Abstraction of learning resources**

Related to the issue of depth of hierarchy is the question of abstraction. In this chapter Koper says that *In an ideal world of reusable learning objects, all objects could be used by a teacher for a course, irrespective of the pedagogy or 'learning design*. If a learning object is constituted by its use, however, it can be argued that to this extent it partakes of the pedagogy within which it has been used. If, on the other hand, one were to remove the criteria for use from the definition of a learning object, one is left with something which looks very like a resource. Koper also seeks abstraction of context, although in this case he refers to learning resources rather than learning objects. A similar question arises of whether a resource can be understood other than in the communicative context within which it was created and is used.

**Learning Objects and the conduit metaphor**

Perhaps these difficulties do not flow from this particular formulation of learning objects, but rather they are inherent in the use of a three tier hierarchy. It may be that the concept of Learning Object is familiar and comfortable because it maps neatly to Reddy's conduit metaphor, adopted by Lakoff, which I referred in the earlier part of these comments. Thus, adapting the original metaphor, we could propose:
- Resources are objects
- Learning Objects are containers,
- Teaching is sending.

I do not suggest that this is Koper's meaning, indeed he makes it clear that it is not. Nevertheless, this metaphor mapping may explain some of the attractions of the three level approach, especially for what Koper describes as the "older instructional design

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6 In this methodology teachers take resources (in this case technological resources), follow a procedure for describing activities to be carried out with them, and so create Units of Practice which can be shared online. There are at present over 1300 units available online to help teachers integrate technology into their classroom activities. See http://ali.apple.com/ali/uops.php
approaches" which espouse the conduit view of education. It may also be part of the reason it sometimes generates resistance among some constructivists.