Learning objects and study skills

Kevin Brosnan
University of Stirling, Scotland UK

John Casey
University of Stirling, Scotland UK

Introduction

Reusable Learning Objects (RLOs) as a technology are simultaneously new and yet also embody aspects of learning that are ages old. It could be argued that amongst the first RLOs were text inscriptions, on various media, used by people other that the original author to help them understand a particular aspect of human activity. The current interest in RLOs suggests that they are yet another new form of learning technology and, according to some, and have the potential to transform both the processes of learning and the institutions that are responsible for the management of learning. As ever, claims for the potential of new learning technologies to radically change the ways in which we support our learners, must be treated with caution. If we are to realise the potential of RLOs to offer new ways of supporting learners and avoid yet another cycle of unfulfilled promise, the so called 'Groundhog Day' phenomenon (Mayes, 1995), we must give careful attention to how we conceptualise this technology and the ways in which it may affect learning processes.

This paper will explore the concept of affordance (Gibson, 1986) as a way of drawing attention to the importance of active use of RLOs within a particular context rather than concentrating only on the features or attributes of the object itself.

Structure of the paper

After a short definition of the term RLO the paper then provides a brief overview of the JISC funded Exchange for Learning (X4L) programme and the place of the Learning to Learn project (L2L) within it. The concept of affordance is then introduced and its use as an important underpinning concept for the L2L project is explained. The final part of the paper explores how the concept of affordance provides a stepping stone to conceptual frameworks that emphasise the importance of context and the situated nature of resource use.

Reusable Learning Objects

The ideas underpinning RLOs are not new – teachers have always reused their own learning resources with different groups of students and reused the resources developed by other teachers for their own purposes. Although there is no universally agreed definition of a RLO the following can be said to be the distinguishing features of modern RLOs:

- they exist in digital form;
- are aggregations of other digital resources (such as images, audio/video clips, text)
- conform to internationally agree standards regarding their structure;
- incorporate metadata that conforms to internationally agreed standards
- they are frequently held in object repositories and can be automatically transferred from these repositories to virtual learning environments (VLEs)

According to Wiley (2000) one of the most important differences between RLOs and previous types of instructional media is that 'those who incorporate learning objects can collaborate on and benefit immediately from new versions' (p. 2)

Work on developing the technologies and particularly the standards to support RLOs is now widespread and involves collaboration on an international scale. The IMS Global Learning Consortium is an international organisation that has coordinated the development of various learning technology specifications (standards in the waiting) including the Content Packaging Specification CPS (IMS, 2001). This specification defines the overall structure for a RLO and what each element of the structure should contain. Another influential international organisation in this area is the Institute of Electrical and Electronics Engineers (IEEE), which coordinates the development of learning technology standards through its Learning Technology Standards Committee (LTSC). The LTSC has developed the Learning Object Metadata (LOM) standard that specifies how metadata (data about data) associated with a RLO should be structured and what it should contain.

There are considerably more specifications and standards than CPS and LOM but these two are fundamentally important in driving efforts toward the effective use and reuse of learning objects.

The JISC X4L programme and the L2L project

The Joint Information Systems Committee is the UK body which 'works with further and higher education by providing strategic guidance, advice and opportunities to use ICT to support teaching, learning, research and administration' (JISC, 2003). The Exchange for Learning (X4L) programme is a recent addition to the portfolio of JISC activity.

> The focus of X4L is on projects that will foster change in online learning and teaching by exploring the potential of re-purposing and sharing content for use in learning. Part of this activity is to explore the process of integration or plugging in of usable objects into online learning such as Virtual Learning Environments (VLE). (JISC, 2003)

The Learning to Learn project (L2L) is funded for three years as part of the X4L programme. and brings together four further education colleges (list here) and one higher education institution (University of Stirling) in central Scotland. The fundamental aim underpinning the project is to provide a coherent range of high quality learning objects that can be used flexibly and in a wide range of different learning contexts to support (adult) learners as they return to learning through FE and all learners making the transition from FE to HE.

The project recognises that policy makers in all parts of the UK are promoting growth in the amount of higher education that takes place within further education, as a means of expanding and broadening participation. This process has gone furthest in Scotland, where some 40% of higher education students are in the FE sector. Yet research in England and Scotland suggests that such students are less likely than the mean to achieve their final qualification. The L2L project aims to develop and evaluate learning objects that will directly help improve achievement and retention among a large and significant body of non-traditional further and higher education students.

Fundamental to the aims of the L2L project is acknowledgement of Goodyear's (Goodyear, 2000) assertion about the need to adopt a design paradigm for online learning that places *learner activity* (and in particular the learner's *cognitive activity*) at the centre of the design process.

> We are committed to the view that educational outcomes are unlikely to be enhanced through networked learning unless careful attention is paid to the design of learning tasks, the learning environment and the social dynamics of learning. In particular, we believe that designers need to have their eyes firmly on what the learner will be doing, rather than on the content, navigation tools, interface design, or speed of communications. We don't mean that these other issues are unimportant – indeed they can be causes of catastrophic failure. But design needs to be driven by a concern for the learner's activity, especially their mental activity. The design of tasks needs to be informed by a strong sense of how the learner's cognitive activity is likely to result in desired learning outcomes. The design of technology needs to be informed by a strong sense of how it should support the learner's activity
> (p.94)

As a way of supporting this approach Goodyear suggests that designers perform a 'cognitive walktrough' which is 'a method for stepping through a set of learning resources, trying at each step to determine what it is that we intend the learner to be doing' (p. 96). Goodyear acknowledges that learners may end up doing something different to that intended (the difference between designed learning tasks and actual learning activities) but that a learning resource is unlikely to be effective unless some thought is given to how it will be used. As a framework for supporting cognitive walkthrough Goodyear suggests the use of Tom Shuell's (1992) 'learning functions', which emphasise what must be in place for successful learning. Shuell argues that every successful learning episode involves the activation of all these learning functions[i] but that a learning function may be activated by the teacher, the learner or by a resource. As Goodyear notes, careful design of resources for online learning can shift the burden of initiating one or other of the learning functions off the learner and this is seen as an important issue for the L2L project.

Goodyear's idea of cognitive walktrough and Shuell's learning functions framework begin to shift attention from learning resources as entities independent of learner activity and toward learning resources as means for structuring and supporting meaningful learning activity. The next part of the paper explores this perspective further by introducing the concept of affordance and exploring its relevance to the L2L project in particular and RLOs more generally.

Affordance, RLOs and study skills

According to Gibson (Gibson, 1986) the noun affordance is a new word that he has invented, whereas the verb 'to afford' exists in the dictionary. The noun affordance refers to 'both the environment and the animal in a way that no existing term does' (p. 127). Gibson goes on to describe examples of an affordance:

> If a terrestrial surface is nearly horizontal (instead of slanted), nearly flat (instead of convex or concave), and sufficiently extended (relative to the size of the animal) and if its substance is rigid (relative to the weight of the animal), then the surface affords support. It is a surface of support, and we call it a substratum, ground, or floor. It is stand-on-able, permitting an upright posture for quadrupeds and bipeds. It is therefore walk-on-able and run-over-able. (p. 127).

The above example exemplifies the fundamental idea underpinning the notion of affordance: an object (including technological artefacts) is viewed by animals, including humans, not primarily in terms of its 'innate characteristics' but rather in terms of what activities that object can easily enable or support. Gibson emphasises this point in relation to the development of perception in young children:

> There is much evidence to show that the infant does not begin by first discriminating the qualities of objects and then learning the combinations of qualities that specify them. Phenomenal objects are not built up of qualities; it is the other way around. The affordance of an object is what the infant begins by noticing.

This perspective forces us to change our analysis from the characteristics of the object to the ways in which the object is used. In crude terms, we don't get very far in simply describing the features of an object distinct from the use of that object.

Gibson developed his thinking on affordance in relation to animals and the mechanisms through which they perceive their environment. However, his work has been extended to focus attention on human use of objects within a social context leading to the concept of social affordance. (Kreijns & Kirschner, 2001) provide a succinct example that illustrates effectively the notion of social affordance.

> A wooden bench is supposed to have a sit affordance. A hiker who has walked for hours and passes the wooden bench on a walk along small country roads, might perceive the sit affordance of the wooden bench as a function of the degree of fatigue. A very tired hiker will sit on the wooden bench but will not lie down (unless the wooden bench also has a lie affordance). A still fit hiker, however, might not even pick up on the sit affordance of the bench and pass it by. The wooden bench is in that case no more than a piece of wood with no further meaning.

Social affordances can be viewed as properties of RLOs that may enable learners to engage in some learning activities more readily than others. It may even be the case that the RLOs which act as social-contextual facilitators relevant to the learner's social interactions. When perceptible, they invite learners to act in accordance with the perceived affordances, i.e. to enter into a communication episode.

This analytical approach provides a bridge to a broader body of work focusing on technological artefacts and how our use of them is embedded within a nexus of social relationships. This approach to the study of technological artefacts emphasises that the manner in which these artefacts are employed influences, and is influenced by, the social context of use. In short, a technical artefact has no meaning in and of itself but becomes meaningful only when seen as part of a social network. The position adopted in this paper is that any analysis of technology, particularly a technology that aims to support human learning, must start from a social perspective. This approach is summarised by Grint and Woolgar (1997):

> Technologies, in other words, are not transparent; their character is not given; and they do not contain an essence independent of the nexus of social actions of which they are a part. They do not 'by themselves' tell us what they are or what they are capable of. Instead, capabilities – what, for example, a machine will do - are attributed to the machine by humans. Our knowledge of technology is in this sense essentially social; it is a construction rather than a reflection of the machine's capabilities.

This insight is not new. According to Andrew Feenberg (1999a) the first educational technology was writing and, like all educational technology, it had its supporters and detractors. Plato was one of those who criticised it because of its inability to recreate the dynamic and immediate interchange of spoken discourse:

> The painters' products stand before us as though they were alive, but if you question them, they maintain the most majestic silence. It is the same with written words; they seem to talk to you as though they were intelligent, but if you

> ask them anything about what they say, from a desire to be instructed, they go on telling you just the same thing forever
> (Feenberg, 1999a).

This analytical approach toward technology and the social implications of technology in use can be located within the broader literature on the 'social construction of technology' (Bijker, Hughes, & Pinch, 1987), (Grint & Woolgar, 1992), (Feenberg, 1999b), (Kling, 1991), (Nardi & O'Day, 1999). This literature makes strong assertions about the 'contingent nature' of technology and emphasises that discussing how a technology 'impacts upon' a social situation is inadequate as an analytical approach, implying that technology is entirely independent of its social situation.

However, caution is necessary if we are to avoid taking this perspective (the social shaping of technology) too far – that is, assuming that we can make of a technological artefact what we wish. There are limitations to what we can do with a particular technological artefact regardless of how interpretatively flexible we may think it to be. A crude example illustrates this; it is impossible to boil an egg using an asynchronous computer conference system!

Using the concept of affordances and changing the emphasis of our thinking about RLOs to encompass the kinds of learning activities that an RLO can effectively support requires new design tools for those responsible for developing online learning. Although still very much in its infancy, the IMS Global Learning Consortium has developed a specification (Learning Design) to address this issue.

RLOs, Affordances and modelling learning activity

Adopting the concept of affordances as a way of thinking about RLOs forces us to concentrate on learning activity – the dynamic aspect of learning, rather than merely describing the characteristics or features of a learning object. The Learning Design specification (IMS, 2001) is an attempt to provide a conceptual framework to support instructional designers to express the dynamic aspects of learning so that others may reuse them. The aims of this work are ambitious[ii] but, if successful, it has considerable potential for promoting the widespread take-up of RLOs and their associated activities.

Underpinning the learning design specification is the metaphor of a theatrical play to represent learning activity. Within a play, activity unfolds in a sequence, actors perform roles and make use of props to help them to do so. All of the activities take place within an environment that uses different sets to provide appropriate support to different kinds of activity. Although there is not the space to explore it further here, the metaphor of a theatrical play offers a very powerful mechanism for thinking about online learning (Laurel, 1993)

Conclusions

The changing nature of the learning population and the increasing demands placed upon institutions of learning has led many to turn to technology as a possible response. Although RLOs appear to be a new addition to the list of learning technologies they are, in many respects, ages old and with them come new and also familiar issues to be resolved. This paper has argued that the theory of affordances offers a framework for moving beyond simply describing the characteristics of RLOs to describing the kinds of activities that such resources can effectively support. Using affordances as a conceptual lens forces the instructional designer to think 'what meaningful learning activities can this resource support'? In crude terms, this is a shift in thinking from 'what is this resource' to 'what can this resource be used for'. At a more formal level, the IMS Learning Design specification is a significant step toward providing instructional designers with the conceptual design tools to fundamentally change their design practice.

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Notes

[i] [i] Shuell's learning functions are: expectation, motivation, prior knowledge activation, attention, encoding, comparison, hypothesis generation, repetition, feedback, evaluation, monitoring, synthesis

[ii] The specification document lists eight requirements that the learning design specification meets. The first of these is completeness which includes: integration of the activities of both learners and staff members; integration of resources and services used during learning; support for a wide variety of approaches to learning; support for both single and multiple user models of learning; support mixed mode (blended learning) as well as pure online learning.