



The Value of Managing Learning Objects

An Intrallet "white paper"
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Introduction

The purpose of this paper is to enable organisations to be able to place a value on the management of their learning objects. This requires a clear view of what constitutes a learning object. There are many definitions but most of them rely either on the structure of the objects or the uses to which they are put. An alternative approach is to consider what is required to create learning objects.

By analogy we could consider the value of a house by considering its structure (for example how many rooms it has) or the purpose to which it is put (such as a holiday home) but we can also consider how much it costs to acquire the land and construction materials, the time taken and the skills required.

Defining learning objects

By ignoring the way learning objects are used we avoid one of the major stumbling blocks: are learning objects relevant only to e-learning? Instead, consider that a learning object is something tangible produced by bringing together subject knowledge and pedagogical expertise. A member of staff in a university or college will often have both in abundance. However, the knowledge and expertise of that particular member of staff are only made tangible when they turn them into learning objects. The tangible assets of value to an institution are the materials produced by the member of staff to support teaching and learning: lecture notes, slide presentations, tutorial sheets, self assessment questions, laboratory handouts, reading lists. Notice that all these items are learning objects and yet they have nothing to do with e-learning. These objects are of great value to other members of staff. They can be passed on to others in the same department, who can take over the course with relative ease, they can be used by staff in other subject areas, as templates of good practice, and they can be used by people in different institutions but in the same subject area, to avoid duplication of effort. These are reusable learning objects.

Of course e-learning also has reusable learning objects and it is possible that the learning objects defined above could also be used in e-learning. The work of the e-learning community has highlighted the granularity of learning objects. At the simplest level these are raw assets, a single image, a table of data, a video clip. The next level brings together a number of objects and gives them an educational purpose, a handout or a web page. Aggregating several of these resources together provides the basis for a more substantial unit of learning, a module or course.

Not only is it valuable to keep all of these learning objects but the context they are used in and the way they are aggregated encapsulates part of the pedagogical expertise of the staff involved in their creation.

Managing Learning Objects

The management of learning objects has, traditionally, been as granular as the objects themselves. The raw assets and handouts are managed by individual staff. The information about units, or modules is held at departmental level. Information about whole degree programmes is held at institutional level. This reflects the level of creation and use of the learning objects. Much of the most valuable material is created by individual staff and used by them in their teaching. Group work produced by their students may also be managed at the same level. This process is outlined in figure 1.

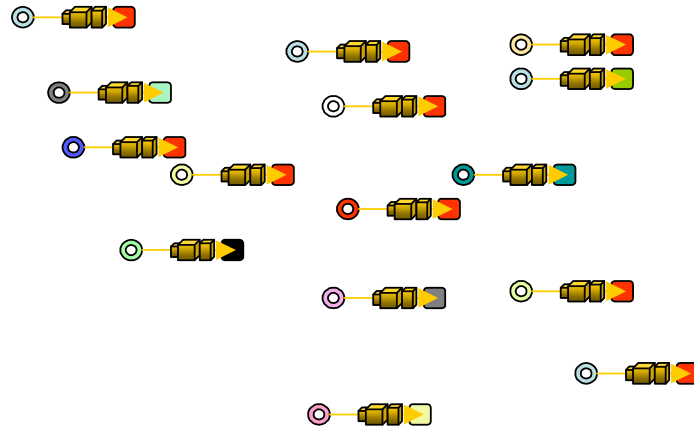


Figure 1: The "individualist" management of learning objects. Each member of staff is capable of using their own discretion to choose the best tools (circles) for creating and distributing (squares) the nuggets which represent their learning objects.

The advantages of this approach are that staff can choose the best tools for both creation of learning materials and distributing them to students. This means that staff neither have to learn to use new tools nor do they have to compromise on what they think is best. They also have the freedom to change when new and innovative tools become available. This does not prevent groups of staff from sharing resources such as a common VLE (virtual learning environment) or authoring tool (such as a simulation building tool), but diversity is supported.

The disadvantage of this approach is the loss of management. Although individuals know what learning objects they have, where they are located and how they can be used, that information is not shared with their colleagues. Not only is there likely to be duplication of effort but duplication of management, backup and version control as well. In addition, there is no incentive to design for reuse as each staff member knows precisely how and when every learning object will be used.

Contrast this with the benefits of a suitable learning object management system (LOMS). Figure 2 shows how the learning objects are managed in a shared pool.

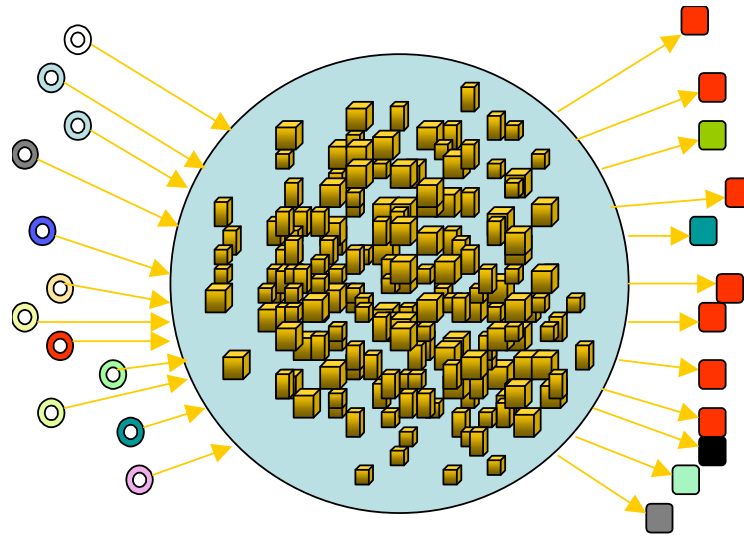


Figure 2: A shared pool of learning objects using a Learning Object Management System can support diverse creation and delivery mechanisms yet offer many advantages of careful management.

The only disadvantage of this approach is that there is a small amount of additional effort in providing a description of each learning object when it is contributed to the LOMS. This is similar to the effort of cataloguing a new book or journal every time it is added to the library. In both cases it would be hard to find and use the object if it is not suitably catalogued.

The advantages of using a LOMS are many: complete management of assets; improved teaching; reduced workload.

- **Complete management of assets:** Learning objects are a key asset of every educational enterprise. They need to be well managed for a number of reasons:
 - **Financial:** Ensuring that all resources are shared will reduce duplication of effort and encourage reuse. Every time a learning object is reused the return on investment from its cost of creation increases.
 - **Control:** Can any institution afford to leave the safety of such valuable assets to individual staff? All learning objects need to be stored so that they can be easily located in a backed-up environment.
 - **Ownership:** The learning objects produced by staff are normally owned by the employer. Yet these assets are liable to be lost if staff leave unless they are properly managed. Sharing resources also enhances team ownership and development of learning objects.
 - **Future-proofing:** The use of international standards for interoperability ensures freedom from proprietary solutions that tie an organisation to a single vendor. Learning objects are described using the IEEE Learning Object Metadata standard and all objects can be exported from a LOMS as IMS Content Packages, the interoperability standard that allows learning objects to be transferred between systems.

For example, between a LOMS and WebCT¹, BlackBoard,² QuestionMark³ or Macromedia⁴ products

- **Improved teaching:**
 - **Quality:** Time is critical to the quality of teaching. By saving time through using a large pool of learning objects staff can spend more time with students or developing new and exciting learning objects. Overall the student learning experience is enhanced.
 - **Productivity:** Developing new learning objects is very much easier when adapting existing objects. When these are available at multiple levels of aggregation productivity is massively increased because different objects act as both templates and raw assets. This enables the most expensive talent in the organisation to "add value" where they can have the greatest impact.
 - **Diversity:** Since the LOMS is neutral to the type of objects it stores there is no restriction on the systems that staff use to create learning objects. Similarly the LOMS delivers the learning objects without making assumptions about the environment in which they will be used, so diversity of delivery is also supported. A shared pool of resources encourages reuse of objects across multiple modes of teaching and learning.
- **Reduced workload:** A significant part of the workload associated with using any form of educational technology is linked to the staff development effort and support team needed to maintain the process.
 - **Easier to support:** Supporting large numbers of staff requires the adoption of common practices. The use of a shared LOMS can be easily supported by learning support services and encourages all staff to develop a workflow that includes effective object management and a culture of sharing and reuse.
 - **Flexible, not restrictive:** The common practice associated with the LOMS is only concerned with management. The creation and delivery aspects, which are pedagogical choices, remain flexible.

These qualitative benefits highlight the advantages of a learning object management system. The next section highlights the cost savings.

Putting a value on managing learning objects

How does an educational institution put a value on its learning objects as assets? Universities and colleges know the value of their buildings, their computer hardware, perhaps even the contents of their libraries. It is vital to know these values as some appreciate while others depreciate - they have a role on the financial balance sheet. But placing a value on the learning assets owned by a college or

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http://www.webct.com/standards/viewpage?name=standards_commitment_to_interoperability

² <http://products.blackboard.com/cp/release6/SupportforScorm.pdf>

³ <http://www.questionmark.com/uk/perception/featurecomparison.htm>

⁴ <http://www.macromedia.com/resources/elearning/standards.html>

university is much more difficult unless they are managed as carefully as these other resources.

How can a monetary value be put on a learning object? Several different metrics are possible. None is perfect. Although they all have drawbacks we might have some confidence in the results if they all give similar values.

- **Production cost:** What is the cost of producing a set of lecture notes, a slide presentation, a laboratory handout, course web pages, reading list, interactive computer-based exercises, tutorial questions, or self-assessment quizzes. The answer depends on the experience of the author, his/her familiarity with the tools and the subject material and many other things, but an average figure might be estimated based on some ratio of production time to teaching time. Figures as varied as 40:1 for courses that don't involve a lot of on-line interactive material to as much as 300:1 for those with very specific on-line learning environments that involve collaboration or simulation have been quoted. To be very optimistic let us assume that a figure of 25:1 is achievable. If a full-year university course has 100 "contact hours" and a university runs 100 such courses then the number of production hours for those courses will have been $100 \times 100 \times 25 = 250,000$. If we take a typical salary of the staff involved to be about £15 per hour (about £28,500 pa) then the total production cost is £3.75 million. If course material has a shelf-life of, say, 5 years then £750,000 per year of new assets will be continuously produced
- **Staff time saved:** How much time do staff spend on preparation of teaching materials? If academic staff are expected to spend time on research, teaching and administration then a first estimate is that 33% of their time is spent on teaching. Perhaps half of that is spent on preparation but let's be really pessimistic and assume only 10% would be saved by being able to reuse material from a LOMS. That would imply that 3.33% of academic staff time preparing learning objects could be saved. In a university with 1000 academic staff, being paid, on average £30,000 the amount saved each year might be $1000 \times £30,000 \times 3.333\% = £1$ million.
- **Replacement value:** Consider an "insurance" viewpoint. If, through some mishap, fire, flood or virus, the learning objects associated with a major course were lost. What would be the replacement and consequential loss value? One way to view this is that a specific degree programme might be unable to run for a year while it is reproduced. The initial cost may be loss of student fees for one year but there may also be a loss of publicity as a result of being unavailable for a year which might reduce applications for several years. For a course such as an MSc with 50 students paying £4000 on average in fees the loss may be limited to only £200,000. Another approach would be to run the course but all staff would need to spend all their time redeveloping the course. During the year that, say, four staff were redeveloping the course their research applications would be lost with a potential loss of research income of, say, £50,000 per head, or £200,000 in total.
- **Lost opportunity:** Opportunities to use existing learning objects arise for many universities and colleges in the form of continuous

professional development (CPD), distance learning, or franchising of courses overseas. In the model shown in figure 1 these opportunities are often lost because valuable learning assets are tied to one particular person or group, who themselves have insufficient time to develop the opportunity. If learning objects are shared and available to be rapidly reused for new and different purposes they enable a university to act quickly to take opportunities as they arise. In 1997-98 UK Higher Education Institutions generated £458 million from part-time CPD and £540 million for full-time overseas student fees⁵. The UK e-University is already offering courses from UK Universities with fees in the range £2,500 to £3,500. If a university can offer such a course and attract even 100 students a year over a 5 year life-span the income is $£3000 \times 100 \times 5 = £1.5$ million. Even if the contribution of the LOMS accounts for only 10% in seizing such an opportunity it represents a gain of £150,000, which would occur for every such course offered.⁶

All of the figures used here are simple examples but they form the basis on which individual universities or colleges can estimate a value for their own learning object collections. All of the figures used have erred on the "low cost" end of the range so the typical values probably also lie at the lower end of the range - although the size of the institution is a key factor.

Conclusions

Learning objects are the tangible assets which staff produce in the process of developing courses. They are a major asset of any university or college. It is vital that they should be managed as carefully as other major assets such as property, computers or intellectual property. This can be achieved using a Learning Object Management System in a way that enhances management, improves teaching and reduces workload while at the same time maintaining the flexibility and inventiveness that staff cherish.

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⁵ http://www.hefce.ac.uk/pubs/CircLets/2000/cl04_00a.htm

⁶ General Motors increased its income from licensing photographs and films of cars, people and production facilities from \$4 million to \$25 million per annum when it adopted a digital asset management system.
http://www.emedialive.com/r2/2001/doing8_01.html