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Article Title: Reuse as heuristic: from transmission to nurture in learning activity design

Year of publication: 2010

Link to published article:

<http://dx.doi.org/10.1080/14703291003718943>

Publisher statement: 'This is an electronic version of an article published in Sweet, J. et al. (2010). Reuse as heuristic: from transmission to nurture in learning activity design. *Innovations in Education and Teaching International*, Vol. 47(2), pp. 215-222. *Innovations in Education and Teaching International* is available online at:

<http://www.informaworld.com/smpp/content~content=a922117439~db=all~jumptype=rss>

# Reuse as Heuristic: from transmission to nurture in learning activity design

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In recent years a combination of ever more flexible and sophisticated Web technologies and an explosion in the quantity of online content has sparked learning technologists around the world to pursue the promise of the ‘reusable learning object’ or RLO with the idea that RLOs could be reused in different educational contexts thereby providing greater overall flexibility and return on investment.

In 2002 the ACETS Project undertook a three-year study in the UK to investigate whether RLOs worked in practice and how the pursuit of reuse affected the teacher and their teaching. Teachers working in healthcare related subjects in Higher and Further Education were asked to create an original learning design or activity from third-party digital resources and to reflect both on the process and its outcomes. The expectation was that teachers would be the ones selecting and reusing third party materials.

This paper describes how one of the ACETS exemplifiers reinterpreted this remit, challenged the anticipated transmissive model of learning, and instead, gave their students an opportunity to create their own original learning designs and learning activities from third-party digital resources. By describing the educational enhancements, the resulting heightened

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levels of critical thinking, and sensitivity to patient needs, “reuse” will be shown to be an effective heuristic for student self-direction and professional development.

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## Introduction

The growth of the World Wide Web has been one of the defining phenomena of our times. In less than ten years it developed from a way for physicists to share research data to a way for millions of people to conduct business, leisure, education and many other information-based activities. This rapid growth has had many dimensions but of particular note has been the rapid development of sophisticated Web technologies and systems and the proliferation of online content, some digitised from existing sources, much of it created specifically for and in the context of the Web. In recent years this has led learning technologists around the world to pursue ideas of ‘reusable learning objects’ or RLOs with the idea that they could be used and reused in different teaching contexts, thereby providing greater flexibility and return on investment. For the purposes of this paper the IEEE (2002) definition of RLOs as “any entity, digital and non-digital, that can be used, reused, or referenced during technology supported learning” is used.

Despite extensive discussion of the potential benefits of Reusable Learning Objects (Littlejohn, 2003; Wiley, 2000; Quinn & Hobbs, 2000) there has been little evidence available to substantiate any practical benefits in pursuing a reusability approach in teaching and learning. The ACETS (Access, Catalogue, Exemplify, Test and Share) Project was funded as part of the UK’s Joint Information Systems Committee’s (JISC) X4L Programme in 2002 to collaborate with teachers in Higher and Further Education to explore means of engaging with the reuse of third party materials and the effect this had on their practice (Ellaway, Dewhurst, Mills, Hardy & Leeder, 2005). ACETS commissioned twenty exemplar projects from

teachers working in healthcare-related subjects throughout the UK Higher and Further Education communities. Each exemplar case study was to be based around the creation of an original learning design that employed third party digital materials. The creation of each exemplar case study was to incorporate both formative and summative evaluation of each teacher's activities and experiences and was to contribute to an overall meta-analysis of the issues associated with reuse in the tertiary sector as a whole.

This paper describes the development and results from one of the ACETS exemplar case studies which challenged the anticipated transmissive application of reused materials by adapting reuse to be the core heuristic instead.

### **Rethinking reuse and learning activity design**

The ACETS Project recommended the following five-stage reporting protocol for the development of the exemplar learning activities:

- 1) identify a single learning objective and find the resources needed to support it
- 2) plan and design the learning activity using the resources identified
- 3) create and assemble the learning activity using the located resources
- 4) deliver the activity recording how it was used to enhance student learning and teaching practice
- 5) report back on the delivery of the exemplar study consisting of a baseline survey, a reflective diary, a semi-structured interview and a learning design statement.

Following this protocol, a conventional exemplar case study would entail the teacher identifying the learning objectives planning the design and completing the learning activity

themselves and it would only be on delivery of the activity that students would become involved. The protocol is essentially a transmissive teacher-led exercise (Pratt, 1998).

By contrast, the project described in this paper required student involvement from the outset and continued throughout, building on past experiences of working together and their IT skills training, to give them the necessary skills and mutual support required to succeed. In short, the students planned their own learning activities in groups, each one creating patient education materials from reusable learning objects.

### **The student projects**

This particular student activity involved 54 third year dental undergraduates (on the five-year training programme at Cardiff University) who had had nine months of hands-on clinical experience as well as IT training in the form of the European Computer Driving Licence (ECDL) qualification, prior to this exercise. As a result these students started with appropriate levels of clinical experience to help determine what they should investigate and sufficient computer skills and academic understanding to tackle the technical aspects of the exercise.

The students worked in small groups (of between twelve and fourteen) and were given the option to choose their own topic within the context of ‘communicating with the patient’. More specifically, each group was directed to create instructional materials of some kind to aid communication with periodontal patients. Each group was also expected to create supporting presentations to share their ideas with their colleagues. In addition, every student was required to keep a written reflective log on his or her progress throughout the course of the project. Each group was encouraged to select just one learning objective that their work would address and they were instructed to use third-party electronic resources wherever

possible and to provide as much support as possible within their groups rather than rely on external input. Only if they got really stuck were they to contact faculty or IT support for help.

The project work was conducted in three stages:

- First of all they agreed on the topic they were going to follow and searched for third party materials to use in their work. After four weeks they gave a five-minute presentation to their colleagues showing example resources, learning objects or websites that they planned to reuse in their project. They also recorded personal reflections on what was helpful in their search and judged how successful reality of resource discovery compared with their expectations.
- The second phase involved the projects being worked up more fully opportunities for collaboration between the groups encouraged and explored. This phase also saw the assembly of their various source materials and learning objects into their final outputs.
- The third phase began with each group presenting their finished materials to the whole class. This coincided with the students completing their personal reflections on how they had sought out their materials, selected what was of value and evaluated what they had learnt from the project. This was structured using the ACETS project's recommended reflective diary format.

## **Outcomes**

An outline of the different communication materials produced by this cohort is shown in Table 1. About a third of the class decided to take up the topic of communicating about smoking, and five groups produced other patient orientated materials. However, three groups

decided, after researching their topic in some depth, that it was more appropriate to produce communication materials for professional colleagues who would then be able to pass this information on to their patients as appropriate. One of the more innovative ideas was that of a newsletter for smokers as a way of engaging them with the basic message that stopping is good for you; in this case presenting one argument after another until they were persuaded to quit as well as giving encouragement to those who had already stopped. Two (male) students decided to study the relationship between periodontitis and low birth weight. They defended their decision to create a presentation, with a good handout for their colleagues rather than a leaflet communicating information to patients, pointing out that the current research literature provided conflicting evidence. A small group of students were worried about how to treat HIV patients and what advice they should give to them. Their original intention was to produce a poster and then a leaflet. However, they decided that a greater understanding of both gum disease and HIV and how it affects the mouth could be of interest to all patients, so that they developed a leaflet that was intended to be informative for HIV and non-HIV patients alike.

### **Presentation**

The most common presentation format used was that of the leaflet. These were intended to be used to support communication in regular one-to-one clinician patient situations as well as in a more serendipitous way with patients selecting this information as and when appropriate. Most students were careful to place Website addresses, or telephone numbers at the back of their leaflet to enable patients to gain further help if needed.

The students mostly used the programs they had covered in their ECDL training (such as Microsoft Word and Microsoft PowerPoint) to produce their materials. However, a number had learned new tools and some used Microsoft Publisher in particular for leaflets, and one newsletter had been produced using Serif Page products. Only one student resorted to physical cut and paste.

One common problem identified was that the image quality and resolution on many Web sites was not of sufficient quality to be transferred to printed copy. For one group producing a poster the facilitator arranged to supply some photographic slides, which were converted to a high-resolution digital format for the PowerPoint poster file. Another group were unable to source a suitable graph from the research literature to illustrate the point they were making. In this case the facilitator was able to find a journal article with a suitable figure for them. More generally the facilitator was able to assist a number of projects by suggesting changes of emphasis or priority when looking at the drafts of a number of the student projects. Some additional AV and IT help was also required to help the students to scan photographic slides, print the posters, and laminate the leaflets.

### **Student Reflections**

Students' reflections were based around the ACETS exemplar reflective diary pro forma questions (see appendix), which ask about the impact of the project from the point of resource discovery, the design process of reusing the learning objects, putting the design process into action and evaluating it, asking what was learnt and gained from it all, whether the participants were likely to try this kind of approach again, and finally the benefits and problems experienced and any advice that could be passed on to other students working in this area.



The written reflections provided rich insights into the content structure and success of the students' learning strategies. Student experiences of resource discovery were quite variable, depending on their requirements. Clearly there were many Web sites on the subject of smoking that required their consideration, but when it came to specific medical or dental topics, search engines referencing academic journals such as PubMed proved more useful. There was also some unease expressed at the commercial nature and reliability of some of their sources. Although the students were designing their patient communication materials so that a layperson could understand them, the students referred time and again to the need to support these ideas with good scientific evidence. This was reflected both in their formative reflections and later in their presentations where they time and again related patient information back to scientific evidence. Such was the importance of this to the students, that on the occasions where they could not clearly relate advice to primary evidence, they were unwilling to proceed without communicating with professional colleagues to help them to interpret the partial information currently available.

The students' reflections on their learning designs and the resources they used involved both practical issues and a common realisation of the need to be able to work realistically within their own capabilities. The presentations provided an opportunity for the students across the whole group to share their ideas and experiences about reusable learning objects and patient communication. It gave them an opportunity to show their communication materials and to justify the way in which they were constructed. They could also share their reflections on their own projects and their reactions to the work of other presenters in the group. The reflections on outcomes and self-regulated learning illustrated how useful the group presentations were considered by the students and how seriously they took the need to teach and support one another.

## **Assessment**

Although quality assessment for digital resources (such as those held at Merlot.com) are reasonably well established, a complex model for evaluation of the learning objects was not thought necessary as part of this learning activity. Instead, a simple grading scheme was instituted for self, peer and facilitator appraisal with options of ‘unsatisfactory’, ‘satisfactory’ and ‘more than satisfactory’. The majority of the projects were deemed ‘more than satisfactory’ by student peers and the facilitator and none were found to be ‘unsatisfactory’ despite a degree of individual modesty.

Students and faculty concentrated on the learning and process and the collective product of materials, presentation and reflections they would consider were generally “excellent all round” or “very good overall but with few minor concerns” (using rankings from Merlot - Nesbit, Belfer & Vargo, 2002). There were very few projects given the mid range grade of ‘materials meet or exceed standards but there are some significant concerns’ and none were rated below this level.

## **Discussion**

The emergent structure of self-regulated learning can sometimes impinge on the individual student who talks about not having their say in the presentation, despite being generally well disposed to the work in hand. In this student activity it was the presentations themselves, when the students were expressing their thoughts and feelings about their work, that it became apparent that many of them had been engaged with quite fundamental issues and had

demonstrated substantial critical thinking and sensitivity to the subject which in turn had informed decisions about the format and content of their final product.

Over all, the projects were shown to have provided positive learning experiences for the students as they gave them ample opportunities to engage actively with one another and collaborate to integrate their thoughts and feelings into their work. The value of the project was, for some, gaining practical insights such as accommodating the special needs and experiences associated with pregnancy. To others it involved making judgments about the appropriateness of materials for pregnant women on the relation between periodontal disease and low birth weight babies, or reflecting on possible stigmatization of HIV positive dental patients. To others it was about techniques of persuasion such as positive approaches to smoking cessation whilst avoiding scare tactics.

The most common reflective theme was around meeting the need for consistently high standards in clinical practice whilst recognising the value of communicating differently to different patients to accommodate individual needs. Although the information to be conveyed needed to be stated simply, each component needed to be verified from evidence obtained from primary scientific research.

## **Conclusions**

From the teacher's perspective the ACETS project primarily provided a context and an impetus for developing their teaching skills from those of instructor to those of facilitator and mediator. This paper has described how it also provided an opportunity to develop self-directed learning designs, which contributed to and reinforced a culture of evidence-based practice for undergraduate dentistry students.

The approach adopted for this particular activity, and reified in the modified learning design, would be unlikely to work well in a transmission-mode learning environment where students expect to receive materials and instructions from their tutors. The benefits of this modified design are such that it is repeatable, scalable and can be incorporated into an existing curriculum. The project work can be undertaken by single students, or in pairs or threes or fours, and feedback provided as part of presentations to small groups or larger plenary sessions. The learning activities also produced materials which were consistently positively received by peers, sometimes for their informative content, sometimes for the way they provided new professional insights, and on occasion just for the quality of presentation of the activity outputs.

The resulting communication materials can go on to be the starting points for a number of subsequent learning activities within the curriculum. For instance, these materials can be reworked to support communication between colleagues or other clinical professionals, or developed to provide support materials for the whole professional team.

The conventional and somewhat technocratic focus on reusable learning objects (Friesen, 2004) prioritises transmissive models based on teachers searching out and selecting the appropriate digital resources assembling them into new learning designs for their students to use. As a result the RLO process is largely conceived as being about the transfer of knowledge from the teacher to their students by means of these learning materials. This paper has presented an alternative, more self-directed, approach where students were required to take responsibility for their own learning and engage with the search for digital materials themselves. As a result, the students were able to take ownership of the topic, reflect on their own learning and make critical judgments about how they were best able to enhance communication between dental professionals and their patients. The reuse of digital content has therefore proved to be an effective (if initially unexpected) heuristic in supporting

professional education and one that would seem to provide ample opportunities for further research and development. Furthermore, it emphasises the need for caution in taking the predominant technocratic and technological rhetoric regarding innovations such as RLOs at face value. Rather, the opportunities they afford can be used to widen the range and dimensions of professional teaching and learning.

### Notes on contributors

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### Keywords

Reusable Learning Objects

Self-directed Learning

Communication

Teaching styles

Transmission

Nurturing

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