

Toolkits as an Approach to Evaluating and Using Learning Materials

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Abstract

The appropriate use of learning technologies is now widely recognised as being an integral part of the development and delivery of learning and teaching materials. However, few academic staff have had the opportunity to develop the pre-requisite expertise to design and implement an effective strategy for acquisition, use and evaluation of either new materials or methods of delivery. In order to provide these practitioners with support and encouragement, easy-to-use guidelines and resources are required. Not only must these be based on sound, tested pedagogical theories, but also first and foremost they must be practical for academics using (or evaluating the use of) learning technologies. This paper describes the development of a web-based evaluation toolkit, which supports practitioners in the effective and appropriate use and evaluation of learning materials. The paper defines the term 'toolkit' within this context and illustrates the concept with some existing examples. It provides a review of resources for supporting decision making, with a particular emphasis on learning technology evaluation research. An outline of the basic toolkit architecture and design will be described. The paper will conclude with potential applications for such toolkits and areas for future development

Keywords

Frameworks, Toolkits, Evaluation, Learning technology

Rationale

In recent years, policy in the U.K. has placed a considerable emphasis on embedding new technology into the learning and teaching process. However, this process is not trivial, and uptake has been patchy (Laurillard et al., 1993). One reason for this is the considerable range of skills that need to be acquired if embedding is to be carried out in a professional way (Phelps et al., 1999). This realisation has led to a noticeable shift in emphasis in funding initiatives, in the UK. Instead of a focus on development, research has concentrated on understanding the issues underlying embedding and the provision of models and frameworks to support integration. This shift is well illustrated by the UK Teaching and Learning Technology Programme (TLTP), where the last phase of funding for the programme shifted from development of materials to integration (HEFCE, 1997a).

Despite the current consensus that adapting and re-using existing learning materials, including Information and Communication Technologies (ICT), is a good thing, examples of this are few and far between. This can be traced to a number of factors. In particular, the 'not invented here' syndrome (HEFCE, 1996) is no doubt still present. However, more important is the issue of the time and skills required to evaluate and then adapt materials. This is compounded by the fact that finding these materials in the first place is a non-trivial exercise (although the growth of subject-specific information gateways, portals and guidelines to resources will go some way towards alleviating this problem). Some of the barriers to uptake that have been identified include: the problem of finding relevant materials in the first place, the difficulty of adapting other peoples' materials, the issue of ownership and copyright, integration with other materials and whether staff having the appropriate educational and/or technical skills required to evaluate, adapt and integrate materials. This paper will focus on a project that addresses these concerns by using models and frameworks to support the evaluation and utilisation of learning materials.

The Evaluation Toolkit for Practitioners

The 'Evaluation Toolkit for Practitioners' project is funded by the Joint Information Systems Committee (JISC) as part of their Committee for Awareness, Liaison and Training's remit. It aims to develop a Web-based toolkit to help practitioners, irrespective of their current degree of expertise, to evaluate the use and range of learning materials. It provides a

structured resource that can be used to plan, scope and cost an evaluation. By providing progressively more detailed information on particular topics, the user can follow up relevant issues when and if this is required. Secondly, by providing a simple, logically organised structure the toolkit reduces the time required to plan work of this type. The aspiration is that the toolkit will be used iteratively, with progressively more detailed analysis occurring once initial feedback and information has been received. In this paper the toolkit will be described; a demonstration of the functionality of the system will be provided at the conference. The paper also reviews the wider context of evaluation research and some of the key existing resources that are available to support this work. This review is a précis of a much more detailed scoping study, which was carried out in the initial stages of developing the Evaluation Toolkit for Practitioners (Conole, Oliver, Harvey, 2000).

Evaluating Learning Technologies

Evaluation is a relevantly new research area, with origins in Social Science research; learning technology is still a research area in the making and associated underpinning research theories and models are still being developed. This section will give an overview of more general evaluation work and highlight some of the key tools and resources.

Evaluating learning technology

The three major funding drivers in the last ten years within the UK HE-sector have been the Teaching and Learning Technology Programme (TLTP), the Fund for the Development of Teaching and Learning (FDTL) and, with more of a focus on the technological aspects, the Joint Information Systems Committee (JISC) programmes. The evaluation philosophy of the first two will be described here as they give an indication of current thinking and evaluation practice within HE.

The FDTL projects have put practitioners into roles where they are expected to evaluate the success of their projects, when their personal experience of evaluation may well be limited. An important support for practitioners working on FDTL projects is the report by Bradbeer (1999). This report introduces a range of issues to practitioners involved in curriculum evaluation. It focuses on qualitative evaluation, and draws on the traditions of reflective and reflexive practice (Schön, 1983) and utilisation-focused evaluation (Patton, 1997). Evaluation in TLTP is similar to that of the FDTL projects. Central guidelines for the formative evaluation of projects have been produced by the Tavistock Institute, and these have been supported by an online discussion forum and face-to-face workshops for project evaluators. The guidelines that have been produced present useful issues and refer the reader to useful sources such as evaluation textbooks and resources.

Oliver (1997) provides a more general discussion of the evaluation literature on learning technologies. He identified several key issues for successful evaluative research and describes frameworks for evaluating the educational benefits of educational technologies, along with themes common to these frameworks. Since issues of cost-effectiveness are also important in the uptake of learning technology, research on economic frameworks for evaluation are also summarised.

Resources for Supporting Evaluation

In essence, resources for supporting decision making range from highly restrictive ‘templates’ or ‘wizards’, which provide step-by-step guidance but little possibility of user-adaptation, through to ‘theoretical frameworks’, which provide a context and scope for the work but leave the user to devise their own strategy for implementation. Between these extremes lie a range of resources, including checklists, guidelines and

step-by-step tutorials. In this section, examples of ‘frameworks’, ‘toolkits’ and ‘wizards’ will be described and illustrated.

Evaluation Frameworks

At one end of the continuum lie open and flexible frameworks, which scope out a defined area of underpinning learning or provide guidelines according to a set of values or criteria. These help position, but not restrict the area of research.

The Teaching with Independent Learning Technologies (TILT) framework adopted an “illuminative” approach to evaluation (Draper et al., 1996; 1997). The course as a whole is evaluated, rather than simply the resource being used. Qualitative analyses are complemented by measuring factors that may have a significant impact on learning. TILT's framework is predicated on the assumption that the evaluation must take place in context, since it aims to evaluate the course's use of educational technology, not the educational technology alone; consequently, the framework does not support comparative or controlled experimental research designs.

The Situated Evaluation of CAL (SECAL) framework (Gunn, 1996; 1997) is predicated on the premise that experimental evaluations fail to identify which single or combined factors supported learning. It is argued that evaluations should be designed in order to account for these factors, rather than attempting to balance or disregard them. SECAL attempts to provide evaluation in context and the evaluation of context. “Evaluation in context” examines the primary effects of CAL use; “evaluation of context” examines factors affecting integration at a university level which indirectly influence learning. As a result of this, authenticity is a pre-requisite of the framework. The SECAL framework involves case-study work, adopting methodologies in an opportunistic manner. It is intended to be used with small sample sizes, making it ideally suited to action research evaluation. It is this small scale, together with its aim of providing rapid and immediately applicable results, which sets it apart from illuminative evaluation.

More recently, ‘the handbook for learning-centred evaluation’ has been developed, which – although described as a ‘handbook’ – fits our definition of a ‘framework’. Users learn to carry out evaluation through their own learning and teaching project. This involves cycles of action inquiry in which they develop an evaluation plan, carry out the evaluation, analyse the data and disseminate the results. Each user is supported in the action inquiry process by a mentor and the evaluation handbook (which is available online at <http://cleo.murdoch.edu.au/projects/cutsd99/>). The handbook guides the user through sequential questions about the nature of the evaluation they are undertaking, including consideration of who the

evaluation is for and what the expected outcomes are. It then focuses on four key areas: analysis and design, development, implementation, and institutionalisation, looking at particular issues and questions which need to be addressed in each area. One of its strengths is that it was produced by consortium across Australia who adopted a pragmatic approach to the development of the handbook, keeping a critical eye on ensuring that it would and could be used effectively in their institutions.

Evaluation Toolkits

Toolkits are more structured than the frameworks described above. In this context, a toolkit is taken to be a model of a design or decision-making process, with tools provided at key points along the way (Oliver and Conole, 1999a). Each of these individual tools is designed to help the user access a knowledge base in order to make informed decisions. The format of toolkits means that they can be used in a standard, linear fashion, or can be “dipped into” at need by users whose level of expertise is stronger in some areas of the design process than others.

The BP-funded Evaluation of Learning Technology (ELT) project produced two toolkits, one for curriculum development and one for evaluation, and a methodology for toolkit development (Conole & Oliver, 1998; Oliver & Conole, 1998, 1999a, 2000). The evaluation toolkit consists of six steps, ranging from identification of the audience for the evaluation through to selection of the most appropriate format(s) for reporting the findings to the audience. At each of these steps, activities are provided which allow users to make informed decisions that allow them to progress to the next step.

The LTDI evaluation cookbook (Harvey, 1998) provides a compliment to the BP evaluation toolkit described above by providing a rich range of evaluation resources. It includes ideas and suggestions to help the user design an evaluation study to suit their own specific needs and is divided into the following sections:

- preparation pages – these provide a framework for the planning and preparation process required before carrying out an evaluation
- recipe pages – consisting of a summary of the main uses for each evaluation method; essentially a step-by-step guide to the time, resources and process likely to be involved in the evaluation, along with a set of ‘cooks hints’
- information pages – provide practical suggestions and advice on the different evaluation methods
- tasting, refining and presentation pages – guidance on reflecting on the outcomes of the study and thinking of ways of acting on the results

- serving suggestions – demonstration of some of the cookbook evaluation methods put into practice.

More specifically, the Flashlight project has produced a questionnaire-based toolkit that provides a simple structure for evaluation by practitioners. The tool provides guidance on what it considers the characteristics of a good evaluation to be. Although these may be useful in determining whether a particular evaluation context is good or not, it focuses on choosing situations that suit the Flashlight methodology, rather than on selecting an approach that suits the situation. The bulk of the tool is concerned with identifying questions that can be used to generate data. This includes consideration of five thematic prompts (e.g. “questions about the use of the technology”), and access to the Current Student Inventory, a repository of questions devised by other users. Based on a brainstorming exercise, questions are then created (possibly based on or incorporating examples from the Inventory) that can be used in surveys or structured interviews. Although interviews are mentioned, the focus for the tool is, quite clearly, questionnaire design. The Flashlight tool is based on the premise that “very different educators need to ask similar questions” (Ehrmann, 1999). This position has been challenged as an oversimplification (Oliver & Conole, 1999b), albeit a useful one. Although criticisms can be made, it is important to recognise the tool’s usefulness and usability within a certain context, which is borne out by the fact that it has been employed successfully in a range of real settings.

The Further Education Development Agency (FEDA) commissioned the Learning with IT project to produce a set of evaluation tools that would provide Further Education (FE) colleges with a mechanism for evaluating their Information and Learning Technology (ILT)-based projects (Thompson et al., 1999). The work included a review of recent evaluation literature, focusing on the relative merits of qualitative, quantitative and hybrid approaches. It also places an emphasis on the contextual elements of the evaluation, such as the rationale, the goals, and so on, and concludes with some general points that affect evaluation design:

- Many factors are known to affect the successful use of ILT
- The confidence of any educational evaluation is strengthened if data is gathered from as many different sources as possible and conclusions are drawn by a process of triangulation
- Evaluation should be based around each lecturer’s/manager’s stated objectives

- Evaluation should involve real students in real situations, that is, the evaluation should take place in context
- Open-ended questions should be included to investigate unanticipated issues
- Strategies to develop ownership of the evaluation should be developed

The resultant tool comprised several components, including questionnaire templates for managers, learners and lecturers, an analysis template and an accompanying manual. A significant proportion of the manual that accompanies these templates is devoted to their customisation. This included reasons for making changes (e.g. “to reflect the precise aims and objectives of the ILT project”) and examples of how this can be achieved. The trials of the tools demonstrated their utility, robustness and versatility. However, several important issues emerged. An important incentive for using the tools turned out to be their value as part of the FE Funding Council’s ongoing programme of self-assessment by colleges. Managers in particular found the analysis straightforward and felt that it generated suitable evidence for inspections. The importance of this research in the context of the evaluation toolkit project described here is considerable. These tools represent a comparable attempt to meet the needs of practitioners with little or no prior evaluation experience who enjoy variable levels of resourcing. In spite of providing standard templates, the work stresses the importance of tailoring the design to the project’s needs, and of producing results that can be acted upon. Also important is the role of the tools in providing evidence that addresses managers’ concerns, in the form of data for self-assessment inspections.

Templates and Wizards

At the other end of the continuum from frameworks lie the most structured of the decision making systems, templates and wizards. Generic templates are found in most software packages, for example the Microsoft Word and PowerPoint templates, which provide structured, pre-defined looks for the user to base their document or presentation on. Many help systems have step-by-step wizards which guide the user through the sequential set of steps required to complete a particular task. One example of an attempt to develop educationally focused wizards is the Extranet Education project (<http://www.comune.bologna.it/iperbole/exe/>). The project has produced a series of educational wizards which aim to help teachers use multimedia in their teaching, for example by producing a multimedia tour of a web site or storing and using digital images.

Summary

Frameworks, toolkits and wizards lie at different points along a continuum, with open but unsupportive theoretical maps at one end, and

restrictive but easy to use software ‘black boxes’ at the other. No value judgement is made about which of these points is ‘best’ for users; clearly, each is suited to supporting users with different needs and varying levels of expertise. By definition, all toolkits include an expert model of a process derived from recognised theory and best practice. This provides a manageable process, supporting the implementation of performance monitoring systems. Furthermore, by providing a common conceptual framework (particularly one in which multiple interpretations of terms can be negotiated and agreed), it becomes possible to define and establish standards.

It is clear that a range of evaluation resources exists, each with their own merits and disadvantages. The development of the Evaluation Toolkit described in this paper builds primarily on the BP ELT toolkit and the LTDI Evaluation Cookbook. However, strengths and weaknesses of the other resources were also taken into account. The examples and guidelines for customisation provided by the Learning with IT project (Thompson et al., 1999) are clearly of use in helping users to get the most from a toolkit. Some weaknesses exist across all of the tools, such as the lack of information on appropriate communication formats and further research will need to be undertaken to redress this problem as part of the development of content. On a general note, this review has emphasised that utility is of central importance, both for the tool and for the evaluation design (Patton, 1997). The other recurrent theme through much of the work outlined here is the importance of underlying educational methods and theories.

Toolkit Architecture

The review above has provided a foundation on which the development of our Evaluation Toolkit is based. In particular, we have noted particular strengths and weaknesses of each of the different approaches and have gathered together materials and resources which can be referenced and included to supplement and support different sections of the toolkit. The development was built on a set of underlying assumptions; that the toolkit should; be easy-to-use for practitioners and provided demonstrable benefit, provide guidance, but not be prescriptive, be adaptable and easy to customise to the local context and provide a comprehensive resource of relevant material. This was achieved by using a modular structure, based around an expert model of the process of evaluation and incorporating activities that manipulate an underlying knowledge base, in line with the

research identified in the proceeding section. The expert model builds on the six-step description used by the ELT toolkit, which represents the most complete description available to date (Oliver, 1999) and links to a variety of relevant resources, including many of those referenced in this paper. The resultant toolkit consists of three components, i) Evaluation Planner, ii) Evaluation Advisor and iii) Evaluation Presenter, which are described below. A screenshot from the toolkit is illustrated in Figure 1.

Evaluation Planner

This section of the toolkit helps the user to define and scope their evaluation. The content is linked with a series of questions, guidelines and exercises supported by user input fields, which are used to guide the user in planning their evaluation strategy and clarifying their reasons for particular choices. The user is guided through the process of identifying the intended audience for the evaluation (stakeholder analysis) and definition of the core evaluation question(s). In addition, the user also defines the scope of the evaluation, giving particular attention to associated time and resource (both financial and human) implications. Output from planner includes an evaluation strategy and implementation guide. This provides the starting point for the communication plan in the Evaluation Presenter section of the toolkit.

Stakeholders:	Lecturer	Lecturer	Student
Concern:	Timesaving	Research	Usability
Question:			
Is this a specific question?	Non-specific ▾	Non-specific ▾	Specific question ▾
Do you want or need to involve all your students in this aspect of your evaluation?	Some students ▾	None ▾	All students ▾
Does this aspect of the evaluation need to be evaluated as part of the teaching process or can it be evaluated in isolation?	In isolation ▾	In isolation ▾	As part of teaching ▾
Save your answers to the questions above		OR	Show All Methods
List of potential data capture methods:	Concept maps, Focus Groups, Unstructured interviews	System log data, Cognitive walk through/think aloud protocols, Designing experiments & pre- and post testing, Resource Questionnaires, Split screen video, Trials	Confidence logs, In-course experiment, Performance test, Reflective logs/student diaries

Figure 1 Filtering of data capture methods by stakeholder concerns

Evaluation Advisor

This section covers the implementation aspects of the evaluation, including decisions about data capture methods and subsequent analysis. It uses the output from Evaluation Planner as a starting point and guides the user through the choices of data collection and analysis required in the evaluation process. It links closely to a knowledge base of relevant external material, such as the LTDI cookbook, Flashlight materials and the handbook for learner-centred evaluation. By the end of working through this section, the user has a clear outline for their evaluation, along with associated data capture methods and analysis.

Evaluation Presenter

This section looks at the communication of the findings of the evaluation to the stakeholders identified in Evaluation Planner. It targets the report format to the audience identified by the evaluation planner and builds on the final part of the ELT toolkit, which is concerned with presentation of the results of an evaluation study. It provides structured templates that take the output from Evaluation Advisor and present it according to the most appropriate media types (Report format, Web site, PowerPoint presentation, Peer persuasion/oral communication or research-paper format).

Usability Trials

Usability trials, in the form of cognitive walk-throughs, were carried out at each of the consortium sites in Bristol, London and Dublin. These were used to improve the design and layout of the toolkit and help the content development to identify areas that required further work and improvement. Feedback from the trials was positive, with many of the users reporting that the toolkit help to guide them through their evaluation process and provided them with useful links to further information and support. However, some users also expressed concern that to be used effectively, the user really needed to spend a good few hours working through the toolkit and that for smaller evaluations this was impractical. The project team have taken on board the issues which have arisen during the users trials and a simpler 'quick' routes through the toolkit, along with templates for standard evaluation processes are planned.

Conclusions

The review of evaluation-related literature helped identify a range of frameworks, toolkits and resources, which informed the development of the toolkit described here. These included empirically-focused evaluation as well as methods that are intended to be predictive, such as the use of checklists for reviewing learning materials and modelling as a way of redeveloping courses. A common feature of these methods was the importance attached to the contextual elements of evaluation, such as the audience for the work. Particularly valuable were developments that included models or resources that could be incorporated into the Evaluation Toolkit. In this context, a three-part format was adopted for the Toolkit; Evaluation Planner, Evaluation Adviser and Evaluation Presenter. Initial user trials and cognitive walk throughs of the toolkit have yielded positive feedback and the general response from the community has been that there is a real need for a tool of this kind. A live demonstration of the toolkit will be presented at the conference, along with a summary of the findings from the user trials.

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