

Unit 9 Evaluating technology-supported learning

As the use of technology in education has continued to develop apace, the evaluation of technology-supported teaching and learning has emerged as a specialist area of evaluation practice within education. It has also become an increasingly common concern for practitioners on the ground who simply want to assess aspects of their current approaches to using technology in their teaching, and ensure the effectiveness of their future approaches.

With the focus very much on the practitioner rather than the evaluation specialist, this part of the guide aims to provide an overview of key issues in the evaluation of technology-supported learning, including the different contexts for evaluation, the main forms of evaluation, common data collection methods, some useful evaluation resources, and important practical considerations.

1.0 Why evaluate technology-supported learning?

The basic rationale for evaluating technology-supported teaching and learning is the same for evaluating any educational intervention. Typically we are either interested in understanding whether a current approach works, whether a planned approach is likely to work, and how practice could be further improved.

However there is a further reason why evaluating the use and impact of technology in teaching and learning is particularly important and is to be encouraged. Most tutors are still relatively new to using technology in their teaching, just as many students are only just becoming accustomed to studying in blended and online contexts. Many tutors therefore don't have the same kind of intuitive, expert understanding about the kinds of technology-supported approaches that will work for their own courses and students as they do about the non technology-supported approaches they are highly experienced in using.

Of course, guidance on good practice in designing and facilitating technology-supported learning can help inform the approach to be taken, but increased confidence and expertise in teaching using technology comes not just from following good practice principles and gaining more experience in applying them, but also from looking directly into the effectiveness of what we do.

2.0 Contexts for evaluation

Just as there are several contexts in which technology can be used to support learning, as outlined in Unit 1, there are also several contexts for evaluating the use of technology in teaching and learning. As you might expect, the different

contexts for using technology are closely mirrored by the contexts for evaluation. However there are also additional, broader contexts for evaluating the effectiveness and impact of educational technology. A range of possible contexts in which to evaluate technology-supported learning include:

- **Specific applications:** Here the evaluation context would concern one particular approach or intervention, eg the use and effectiveness of skeleton online lecture notes, online seminars, or self-test features.
- **Blended approaches:** Where the evaluation context is a blended course, usually in terms of overall design, delivery and experiences
- **Online approaches:** As for the above, except that the course in question is a predominantly or fully online one, including distance courses
- **Programmes:** Evaluation within a programme context may cover approaches to the use of technology to support learning across all the modules in a campus-based or online programme, and could also include programme-level resource provision and administrative support
- **Departmental:** This could concern the use of, and impact, that educational technology has had across a department or school
- **Institutional:** Where evaluation is concerned with the deployment, use, and effectiveness of institutional practice or initiatives in the area of educational technology (eg the cross-faculty evaluations of WebCT use involving staff and students that have been conducted here at Napier).

3.0 Finding a focus for evaluation

As the above overview of evaluation contexts begins to suggest, there are a range of factors and issues that might provide the focus for evaluating technology-supported teaching and learning. Not all of those that follow will be relevant to the individual tutor seeking to evaluate their current or planned approaches to using educational technology, although many could be.

It should also be pointed out that no small-scale evaluation would realistically be expected to cover more than two or three of these factors at the most.

3.1 Student experiences

Most evaluations that the tutor would undertake of their own practice would seek the views of their students on some aspect of their experience, including:

- Perceptions on the design, content and usefulness of online resources
- Views on the coursework undertaken in blended and online contexts
- The effectiveness of the guidance the student received to prepare them for studying online, and the quality of support from the tutor thereafter
- Level and clarity of online course materials, assignment specs etc
- Future improvements covering any or all of the above areas
- Which tools and resources students used, how often, and why.

This list is not exhaustive, but gives a flavour of potential issues to focus on.

3.2 Learning outcomes

When evaluating the impact of technology-supported learning, either in relation to a single intervention or more typically at the level of a blended or online course, it can be useful to look at the quality of the resulting learning outcomes.

This is most commonly measured via achievement on assessed coursework, and can be based on average grades for the class, but also individual grades. Looking at average grades can be a useful indicator where a significant use of educational technology has been introduced to a course that has previously taken a traditional classroom-based approach, whereas individual grades can provide some insight when looking at differences between students who made good use of online resources compared with those who did not.

It is also possible to ask students to self-rate the overall quality of their learning on a blended or online course, or in relation to a specific intervention (eg the extent to which participating in online seminars aided their understanding).

3.3 Tutor experiences

The perspectives of tutors are a valuable focus for evaluating technology-supported learning, particularly in contexts where team teaching is involved, or where evaluating a programme, departmental or institutional approach to educational technology is concerned. Possible issues to cover can include:

- How and why tutors are using educational technology
- Perceived effectiveness of blended and online teaching approaches
- Tutor support and training needs relating to the use of technology
- Perceptions on departmental or institutional initiatives.

3.4 Usability and accessibility

As a specialist area of evaluation practice, the evaluation of technology-supported learning is a multi-disciplinary concern which is strongly influenced by the computer science discipline of human-computer interaction because, ultimately, educational technologies are end-user applications.

So what does this mean in practice? Basically just that evaluation of technology-supported learning may often need to address usability and accessibility issues. This is especially so where the tools and resources that the students are provided with have been designed especially for a particular context (eg a custom course website, original multimedia elements etc).

As touched upon previously some of the key issues in usability include:

- Ease and intuitiveness of navigation
- Clarity of interface layout
- Readability of online text
- Colour scheme and contrast
- Size of buttons and other clickable areas
- Meaningfulness of icon design
- Ability to pause and resume video and animations
- Ensuring content is viewable on all major platforms.

Some of the key issues in accessibility have been discussed earlier and include

- Providing text alternatives to interactive content
- Ensuring page layout can be read by text-based browsers
- Providing alternative (ALT) text descriptions for icons
- Using sans serif fonts (eg Arial) at 12 point minimum.

3.5 Course and resource development process

Where the focus is on the efficiency of team approaches to developing blended and online courses and resources, with a view to improving this process.

3.6 Widening access and retention

In which the focus of evaluation is on the extent to which departmental and institutional approaches to using technology to widen access to education, and improve retention and achievement rates, have been successful.

3.7 Infrastructure and support

Issues of interest in evaluation here might be the general robustness and reliability of the institutional MLE, including the integration of the VLE with other systems, C&IT services support for online learning, and the provision of general student support services for online and other non-attendance students.

4.0 Forms of evaluation

At a general level, it is possible to distinguish between three main forms of, or approaches to, evaluating technology-supported teaching and learning. Most tutors will already be familiar with the ideas of formative and summative evaluation, to which we can also usefully add diagnostic evaluation.

4.1 Diagnostic evaluation

In relation to technology-based teaching and learning, diagnostic evaluation can essentially be thought of as an evaluation of teaching and learning needs in order to determine where educational technology might usefully play a part in supporting or enhancing learning. For example, a tutor might begin by canvassing opinion from their students on possible general improvements to a course, or they may already have identified a particular issue or problem that they would like to address (eg making better use of limited face-to-face contact time, or encouraging more participation in subject-related debate).

Identification of issues of this kind provides the basis for thinking about where technology might help, which might be further explored in consultation with a knowledgeable colleague or specialist adviser (eg your faculty's ADA). On the basis of this, an appropriate role for educational technology would then be identified (eg extending face-to-face seminars with online follow-up sessions).

4.2 Formative evaluation

Formative evaluation is carried out either during the development of a particular technology-supported approach to teaching, for example when a VLE site is being put together, or may be conducted following initial implementation to gauge the effectiveness of a particular approach and make adjustments as necessary. Actually, formative evaluation of educational technology often involves at least both these stages as part of an iterative approach to design and development. This is to be recommended when educational technology is being developed or used for the first time in a particular context.

This may sound like a lot of work, but really need not be. Consider the example of a tutor who develops their VLE site, and prior to it being made available to students asks a colleague to spend a short while looking over it, paying particular attention to the clarity and structure of the site and the material within it. On the basis of their colleague's feedback they make a few adjustments. A couple of weeks into the trimester, they use some time at the end of a seminar to check how their students are finding working on the VLE. There's a little bit of confusion over what's required for some of the discussions tasks, on the basis of which the tutor amends the task instructions that are provided online.

Formative evaluation is not always done quite as informally as this, depending upon the scale at which you want to run an evaluation, but it very often can be.

4.3 Summative evaluation

Summative evaluation typically comes at the end of a particular implementation, as a means of assessing the success of an initiative. This could mean conducting a student evaluation at the end of a blended or online module, or at the end of a

particular technology-supported activity (eg following the completion of an online collaborative project, or series of online seminars).

5.0 Common data collection methods

There are a number of options open to you when thinking about how to generate and gather evaluation data. Your choice of method(s) will often depend upon the exact focus of your evaluation, as well as what is feasible in your evaluation context. Some of the main options include:

5.1 Questionnaires

Well-designed self-completion questionnaires are a very good means of gauging opinion on a range of issues. They can be administered prior to the design of a technology-supported learning approach, and in this respect may play a part in diagnostic evaluation. They can be administered following implementation as a means of taking stock of how well students are being supported, or at the end of a blended or online learning context to establish how effective the approach was overall, and whether the original aims were met.

Although questionnaires can be useful for putting a common set of questions to a group of students, for example a series of value judgements covering the online resources and support they were provided with, one inherent limitation of questionnaires is that they only ask the questions that the survey designer feels are relevant. The particular problem with this in technology-supported learning contexts goes back to the fact that many tutors and students are still becoming accustomed to blended and online learning, and there may be much more of interest happening in these contexts than a pre-designed questionnaire can provide an insight into. For this reason it is often useful to combine the use of questionnaires with some interview-based data collection, if this is possible, so that all or at least more issues of potential relevance are covered in evaluation.

Of course, an obvious advantage of questionnaires over interview-based approaches is that questionnaires are ideal for gauging the opinion of large student groups. They can also be distributed electronically, which is particularly useful in predominantly online and online distance course contexts.

► See [Appendix 12](#) for an example of a student opinion questionnaire that contains some common kinds of questions and value statements relating to the use and perceived effectiveness of blended and online learning tools, support and resources. This questionnaire is here for you to adapt and use accordingly.

5.2 Interviews and focus groups

As indicated above, interview-based approaches to evaluation are excellent for gaining a real insight into how students, and tutors and relevant others, feel about

the use and effectiveness of technology-supported learning in any given context, and often highlight issues that the evaluator had not anticipated.

For both interviews and focus groups, it's important to have a semi-structure of key themes and broad, open-ended questions you want to cover, but don't stick to this too rigidly – the best interviews and focus groups are led by what the participants are saying, with the evaluator prompting as required.

One-to-one interviews are good for exploring the experience of the individual in-depth, and may be useful where you are interested in the views of particular individuals (eg the tutor for a particular course, a department head, students with specific backgrounds or support needs, or who have had particular experiences in a blended or online course). Focus groups are particularly good for exploring a range of issues from different perspectives. If nothing else focus groups may be a better option than interviews for gauging the general views of students, as focus groups can feel more relaxed than interviews, and often comments from one student will spark thoughts and comments from another.

Interviews and focus groups can be time consuming to arrange and conduct, and for practical reasons you may find you need to think carefully about when to use them. However their use can't be recommended enough where a rich look into the experience of technology-supported learning is required.

5.3 Tracking data

In relation both to how much time students spend online, and more importantly how they spend this time in terms of the tools and resources used, most VLEs automatically track online activity, and allow the tutor to generate all kinds of usage statistics both for the class as a whole, and for individual students.

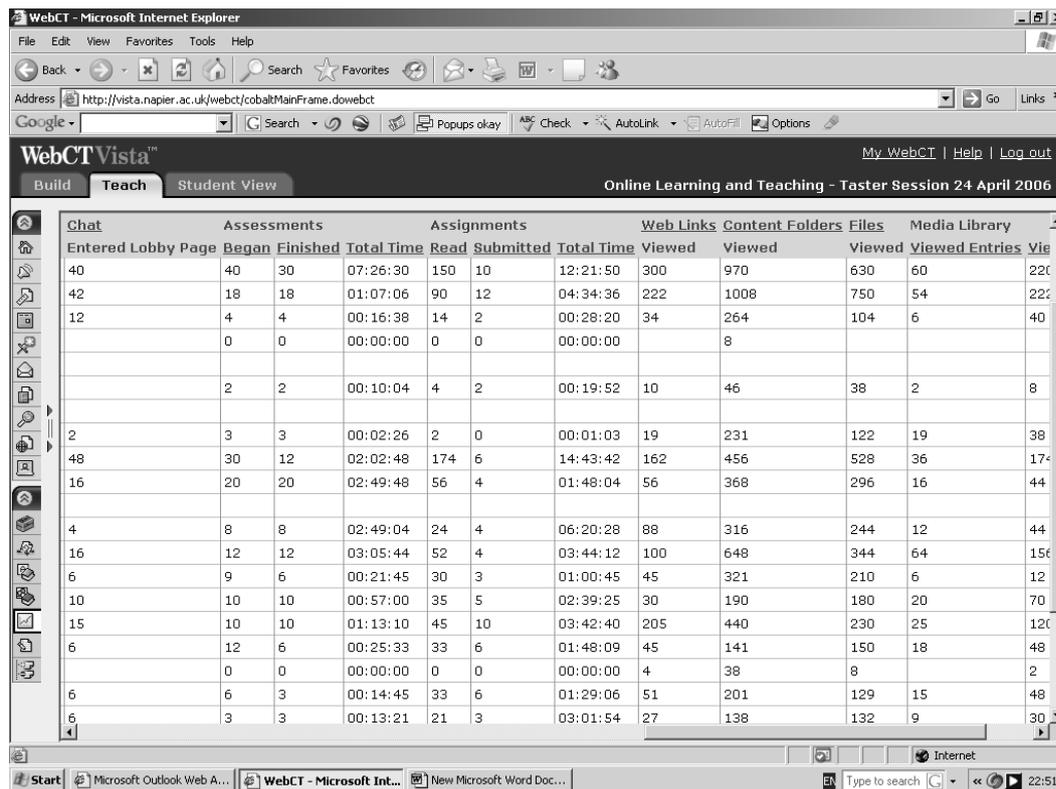


Figure 23: A screen shot from WebCT showing the kind of general tracking data available for the tutor to view for each student

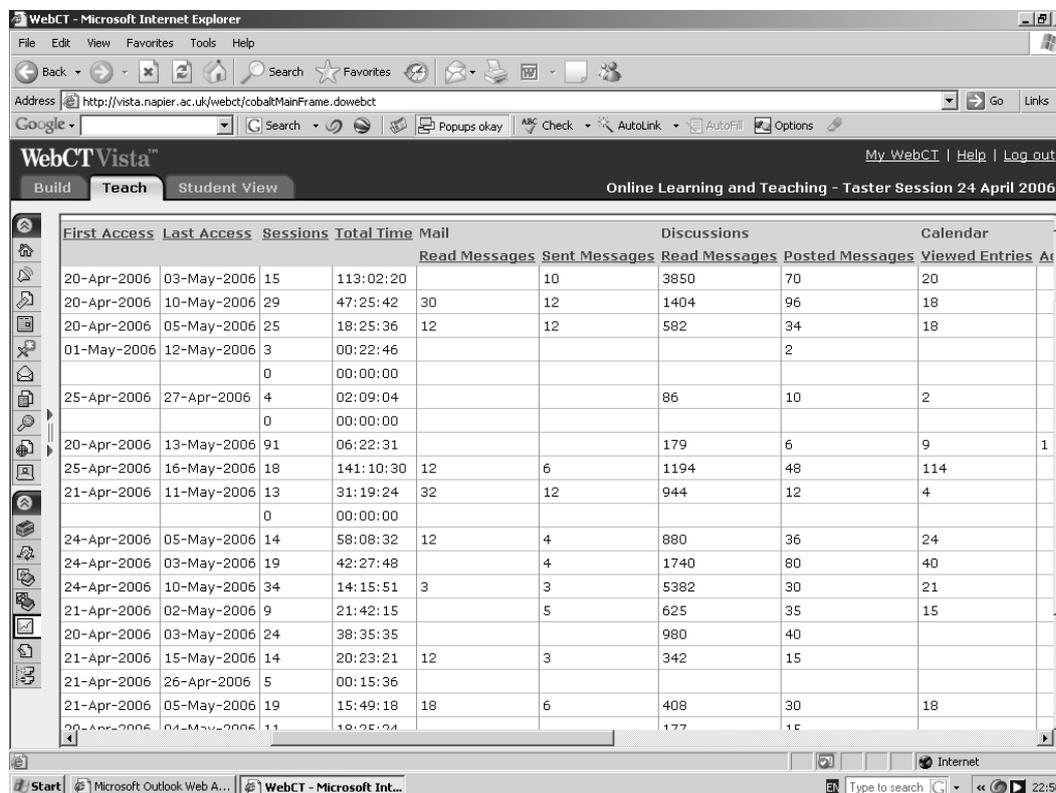


Figure 24: Screenshot from WebCT showing tracking data for chat and discussion board activity, including discussion messages read and posted

Obviously tracking data of this kind can provide a very useful picture of online activity, as well as being useful for identifying those students who may be having difficulty engaging effectively in a blended or online course.

However, a slight word of caution is necessary when using tracking data to help evaluate what your students do online. The time they have spent online, particularly in relation to accessing course materials, cannot necessarily be taken as an indication of individual studying effort. Many students will opt to work with printed copies of VLE materials. They may also be consulting other resources out with the VLE, including other online materials and printed texts. Furthermore, the total time recorded for online activity will not be accurate if the student has left the workstation while still logged on. Remember then that VLE tracking data only indicates what students are doing within a VLE course site, and is just a snapshot of their total learning activity.

5.4 Observations

Physically observing what students do when they are utilising educational technology can often lead to additional insights into how effectively they are using the resources provided, and the ease with which they are able to navigate and interact with them. Simply arranging to sit in on a session can be problematic though, as the student can often be wondering ‘have they seen enough yet?’, and may start interacting with resources in non purposeful ways.

It is better then to use observation in a structured way, perhaps by providing the student with a particular task, or tasks, to undertake. This provides a useful focus both for what they will attempt, and what you will be able to observe. You could also combine this approach with a ‘think aloud’ element, and ask the student to verbalise what they are doing and any difficulty encountered.

As an alternative way of using observation, consider having a colleague ‘shadow’ one of your ‘live’ blended or online courses, or a particular aspect of it, and then have them provide feedback on the design, tasks set, and particularly what they see as being positive or not in terms of the likely student experience.

5.5 Peer review

Peer review is a more formal evaluation option than having a colleague shadow a course, and would typically involve having either a colleague or other expert with relevant experience critique your approach for a planned blended or online course. They would typically be provided with or be involved in setting some criteria for the review, perhaps making use of an existing quality matrix or rubric (see section 7.0 below). Peer review is an excellent means of ensuring the appropriateness and robustness of a blended or online course, and is particularly good practice when the course in question is running for the first time, or is about to run for the first time in a blended or online format.

The assumption of peer review as described above is that you are going beyond introducing one or two appropriate uses of educational technology into an existing course, and taking a fairly rich technology-supported approach (refer to online module peer review checklist available in [Appendix 7](#)).

5.6 Study diaries

Study diaries can be a useful way for students, or a few selected and willing students, to record thoughts about their blended and online learning experiences as they have them. In this respect they can be a very useful source of evaluation data. The trouble arises if students either don't get into the habit of writing entries as and when they should, or attempt to write from memory prior to their submission. If you can be confident that the selected students will use them effectively, then they are definitely worth considering.

You as the tutor may also want to keep a diary of your technology-supported teaching experiences, particularly the first time round, as a means of recording what worked well and what could have worked better as it actually happens.

5.7 Course grades

As discussed in section 3.2 above, average and individual coursework and exam grades can be a valuable general indicator of learning effectiveness in any course context, and may help in comparing different iterations of a course.

6.0 Practicalities in evaluation

When evaluating any approach to technology-supported learning, particularly in blended and online contexts, there are several practical considerations to be than need to be taken into account. Chief amongst these are access to participants, sampling, ethical considerations, and piloting.

6.1 Access to participants

In blended and online courses, access to students for the purposes of evaluation might not be straightforward. This is especially so in part-time and distance learning contexts. It is less of a concern in campus-based courses that take a blended approach, or which make some particular use of technology.

If you are dealing with a geographically dispersed group of students, you may find that certain data collection methods (eg interviews or focus groups) prove impossible, or need to be re-thought for the online medium (eg using discussion boards for group discussion, or internet telephony for one-to-one interviews).

If your evaluation does involve distance learners, or students who rarely attend campus, you'll almost certainly want to make use of an online questionnaire. Actually, whether it's a campus-based or online context in which you are evaluating, administering questionnaires online is both convenient, and will allow you to automatically collate the feedback received. Consider then using the VLE's assessment feature to create and distribute your evaluation questionnaire.

Alternatively, use a web-based survey tool to produce and administer your survey. Ultimate Survey is a popular and affordable option, which is also available through C&IT. You can find out more about Checkbox (formerly Ultimate Survey) at: <http://www.checkbox.com/> and on the Edinburgh Napier WebCT staff help pages at <http://www2.napier.ac.uk/webct/staff/resources2.html>.

6.2 Sampling

If we're talking student involvement in a course evaluation, or even the numbers of tutors who might be involved in a broader evaluation, then how many participants are likely to be enough? That really depends on how big the group in question is to start with. Consider the following general pointers though:

- After two or three focus groups involving even just four or five participants each, there will be diminishing returns in terms of the feedback received. If you've got a particularly small class of students, one focus group or a few interviews will be enough.
- For observations and other evaluation techniques that are focused on the usability and ease of interacting with online resources, four or five participants are likely to uncover the majority of any problem issues.
- When administering questionnaires to large groups online, a 20% response rate may sound low but is actually not a bad minimum.

6.3 Ethical considerations

Consider whether ethical clearance is likely to be required for the kind of evaluation you have in mind. If you are canvassing opinion from your own students to inform future course provision it may not be. If you are planning to contact students other than your own, or will be audio recording interviews or videoing observation sessions, then it may well be. Check just in case.

This issue aside, always make sure those involved in the evaluation know the purpose of it, how their feedback will be used, if their identity will be protected, and have the option not to be involved. Where recording interviews and focus groups, be sure to seek the consent of the participants to do so, and have them sign an appropriately worded consent form to document their agreement.

6.4 Piloting

If time permits, and you are working on a substantial technology-based learning development including a fully online course, or a suite of interactive course materials, then you should consider piloting and evaluating the development, or representative parts of it. Involve real students wherever possible.

7.0 Useful evaluation resources

There are a number of good sources of technology-based learning evaluation guidance on the web, and many tools that are available to use (but be sure to check that permission to do so is provided, and what restrictions may apply).

7.1 General information on good evaluation practice

The LTDI (Learning Technology Dissemination Initiative) Evaluation Cookbook is an excellent starting point for further information and advice on a range of relevant approaches to, and techniques for, evaluating technology-supported teaching and learning. It is available in print, and online at:

<http://www.icbl.hw.ac.uk/ltdi/cookbook/>

7.2 Rubrics

Many educational institutions, and other agencies involved in the area of online learning, have developed rubrics against which to evaluate or ensure the quality of blended and online courses. A rubric is essentially a matrix-like framework that lists desirable criteria for blended and online courses that are based on established good practice principles, and against these criteria provides a means for determining the extent to which these criteria are being met.

California State University, at Chico, have one of the more established tools of this kind. Their Rubric for Online Instruction (ROI) contains six categories of online course delivery and support, and within each category defines the criteria for 'baseline', 'effective' and 'exemplary' practice. This is illustrated below:

Category 3	Baseline	Effective	Exemplary
Instructional Design & Delivery	A. Course offers limited opportunity for interaction and communication student to student, student to instructor and student to content.	A. Course offers some opportunities for interaction and communication student to student, student to instructor and student to content.	A. Course offers ample opportunities for interaction and communication student to student, student to instructor and student to content.
	B. Course goals are not clearly defined and do not align to learning objectives.	B. Course goals are defined but may not align to learning objectives.	B. Course goals are clearly defined and aligned to learning objectives.
	C. Learning objectives are vague or incomplete and learning activities are absent or unclear.	C. Learning objectives are identified and learning activities are implied.	C. Learning objectives are identified and learning activities are clearly integrated.
	D. Course provides few visual, textual, kinesthetic and/or auditory activities to enhance student learning.	D. Course provides some visual, textual, kinesthetic and/or auditory activities to enhance student learning.	D. Course provides multiple visual, textual, kinesthetic and/or auditory activities to enhance student learning.
	E. Course provides limited or no activities to help students develop critical thinking and/or problem-solving skills.	E. Course provides some activities to help students develop critical thinking and/or problem-solving skills.	E. Course provides multiple activities that help students develop critical thinking and problem-solving skills.

Rubric for Online Instruction, CSU, Chico, Copyright 2003 Rev. 2/23/04

Figure 25: Excerpt from the CSU Chico Rubric for Online Instruction, showing the baseline, effective, and exemplary criteria for the third of the six categories in the rubric, which concerns Instructional Design and Delivery (available online at <http://www.csuchico.edu/celt/roi/>)

Rubrics like this are excellent tools both for the tutor to use in evaluating their current or planned practice, and also for use by external reviewers.

7.3 Toolkits

There are some very good evaluation planning toolkits available online. These not only offer general advice, but also provide template evaluation plans and other tools and resources that you can adapt for your own purposes.

See in particular:

- JISC infoNet evalkit: <http://www.jiscinfonet.ac.uk/Resources/evalkit>
- The Evaluation of Learning and Media Toolkit from LTSS Bristol at <http://www.bris.ac.uk/esu/elearning/> (free sign-up required).

8.0 A note on quality assurance

At many institutions, internal quality assurance documentation contains guidance on, and describes processes for, ensuring the standard or blended and online courses. At Edinburgh Napier, you should consult section A.9 of the Quality Framework: Assuring quality and standards in online learning, which is currently being updated and soon to be made available on the Quality Framework website at

<http://staff.napier.ac.uk/services/academicdevelopment/QualityEnhancement/QualityFramework/Pages/QualityFramework.aspx>.

9.0 Further reading

Benyon, D. Harper, S. and Harper, P. (2010) *Designing interactive systems: a comprehensive guide to HCI and interactive design*. Harlow, England; NY: Addison Wesley

Dix, A.J. et. al (2004) *Human-computer interaction (6th edition)*. Harlow: Pearson/Prentice Hall

Ghaoui, C. (2003) *Usability evaluation of online learning programs*. Information Science Publishing.

Harper, S. (2008) *Web accessibility a foundation for research*. London: Springer

Jochems, W., van Merriënboer, J., Koper, R. (2004) *Integrated e-learning*. Ch. 8. Usability evaluation of integrated e-learning by F. Paas and O. Firssova. RoutledgeFalmer.

McPherson, M. (2004) *Developing innovation in online learning: an action research framework*. London: RoutledgeFalmer.

Mohan Mehrotra C., et al (2001) *Distance learning; principles for effective design, delivery and evaluation*. Thousand Oaks, Calif.; London: Sage.