Costs of E-Learning Scoping Exercise: Report

by Paul Bacsich, Sero Consulting[1]

During academic year 2007-08, JLT commissioned a small project to explore the *Tangible Benefits of e-Learning* at an institutional level. The outcome of this work was presented back to JLT during their June 2008 meeting. As a result the JLT charged the JISC Executive with an action to explore the area further and present an ideas paper for discussion at the next JLT meeting. The Executive commissioned Paul Bacsich of Sero Consulting to produce a discussion paper for JLT on areas for future funding that would build on the Tangible Benefits of e-Learning work, based on a review of current resources and consideration of the JLT and JISC remits. This is that review – it is a background report (Annex B) to the paper "Costing e-Learning" presented to JISC Learning and Teaching Committee.

It has been written in a form such that it could be made public if need be, for example to evidence some of the assertions in the Committee paper or to be placed on JISC infoNet.

The paper represents around 4 days of web searching and contact with experts. It has the following sections:

1. Desk Research
2. Gap Analysis
3. Features of a New System
4. Reference Material
5. List of Experts Consulted.

1. Desk Research

Desk research used a combination of consultation with experts and searches on the internet. Given the complexity of the searches required (see later) and the limited amount of material that came to the surface, consultation with experts (not originally envisaged) turned out to be a key part of the process. The experts were chosen to be knowledgeable and discreet – and several were used to working with JISC projects. Contact was not made with HEIs or FECs unless they contained experts or were the source of a potential tool (such as the OU).

Consultations also took place with the BELA team of HE Academy benchmarking consultants, with colleagues within Sero Consulting (who have much experience with FE e-learning matters) and with members of the author's former research team for the CNL projects.

Searches have been done in the education domains of various countries for key phrases such as "costs of e-learning".

A note has to be made here of the limitations of a web searching approach. Certain agencies including Becta and HEFCE do not keep their public web documentation in synchronisation with project developments and reports, for many reasons including confidentiality. Some of the US agencies – in particular TLT Group and NCHEMs – are commercial in their approach (even if formally non-profit) and keep much key material behind firewalls.

A bibliography was built up of material found but it cannot be regarded as comprehensive – that would require its own literature search study. See Section 4.

This leads on to the general caveat that the conclusions and recommendations in this report are based on just 4 days of web searches and email communications. In contrast, some of the earlier studies funded six months of Research Assistant work and more, to evidence their

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conclusions. In addition to the usual difficulties with such a low-resource study a mass of relevant material (from the Pathfinder programme) was released only late in the study period.

Nevertheless, due to my experience in the area and having maintained a watching brief on it for the time since the CNL studies, I am confident of the conclusions.

1.1 Countries

Below are some notes on country searches to give a flavour of the issues. Many more searches were done than reported on here.

There were a number of research challenges that had to be overcome including:

- Codes for educational domains do not always map neatly to countries (there are several non-US institutions in the .edu domain) and in some countries can be inconsistent (especially for private universities) or non-existent (e.g. Canada).
- There are many phrases used for "e-learning" and several used for "cost", giving substantial combinatorial complexity.

(The situation was similar when the author had to write a report on the MIT90s change management model – "MIT90s", "MIT90", "MIT 90" and even "MITs 90" were used across the web, quadrupling the search complexity.)

The US was done first since it is the home of several costings tools, Flashlight and TCM in particular.

1.1.1 United States

Searching across site:edu for "costs of e-learning" yields just 8 hits. Some are not from US university sites and had to be filtered out. There is none that describe a trial of a costing methodology but there is one interesting monograph on *The Economics of E-Learning* and some other useful information on costs. Searching across site:edu for "costs of elearning" yields 4 hits, different from the above. Searching across site:edu for "cost of elearning" yields just 1 hit – but a new one, *The 10 Myths of eLearning*, with a section on costs, but only a hint of an "ROI tool".

In the US it is common to find relevant material under "distance learning" and NSF is now using the phrase "cyberlearning" for e-learning. Readers by now will get some real-world grasp of the combinatorial complexity. We shall not go into such detail again.

Regarding the experts' views, Christine Geith reports that she has not heard of any new methodologies but points out that the Twigg NCAT scheme contained costings elements (though much criticised). She also points out that the for-profit universities in the US have the most experience in costing of e-learning but do not share any methodologies or results. Steve Ehrmann reports that there is no evidence that his TLT Group Flashlight approach has been used recently. Curtis Bonk confirms that there is no breakthrough methodology in the US. Yet despite these signs of no breakthrough, the topic of costs of e-learning is of significant and continuing interest to institutions in the US in recent years – as for example in the seminar "Managing Cost Effectiveness as a Measure of Quality" in the NUTN seminar series for 2006.[2]

1.1.2 UK

The overall context and paucity of material can perhaps be ascertained from noting that the search across site:ac.uk for "costs of e-learning" yields only 14 hits, with only two in the last 12 months. (Though one is a gem – du Boulay et al (2007).)

[2] See http://144.162.197.249/annual_event/2006/presentations/index.html,

Costing

The general picture on the lack of activity in costing is clear from the HE Academy/JISC Benchmarking and Pathfinder programmes. Bacsich (2008b) noted, after displaying the "carpet" on page 12 of his report showing a low cohort average of 1.4 (coded red in his "traffic lights" system) for costing competence, that:

> Although too much should not be read into this, it makes it clear that the following issues need more attention in the sector: accessibility and learning material style, academic workload and costs, and staff recognition and reward. This view fits with an earlier more narrative view from Phase 1 and is reasonably consistent with the view from OBHE (2007).

Near the end of the research phase for this study, the HE Academy EDSUT team released their overall report (EDSUT, 2008) which noted in paragraph 6.10 in rather more diplomatic language:

> The exercise has highlighted the need for a better understanding of the costs of e-learning, including workload requirements and costing the time and effort required by both academic and support staff. A large element in the challenge in developing this understanding is the false premise that e-learning can somehow be isolated from other aspects of organisational activity for management purposes

Other BELA and OBHE reports that fed into these final reports confirm the points at greater level of detail – see the Bibliography.

In addition to the overall reports it is known that a number of institutions in benchmarking did look more in detail at costs issues. These include the University of Leicester (who have plans to do more work in this area) and in particular the University of Chester, who carried out a small Activity-Based Costing style study on one of their programme areas in which e-learning was deployed and reported in their Pathfinder Journey report (Chester, 2007) that they had made some progress in the costings area.

More recently and perhaps more significantly, in its public report the Benchmarking Phase 2 institution, the University of Worcester (2008), noted that:

> A new Full Economic Costing system was introduced in September 2006 for programmes going forward to Academic Portfolio Committee for approval... [The] FEC spreadsheet incorporates ample sensitivity to accommodate e-learning e.g. facility exists to decrease Car Park cost, facility to include increased ILS cost.

It goes on to state:

> Two recently approved programmes were identified by the Planning Office that specified a significant use of e-learning in their Course Proposal Forms. For both these courses the FEC spreadsheet that was created took into account the element of distance learning and so the labour cost was lower, but the cost for ILS was higher than for a traditionally delivered course. It is hoped to make the model more sensitive over time to take into account these differences.

This is an example conspicuous both by its rarity and by its openness – though very recently the University of Salford have also signalled their interest in the area via a request for advice (which they are happy for me to note here).

Perhaps surprisingly, in contrast to Benchmarking the issue of costing did not figure substantially in many Pathfinder projects. A noted counterexample to this general lack of interest (there were less than a handful of studies that even mentioned the topic of costs) was the study by Edge Hill University (Edge Hill, 2008) on "Raising Awareness of the Costs of e-Learning", to which the author provided some informal assistance. This produced a number of

pen-pictures of methodologies similar to this report but without much analysis or comparison and without any bibliography. Since the University was certainly interested in the area, perhaps this shows how difficult it is for institutions to master this area when the information management of resources on "costs of e-learning" is in its current poor state, with some key reports missing and others in unlikely places.

Work planning

Work planning is a vital aspect of costing and one that is known from benchmarking studies to be weak in UK universities when work planning non-traditional teaching such as e-learning.

A search across site:ac.uk for "work planning" AND "e-learning" yields an encouraging-seeming 258 hits. However, many of them are hits on the Pick&Mix benchmarking criterion for work planning, picked up from institutional blogs of those institutions who participated in the HE Academy/JISC benchmarking e-learning exercise.

Nevertheless, there is a useful hit for the *Report on the 'Benchmarking e-learning at the University of Leicester' to the Student Experience and Enhancement Committee*, December 2007, where it notes on costing:

> The University of Leicester (UoL) has knowledge of the costs of delivery of various programmes. This particularly applies to the distance learning portfolio where there is an annual bidding round for allocations for the non-pay costs of delivery. For 2007-08 this will have been completed by the end of September 2007. For other areas allocation are allocated by formula and there is less full information taken into account. UoL will shortly be completing a project to measure the full economic costs of teaching in line with the HE sector's initiative to develop the transparency review into costs of teaching. The focus of this project at UoL will be on the costs of different modes of delivery. This will include the costs of campus-based, distance-learning and e-learning. On completion of the project and introduction of the measures, Leicester should have met the level 5.0 criteria which is described as 'activity-Based Costing being used to some extent in all departments'.

1.1.3 Australia

Several searches were done but nothing directly relevant and recent came up. For earlier Australian work see for example the CNL bibliographies.

Among experts, Anne Forster was contacted – she replied with no specific information on activity in Australia but sent a useful but long list of contacts who could be consulted for more information (this might be relevant for a future phase). Irena White was contacted and mentioned the study on cost-benefit of research communications by Professor John Houghton (known to JISC)[3] – but this is not close enough to our topic to be relevant.

1.1.4 Canada

Tony Bates was contacted and sent a useful set of references, the most relevant of which we have put in the Bibliography. General considerations and earlier information from him indicates that costing of e-learning is not a strong topic at Canadian universities.

1.1.5 Netherlands and other EU countries

EU partners in the Re.ViCa project were emailed but no specific information was returned. General considerations and earlier information from studies of mine and others indicates that costing of e-learning is not a strong topic in most of continental Europe.

A longer study would check the virtual university initiatives and consult with experts in Finland, Estonia, Switzerland and Sweden. It would also check carefully to see what has been done by

[3] See http://www.dest.gov.au/NR/rdonlyres/0ACB271F-EA7D-4FAF-B3F7-0381F441B175/13935/DEST_Research_Communications_Cost_Report_Sept2006.pdf.

EU projects – with the caveat that any such project outputs do not seem to have made it yet into widespread operational use. In this context the paper by Curran (2004) to the EU symposium is of note.

1.1.6 New Zealand

Web searches did not turn up any material of great interest. This confirmed expert views sought at the very beginning of this study.

Stephen Marshall was contacted – he is closely in touch with all e-learning benchmarking developments in both New Zealand and Australia and thus his views are likely to be authoritative. He observes:

> The short answer is that there appears to be little or no information available in Aus[tralia] or NZ. People are certainly interested in how they can use data from the CEQ, LTPF and AUSSE[4] to potentially demonstrate tangible benefits but there appears to be no published work demonstrating this...

1.1.7 Other countries (outside the EU)

If and when a longer study is done it is likely that there is material from other non-EU countries, but how relevant it is would not be clear. Two indications are:

- Presentations (e.g. in the past at Online Educa) from speakers in Arab countries make it clear that the cost-effectiveness of provision at HE level is more of an issue in that region, confirmed by my own comparative work for the Arab Open University; and it seems a topical issue in the Gulf states at present as judged by recent conferences and events – see in particular Farook (2008) for an example in the corporate sector.
- There has been relevant work in China – in fact in the past I supervised an RA sent from China and funded by their Ministry to research the topic.

1.2 Methodologies

1.2.1 General conclusions

Regarding UK methodologies or general methodologies:

- Reports from both benchmarking teams (BELA and OBHE) over three phases make it clear that *costing for e-learning* and *work planning for e-learning* need attention, being noticeably weaker than many other indicators (see e.g. the Pick&Mix Phase 2 carpet – Bacsich (2008b) – for a visual representation of this). There is no sign of any greater attention in this area in Wales HE – even though the benchmarking phase there is not complete the initial discussions do not indicate any great level of skill.
- There is no sign of current *operational* work in the UK using CNL or INSIGHT or TCO.
- There is little sign of any operational work using Activity-Based Costing – but a few forerunners.
- The evolution of TRAC(T) is not at a stage when it can be used for costing e-learning within the official paradigm, and its current and future applicability outside English HE is not clear – in particular it does not apply to HE in Wales, nor to FE anywhere.

Regarding non-UK methodologies:

- There is no sign of current activity using Flashlight in the UK.
- There have been at least 16 trials of TCM in the US (and ongoing activity) but none in the UK.

[4] Course Experience Questionnaire, Learning and Teaching Performance Fund, and Australasian Survey of Student Engagement respectively.

- The experience from earlier attempts funded by JISC to import US methodologies (Flashlight and Round Table from the TLT Group) into the UK is that despite heroic efforts to adapt the concepts and language to the UK scene, the methodologies do not "travel" – the culture is too different. There is a partial counterexample to this with the eMM methodology but this is from New Zealand (rather closer culturally). It initially appealed to the internationally-oriented distance learning players and high-paradigm research-led institutions who favoured it, but interestingly a majority of them now say that they will not use it again and in particular that it was too complex for the gains realised. Complexity is the death-knell of methodologies in this whole area of planning and change management.

1.2.2 Methodology summaries

There are at least ten costing methodologies relevant to e-learning that have been used – or at least proposed – in the past ten years or so. Pen-pictures of these are given below. Fortunately all modern methodologies have their roots in the general principles of activity-based costing, so we describe this first.

Note that our overview focusses on methodologies used in institutions or at least proposed for use in them – it is not a literature survey of experts' papers analysing costs of e-learning from the research point of view.

A ABC (general Activity-Based Costing)

Overview: Wikipedia defines Activity-Based Costing (ABC) as:

> a costing model that identifies activities in an organization and assigns the cost of each activity resource to products and services according to the actual consumption by each in order to generate the actual cost of products and services for the purpose of elimination of unprofitable and lowering prices of overpriced ones. In a business organization, the ABC methodology assigns an organization's resource costs through activities to the products and services provided to its customers. It is generally used as a tool for understanding product and customer cost and profitability. As such, ABC has predominantly been used to support strategic decisions such as pricing, outsourcing and identification and measurement of process improvement initiatives.

Other methodologies including CNL include aspects of Activity-Based Costing into their approach, usually trying to avoid the complexity, time burden and specialist tool-set required for a fully-fledged ABC system.

Link: Since this is not a specific methodology but more of a methodologies container (compare MIT90s) the best reference is to the Wikipedia definition.

Commentary: ABC is a mature approach with specialist software support where required (it is too complex for spreadsheets). A full trial of ABC (at Sheffield Hallam University) was funded by JISC in 2001 as a key part of the CAL project. The committee at the time did not show interest in taking this forward.

Regarding recent uptake in the UK HE/FE sector, it is said in UCISA circles that there are some trials in the UK within IT departments but not for e-learning. Details were sought but none have come to light in time.

Searches indicate no use in Ireland or Netherlands. General considerations suggest that it will not be used in Canada.

In Australia it is said by those in contact with Australian developments to be used at several institutions e.g. the University of Wollongong (Reich and Abraham, 2008). For New Zealand, no uses have surfaced.

B CNL (from TERG at Sheffield Hallam University)

Overview: The main aim of the JISC-funded project CNL1 which ran at Sheffield Hallam University in 1999-2000 was to identify the unrecorded or "hidden" costs involved in

Networked Learning and to produce a *Planning Document* and *Financial Schema* using which a complete picture of the actual costs of Networked Learning can be reached. The Schema used the general principles of Activity-Based Costing and proposed a specific 3-Phase Model to describe the overall process of developing and delivering a course or programme. There was a follow-on phase 2 (CNL2) which trialled a full Activity-Based Costing system for learning and teaching in one School of Sheffield Hallam University but acceptance of the system was limited, probably because of this was in the early phases of development of the Transparency Review of Costing and there was strong resistance in English HE to many of the concepts.

Link: http://www.matic-media.co.uk/CNL.htm links to the main reports and supporting material such as workbooks.

Commentary: As the leader of the CNL team I feel that there were many good features of the CNL system but like any system of that era it would require substantial refreshment and alignment with newer higher-level developments coming from funding councils, in particular TRAC(T) for HE (Wales excepted) and FFE for English FE. An annotated Executive Summary of CNL1 at http://www.matic-media.co.uk/cnl-1-execsum.htm gives some idea of where a few years ago it seemed to me that work would need to be done.

Regarding uptake in the sector, in the period 1999-2004 I and some of my RAs gave talks around the UK and beyond on this topic, including to many institutions in the UK and incoming university delegations from other countries. After that the main interest in the work seemed to come from the US. I still keep a watching brief on costing and many reports and papers on CNL link back to my web site. I would normally have been told or found out if CNL or one of the similar methodologies was being deployed in the sector in a “visible” way (i.e. web sites, research papers, conference presentations etc) – as happened in some cases in the recent Benchmarking and Pathfinder exercises. I know of none such, and this view is confirmed by results from the Benchmarking E-Learning Exercise. But it is always wise to check and the next paragraph describes my checking process.

For approaches which are felt to be “scholarly” and associated with one or a few academic authors, experience shows that Google Scholar gives better results than Google. Google Scholar gives 54 hits for “Bacsich CNL”. In particular the *CNL Handbook (Guidelines and Resources for Costing Courses Using Activity Based Costing)* gets 4 citations – this would be the most likely to be cited if an actual study was being done rather than a scholarly paper. None of the citations are for practical studies but two of the papers (by Moonen and Curran, the latter a co-worker of the author on earlier costings studies) show how parts of the work might be taken forward.

Finally it should be noted that the INSIGHT tool acknowledges its debt to CNL (and to the US Flashlight approach).

C Flashlight (from TLT Group)

Overview: This is taken from the CNL1 report.

> The Flashlight Cost Analysis Handbook claims that it has been created to help users better understand the cost issues involved in incorporating new technologies into teaching and learning, and that it hopes to promote the appropriate use of technology. The Handbook provides a process for building an Economic Model which should help readers to focus on the crucial, and “sometimes hidden”, uses of resources by describing patterns between the use of resources such as time, money and space.
>
> The Economic Model explores the relationship between the resources, units and outputs (products or services) in terms of Activity Based Costing. *Thus at that strategic level it is totally consistent with our views*.
>
> The Handbook encourages readers to consult the publications of the (US) National Association of College and University Business Officers (NACUBO), most recently Jenny (1996) “A Cost Accounting Handbook for Colleges and Universities”. It also

refers to the KPMG report. It criticises the weakness of some other previous models. It notes that there are many difficulties in accessing costs in Higher Education including the various accounting methods used by different Institutions at different stages, and the issues of hidden subsidies such as external funding.

Like the KPMG Guidelines, the Handbook uses examples and pilot projects in order "to breathe life into the myriad of decisions that must be made in implementing and evaluating an innovation".

The Economic Model is completed in eight steps:

1. Identify the question of interest.
2. Identify the outputs.
3. Identify the activities completed to produce your outputs.
4. Identify the faculty/staff workload.
5. Identify the resources consumed in the activities.
6. Identify the metrics/performance measures.
7. Calculate costs for each activity.
8. Aggregate the total cost and calculate the metric/performance measure.

The Handbook addresses each step in turn using the pilot project to illustrate difficulties or specific examples of usage. This includes in Step 4 a breakdown of the use of staff time as six categories: teaching, research/scholarship, professional growth, administration, consulting/freelance work and "other".

Link: There is no public documentation on Flashlight but the CNL1 report (Bacsich, Ash et al, 1999) gives the main information required to understand it – and a critique. (It also contains critiques of several other methodologies.)

Commentary: The Flashlight model is old, so old that it was taken into account by both CNL and INSIGHT in the early part of the millennium. In particular the CNL1 report (see section 8.2) demonstrated many of the required mappings of Flashlight into UK analytic schemes like CNL and the HEFCE work on costing and planning.

Thus it is unlikely that anything new would be added by looking again at its theoretical aspects. As noted earlier, it does not now seem to be used, even in the US.

D INSIGHT (from University of Strathclyde)

Overview: The following overview is taken from the INSIGHT document (Nicol et al, 2002):

> The original 'Insight' proposal from the University of Strathclyde, presented to JISC (The Joint Information Systems Committee) in June 1999, was aimed at understanding how ICT (Information and Communication Technology) is organised and managed within higher education institutions and finding ways of improving the cost-performance relationship of ICT usage. The strategy was to identify the principles that govern the use, organisation and management of ICT and from this to develop an evaluation model and associated tool-set through which cost-performance relationships could be identified, measured and compared.
>
> ... the Project Team elected to focus initially on the development of a cost/benefit model which would facilitate the evaluation of existing or proposed C&IT initiatives. The initial scope for the cost/benefit model was developed through an analysis of requirements, drawing together existing work in the field and identifying 'gaps' that had to be addressed. This analysis encompassed a number of overlapping activities:
>
> - Existing literature was reviewed to ensure that the Insight Initiative took account of previous work in the area of the evaluation of costs of ICT within higher education.

In particular, this project draws on the work of the Joint Funding Council's Costing Guidelines for Higher Education Institutions, which provides a framework for costing within higher education, and two HEFCE Reports: 98/42- Information Systems and Technology Management – Value for Money Study and 99/21 – Appraising Investment Decisions.

- The work of the Flashlight team at the University of Indiana 1 and the work carried out by Dr. Paul Bacsich and his team at Sheffield Hallam University 2 has also proved very useful in informing our thinking.
- Literature was reviewed in the area of evaluation of benefits of ICT in higher education and on different evaluation frameworks.
- ...

Link: http://www.jiscinfonet.ac.uk/Resources/external-resources/strathclyde-insight-case-study (and at some other sites, some of which appear to be obsolete)

Commentary: The INSIGHT tool acknowledges the influence of both the UK CNL and the US Flashlight approach – as well as the overarching HEFCE framework. It is also on the costings aspects well within the standard activity based costing paradigm so could be used as a basis.

The evaluation aspects were less successful, With hindsight, 2002 may have been a little early in the history of HE e-learning and its evaluation to expect much agreement in the sector on the benefits aspects. Recent developments including benchmarking, the *Learner Experience* studies, the *Tangible Benefits* work and a more adverse (or realistic) financial climate within a context of impending demographic downturn (UUK, 2008), may now make this agreement easier to achieve.

E TCM (from WCET and NCHEMS)

Overview: From the JISC InfoNet page:

> The Technology Costing Methodology (TCM) project was created by the partnership of the National Center for Higher Education Management Systems (NCHEMS)and the Western Cooperative for Educational Telecommunication (WCET) in the United States. TCM is an authoritative costing analysis tool, including standard definitions of cost categories, for institutions and multi-institutional agencies to: a) analyse the costs of instructional approaches that make heavy use of technology; and b) to legitimately compare cost data for different instructional approaches. It is not a set of accounting protocols nor a cost/benefit analysis, but instead focuses on measuring comparative costs across institutions. *Since definitions of "quality" and "benefits" vary widely, these determinations are left to the institution*. [our italics]

Link: http://wcet.info/2.0/index.php?q=TCM_Home_Page

Commentary: The TCM approach is some years old. It is also US-based and unlike some other approaches, never contextualised for UK HE/FE. Regarding uptake in the sector, there is no visible uptake of TCM in UK HE/FE – despite references to TCM in several reports advising the sector. The evidence follows.

The acronym "TCM" has an unfortunately large number of meanings (see http://www.acronymfinder.com/TCM.html) hence it was decided to use the word "costing" as well in any searches. Even so there were many false positives generated.

A search across site:ac.uk for TCM AND costing generates 98 hits. There is an entry for it in JISC infoNet. It is referenced in LTSN Generic Centre e-Learning Series No 3. It is cited in "Sources of Guidance" in the JISC report *Risk assessment for the distributed e learning regional pilots and Higher Education Academy Subject Centre projects* (May 2005).

However, no sites were found citing TCM as a tool used for *costing* e-learning.

In case later hits in the above search were overlooked a new search was done across site:ac.uk for TCM AND costing AND e-learning, generating 27 hits, and this subset carefully scrutinised. No relevant hits were found.

F TCO (from Becta)

Overview: Total Cost of Ownership (TCO) is a method of identifying and understanding *all* of the costs associated with the acquisition, use and support of ICT, with the aim of improving decision-making about future ICT investment and deployment. It was first popularised by the Gartner Group in 1987 but its roots are considerably older, dating at least to the first quarter of the twentieth century (Goodall 2008).

The first UK-based project that looked at TCO in schools was completed by Becta in August 2002 and produced a specific TCO approach.

The TCO model quantifies not only the visible costs but makes an assessment of the "hidden staff costs" where staff are informally supporting the technology and their peers (this is done in some other schemes including CNL). In addition to an assessment of the inputs, the model goes beyond pure costing to assess a range of outcomes including user satisfaction, service reliability and appropriateness.

A later project was run in 2003-04 by Becta for JISC to carry out a pilot study working with up to 9 FE colleges and develop a TCO model for use in the FE sector.

Link: For the JISC TCO project run by Becta see http://www.jisc.ac.uk/whatwedo/programmes/programme_jos/project_tco.aspx.

For the Wikipedia article see http://en.wikipedia.org/wiki/Total_cost_of_ownership.

There was a Becta literature review at http://www.becta.org.uk/page_documents/research/tco.pdf but this is no longer extant at that site. The abstract on JISC infoNet notes that:

> This literature review identifies over 130 documents that are relevant to the issue of TCO. The review presents the findings from the literature by analysing the various uses of TCO, how to implement and identify actual costs. It discusses what kinds of models there are for use in education and considers what should be included in the monetary costs within a single school. It also captures the implications from the literature with regards to which kinds of TCO analysis to use in schools and LEAs.

It would be useful to reinstate this literature review on JISC infoNet.

Commentary: The project was completed in May 2004. Regarding uptake in the sector, a search across site:ac.uk for TCO AND costing generates 50 hits, but most are about generalised use of TCO rather than the specific Becta approach. Nevertheless there are some interesting papers, such as Power (2006).

An apparently tighter search across site:ac.uk for "TCO costing e-learning becta" still yields 23 hits, but most are now references to Pick&Mix benchmarking where the commentary for the costing criterion mentions Becta and TCO. There are also several references to the DFID project *DEEP IMPACT*, run by the OU, which was an investigation ending in 2004 of the use of information and communication technologies for teacher education in the global south, but the results are focussed on schools overseas. Various other hits turn out to be to Pick&Mix or to other reports already found. There are no signs of ongoing activity with TCO across the UK HE/FE sector – this view was confirmed informally by a Becta source. In contrast, in schools TCO continues and is particularly relevant to the *Building Schools for the Future* programme.

G TRAC(T)

Overview: TRAC (the Transparent Approach to Costing) is the standard method now used for costing in higher education in the UK. TRAC was developed out of work by the Joint Costing and Pricing Steering Group and was introduced after the Transparency Review in 1999 – a

government policy study overseen by the Science and Engineering Base Co-ordinating Committee. After five years of implementation (finishing in 2004), TRAC is now being consolidated and extended to cover full economic costing (fEC) at project level.

The development of TRAC has been the responsibility of the Joint Costing & Pricing Group (JCPSG) – an HE sector body who have been supported by consultants J M Consulting Ltd.

TRAC(T) is a new framework for costing teaching based on the principles of the Transparent Approach to Costing (TRAC). It has three main aims:

- to enable higher education institutions (HEIs) to understand their own costs better, so that they can use cost information for planning, decision-making and management;
- to inform HEFCE's allocation of funds for teaching;
- to assist in understanding the total costs of sustainable teaching.

HEFCE is developing TRAC(T), working with the HE sector in England, and with a group of adviser institutions and consultants. This is a staged process which is likely to continue for three to four years. The initial (priority) requirements for Stage One (implementation over 2006-08) have now been defined.

The first year of implementation (2006-07) will be a pilot year. Institutions will report initially on 2005-06 data in February 2007, and will be supported in reviewing and refining their methods and data through an informal benchmarking process provided by HEFCE and facilitated by J M Consulting.

The aim is for all HEIs in England and Northern Ireland to be in a position by February 2008 to report consistent data on the full costs of their HEFCE-fundable teaching in the Higher Education Statistics Agency (HESA) academic cost centres where they have provision. This will provide valuable management information for institutions, and will enable HEFCE to review the price groups used in its funding method for teaching in time to inform any changes for 2009-10.

Scotland is monitoring this and some institutions are involved but it does not seem to be compulsory for HEIs in Scotland. It does not apply in Wales and will not do so in the immediate future.

TRAC and TRAC(T) do not apply to FE, not even it seems to those FE who do HE teaching.

Link: http://www.jcpsg.ac.uk/guidance/draft/

Commentary: The system is still under development, and there has been little visible development yet to cover e-learning – but note the work at Worcester (2008).

Regarding uptake in the sector, the general TRAC(T) approach is mandatory in England and Northern Ireland and being used by several HEIs in Scotland. It does not apply in Wales, though in time it probably will. Thus it might provide one overarching container for any new JISC costing methodology (even if not the only one since TRAC and TRAC(T) do not apply to FE).

However, in the BELA benchmarking studies only one institution mentioned use of TRAC(T) as relevant to e-learning and several of the benchmarking teams had no idea what it was when they were asked specifically. For a cautiously positive view about the relevance, in time, to TRAC(T) for e-learning see the report by Leicester (2007) and for some signs of progress see Worcester (2008). Much more typical is the view from Bell and Farrier (2008) that "costing models and workload models which take into account the extra requirements for elearning [sic] have yet to be developed".

Within this study item a request for information on costs of e-learning was made to Melanie Burdett, one half of the JM Consulting team who underpin much of the HEFCE costing work,

in the faint hope that they might have done some work for HEFCE on the costs of e-learning. Melanie Burdett replied:

> The only work we have done in this area was a study which sought to identify the costs of alternative methods of delivery – but it looked at costs of a course/student, and there were very few e-learning courses around – they were mainly flexible learning. It made sweeping assumptions about central services and estates costs and did not look at the IT costs (too small an amount of the total costs per student). It was quite a few years ago – June 2003. Available at www.hefce.ac.uk/pubs/rdreports/2003/rd14_03.

H Diana Laurillard's work

Overview: Professor Diana Laurillard has been working for a few years on a new synthesis of costs and benefits for e-learning. The description below is taken from an authoritative review of Laurillard's paper by Ingrid Schönwald.[5]

> ...The aim of the author is to develop a 'benefits-oriented cost model' that enables innovators to plan and understand the relationship between the expected learning benefits and the likely teaching costs.
>
> The first part begins by analysing existing approaches to cost modelling and measures of benefits, such as cross-institution approaches, within-institutional approaches and or approaches for a cost-benefit-analysis. The author identifies several limitations in the existing approaches to costing:
>
> - There is no consistency in costing new technology methods across institutions in terms of costs measured
> - There is no consistency in the parameters to be used for comparing the costs of new technology with the costs of traditional methods, within an institution
> - There is no critical literature: studies that produce conflicting findings do not comment on these discrepancies
> - Costing models identify parameters to be costed, but give little help in estimating or measuring these for a particular institution, department, or course
> - There is no agreement on how best to identify and compare benefits of new technology against traditional methods
>
> The author concludes that traditional costing studies for new technologies have given little help to innovators and managers because they have tried to give a definitive and generalized answer to the question of whether they are cost-effective which is not possible with an emerging educational innovation. From her critique of existing approaches the author generates a list of seven requirements for a different approach: The model should …
>
> 1. Define benefit parameters that can differentiate between old and new methods
> 2. Define the cost parameters that can be associated with comparative benefits
> 3. Focus on the major cost driver of staff time
> 4. Represent value to the learner in terms of use of their time
> 5. Support the local exploration of the cost-benefit relationship
> 6. Represent technology-specific benefits
> 7. Represent benefits in terms of improvements in learning

[5] See http://www.elearning-reviews.org/topics/resources-management/educational-controlling/2007-laurillard-benefit-oriented-cost-model/. Ingrid Schönwald is at SCIL (Swiss Centre for Innovations in Learning), a centre of expertise in benchmarking e-learning and involved in the Swiss Virtual Campus.

> The main idea of the model is to get beyond retrospective analysis of costs and benefits, and develop instead to an approach that focuses on prospective planning for the internal relation between critical benefits and their related costs. The proposed modelling tool focuses only on the costs linked to staff and student time, and the benefits linked to the types of learning and teaching, and doesn't include benefits such as flexible study times, reach to off-campus students etc.
>
> The default data of the proposed 'benefits-oriented cost model´ are average values derived from studies in one institution (probably the author's own institution). For local implementation in other universities the costs (in terms of staff and student time) and benefit assumptions (in terms of personalization and quality of active learning experience) have to be checked as costs and benefits depend on the specific institutional context.
>
> The author recommends use the model as a planning tool as it can help to
>
> - clarify thinking about the purpose of a technology-enhanced learning innovation
> - identify the key parameters that confer learning benefits
> - compare old, new, and blended methods model alternative plans
> - support an iterative approach to designing a plan against the cost it generates
> - capture the planning in a form that can be communicated and revised
> - define the staff resource needed to realise a plan
> - assess the per student cost of the teaching time for a course
>
> With the development of her model the author proposes an interesting idea to refresh the old "return-on-investment" discussion in e-learning. It will be interesting to see if and how the model will be implemented (and probably evolved) within a specific university context.

Link: The paper is not public but Athens subscribers should be able to access it, e.g. at http://www.springerlink.com/content/c176t337h7381n51/.

Commentary: There are many observations in this paper that costings experts would challenge including that there is (or was) "no critical literature" – and most of her diagnoses are familiar from the era of CNL and INSIGHT – though it is of concern that the sector has done so little about it in the last six years. Interestingly she does not cite CNL (thus perhaps missing many of the comparative analyses it focussed on) and does not discuss the INSIGHT work in any detail.

Her focus on planning is also familiar from CNL and from much of the work of Tony Bates. In my view she underestimates the commonality between institutions in this area – and my view is confirmed by the benchmarking studies. Her focus on the use of time is not new – see e.g. Bacsich (2004) – but it is good to have it reinforced.

A more serious omission given the likely direction of many universities in the sector towards more flexible provision is that she notes the scope limitations of her current model:

> The other important benefits of digital technology are to provide flexibility of provision, wider access to material etc. but these improve the opportunity to study, rather than the quality of the learning experience per se, *and need a different kind of costing analysis*. [our italics]

In the light of the approach from DIUS (Denham, 2008) and the scenarios outlined in UUK (2008) this "different kind" of costing analysis must be a key part of any new costs of e-learning system.

Nevertheless the paper takes a fresh view of an old subject and is one of the few recent starting points for any future synthesis.

There is no uptake as yet since the project is still in the research phase.

I Open University work

Overview: The Open University courses management system *PLANET* includes planning and approval processes and a costing tool to support "business appraisal" of new programmes.

Link: There is none since the work is confidential. There are almost no references to it on the public web. It is believed that Diana Laurillard would have drawn on this.

Commentary: The Open University informs me that it would be prepared to make its work more widely available if it would assist the development of a common costing regime for e-learning in the HE sector.

J NCAT (from Carol Twigg)

Overview: An approach to costing was taken in the US *Program on Course Redesign* funded by the Pew Foundation and directed by Carol Twigg, which led to the setting up of the *National Center for Academic Transformation*. Since Diana Laurillard has studied this programme in detail and worked hard to bring it to the UK it is reasonable to draw on her analysis of it.

> ... The explicit aim of the Program was to use technology in the design of courses in order to reduce costs, improve quality and enhance access. It therefore took seriously the business of defining costs accurately. Thirty institution-based projects were funded each year, from 1999 to 2001, to redesign their pedagogical approaches to achieve more efficient learning. Twenty of the thirty reported cost reductions, mainly through the adoption of course management systems, automated assessment, online tutorials and shared resources. The benefits of ICT were expressed in terms of
>
> - higher grades,
> - better performance on tests of content knowledge and understanding,
> - reduced drop-out, failure and withdrawal rates, and
> - significant movement from passive to active, learner-centred pedagogy
>
> These are all retrospective measures, but the change in pedagogy and the drive to reduce costs, were planned in from the start, as they have to be if they are to be achieved (C. Twigg, 2002).
>
> The important innovation of the Pew Program was to focus on planning for both cost reduction and greater value to the learner, right from the start of the innovation. This enabled it to achieve and demonstrate the cost-effectiveness of introducing technology in ways that other projects have never managed. Given its relative success, a study was commissioned to assess its transferability to the UK, and the report from the Observatory for Borderless Higher Education contains a wealth of information and sources of technology costing methodologies (OBHE, 2003). The report observes that there has been very little engagement with the findings of the Program in the US, no critique, no adoption, and only occasional description can be found in the literature....

Link: http://www.thencat.org

Commentary: The Program on Course Redesign formed a large part of the intellectual basis for the Scottish Transformation Programme although in the end Transformation did not turn out to be the UK exemplar of the Program which some might have expected – and both the English Pathfinder Programme and the Welsh Enhancement Programme (Gwella) have taken a different, more incrementalist approach. Nevertheless the Program remains of great current interest to some UK analysts (though at this stage none of their conclusions are public).

However, some critiques have been made of the NCAT approach to costing, referred to in the OBHE (2004)report, and from Bates and others, as well as its other assumptions, and my own US sources confirm the view from the OBHE report that the Program has not reached any kind of actual or conceptual breakthrough in the US. Such conclusions mean that the NCAT costing model is likely to be rather too tied to a particular transformative view of e-learning which is not (yet?) in favour in the UK.

The best conclusion is to recommend that the wider issues of the Program are left to those in JISC looking at future programmes in the Curriculum Design and Delivery area but to ensure that any future costings synthesis draws, with care, on the Program's work on costings, ensuring that this aspect is disentangled from wider assumptions.

2. Gap Analysis

The older methodologies of CNL and INSIGHT are now not used in the UK. For whatever reason they did not catch on. To be used now they would require considerable refresh – but this is feasible.

TCO is has not penetrated HE and use in FE is not progressing at present. It is rare that an FE methodology makes it "up" to HE, though to some extent ELTI (an HE-FE methodology) and Pick&Mix (an HE-refreshed FE-derived methodology) more sustainably have done so. These two contrasting examples give a clue as to how to bring this transition about: a refresh/relaunch is required and continuous support, as Pick&Mix has had now for nearly four years through five programme phases.

US methodologies seem also to have no traction in the UK. This is typical of bringing US methodologies into UK HE/FE. (With the possible exception of IMS, and at a cost.) Indeed, several like Flashlight and NCAT seem to have little traction even in the US.

Nor are the full features of Activity Based Costing used in UK HE/FE e-learning, though there are signs of use in some IT departments.

It is too early for institutions to have refined TRAC(T) for e-learning use (see the reports from the University of Leicester and the University of Worcester) and in any case TRAC(T) does not apply in Wales – or to FE anywhere.

The work of Professor Diana Laurillard is interesting but would have to be correlated to earlier and current JISC initiatives, broadened in scope and focussed more on operational matters of interest to the majority of institutions implementing e-learning on a large operational way, most of these being new universities.

3. Features of a New System

Evidence from one or more experts indicates that the following features are required for any system to be worthy of consideration for use by managers, teams and committees charged with making effective decisions in universities:

1. Alignment with any overarching measures of cost: TRAC(T) is valid in three home nations (but not Wales); FFE[6] is valid in English HE.
2. A range of tools within a general methodology, oriented to different constituencies within the institution – e.g. finance staff will want more detail and may be impatient with softer measures; evaluators may feel that "quality" aspects cannot and should be not be reduced to numbers; managers will want clear outputs to aid decisions and the ability to summarise detail.
3. No residual US or Commonwealth tone to the tools: they must be UK in language and concepts.

[6] Framework for Excellence – see http://ffe.lsc.gov.uk/.

4. Self-extending so that new measures can be incorporated such as for Web 2.0 (e.g. student-generated content).
5. Developmental not audit-based in tone – a feasible model for this is the "engagement approach" used for the HE Academy benchmarking by the BELA team, linked to use of CAMEL if cohorts are involved.
6. Numbers at the heart of the system (think of accounting as the backbone) but softer measures (soft tissue) around this. This is totally in line with the recommendations from the Joint Costing and Pricing Steering Group – "managing by the numbers" now has many critics.
7. No limitation to particular views of e-learning such as "transformative", "incrementalist" or "embedded".

This will be picked up in the Committee paper.

4. Reference Material

4.1 Bibliography

With the exception of some standard papers, this bibliography focusses on papers generated since the bibliographies were published for the CNL studies.

it was out of scope to produce bibliographic references covering the "e-training" area outside universities and colleges. However, the resources at Learning Light (2007) give some indication of how issues such as cost-effectiveness that education finds intractable are not seen as nearly so intractable in the corporate and public-sector training area. See also the paper by Farook (2008) on Emirates Airlines use of e-training.

it was also out of scope to review the many scholarly papers on costs of distance learning from experts such as Greville Rumble and Tony Bates. Some of the most relevant ones are cited in the small bibliography in Laurillard (2007).

4.1.1 Existing bibliographies

There appears to be no up to date and complete bibliography of the literature on costs of e-learning in tertiary education. But there are some older complete bibliographies and one new but incomplete one.

- The CNL1 Report (published in October 1999) contains as Appendix 1 (starting on page 84) a Full Bibliography of 6 pages and 119 items. Producing such a bibliography was one of the aims of the CNL1 project – another aim was to analyse all known costings approaches available at that time so it aimed to be a systematic and all-embracing approach. See http://www.matic-media.co.uk/CNL-1.doc.
- The CNL2 Report (published two years later – September 2001) extended this in its "Full list of publications read for CNL" (pp. 76-90) to 194 items. For both the CNL1 and CNL2 bibliography several months of RA effort was put into creating each. See http://www.matic-media.co.uk/CNL-2.doc.
- The INSIGHT Report (at http://www.jiscinfonet.ac.uk/Resources/external-resources/strathclyde-insight-case-study) does not seem to have a bibliography – however since it was published in February 2002 (just a little later than CNL2) and covered much the same ground in the costings area as CNL2, this is not a particular problem.
- The 2007 paper by Diana Laurillard does have a bibliography but not a comprehensive one; it was not one of the aims of the paper and it presumably did not help that at the time some of the key resources she needed were not online. Fixing that issue should be one of the more minor (but important) outcomes of any future work.

4.1.2 New material

This covers material since the CNL and INSIGHT studies relating to costs of e-learning and also reports and papers evidencing assertions about costs of e-learning made in this report.

Bacsich, Paul, Ash, Charlotte et al (1999), *The Costs of Networked Learning*, October 1999, http://www.matic-media.co.uk/CNL-1.doc.

Bacsich, Paul and Ash, Charlotte (1999), "The hidden costs of networked learning – the impact of a costing framework on educational practice", paper presented to the ASCILITE conference, Brisbane, December 1999, http://www.ascilite.org.au/conferences/brisbane99/papers/bacsichash.pdf.

Bacsich, Paul, Ash, Charlotte and Heginbotham, Sarah[7] (2001), *The Costs of Networked Learning – Phase Two*, September 2001, http://www.matic-media.co.uk/CNL-2.doc.

Bacsich, Paul (2004), *The real costs of e-learning: what are they? how can we find out?,* British Council presentation to the universities delegation from Venezuela, March 2004, http://www.matic-media.co.uk/presentations/CNL-Venezualans-160304.ppt.

Bacsich, Paul (2008a), *Benchmarking Phase 2 Overview Report*, March 2008, http://elearning.heacademy.ac.uk/weblogs/benchmarking/wp-content/uploads/2008/04/BenchmarkingPhase2_BELAreport.pdf .

Bacsich, Paul (2008b), *The national UK universities benchmarking e-learning programme*, paper presented at the EADTU conference, Poitiers, September 2008, http://www.eadtu.nl/conference-2008/Proceedings/QA%20-%20Paul%20Bacsich%20-%20National%20UK%20Universities.pdf.

Bartley, Sharon and Golek, Jennifer (2005), "Evaluating the Cost Effectiveness of Online and Face-to-Face Instruction", *Educational Technology & Society*, 7 (4), 167-175, http://www.ifets.info/journals/7_4/16.pdf.

Beetham, Helen (2008), *Briefing paper to support Call I: Transforming Curriculum Delivery Through Technology within Circular 08/08*, April 2008, http://www.jisc.ac.uk/media/documents/programmes/curriculumdesign/curriculumdesignbriefing.pdf.

Bell, Malcolm and Farrier, Stephen (2008), "Measuring Success in e-Learning – A Multi-Dimensional Approach", *Electronic Journal e-Learning*, Volume 6 Issue 2, 2008 (99-110), http://www.ejel.org/Volume-6/v6-i2/Bell_and_Farrier.pdf.

Bramble, William J. and Panda, Santosh (editors) (2008), *Economics of Distance and Online Learning: Theory, Practice and Research*, Routledge, 2008, ISBN: 978-0-415-96389-3. A compendium of papers by various authors. Abstract: "This book provides a comprehensive overview of the organizational models of distance and online learning from an international perspective and from the point of view of economic planning, costing and management decision-making. The book points to directions for the further research and development in this area, and will promote further understanding and critical reflection on the part of administrators, practitioners and researchers of distance education. The experiences and perspectives in distance education in the US are balanced with those in other areas of the world."

Casey, John and Wilson, Pam (2005), *A practical guide to providing flexible learning in further and higher education***,** prepared for QAA, 2005, http://www.enhancementthemes.ac.uk/documents/flexibleDelivery/FD_Flexible_Learning_

[7] Sarah Heginbotham is now Sarah Langlois and working in a senior role at the *TRU Open Learning* campus in Canada (http://www.tru.ca/distance/).

JCaseyFINALWEB.pdf. This contains a not unexpected reference to TCO but it turns out yet again to be a reference to the costing criterion in the Pick&Mix benchmarking scheme.

Chester (2007), *The Pathfinder Journey*, in the ZIP archive at http://elearning.heacademy.ac.uk/weblogs/pathfinder/wp-content/uploads/2007/11/ChesterPathfinderBriefings.zip.

Curran, Chris (2004), "Virtual campus: economic models", in: *The 'e' for our universities – virtual campus: Organisational Changes and Economic Models*, EU Consultation workshop, November 2004, http://ec.europa.eu/education/archive/elearning/doc/workshops/virtual%20campuses/position_summary.pdf. (Several other papers in this collection are also relevant to the wider context.)

Derby (2007), *University of Derby e-Learning Benchmarking report* (16 pp), October 2007, http://ebenchmarkblog.derby.ac.uk/blogs/files/237/1041/ELBUoDfinal.doc.

du Boulay, Benedict, Coultas, Julie and Luckin, Rosemary (2007), *How compelling is the evidence for the effectiveness of e-Learning in the post-16 sector? A review of the literature in higher education, the health sector and work-based learning and a post-review stakeholder consultation*, report to Eduserv, November 2007, http://www.reveel.sussex.ac.uk/files/Version4.1.pdf.

Castillo-Merino, David (coordinator) (2008), *The Economics of E-Learning*, rusc vol. 5 n.º 1 (2008) | issn 1698-580x, 2008, http://www.uoc.edu/rusc/5/1/dt/eng/monograph.pdf. Largely theoretical but with one paper on a Balanced Scorecard approach.

Denham, John (2008), *Speech to the Universities UK Annual Conference*, Cambridge, 11 September 2008, http://www.dius.gov.uk/speeches/denham_uuk_110908.html.

Edge Hill (2008), "Raising Awareness of the Costs of e-Learning", paper 1 of 1 in the *Edge Hill University Briefings*, in the ZIP archive at http://elearning.heacademy.ac.uk/weblogs/pathfinder/wp-content/uploads/2008/10/Briefings_EdgeHill.zip.

EDSUT (2008), *Challenges and Realisations from the Higher Education Academy/JISC Benchmarking and Pathfinder Programme*, September 2008, http://elearning.heacademy.ac.uk/weblogs/pathfinder/wp-content/uploads/2008/09/Bench_and_PathFinalReview20080926.pdf.

Education for Change (EfC) (2005), *Risk assessment for the distributed e learning regional pilots and Higher Education Academy Subject Centre projects, Report 1: Guidance on risk assessment*, May 2005, http://www.jisc.ac.uk/uploaded_documents/risk_assessment_guidance.doc. Cites TCM.

Educause (2005), *Grassroots Projects: Fostering and Supporting an Institute-Wide Culture of Innovation*, Educause, 2006, http://net.educause.edu/ir/library/word/eli0654.doc.

Farook, Leena (2008), "Emirates' eLearning Route Map: eLearning Policies and Implementation Strategy", in *e-Learning Excellence in the Middle East: Define, Design, Deliver*, Dubai, January 2008. Not on web yet.

Frydenburg, Jia (2002), "Quality Standards in eLearning: A Matrix of Analysis", *International Review of Research in Open and Distance Learning*, October 2002, http://unex.uci.edu/pressroom/news/2002/1001_elearning.asp. Some interesting information but not on tools.

Glenaffric (2008), *Benchmarking Exercise Phase 2 Review by the Evaluation & Dissemination Support Team*, April 2008, http://elearning.heacademy.ac.uk/weblogs/benchmarking/wpcontent/uploads/Benchmarking2SummaryReport21April08F.pdf

Goodall, George (2008), "TCO: What's Old Is New", *Info-Tech Insight*, March 2008, http://www.processor.com/editorial/article.asp?article=articles%2Fp3012%2F06p12%2F06p12%2Easp&guid=38EA5B42565B4C989AB66754B695F44C&searchtype=&WordList=&bJumpTo=True.

Harvey, Bill and Beards, David (2004), "E-learning in Scottish further and higher education", *Education + Training*, Vol. 46 6/7, pp 353-360, ISSN: 0040-0912, DOI: 10.1108/00400910410555268

JCPSG (2008), *TRAC(T) Guidance (for England, Scotland and Northern Ireland)*, last updated September 2008, http://www.jcpsg.ac.uk/guidance/draft/. TRAC(T) does not apply in Wales, although Welsh institutions must use general principles of Full Economic Costing when applying for e.g. JISC and Research Council grants.

JISC infoNet, *Resources related to Costing* (prepared for SFC), http://www.jiscinfonet.ac.uk/InfoKits/implementing-elearning/sfc-costing

Jones, Roger and Haworth, Annette (2006), *i-continue: Sustainability of Investment in ICT: Final Report*, a report to the JISC Leadership and Management Programme, April 2006, http://www.reading.ac.uk/nmsruntime/saveasdialog.asp?lID=25705&sID=105021. This contains some passing references to TCO and its links to Full Economic Costing.

Lakin, Mary Beth, *The Health of E-Learning: sickly or soaring?,* ACE, http://www.acenet.edu/AM/TemplateRedirect.cfm?template=/CM/ContentDisplay.cfm&ContentID=12152

Laurillard, Diana (2007), "Modelling benefits-oriented costs for technology enhanced learning", *Higher Education*, Vol. 54, pp. 21–39

Learning Light (2007), *Costs, benefits and ROI of e-Learning*, infobase at http://www.e-learningcentre.co.uk/eclipse/Resources/costs.htm

Leicester (2007), University of, *Report on the 'Benchmarking e-learning at the University of Leicester' to the Student Experience and Enhancement Committee*, December 2007, http://www2.le.ac.uk/projects/elearningbenchmarking/2007-benchmarking/Report%20to%20SEECommittee%20on%20Benchmarking%20of%20e-learning%202007.doc/at_download/file

LTSN Generic Centre (2003), *A guide for Teachers*, LTSN Generic Centre e-Learning Series No 3, by Alison Littlejohn and Carol Higgison, 2003, http://www.dur.ac.uk/resources/its/lt/elearning/ELN063.pdf.

Mayes, Terry and Morrison, Derek (2008), "You take the high road: national programmes for the development of e-learning in Higher Education", *Reflecting Education*, Vol. 4 no 1, http://www.reflectingeducation.net.

Moonen, Jef (2003), "Simplified Return-on-Investment", *Interactive Learning Environments*, Volume 11, Number 2, August 2003, pp. 147-165(19).

Nicol, David et al (2002), *INSIGHT: A Model for Evaluating the Costs and Benefits of ICT in Teaching and Learning*, February 2002, http://www.jiscinfonet.ac.uk/Resources/external-resources/strathclyde-insight-case-study.

OBHE (2004), *Redesigning Teaching and Learning in Higher Education using ICT: Balancing Quality, Access and Cost – A review of the US Pew Grant Program in Course Redesign and its potential for UK higher education – Final Report*, Done for the Department for Education & Skills and available to the author, but never published.

OBHE (2007), *Benchmarking Phase 2 Final Report*, December 2007, http://elearning.heacademy.ac.uk/weblogs/benchmarking/wp-content/uploads/2008/04/BenchmarkingPhase2_OBHEreport.pdf.

Power, Tom (2006), *ICT and teacher education in the global south: costing the benefits of learning (Using suites of 'free' refurbished computers may cost over four times more than buying and using 'state of the art' mlearning technologies)*, paper for BERA based on a report for DFID, http://www.open.ac.uk/deep/Public/web/publications/pdfs/TPower2006-BERA.pdf. Takes a generalised TCO approach.

Reich, Fred and Abraham, Anne (2006), *Activity Based Costing and Activity Data Collection: a Case Study in the Higher Education Sector*, Faculty of Commerce – Papers, University of Wollongong, 2006, http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1220&context=commpapers.

UNCG (2005), *UNCG 2003-08 Distance Learning Plan*, University of North Carolina at Greensboro, 2005, http://web.uncg.edu/dcl/icampus/pdf/DLplan.pdf. This makes it clear that reducing costs of e-learning is to be a priority but gives no information on how costs are calculated.

Teesside (2007). Benchmarking Final Report (External) (8 pp), May 2007, http://uotblogs.typepad.com/university_of_teesside_eb/files/final_report_external_v1.doc.

UUK (2008), *The future size and shape of the higher education sector in the UK: threats and opportunities*, Report to Universities UK by Nigel Brown Associates, 2008, http://www.universitiesuk.ac.uk/Publications/Bookshop/Documents/Size_and_shape2.pdf.

Wentling, Tim (2002), *Cost Analysis of E-learning: A Case Study of A University Program*, University of Illinois at Urbana-Champaign, http://learning.ncsa.uiuc.edu/papers/AHRD2002_wentling-park.pdf.

Worcester (2008), *Benchmarking Exercise Phase II Report* (64 pp), March 2008, http://ebenchmark.worc.ac.uk/wp-content/uploads/2008/04/university-of-worcester-hea-elearning-benchmarking-final-report.doc.

4.2 URLs of agencies etc

ABC	http://en.wikipedia.org/wiki/Activity-based_costing (public domain)
CNL	http://www.matic-media.co.uk/CNL-1.doc
INSIGHT	http://www.jiscinfonet.ac.uk/Resources/external-resources/strathclyde-insight-case-study
NCAT	http://www.thencat.org
NCHEMS	http://www.nchems.org (and the *NCHEMS Information Center* at http://www.higheredinfo.org/ is a gold mine)
TCM	http://wcet.info/2.0/index.php?q=TCM_Home_Page
TCO	http://www.jisc.ac.uk/whatwedo/programmes/programme_jos/project_tco.aspx
TRAC(T)	http://www.jcpsg.ac.uk/guidance/draft/

5. List of Experts Consulted

A number of experts were consulted at institutions and agencies, including those expert in costing (such as Melanie Burdett, David Nicol or Steve Ehrmann) and those with a good overview of countries and/or sectors (such as Anne Forster or Christine Geith) – or both (such as Tony Bates).

Experts outside my immediate consultants circle (such as David Kay and Peter Chatterton) who have replied are:

1. Tony Bates, Canada
2. Professor Curtis Bonk, US, well-known speaker on e-learning at UK HEIs

3. Melanie Burdett, JM Consulting, TRAC and HEFCE consultant
4. Nigel Ecclesfield, Becta
5. Steve Ehrmann, TLT Group/Flashlight
6. Anne Forster, Australia, former President of ODLAA
7. Fred Garnett, expert on e-maturity (EMF), formerly at Becta
8. Christine Geith, Michigan State University
9. Diana Laurillard, Institute of Education, researcher in costing
10. David Nicol, University of Strathclyde, tool owner of INSIGHT
11. Donald Clark, former CEO of Epic, on Ufi Board, etc
12. Cliona O'Neill, HEFCW
13. Brian Sayer, London External System
14. Irena White, Australia
15. Peter Wilson, OU