TRIADS - Tripartite Assessment delivery System

Subject areas	Geography, geology, medicine, veterinary science
Theme	Assessment
Project number	34/96
Duration	36 months from November 1996 to October 1999
Funding	£199, 649
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Goals

TRIADS is a collaborative project between the University of Liverpool, the University of Derby and the Open University. It aims to improve the quality of learning by promoting a 'learning outcomes led' approach to curriculum design and to encourage the use of objective, computer-delivered assessment methods to evaluate the level to which learning outcomes have been achieved.

Project outcomes

A survey of learning outcomes, undertaken by the project team, identified common outcomes in a range of sub-disciplines of geology and concluded that generic objective assessments could be widely applicable.

The Tripartite Interactive Assessment Delivery System (TRIADS) was released to evaluation sites in 1997 and has undergone substantial development since then. It is designed to facilitate objective assessment of higher order skills such as synthesis, application of knowledge, skills and understanding complete with over 15 easy-to-use templates for question production. The system has been presented at numerous meetings and seminars throughout the UK, and abroad, and has been well received.

TRIADS is now being evaluated by 37 departments in 24 universities covering 18 disciplines as a mechanism for evaluating learning outcomes. Outside the lead sites, TRIADS tests have been used at the University of Glasgow to assess groups of up to 800 students and at other sites for smaller numbers of students.

The latest version of the system is web compatible and a further 15 question styles are currently being converted into templates. We believe that it is one of the few systems that can deliver the quality and rigour of assessment that is required in the higher education environment.

(see demonstration at: http://www.derby.ac.uk/assess/newdemo/newdemo.html)

Programme of work

The programme involved:

- awareness-raising presentations;

- demonstrations of computer-delivered assessment methods;

- practical workshops to guide first-time users through production and developmental testing of questions suitable for computer delivery;

- a technical and educational help service to those departments evaluating the TRIADS assessment system.

In addition, active links have been established with other geo-based FDTL projects, with the TLTP projects UKESCC and GeographyCAL, and with the (now defunct) CTIs in geography and biology. Links exist with three of the new subject centres (Biology, Materials, Geography/Earth/Environment). We see this system providing wide benefit and also having a future beyond FDTL funding by virtue of its commercial potential.

2. Deliverables and outcomes

2.1.2 Principal training workshops

- TRI-IT workshop, Derby, 8-9/12/98. 23 delegates, 16 departments/units, 11 HEIs (plus 3 lead sites)

- TRIED-IT workshop, Liverpool, 13-14/4/99. 31 delegates, 20 departments/units, 14 HEIs (plus 3 lead sites)

- TESTED-IT workshop, Derby, 12-13/10/99, 36 delegates, 27 departments/units, 15 HEIs (plus 3 lead sites)

Verbal presentations, demonstrations and specific training sessions for staff at evaluation sites

1) Jan 1998	Dr E M Leonard, Institute of Biomedical and Life Sciences (IBLS), Glasgow (at Derby)
2) 30-4-98	Dr S Bennet, Learning Technology Development Unit, Hertfordshire, (at Herts)
3) 28 to 30-9-98	Dr E M Leonard, Dr R G Sutcliffe, IBLS, Glasgow (at Derby)
4) 4-11-98	Dr C Steadman, Information Management School, Leeds Metropolitan, (at Derby)
5) 23-11-98	Dr E J Loeffler, Dr J C Schumacher, Earth Sciences, Bristol (at Bristol)
6) 30-11-98	Dr B M Hallam, Educational Counselling, Birmingham (at Derby)
7) 27-1-99	Dr D J Booth, Computing and Mathematics, Huddersfield (at Derby)
8) 22 to 25-2-99	Dr R G Sutcliffe, IBLS, Glasgow (at Derby)

9) 12-3-99	Ms A Blass, Dr J Haywood, Media and Learning Technology Services (MALTS), Edinburgh (at Edinburgh)
10) 3 to 4-5-99	Roger Sutcliffe, University of Glasgow (at Derby)
11) 11 to 12-5-99	Keith Adams & colleagues, University of Ulster (in Ulster)
12) 27-5-99	Liz Loeffler , University of Bristol (at Bristol combined with presentation to academic staff)
13) 22-6-99	Dr. Neil Arnold – University of Cambridge (at Cambridge combined with presentation to academic staff in the Department of Geography)
14) 16 to 17-7-99	Dr. Ruth Robinson & Marianne Leyton – University of St. Andrews (at St. Andrews combined with presentation to academic staff)
15) 13-7-99	Dr. Jill Taylor, Leeds Metropolitan University (at Derby)
16) 29 to 30-7-99	Ava Blass, University of Edinburgh (at Derby)
17) 14-9-99	Christina Smart (at University of Bangor combined with presentation to academic staff in the Department of Ocean Sciences)
18) 27-10-99	Making use of images in Advanced Computer-based Assessment (ACBA) using the TRIADS system. Invited talk by Prof. Don Mackenzie to members of the JISC-JIDI Project at University of Loughborough

2.2 Products available beyond life of project

Software　　　　Main TRIADS engine, question templates for 20 Question styles Websites at three lead sites

Websites　　　　Boyle, A. P., 1998. "TRIADS - Assessment of Learning Outcomes, University of Liverpool", http://www.pcweb.liv.ac.uk/apboyle/triads/.

D. M. Mackenzie, B. Mills, and H. Wilkins, 1999 "TRIADS and its potential for assessment in Electrical Engineering",

http://www.derby.ac.uk/assess/ijee/elecdemo.html World Wide Web: University of Derby,

D. M. Mackenzie and H. Wilkins, 1998 "TRIADS - Demonstration of Question Styles", http://www.derby.ac.uk/assess/newdemo/newdemo.html World Wide Web: University of Derby.

D. J. Edwards, 1998 "Course Assessment: teaching and learning issues", http://exodus.open.ac.uk/Others/triad/manc_conf.html, World Wide Web: Open University.

Manuals　　　　Technical manuals on use of TRIADS software.

'System Resources Manual' and 'Question Resources Manual' containing guidelines on question design, assessment strategy, etc., both on-line and as hard copy manuals.

Publications　　　Boyle, A.P., Bryon, D.N. & Paul, C.R.C. 1997. Computer-based learning and assessment: a palaeontological case study with outcomes and implications. *Computers and Geosciences*, **23**: 573-580, 2 figs.

Boyle, A.P., Edwards, D.J., Mackenzie, D.M., Mills, B., O'Hare, D., Morris, E.C., Paul, C.R.C., Wilkins, H. and Williams, D.W. (2000) Developments in on-line assessment - experiences and evaluation of using TRIADS and its potential for assessment in electrical engineering. International Journal of Electrical Engineering Education, Special Issue, Volume 37/1 (In Press)

Boyle, A. P. & Paul, C. R. C., 1998. Benchmarking Subject Learning Outcomes: Earth Science case study. In Jackson, N. J (ed.): *Managing Quality and Standards in UK Higher Education.* Quality Assurance Agency, London.

Edwards, D. & Boyle, A. P., 1999. Evaluation: the TRIADS experience. FDTL/TLTP Projects News Bulletin, **2**: 2-3.

Mackenzie, D.M. (1999) Recent Developments in the Tripartite Interactive Assessment Delivery System. Proceedings of the Third Annual Computer Assisted Assessment Conference. University of Loughborough. 16th-17th June

Mackenzie, D.M., Wilkins, H., O'Hare, D. and Boyle, A. (1999) Practical Implementation of Recent Developments in the Tripartite Interactive Assessment Delivery System. A Workshop for the Third Annual Computer Assisted Assessment Conference. University of Loughborough. 16th-17th June

Paul, C. R. C. & Boyle, A.P. 1998. Computer-based assessment in palaeontology at the University of Liverpool, In Charman, D. and Elmes, A. (Compilers) *Computer assisted assessment in science education: a review of good practice*. pp. 51-56, SEED, University of Plymouth.

Abstracts

Boyle, A. P., Bryon, D. N. & Paul, C. R. C., 1997. Computer-based learning and assessment in palaeontology: outcomes and implications. In: Alt-C '97, University of Wolverhampton.

Boyle, A. P., Paul, C. R. C. & Morris, E. C., 1998. Integrating UKESCC modules into first year tutorials - experiences in promoting self-directed learning and the development of IT skills. In: UKESCC Annual Users' Meeting 1998 (eds Sowerbutts, W. T. & Mackenzie, D. M.), University of Derby.

Boyle, A. P., Paul, C. R. C. & Morris, E. C., 1998. Using computer-based assessment to test independent learning. In: UK Geosciences Education Symposium: Assessment in the New Millennium (ed. King, H.), University of Birmingham.

Mackenzie, D. M., Boyle, A. P., Edwards, D. J. & Paul, C. R. C., 1998. Better assessment through a learning outcomes and computer-aided approach. In: The Association for Science Education 1998 Annual Meeting, pp. 24, University of Liverpool.

Mackenzie, D. M., Boyle, A. P., Edwards, D. J. & Paul, C. R. C., 1998. TRIADS Workshop. In: Improving teaching, learning and assessment in Geography (ed. Gravestock, P.), University of Warwick.

3 Dissemination

At the end of the three years of funding, TRIADS is being evaluated in thirty-seven academic departments covering eighteen disciplines at twenty-five universities, across the whole UK. Our initial strategy involved a discipline-based approach, but we moved away from specific disciplines to a more flexible recruiting policy, using the criterion of enthusiasm irrespective of subject. Furthermore, collaborative links with IT-support or Learning Resource centres often give access to numerous departments within an HEI, so we encourage this type of contact. However, IT or learning support centres are rarely directly involved in teaching, so although staff are often enthusiastic about the TRIADS project this does not always guarantee usage within the institution. Our Web pages have given us several contacts that have resulted in active evaluation sites. However, continual dissemination effort is needed if this type of project is to succeed, as not every enquiry results in a new site, especially an active one. We have found a useful tactic is to target subject areas that are approaching a teaching quality audit, as this enhances successful uptake of good practice. Continued collaboration with selected subject centres and with the new Generic Learning and Teaching Centre should promote further uptake of TRIADS and through this the embedding of best assessment practice. Despite the reservations and re-orientation of our dissemination effort, we succeeded in signing up nearly four times as many evaluation sites as we originally planned. Ten evaluation sites have been added since our last annual report (30-4-99) and we are actively discussing participation with two more. Our sites represent a range of institutions, including established and newer universities, and at least one Higher Education college.

4 Evaluation

Table 1 summarises the main features of our evaluation strategy.

Table 1

Focus	Process/method
Software engine	Technical appraisal by evaluation sites
Assessment questions	Design and testing of questions used in TRIADS applications
	Evaluation of questions after use, test design and feedback
Assessment tests	Reflection on test process and feedback received (student perspective) via questionnaires at beginning and end of tests
Learning & teaching strategy	Feedback on teaching and learning process of modules (student perspective) via questionnaires at beginning and end of tests
Impact on learning, teaching and assessment	Feedback from evaluation sites gathered by:
	a) Team using interviews, questionnaires and network
	b) External Evaluator interviews
Dissemination	a) Quantitative - listing contacts made, conferences workshops etc., and contacts vs follow-up
	b) Quantitative by questionnaire etc. after TRIED-IT and TESTED-IT workshops
	c) Qualitative - impacts of dissemination - data gathered by Team and External Evaluator interviews
Project goals	Reviews of overall goals, extent of achievement, contextual factors, barriers to uptake and likely future developments

4.1 Quality of products and deliverables

In this context, the products are both the software engine and templates, and the tests that have been developed.

4.1.1   Software

Our software engine is continually being upgraded, new question templates are developed as soon as the need for them is perceived and we have trained staff at several evaluation sites in customising their own question templates. Feedback from evaluation sites is invaluable in these processes. The software and templates have been shown to be robust under repeated testing, and of marketable quality. They offer many features not available in commercial software packages. Web delivery of the TRIADS engine, question templates and handbooks ensures that upgrades are made available to users as soon as possible after development. The only drawback appears to be complexity of the system, because of the sophistication of the underlying program, *Authorware*. This requires practice and regular use to become skilled, requiring time and commitment. Indeed much of the technical support provided by the project team has concerned *Authorware* issues rather than issues that are directly associated with the assessment system. Time is often mentioned as the one thing that academic staff do not have to spare and it is apparent that the TRIADS software is a system that may be more suited to centralised implementation than to the occasional implementation by individual academics. In the light of this, plans are in hand to develop a 'quickstart' version for individual users.

Feedback from three workshops has resulted in improvements to the technical handbooks and has resulted in an additional guide on educational issues. These were made available on websites as soon as possible. Feedback from the TESTED-IT workshop also highlighted specific local technical problems of web-delivery that involve configuration, caches, plug-ins, etc. beyond our control. Nevertheless, these can present a significant barrier to uptake and the technical support team are currently providing advice where requested.

4.1.2   Tests

A few tests have been developed outside the main sites. These, understandably, do not yet use the full potential of the system. Also, many evaluation sites have become focused on the technical aspects of implementing questions in TRIADS and not on the many issues of designing good assessment tests. At the various workshops there have been presentations and advice on how to go about planning and evaluating tests, but, as yet, fewer participants seem interested or concerned about these bigger, quality matters.

However, one of the more active sites at the University of Glasgow Biomedical School has undertaken testing of 800 students at a time using TRIADS-developed tests.

4.2   The extent of take up and use of products and deliverables

There are currently thirty-seven academic departments evaluating the TRIADS system covering eighteen disciplines at twenty-five universities (Appendix 1). This is nearly four times the number we originally envisaged. New sites have joined the list at all stages of the project and we have accepted sites after our original deadline, in the hope that one or two would prove to be 'fast track users'. Additional sites are still being signed up since we now know continuation funds have been approved (subject

to this report being satisfactory). In that sense uptake has been successful. However, some of the longest-standing members of the list have not proved to be the most active. It has been difficult to find out exactly how many are actively developing tests using TRIADS, despite three face-to-face workshops.

Our strategy has been to have a formal agreement, signed by a head of department or other senior figure, to ensure institutional support at least at departmental level. We have kept pressure on sites to keep to the agreement and provide essential feedback for the project. Attendance at training workshops and provision of example questions, etc. has been an essential part of the agreement. We have done this via the TRI-IT, TRIED-IT and TESTED-IT workshops that have been run at suitable intervals to provide targets at realistic intervals for colleagues to produce the required work. Sites that do attend workshops and produce example questions or assessments will continue to be supported by the TRIADS team as valued partners, with free software and training up to the end of the continuation funds, and preferential support thereafter. Sites that do not use the software and do not provide us with the feedback required by the evaluation site agreement will have the links to the Derby site, where upgrades are provided, closed. They receive no further support from the project and will be charged full commercial rates for the software and training services once the project becomes fully commercial. There are thus both stick and carrot to ensure active participation and uptake. Part of the continuation funding will support a network of users who should provide critical mass to ensure use well beyond the lifetime of the project.

An assessment of TRIADS by computer professionals at the Open University stated that for a small university or department, TRIADS had a lot to offer. For programming and multimedia professionals, however, there was nothing contained that they could not achieve working in C^{++}. It should be noted, though, that nothing approaching the facilities of TRIADS has been produced. While it could be produced in C^{++}, it would be non-trivial.

4.3   Effectiveness and impact of uptake and use

An objective of the final workshop was to get information on the strengths of our system and outstanding user needs. These will inform our continuation strategy.

TESTED_IT Conference feedback.

The discussion in the final plenary session raised a number of issues that are currently being addressed. These most important of these were:

- Provision of full Web delivery capability with FTP file-back of results. This is currently being tested at Derby and will be available in the next version of the engine.

- Macintosh compatibility issues – mainly fonts, but including Macromedia support. This will be tackled together with other Web delivery issues.

- The problem of student input and scripting of maths symbols, functions and formulae. This is a complicated issue and will be tackled once more pressing issues have been addressed.

- Improved advice concerning installation on networks and packaging for Web delivery. This will be available with the next version.

- Facility to turn off the sign-on screens for formative delivery. This is scheduled for the next version.

- Improvements to the sign-on screen so that all entry fields are on a single screen. This is scheduled for the next version.

- Use of UNC paths for LAN delivery – currently available.

- More user-friendly question input. This will be tackled in the version after next.

- Provision of an easy-to-use closed version with a limited range of question styles to stimulate use by individual academics. Work should start during summer 2000. For the development team, this is the most important issue.

- Question banks, question sharing and transferability between systems. A topic that comes up with some regularity. This seems like a good idea but often falls down when individuals or organisations become protective of their intellectual property rights. Applicability of questions to different curricula is another potential problem. However, we shall be encouraging users to collaborate in discipline groups and are happy to provide the facility for question exchange.

Of these issues, full Web capability was the most generally pressing issue and work on this is proceeding well. All first semester assessments in 1999/2000 at Derby have been used to test FTP file-back. Most of these were delivered from a local network server but three were delivered from the web server via *Netscape* and the *Authorware* 5.1 Full Web Player plug-in. The outcomes were very encouraging and no results were lost during FTP transfer. The latest version of TRIADS will now produce self-refreshing web pages so that tutors may view the results as they are completed in real time. At Liverpool, one TRIADS examination for 95 students was run with emailing of results set up as well as saving to disk. Again all results were successfully recorded with both methods.

Improved user-friendliness was also a pressing issue and this will be tackled as soon as the Web compatible version is complete.

TRIADS user information survey

Delegates were also surveyed to establish their current and future assessment requirements in order to make appropriate decisions about the direction of TRIADS development. The results of this survey are discussed below.

Balance of question styles currently in use by delegates

Table 2 shows that the multiple-choice/response style of questioning is still by far the most heavily used.

Table 2. Ranked list of Triads Question Styles currently being use

Multiple choice	19
Label diagram (move text object)	15
Multiple response	14
Matrix selection with sequencing	11
Assertion Reason	10
Multiple True/False	10
Single/Multiple Text entry	10
Classification	9
Simple sequencing	9
Single/Multiple Numeric entry	9
Text-matrix selection	9
Random sequential label diagram	7
Mixed text and numeric entry	6
Multiple polygonal hot-spot	6
Multiple rectangular hot-spot	6
Multiple clickable object	5
Plot point - check XY	2
Build diagram (move graphic object)	0

This is not surprising given that around half the delegates were relatively new to the use of TRIADS. Outside this group of question styles, the 'Label diagram' style was by far the most popular, perhaps reflecting the flexibility of the TRIADS template for this style.

The significant use of sequencing, classification and free text-entry type questions illustrates that delegates are beginning to take advantage of the wider range of TRIADS styles and move away from the traditional multiple choice group.

Question styles that delegates wished to see developed

A number of question styles are currently in development in TRIADS or are available as one-off examples rather than templates. Delegates were asked which of these they would like to see developed into generic templates for their application. The results are shown in Table 3 below:

Table 3. Users wish-list for priority development in TRIADS

Plot graph, draw line and text/numeric entry	17
Draw straight line(s)	9
Fill a table (text/numeric)	9
Multiple question / multiple answer	9
Draw curved line(s)	6
Multiple text/numeric entry with labelling	6
Random image - label diagram	6
Draw arrow(s)	5
Matching pairs (text/graphic)	5
Multiple sliders	5
Classification of sequences	4
Matrix selection with classification	4
Line/word clicked	2
Multiple choice with matching pairs	2
Adaptive multiple choice - 4 levels	1
Draw box	1
Draw circle	1
Multiple text/numeric entry with sliders	1
Versions of questions with more control of feedback	1

Question styles that support the testing of graph plotting were overwhelmingly in highest demand and these will receive the highest priority development over the coming year. This balance reflects the strong scientific bias of the current range of evaluation sites. However, it is our intention that styles more useful to testing in the arts and humanities (e.g. word/line clicked linked to other styles) will also be developed in order to move the systems into new disciplines.

Integration into Course Management Systems

Many institutions are now beginning to use Course Management Systems to deliver learning and assessment materials to their students and it is the intention of TRIADS developers to ensure that the appropriate procedures are provided to export data from TRIADS assessments into these systems. The systems used by delegates in their institutions are listed in Table 4 below:

Table 4 Current Course Management System usage

In house	4
Web CT	4
Lotus Learning Space/Notes	3
TopClass	3
SITS	1
Pathware	0
None	9
Not known	1

Work will start in 2000 at Derby to integrate the TRIADS system with courses that use Lotus Learning Space for part or all of their delivery.

An essential aspect of the training sessions has been to raise awareness of the need for an assessment strategy. Details are summarised on the OU website

URL: http://exodus.open.ac.uk/Others/triad/manc_conf.html

Staff at evaluation sites are strongly encouraged to evaluate the effectiveness of their assessments as a fair measure of student learning and to make modifications where necessary. The aim of our final conference was to allow staff to present examples of their assessments both as evidence of use of the software and for peer review. However, the TRIADS software itself has student feedback included in it, so staff may gather information directly from students about the success of individual assessments, modules or entire courses of study. Furthermore, experience at Liverpool has shown that students' perceptions of their learning do not always match up with their performance in exams, nor do their estimates of the effort involved in using courseware match with time logged on. Software, such as the TRIADS assessment engine, has the capacity to generate objective data on student effort, time taken on individual questions, etc. For some purposes these data are far more valuable than subjective feedback that can be influenced by extraneous factors such as how one is feeling at the time or precisely when the feedback is completed. As an example, during 1999 we have acquired unequivocal evidence that some students at Liverpool are using formative assessments to further their learning. Some CBAs select questions randomly so that every time students log on they get a different selection of questions. From student feedback the most common reason given for repeating assessments is to improve scores: the next most common reason is to learn. In 1999 a few students repeated assessments after gaining 100%. They clearly cannot be doing this to gain better marks.

4.4 Lessons learned useful to HEFCE initiatives
4.4.1 Support

We knew (from OU experience) that 'students' learning about and using TRIADS at a distance would need strong support systems and regular deadlines, such as assignments, as incentives. We have tried to ensure technical support for our evaluation sites, through the full-time TRIADS-funded contract staff at Liverpool and the part-funded staff at Derby. In the event it was the Derby staff who were contacted far more frequently, and extensively, about technical problems and issues. One or two

sites were very frequently in contact for help (several times a day, for several hours total), or they visited Derby for concentrated help, for up to a week. This has been a time-consuming aspect when staff have 'day jobs' to attend to.

Equally, academics are very busy people who cannot just drop what they are doing and go off to learn some new techniques no matter how keen they may be to become involved. In several cases we experienced initial enthusiasm following a presentation, but a long silence before sites actually signed up to use the software. Successful uptake involves a great deal of dissemination effort applied continuously.

4.4.2 Incentives and encouragement

We supplied deadlines and feedback by requesting that samples of material were brought to the workshops, and demonstrated. It was during the workshops that we realised that some 'beginners' were surging ahead of some 'regular attenders' who had achieved little (in TRIADS terms) since the previous workshop, or signing as an evaluation site.

4.4.3 Need for continuation strategy

Initiatives are essential to stimulate new activity, but need to be sustained for some time before they will yield tangible results. The perception that TLTP was not as successful as it could have been results, at least in part, from auditing uptake too soon after the initial range of products became available. We believe this project will be considerably more successful in terms of uptake if audited after 4 or more years, rather than (or as well as) after three years. Our impression is that it is now beginning to take off really seriously.

4.4.4 Previous experience

The greater the existing investment in a particular approach (in our case to assessment) the greater the barrier to adopting a new one, even if it is acknowledged that the new approach is potentially better. In the specific case of computer-based assessments (CBA), we might cite examples of universities that have significant investment in CBAs based on *Questionmark* and others that have developed in-house systems during the course of our project. These have not become involved with TRIADS despite awareness of the project and continued contact over the period of the grant.

4.4.5 Barriers to uptake

The workshop discussions investigated issues of individual, departmental and institutional barriers to implementation and uptake. However, it has been difficult to generalise from the responses given. Often junior contract staff have made more progress. Perhaps this is because the prospect of another contract is a better spur for them to find development time, than for established staff with a full workload. However, junior staff are usually not influential in the policy and implementation structures to enable wider dissemination.

One major barrier is that some places have already bought institutional copies of expensive commercial testing software. Although the range and styles of question is typically severely limited, the investment has been made and some staff do not want to appear to have made 'a wrong decision'. A similar situation occurs at the OU, where IT professionals say that they want to stay with in-house 'programming tools' rather than use commercial software, from companies that may go out of business or become the BETAMAX of the area. This is part of the "not invented here" problem.

When more staff are familiar with computer-based assessment systems and eventually realise the constraints (financial, technical and pedagogical) of other programmes, some disciplines will realise what TRIADS can offer. However, this has to be a longer-term aim than the current four year project.

4.4.6 'Buddy systems'

In retrospect it might have been better to schedule TRIADS staff working at evaluation sites for periods of time (say a week), than the responsive mode we adopted. In this way members of the team and could help assess the departmental/institutional environment and thus tailor assistance more appropriately.

4.5 Summary of external evaluation

The project was evaluated externally by an independent consultant who provided a report about half way through. The evaluation was aimed at eliciting some perspectives of our evaluation sites, especially their priorities, barriers to implementation and constraints on use. The report contained some worrying evidence of misconceptions about the project, even at evaluation sites, but the anonymity of replies made it impossible to follow these up in detail and correct the misconceptions. We also felt that the report presented restricted data and was more descriptive than analytical. Feedback from our workshops (see above) was generally the most useful source of evaluation information. Overall, we concluded that external evaluation was the least effective evaluation method and also the most expensive.

5 Continuation strategy

Long term future of the project and the TRIADS software is assured by the initiation of a Centre for Interactive Assessment Development at the University of Derby. This new department is headed by Professor Don Mackenzie and employs Helen Wilkins, the authoring assistant who has been involved with the FDTL project since its inception. Two other members of Derby staff join the department, Dr. Dave O'Hare from Biological Sciences who has more recently become involved with the TRIADS project and Chris O'Reilly who lends his technical expertise in the field of video, graphics and photography. This team will provide a computer-based assessment service across the University of Derby, together with technical backup and software development for existing TRIADS users in other universities.

This provides the assurance that some academics have needed before taking up the software, that there will be continuing support once they have started to use the materials. This is one area where commercial products score over in-house developments.

Continuation funding under both categories 1 and 2 has been approved (subject to acceptance of this report). This will ensure we can provide additional support for existing evaluation sites and for any new ones that sign up before the end of this calendar year. That should ensure wider and more permanent uptake, by helping sites to produce and evaluate their first assessments and by building a critical mass so that individual disciplines can build effective networks as well as being part of the wider community.

The second thrust of our continuation funding is to work closely with three named subject centres (Geography, Geology and Environmental Sciences; Materials Science; Biology) and also with the proposed new Generic Learning and Teaching Centre (GLTC). This, in turn, should ensure wider dissemination and uptake within the chosen disciplines. We hope that further dissemination to other disciplines will come via the GLTC.

In addition, further support is currently being sought through EU funding , JISC, and some charitable sources, some of which involve other educational sectors. Conditions of use for non-HEIs and for commercial partners have been agreed in principal with the University of Derby, thus facilitating commercial bids. The long term aim is to make the project self financing through production contracts, training workshops and sale of licensed products. In pursuit of these ends, commercial licences for *Authorware* have already been purchased.

Appendix 1 – Current Evaluation Sites

In addition to the Departments of Earth Sciences at the Universities of Liverpool, Derby and the Open University, the following departments/institutions are currently Evaluation Sites for the TRIADS system:

Anglia Polytechnic University

Department of Life Sciences

University of Bangor

Department of Ocean Sciences

Queens University, Belfast

Computing Sciences

University of Birmingham

Department of Educational Technology

Department of Earth Sciences

Department of Civil Engineering

University of Bristol

Department of Earth Sciences

Department of Veterinary Sciences

University of Cambridge

Department of Geography

University of Cardiff

Dental School

University of Derby

Centre for Educational Development & Media

University of East London

Life Sciences

Edge Hill College of Higher Education

Department of Natural & Applied Sciences

University of Edinburgh

Media & Learning Technology Service (for Modern Languages)

University of Exeter

Teaching & Learning Support

University of Glasgow

Institute of Biomedical and Life Sciences

Department of Computing Science

University of Huddersfield

Department of Mathematics & Statistics

University of London - Birkbeck College

Department of Biology

Department of Earth Sciences

Leeds Metropolitan University

School of Information Management

Health Sciences

University of Manchester

Teaching & Learning Support Unit

University of Nottingham

Biodiversity Consortium

School of Geography

University of Liverpool

Faculty of Veterinary Sciences

Faculty of Medicine

Department of Materials Science

Department of Public Health

Department of Civil Engineering

Liverpool Hope University

Capabil_IT_y Project

Department of Environmental & Biological Sciences

Learning & Teaching Unit

University of Plymouth

Department of Earth Sciences

Sheffield Hallam University

Institute of Learning & Teaching (?active)

University of St. Andrews

Department of Geography & Geosciences

University of Ulster

School of Applied Biological & Chemical Sciences

Department of Biomedical Sciences

The system is also in use in the Centre for Interactive Assessment Development (CIAD) at the University of Derby, which is currently producing assessments for the divisions of Geography, Biology, Environmental Sciences, Electrical Engineering, Radiography and Computing Sciences.