Computer-assisted Assessment Centre (TLTP3) Update

Joanna Bull and Colleen McKenna University of Luton Park Square Luton LU1 3JU Tel: 01582 743126 Fax: 01582 743237 joanna.bull@luton.ac.uk colleen.mckenna@luton.ac.uk http://caacentre.ac.uk

Introduction

The Computer-assisted Assessment Centre (http://caacentre.ac.uk) is funded by the Teaching and Learning Technology Programme (phase 3) to provide advice, guidance and good practice to all those in higher education wishing to implement and evaluate computer-assisted assessment (CAA). This paper describes the activities of the Centre over the past year and in particular discusses the findings of the second phase of the national survey into CAA.

Blueprint for CAA

Over the past year the Centre has been working to document good practice in CAA, drawing on a comprehensive literature review and extensive national survey. The aim has been to provide all staff who may be engaged in some form of CAA activity with a well-grounded point of reference, whether they be academic staff, senior managers, administrators, staff developers, technical support staff or learning technologists. In addition, three models for implementing CAA are presented to provide a structured pathway through the pedagogical, operational, technical and organisational issues which need to be addressed in order to effectively implement CAA in higher education. The models detail the implementation of web-based, optically-based and PC-based CAA systems and are cross-referenced to the Blueprint to help provide both an over-arching perspective as well as a detailed methodology which can be easily followed.

The Blueprint for CAA is currently being piloted in consortium member institutions where it is being used to support the implementation of CAA in a range of different disciplines. The Blueprint provides advice and guidance to potential and existing users of CAA, covering a wide range of issues.

The key issues surrounding the use of CAA in higher education are discussed with a view to encouraging appropriate adoption of CAA as one of a balance of assessment methods. There is discussion of the pedagogical issues associated with objective testing and the structuring of tests and questions as part of a wider assessment strategy. Practical advice concerning the construction of tests and questions is offered and basic and complex question types are addressed within the context of Bloom's taxonomy (Bloom, 1956). Techniques for scoring tests and techniques for making effective use of statistical reports which are commonly generated through the use of CAA are also discussed.

The Blueprint provides an overview of the range of technologies available with which to deliver CAA and explores related activities, such as computer-mediated communication which provide the opportunity to broaden the scope and potential of CAA to effectively assess student learning.

Other chapters discuss in detail the operational and technical issues associated with delivering CAA, particularly in a summative context. The appendices contain examples, schedules and instructions for CAA examinations and workshops. The need for effective staff development for all staff (academic and support) is highlighted as is the need to provide clear and adequate student support.

Final chapters provide an overview of methods of evaluating CAA and discuss quality assurance issues as well as considering implementing CAA on a strategic level and managing change within an institution.

Piloting

Consortium members at Oxford Brookes University began piloting different types of CAA following staff development workshops delivered by the project last spring. Pilots at Loughborough, Glasgow and Luton universities are currently in preparation for the coming academic year. The pilots involve both academic and support staff in implementing CAA in a range of different disciplines. The pilots include:

- providing an Electronic Language Level Analysis for diagnostic and placement purposes for prospective and placement students;
- introducing CAA for summative assessment in an interdisciplinary module using an optical mark reader;
- the use of question banks for self-assessment in sociology;
- the introduction of formative and summative assessments in literary studies;
- the development of web-based grammar tests in French, German and Spanish;
- providing self and summative assessment to distance learning students in nursing and midwifery.

The pilots will inform the further development of the Blueprint and associated staff development materials.

Survey update:

In the third annual CAA conference, the background and methodology for the CAA Centre National Survey, along with preliminary findings from academic respondents, was reported in "Update on the National TLTP 3 Project". The

following section offers a brief overview of the survey's findings on CAA usage across the sector, and it provides analysis of responses to pedagogical and strategic questions addressed by all four groups who took part: academics, educational technologists, staff developers and quality assurance staff. Particular areas of consideration include critical success factors for the implementation of CAA, effects on students and staff of computer anxiety, the appropriateness of objective testing for assessing undergraduate learning and the suitability of CAA to assess different disciplines.

Background:

We received over 750 completed questionnaires, the bulk of which (77%) came from academics. Both users and non-users of CAA replied, including staff teaching and supporting a range of subject areas. Just over half of those who returned the survey, categorised themselves as non--users (56%). Of these, 26% **intended** to use CAA in the future and 60% said they **would consider** using CAA in future. In terms of a sector-wider profile, over 80 universities and colleges of higher education reported some use of CAA. Of these, there were over 40 old universities and 30 new universities.

The breakdown of CAA according to subject category suggests that it is predominantly used in computing, sciences and mathematics. However, there is evidence of some use in social science and humanities courses. The following list shows the number of computerised assessment reported by academics responding to the questionnaire:

Computing/IT-64 Biomedical Science-40 Geological science-39 Maths/Engineering-32 Other science-30 Modern languages-20 Psychology-13 Business-13 Social science-13 Humanities-12 Built environment-10 Leisure-7 Study skills-5

Critical success factors, concerns and future developments

Respondents were asked to identify critical success factors for the effective implementation of CAA. At the level of the individual academic, support (pedagogical and technical) was the most frequently mentioned factor (cited by 99 respondents). This was followed by time-related issues (96) including the availability of time to develop assessments and the desire to save working-time as a result of using CAA. Confidence in the system (54), especially its

pedagogical fitness for purpose, was also seen to be important. Other factors reported included the importance of attitude (in terms of motivation and enthusiasm towards CAA) on behalf of practitioners (27), the ease of use of CAA systems (27) and access to subject-specific examples and question material (18).

Quality assurance respondents were particularly interested in issues of reliability and appropriateness of CAA as well as relevant protocols and support. Respondents identified "agreement about what can be realistically expected of CAA in terms of lower and higher order learning", "straightforward procedures for running CAA assessments", "achieving educational objectives" and "an informed and enlightened attitude towards assessment in general and CAA in particular" as critical success factors.

This group was also asked to specify what concerns, if any, they had about "the use of CAA for assessment which counts towards module marks". Responses included worries about plagiarism, reliability and validity of the assessments and the IT systems, over-reliance on a single method of assessment, security of the results, the possibility that "a technical error leads to a gross change in a mark" and the fact that the "computerised assessment of communication" is not an option.

Staff developers highlighted the importance of the provision of a range of different types of support, including question and curriculum design, technical and administrative training, and access to external consultancy. Repeated references were also made to the significance of an institution-wide strategy for implementing and supporting CAA. Specific success factors cited included a "a clear understanding of the scope of what can be assessed in this way, given good question design"

"[Integration] with Teaching and Learning strategy and resource planning"

"Good understanding of proper design and use of CAA instruments"

"Recognition by University/quality assessors/(even RAEs) of the value both [CAA] development work"

"Need up to move away from objective testing rather than creating a push for more of it. Objective testing has not been shown to measure higher orders of learning."

Educational technologists also emphasised the importance of support in question design and computer skills, along with confidence in hardware, software and marking systems. This group of respondents was also asked what future developments in CAA they would like to see. The most frequently cited development was the establishment of question banks at a national level. Other developments included improved security, greater variety and flexibility of question types, incorporation of artificial intelligence techniques to extend the range of testing and marking modes, the use of speech recognition and analysis to aid students with special needs, "seamless integration with existing user

databases at campus level" and "software developers to understand what it means to be a big university and that no one size fits all."

Computer anxiety

Survey participants were also asked to respond to a series of statements on pedagogical issues using a 5-point likert scale. The following analysis considers responses (according to participant group) to statements about computer anxiety, objective testing, and the suitability of CAA to assess different disciplines.

In order to gauge the perceived impact of computer anxiety on staff and students involved in CAA, participants were asked to assess two statements. Firstly, they were asked to what extent they agreed with the following: "Academic staff anxiety about using computers is a significant problem with CAA." The majority expressed agreement with this view. Breakdown according to category shows that educational technologists supported this perspective most vigorously with 75% agreeing or strongly agreeing, while only 12% chose "disagree" or "strongly disagree". Other groups expressed similar views:

"Academic staff anxiety about using computers is a significant problem with CAA." *

	strongly	disagree	not sure	agree	strongly
	disagree				agree
Academics	4	15	16	43	18
Staff developers	2	21	13	51	9
Educational	1	11	11	41	34
technologists					
Quality assurance	0	20	24	48	8

A similar statement about students was also presented: "Student anxiety about using computers is a significant problem with CAA." This time the results were mixed with over half of staff developers and 41% academics disagreeing with this statement, while over 50% of quality assurance staff agreed or strongly agreed. In general, with the exception of quality assurance staff, respondents seemed to think that computer anxiety was much less of a problem for students than for academic staff.

	strongly	disagree	not sure	agree	strongly
	disagree				agree
Academics	8	33	25	26	5
Staff developers	6	46	25	19	0
Educational	8	26	24	36	4
technologists					
Quality assurance	0	20	24	48	8

"Student anxiety about using computers is a significant problem with CAA."

Objective testing and suitability of CAA across disciplines

We also asked a set of pedagogical questions to all four groups. Respondents were requested to indicate their level of agreement with the ability of objective test questions to assess different learning levels. The first statement read as follows: "It is possible to test lower order learning, such as knowledge and comprehension, using objective tests." All four groups overwhelmingly (80% and higher) expressed agreement with this position. This was followed with a statement about testing advanced learning levels: "It is possible to test higher order learning, such as critical analysis and evaluation, using objective tests." Perhaps not surprisingly, the level of agreement was reduced, ranging from 32% (Q A) to 47% of educational technologists. Roughly a quarter of respondents in each group expressed disagreement with this, and many said they were unsure.

"It is possible to test lower order learning, such as knowledge and comprehension, using objective tests."

	strongly	disagree	not sure	agree	strongly
	disagree				agree
Academics	1	4	12	51	29
Staff developers	0	4	6	57	26
Educational	0	1	10	49	39
technologists					
Quality assurance	0	0	12	72	12

"It is possible to test higher order learning, such as critical analysis and evaluation, using objective tests."

	strongly	disagree	not sure	agree	strongly
	disagree				agree
Academics	7	19	33	31	5
Staff developers	4	21	29	38	3
Educational	6	21	25	39	8
technologists					
Quality assurance	0	20	44	28	4

Two related statements about the appropriateness of objective testing were also presented. The first concerned the use of objective tests for foundation and intermediate study: "Objective testing is a good method of assessing material typically found in level one/two (eg first and second year) modules." Roughly between half and three-quarters of participants expressed agreement with the sentence, with 10% or less of all groups signalling disagreement. When respondents were asked about the suitability of objective tests for level three or postgraduate work ("Objective testing is a good method of assessing material typically found in level three (eg. final year or postgraduate modules."), the level of disagreement rose to between 24% (Q A) and 41% (academic) with agreement dropping to between 16% and 28%. The most frequent response to this question was "not sure".

"Objective testing is a good method of assessing material typically found in level one/two (eg first and second year) modules."

	strongly	disagree	not sure	agree	strongly
	disagree				agree
Academics	2	6	22	50	16
Staff developers	0	10	29	49	7
Educational	1	4	18	49	26
technologists					
Quality assurance	4	4	44	44	4

"Objective testing is a good method of assessing material typically found in level three (eg. final year or postgraduate modules."

	strongly	disagree	not sure	agree	strongly
	disagree				agree
Academics	12	29	38	15	2
Staff developers	6	32	40	16	1
Educational	8	20	41	25	3
technologists					
Quality assurance	4	20	52	16	0

Participants were also asked to respond to statements about the suitability of CAA to assess different disciplines. ("CAA can only be used to test some disciplines.") Academics and educational technologists expressed more disagreement than agreement with the statement, while staff developers and quality assurance expressed marginally more agreement and disagreement.

"CAA can only be used to test some disciplines."

	strongly	disagree	not sure	agree	strongly
	disagree				agree
Academics	6	26	37	22	5
Staff developers	3	28	31	26	7
Educational	6	43	21	24	4
technologists					
Quality assurance	4	24	24	24	12

We also included a statement about CAA's ability to assess breadth ("CAA offers the potential to test a broad range of subject knowledge.") Here, high agreement levels were demonstrated across all four groups, with 52% of quality assurance staff, 63% of academic staff, 69% of staff developers and 74% of educational technologists choosing either "agree" or "strongly agree". Similar high rates of agreement were expressed with the statement "Academic staff benefit from writing appropriate CAA questions." (Q A- 56%, AC-69%, E T- 82%, S D-84%).

"CAA offers the potential to test a broad range of subject knowledge."

	strongly disagree	disagree	not sure	agree	strongly agree
Academics	2	10	22	51	12
Staff developers	0	4	21	60	9
Educational	1	3	20	56	18
technologists					
Quality assurance	0	4	40	40	12

"Academic staff benefit from writing appropriate CAA questions."

	strongly	disagree	not sure	agree	Strongly
	disagree				Agree
Academics	1	6	20	52	17
Staff developers	0	0	11	65	19
Educational	0	1	15	50	32
technologists					
Quality assurance	0	8	32	48	8

The above represents a a sample of the views of various groups of people working in higher education institutions on the advantages and disadvantages of using CAA. Analysis of questionnaire data is ongoing and in-depth report on the survey (together with information collected from focus groups and interviews) will be published later this year.

* All figures in tables are percentages. Figures often add up to less than 100% due to a small percentage of respondents leaving the questions unanswered.