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Introducing Computer-assisted Assessment: considerations for the new practitioner

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Introduction

Computer-assisted assessment (CAA) is an all-encompassing term referring to the use of computers in the assessment process. This includes the use of computers for the delivery, marking, and recording of assessments as well as the provision of feedback. The use of CAA, which is really a relatively new development in UK Higher Education, is thought to be increasing significantly (Boyle & O'Hare, 2003). In part, the recent growth of CAA has been driven by the general increase in the use of learning technologies and the widespread adoption of virtual learning environments (VLEs) (Warburton & Conole, 2003). While the CAA components of VLEs and other CAA software can provide academics with the technical tools they need, the availability of a 'CAA system' is just one factor for the new practitioner to consider. This essay aims to outline the main considerations for individual lecturers wishing to embark upon the use of CAA. It is specifically aimed at the individual rather than at the institution and at new practitioners in particular. These issues have been explored under five main headings: assessment purpose, time, pedagogic, operational & technological and students. These are not discrete topics and furthermore the experience of the institution, within which the individual is operating, as regards CAA, will affect all of these considerations.

Assessment Purpose

CAA should not be considered in isolation from other assessment methods within a course. Its introduction should be carefully considered in relation to the assessment strategy and the overall syllabus design:

> *"…before launching into CAA it is important to address fundamental issues of assessment and its role and purpose in learning and teaching…"* (Seale, 2002)

Bull and Danson recommend starting with a needs analysis; in particular they suggest, "Consider how assessment is undertaken currently and where a CAA system might be most beneficial" (Bull & Danson, 2004). In order to be effective, any assessment method, such as a multiple-choice test, needs to be selected with

reference to the learning outcomes / objectives of the course. (Brown, 2001). In practice, a decision to use CAA, rather than an observed need for it, may be an individual lecturer's starting point. Even so, it is important that the use of CAA is not simply 'bolted on' but aligned with other features of the course so that it is effective and accepted by the students. It must be apparent what is being assessed and why – there must be a clear purpose. A basic distinction here is between formative and summative assessment. Formative assessments are those that aid learning, through the provision of feedback, which shows how a student is progressing. Students' performance is not necessarily recorded. Summative assessments, however, are primarily for recording the student's achievement for classification or to allow the student to proceed to the next stage (including graduation). It is possible for an assessment to have both a formative and a summative purpose. Course work, for example, returned to students during the year provides feedback on understanding and progress but may also count to the final mark.

As with the introduction of other types of learning technology, the recommendation is to start small and build gradually when introducing CAA. Furthermore, formative assessment is widely seen as the best starting point:

> *"…It is wise, however, to start small, usually with small-scale formative or self-assessment tests. This provides the opportunity to learn from experience prior to moving to high-stakes summative assessment…."* (Bull & Danson, 2004)

This incremental, low-risk option would seem most sensible, both practically and pedagogically. However, in my experience, it is often the use of CAA for summative purposes that attracts lecturers - usually for the potential time saving (from marking) that it can deliver. However, the use of CAA for summative purposes is more complex. There will undoubtedly be a larger number of parties to consult, including perhaps those responsible for assessment administration and quality within the institution. This need for consultation will be explored further in *5. Operational and Technological* (below). Furthermore, students require greater support when CAA is used for summative assessments (see *6. Students* - below).

Time

CAA, like all other learning technologies, requires a commitment of time to implement it. Gipps notes that, "developing high quality tests needs substantial time and resource" (Gipps, 2003) making time a major consideration. Time is a scarce resource for most Higher Education lecturers and this can be barrier to the introduction of any learning technology. A survey of WebCT[1] users at London Metropolitan University in 2004 revealed that 70% of respondents saw lack of time

[1] WebCT is virtual learning environment (VLE) software. It has been used at London Metropolitan University since 1997.

to develop and implement their WebCT course as a major barrier to their use of the WebCT. A lack of time to learn the necessary skills was the second most reported barrier in the survey, chosen by 35% of respondents. (Lingard, 2004)

This is backed up by the findings of the 2003 survey of CAA in UK Higher Education. Warburton & Conole reported, "The greatest obstacle to CAA uptake by academics was perceived to be lack of time" (Warburton & Conole, 2003). The time investment for CAA is significant and it is important to note that it is very much 'front-loaded'. Time is therefore required upfront, to write the questions, put them online and test them, with the actual question-writing requiring the most time. Staff development and training is also likely to be needed (or is at least recommended) before an individual begins to undertake those tasks (see below: *4 Pedagogy* and *5 Operational and Technological*). However, there is less of a continuing time commitment compared with the use of other learning technologies, such as online communication for example, which requires regular 'participation'. In the long term therefore, even allowing for the evaluation and reviewing of questions, less time is required because marking is then automatic and there is considerable potential for the reuse of questions.

Pedagogy

The first pedagogical consideration – a clear assessment purpose for the use of CAA was explored above. This section will look briefly at types of CAA, question and test design and then feedback.

Although CAA is frequently associated with the use of standard multiple-choice questions (MCQs), it is much broader than this. Multiple-choice tests are one example of objective testing, which is where possible answers are predefined, thus allowing automatic marking. Objective testing can go much further than standard MCQs through the use of different question types or the inclusion of multimedia. Possible question types include labelling (graphical or text based), sequencing, and short answer, requiring text or numeric input. In each case the questions remain based on selecting or providing a predetermined response and the advantage of computer marking is not lost. CAA is not, however, restricted to objective testing. It is increasingly being used in more creative ways to extend assessment methods, particularly through the use of the Internet and virtual learning environments (VLEs) (Bull & Danson, 2004). The online environment is useful for facilitating group work and peer assessment as it affords easy communication and file sharing. Although traditional essay-style assessments cannot yet be marked automatically – this is an area of continuing research (Seale, 2002) – they can be delivered and collected through virtual learning environments, from where feedback can also be provided.

Writing objective questions and tests is very time consuming and this is where much of the up-front time is directed. A good starting point is to undertake a review of

existing material which will include set texts and the Internet, as well as question banks that may be available freely or for purchase (Bull and Danson, 2004). Even if nothing usable is found, the review will help with the writing of new questions and this is a new skill for many staff:

> "…T*he development of objective question styles is a professional skill different to teaching or conducting research. It is therefore essential that where CBA*[2] *is practised, it is accompanied by training…"* (Boyle & O'Hare, 2003).

Bull and Danson (2004) also stress the need for pedagogical staff development and in my experience it is something that is definitely needed but often not considered by individuals introducing CAA.

A major benefit of CAA when used for formative assessment is its ability to provide feedback. In terms of feedback, there are two key strengths; firstly that the provision of feedback can be timely, usually immediate, and secondly the ability of CAA to offer unlimited attempts, allowing for practice (Bull & McKenna, 2004). Feedback can be given in variety of formats and exactly what feedback is provided may depend on the purpose:

> *"…The purposes of feedback are to motivate students, to inform them how well they have done and how to improve…"* (Brown, 2001)

Feedback can simply be whether an answer is correct or not; it can be a mark or standardised comment, such as those used in statement banks; it may go a step further and give the correct answer or explain why an answer is correct or incorrect. Alternatively, it can be used to help the student find the correct answer by suggesting further resources.

Operational & Technological

As noted above, the introduction of CAA for formative purposes is less complex than for summative assessment, as there are fewer groups to consult for effective implementation. However, even when using CAA for purely formative purposes, a new CAA practitioner is unlikely to be able (or want) to act in isolation. There will probably need to be some consultation with colleagues within a programme, the subject area or department, particularly if the unit or module is taught with other staff.

There will need to be a review of options, in terms of which CAA system will be used to deliver the assessment. Although there are many CAA systems available, a lot will depend at what stage the institution as a whole is at with using CAA. It is

[2] Computer Based Assessment – slightly narrower than CAA, covering assessments taken at a computer but not, for example, the use of optical recognition for marking paper-based tests.

important to consult with the IT department and, if available, any learning technology, e-learning or even CAA specialists. The institution may already have possible solutions in place. It is likely that there will be access to a VLE with some kind of CAA tools. Ideally, a new practitioner should be able to decide upon the required features to meet the pedagogical goals and choose a CAA system that meets them. In practice this is not always possible as the solutions may be restricted for reasons of cost, IT infrastructure or support. In an institution that is new to CAA wider consultation may be needed and there would be great benefits in visiting other institutions (Bull and Danson, 2004).

Once a decision has been made on the technology, for most users some training will be required in the use of the CAA system. It may be that the availability of support for a particular solution is considered when making a decision on which technology to use. Academics, according to the 2003 CAA survey, often have a "perceived steep learning curve associated with getting to grips with the technology and constructing specialized CAA question types" (Warburton & Conole, 2003). The amount of support (including training) will depend greatly on the solution and the individual's previous experience. It is not only a question of 'how to use the software'; new practitioners may need to take advice on issues such as accessibility. The Special Educational Needs and Disability Act 2001 requires educators "to make reasonable adjustments to ensure that people who are disabled are not put at a substantial disadvantage compared to people who are not disabled" (TechDis, 2002). In the case of CAA this could, for example, mean planning alternative formats for students unable to use the chosen CAA solution.

The use of CAA for summative purposes would involve other considerations, particularly regarding security and the robustness of the system but also the practicalities of using computer suites for assessment, such as the number and arrangement of the PCs. If CAA were to be used for summative assessments wider consultation would be needed. For example, its use may need to be approved by an internal assessment or validation body and it may have implications for other assessment regulations, such as those covering invigilation.

Students

The use of CAA offers great advantages for students, particularly in terms of feedback, but care must be taken that some students aren't put at a disadvantage by this use of technology:

> *"…Above all else, technology should not get in the way of a student achieving a score that accurately reflects his or her ability..."* (Bull & McKenna, 2004)

There are two issues to consider. Firstly the general IT skills of the students and secondly their familiarity with the CAA system being used. While at is true that,

"Student technical skills are less of a problem in the new millennium" (Bull & Danson, 2004), there are still a significant number of students entering university who aren't confidant or experienced ICT users. For example, mature students and those international students from less technologically advanced countries are two groups that might lack the necessary computer skills. It is important that the individual lecturers are aware of the abilities of their students and that appropriate support is made available. In addition, if CAA is to be used for summative purposes then students must have some familiarity with actual CAA system to be used. Ideally this should be done by using CAA for self-tests or some kind of formative assessments prior to its use for summative tests. Alternatively, practice tests in the same format as the summative assessment could be made available. Students need to be comfortable with the question types as well as the technology.

Conclusion

There are a number of considerations for an individual wishing to introduce CAA. Firstly it must be recognised that implementing successful CAA requires a time commitment. Significant time will be spent planning, researching and consulting before the assessments can be produced, which itself requires considerable time. The use of CAA needs to have a clear purpose within the assessment strategy and to be aligned with the learning outcomes so that CAA is both accepted by students and effective in its aims. For the new practitioner there seems to be a strong case for an initial use of CAA for formative purposes. It will require less consultation and support from other parties. At the same time it takes advantage of one of the key benefits of CAA – the provision of timely feedback. It is likely that new practitioners will need to attend staff development sessions for both pedagogy and technology.

Writing effective objective questions will be a new skill most academics will need to learn. The students must be considered carefully in terms of their IT skills and experience of CAA. The need for students to experience any CAA system before it is used for summative purposes is another argument for starting with formative assessment. All of these considerations will be greatly affected by the status of the individuals' institution with regard to CAA. At an institution where CAA is well developed there may already be technological solutions, operational procedures and staff development in place. This will provide clear advantages if the established processes meet the new assessors requirements. Perhaps the key consideration for a new practitioner, no matter what form of CAA is to be implemented, is an acceptance that introducing CAA is not best done in isolation. While it may be possible to go it alone, consultation with all stakeholders is the key to long-term success.

References

Boyle A. & O'Hare D. 2003 *Finding appropriate Methods to assure Quality Computer-based Assessment Development* in UK Higher Education in Proceedings of the 7th International Computer-assisted Assessment Conference, July 2003, Loughborough: Loughborough University, pp. 67-82 <http://www.lboro.ac.uk/service/ltd/flicaa/conferences.html> Accessed May 2004

Brown G. 2001 *Assessment: A Guide for Lecturers* – Assessment Series No.3, LTSN <http://www.ltsn.ac.uk/application.asp?app=resources.asp&process=full_record&section=generic&id=3> Accessed check

Bull J. & Danson M. 2004 *Computer-assisted Assessment (CAA)* – No.14 in LTSN Generic Centre Assessment Series, LTSN <http://www.ltsn.ac.uk/application.asp?app=resources.asp&process=full_record&section=generic&id=350> Accessed May 2004

Bull J. & McKenna C. 2004 *Blueprint for Computer-assisted Assessment* London: RoutledgeFalmer

Bull J. & Zakrzewski S. 1997 "Implementing learning technologies: a university-wide approach" in *Active Learning* Vol.6

Gipps C. 2003? "Should Universities adopt ICT-based Assessment?" in *Exchange* Issue 4 pp.26-27

Lingard M (2004) *WebCT Staff Survey 2003* TLTC, London Metropolitan University <http://www.londonmet.ac.uk/tltc/webct/overview.cfm> Accessed October 2004

Seale J. 2002 *Using CAA to Support Student Learning*, LTSN <http://www.ltsn.ac.uk/application.asp?app=resources.asp&process=full_record&section=generic&id=38> Accessed May 2004

TechDis (2002) *Web Accessibility and Usability Resource: A Guide to Current legislation* <http://www.techdis.ac.uk/seven/laws.html> Accessed May 2004.

Warburton B. & Conole G. 2003 *CAA in UK HEIs – The State of the Art* in Proceedings of the 7th International Computer-assisted Assessment Conference, July 2003, Loughborough: Loughborough University, pp. 433-441 <http://www.lboro.ac.uk/service/ltd/flicaa/conferences.html> Accessed May 2004

Biographical note

At the time of writing this paper, Matt Lingard was a Learning Technology Support Officer with the London Metropolitan University's Teaching & Learning Technology Centre (TLTC). He has since left the University and is now sharing his expertise with the London School of Economics.