

# **CAA IN UK HEI'S – THE STATE OF THE ART?**

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# CAA in UK HEIs - The State of The Art?

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## Abstract

In 1999 the CAA Centre carried out a survey on the degree of uptake of CAA and its associated barriers and enablers. In the four years since the original survey was undertaken, the use of learning technologies in general has become more widespread and better integrated with other learning and teaching methods. In particular the emergence of easy-to-use all in one Virtual Learning Environments (VLEs) such as WebCT and Blackboard has had a major impact and raised the awareness and potential of learning technologies significantly. These products are now in wide-scale use across the sector, with most HEIs having acquired institutional licences and integrated the development of VLEs into their learning and teaching strategies. Part of the functionality of these products includes CAA facilities such as quiz creation and delivery tools. Because these CAA tools are bundled with these products, it is likely that this has increased the opportunities for experimenting with CAA by academics and that this 'entry level' electronic testing has made CAA more pervasive (JISC, 2003). In addition to the use of VLEs, there has been a significant increase in activity across the sector in the development of more holistic joined up Managed Learning Environments (MLE), where VLEs are integrated alongside other institutional business systems such as library information and student records systems. This is also likely to have acted as a stimulus to increased adoption of CAA. Given these major developments it seems timely to repeat the original CAA survey in an attempt to ascertain how the use of CAA in universities has changed. This paper presents preliminary findings and makes some suggestions about key trends in the use of CAA in HE. The outputs will feed into a JISC-funded assessment project (TOIA), which is building a set of free online assessment tools based on a comprehensive assessment specification of CAA needs.

**Keywords:** CAA, survey

## Introduction

Assessment has long been recognised as a key catalyst for learning and teaching and as a driver for improving quality in Higher Education (HE). The use of CAA has enabled practitioners to explore the potential technologies have to offer in terms of improving assessment, and have opened the debate both in terms of the use of technologies to support learning generally and issues associated with effective and innovative assessment practices. CAA encompasses a range of activities, including the delivery, marking and analysis of all or part of the student assessment process using standalone or networked computers and associated technologies. Previous research has shown that there are a range of motivations for implementing CAA within a course and it is often a combination of factors which result in CAA being used (Bull & McKenna, 2001).

Some of the key reasons frequently cited include:

- To increase the frequency of assessment, motivating students to learn and encouraging skills practice
- To broaden the range of knowledge assessed
- To increase feedback to students and lecturers
- To extend the range of assessment methods
- To increase objectivity and consistency
- To decrease marking loads
- To aid administrative efficiency

Assessment is in many ways the critical catalyst in learning and teaching and through new technologies CAA has an immense potential in terms of transforming educational practice and introduce new and innovative forms of assessing student knowledge. However we still need to better understand the degree of uptake of CAA across the sector and the ways in which it is being used.

This paper will describe the findings of a survey of the use of CAA in universities and critique these against an earlier survey alongside relevant findings from the literature. In particular the results provide a snapshot of current developments in CAA and provide a benchmark against developments in this area since 1999. The 2003 survey is an attempt to ascertain how the use of CAA has changed, in particular the 1999 CAA survey carried out by the CAA centre (Bull, 1999; Bull & McKenna, 2000) which drew on Stephens and Mascia's earlier survey (Stephens & Mascia, 1997). These will be compared to findings in general on the uptake of learning technologies and associated barriers and enablers. The results are intended to feed into a current JISC-funded CAA project, TOIA, which is developing a free online assessment tool for the sector (TOIA, 2003). The findings will be used alongside the project's formative evaluation to provide an understanding of current CAA practices and associated barriers and enablers to uptake and use and in particular to help refine the TOIA assessment tools to best meet the needs of the end users.

CAA developments sit within a wider framework of maturing learning technology activities across the sector. The emergence of the internet and its increased use across the sector a decade or so ago can be seen as a watershed in terms of developments in this area. Through project initiatives such as the TLTP and FDTL programmes and a range of JISC-funded initiatives we now have a richer understanding of effective implementation of learning technologies and numerous case studies and evaluation studies (e.g. Davis et al., 2001). In terms of CAA update and usage a number of recent generic developments are worth noting in terms of their impact on CAA activities across the sector, particularly the increasing pervasiveness of VLEs across institutions and the emergence of MLE development activities (JISC, 2000). Other notable developments include increased recognition of the importance of standards and growth in associated interoperability research (Sclater et al., 2002), coupled with projects focusing on joint collaboration and resource sharing through the development of national subject question banks (White & Davis, 2000).

The impact of these new developments will be explored in terms of the findings of the survey and how they have shifted CAA patterns of usage.

## **Background**

The results reported in this paper build on the findings of the previous survey and associated CAA literature focusing on identification of the key barriers and enablers. A summary of the background literature is reported here and will be discussed in relation to the current survey results in the discussion section. Research literature in the area covers a broad spectrum of associated issues from underpinning technical and architectural requirements, end-user needs and perceptions, as well as identification of associated barriers and enablers at both local subject-specific instances and large-scale institutional implementations.

A significant finding of the 1999 survey was that less than half the academics who responded were active CAA users. Of these there was significant evidence of use of CAA for summative purposes, not surprisingly with a predominance of use amongst mathematics and the 'hard' sciences, using principally multiple choice and multiple response questions. However a more detailed breakdown of usage revealed a richer pattern of usage for self-assessment, formative and diagnostic purposes as well. Other factors of importance were associated support for question development and delivery and academic users in particular stressed that having someone else to import questions for them into the software was as important. The greatest barrier to the adoption of CAA was seen as lack of time, a feature which resonates with other studies on barriers and enablers to take up of CAA and learning technologies more generally (Bull, 1999; Bull & McKenna, 2000).

From the 1999 survey of particular note was the concern raised by academics about the limitations of existing CAA question types and the perception that CAA could not adequately assess higher-order skills, particularly in the Arts and Social Sciences. For academics, the most important enablers were adequate time for implementation and development, appropriate hardware and easily used CAA systems. Confidence in the system (especially pedagogical fitness for purpose), motivation and enthusiasm for CAA of practitioners were also seen as important, as was access to subject-specific examples and supporting question material. Quality assurance staff were interested in establishing base levels of expectation regarding the use of CAA in terms of lower and higher order learning, and in having straightforward procedures for running CAA assessments. They also raised concerns about the reliability and appropriateness of CAA and relevant protocols and support. There were also concerns about plagiarism, and some issues about the reliability and validity of online assessments systems and potential security weaknesses. Doubts were also raised regarding over-reliance on a single method of assessment. Concerns about summative and high risk use included the possibility that technical errors could lead to gross errors in marking. The most important institutional enablers identified concerned institutional commitment. Pedagogical and technical support and support from senior managers were identified as critical factors, together with strategic guidance. Staff developers stressed the importance of a range of

development needs, including question and curriculum design, technical and administrative training and the significance of an institution-wide strategy for implementing and supporting CAA, including embedding with institutional teaching and learning strategies.

The 1999 survey revealed that CAA was used predominantly in the sciences. A number of studies have considered issues associated with large-scale CAA implementation and point in particular to issues associated with scaling up to institutional level (Danson, 2001; Stevenson et al., 2002). In particular institutional commitment, internal politics and the importance of effective strategies and stakeholder engagement emerge as critical success factors.

To compliment these large-scale implementation issues a number of more detailed contextual case studies of CAA have been carried out which provide a richer overview of the emerging issues and how these apply to other HEIs, along with local institutional issues (e.g. Hopkins, 1998). A number of these also report on successes and cautionary tales in implementing CAA systems, along with the perceived potential of CAA and associated pitfalls. (e.g. O'Leary & Cook, 2001)

Question bank development and successful application have been the focus of a number of projects, with the FDTL-funded Electrical and Electronic Engineering Assessment Network (E3AN) project in particular providing a rich understanding of cultural and subject-specific issues (White & Davis, 2000). The project has documented their experience and produced guidelines and templates to support related initiatives. Research has also been carried out on underpinning standards and interoperability, in particular focusing on the extent to which CAA tools can be considered to genuinely interoperate and examining the likely benefits for users and future prospects for CAA interoperability (Sclater et al., 2002). In addition a detailed user requirements specification for a comprehensive online assessment engine has been carried out which outlines 21 defined roles within the CAA process and life cycle (Sclater & Howie, 2003). These user requirements have been mapped to the two leading online assessment systems to analyse closeness of fit and these are being used to underpin the development of the architecture for the new TOIA CAA system.

A number of studies have focused on issues associated with question design and particularly the difficulty of designing online assessments to foster deep learning. These conclude that the design of different types of quiz question influence the extent to which formative and summative feedback is presented to students. The findings suggest that typically quiz questions are considered limited in their capacity to assess higher-order cognitive skills. The impact of assessment opportunities on student learning has also been researched and the results show that while the majority of students use and find useful both offline and online assessment resources, use has no differential impact on final learning outcomes (Bhalerao & Ward, 2001; Davies, 2002; Morgan & O'Reilly, 1999; O'Reilly, 2001).

## **Methodology**

The 2003 survey's design was based on the 1999 survey but was expanded to include additional questions about the influence of VLEs, plans for MLE development and the profile of interoperability. This was done to test whether these technologies and CAA activities in particular have become more embedded since the last survey. The survey was distributed electronically via appropriate mailbase lists. This paper presents initial findings from the survey; more detailed analysis will be presented at the conference. The survey results will be triangulated with the parallel evaluation activities being undertaken as part of the TOIA project. The evaluation includes usability studies of the use of the TOIA tools coupled with semi-structured interviews with users to ascertain CAA patterns of usage and associated barriers and enablers. The methodology adopted is multi-faceted following the philosophy of utilisation-focused evaluation (Patton, 1997).

## **Findings**

These are preliminary results from the 2003 survey. More detailed findings will be presented at the CAA Conference. To date 52 usable questionnaires have been received and the findings discussed here are based on these. Returns were received from both end users such as academics and associated support staff (learning technologists, CAA officers and quality assurance staff. The questionnaire consisted of a total of 26 questions grouped around the following main themes: barriers and enablers to the uptake and use of CAA, appropriateness of objective testing for assessment, CAA usage across subject domains and perceived benefits.

A range of reasons were cited as barriers to successful CAA uptake and implementation, ranging from individual issues (in terms of time requirements, support issues and perception of the value of CAA) to institutional issues (such as lack of commitment or understanding of the associated issues and VLE/MLE implementation issues). By far the greatest barrier to implementation was associated cost issues (both in terms of personal investment and the cost of commercial CAA systems). Unrealistic expectations and a lack of understanding of the issues associated with CAA, coupled with inherent conservatism were also cited as important barriers, as was a lack of appropriate support. Respondents were less concerned with MLE integration or, surprisingly, security and associated copyright issues.

The greatest obstacle to CAA uptake by academics was perceived to be lack of time exacerbated by the perceived steep learning curve associated with getting to grips with the technology and constructing specialized CAA question types. The second highest factor was a perceived credibility gap between what CAA promises and what people think can realistically be delivered; lack of support came third, closely followed by cultural resistance to change and technophobia. Related issues included unfriendly software, academics working in isolation and individual inertia. Surprisingly cost was mentioned only once.

The importance of training and support was the highest critical success factor for the implementation of CAA, followed by the importance of reliability and ease-of-use of institutional CAA services and perceived time savings and effectiveness. However the confidence of question developers and end users in using these systems was also important. Related to this were individual academic commitment and overcoming initial user barriers. The role of subject-specific shared question banks and exemplars was cited. The relevance of CAA evangelists, importance of initial experiences and adhering to institutional guidelines came low on the list.

Institutional commitment and associated strategic integration was considered important by a third of respondents as a critical success factor for implementation of CAA at institutional level. Other factors mentioned included the importance of adequate funding to support CAA activities, integration with existing institutional procedures, ease of use, the need for an appropriate technical CAA infrastructure and realistic expectations and proven benefits.

Faculty support for CAA was limited and mainly restricted to occasional time release and there was still significant evidence of external funding still being used as the primary support mechanism. There was significant interest in the provision of subject-specific question banks, other important factors cited included the need to embed CAA within normal teaching, issues of effective interoperability (particularly between CAA systems and VLEs), integration of multimedia and reliable confidence testing within CAA systems.

The survey considered the main methods of delivery for CAA and predictably the main mechanism was web-based, while a significant number still delivered via networks, with a smaller percentage by OMR. Interestingly, only about third of the tests were invigilated. The majority of respondents running summative CAA tests restricted the percentage weighting to about a third or less although in a small number of cases the test was worth 100% of marks awarded. Groups varied in size; with evidence of tests being used to support both small and large (greater than 200) cohorts.

## **Discussion**

Not surprisingly perhaps many of the identified barriers and enablers remain the same between the 1999 and 2003 surveys, although encouragingly there is more evidence of embedding and institutional commitment to the importance and role of CAA within a wider spectrum of learning and teaching. Perhaps the greatest change since the 1999 survey has been the increased predominance of VLE and MLE developments, often at institutional level and the way in which CAA activities have become integrated as part of this process. Consequently CAA is more embedded and strategically aligned. Surprisingly, there is still less concern for associated security and plagiarism issues, although these may become more significant in future. Connected pedagogical issues, academic engagement, cross-subject differences and associated recognition remain significant issues and potential barriers to large-scale implementation.

## **Conclusion**

This paper has reported preliminary findings from a survey of CAA usage across the sector. The findings are compared to a related survey undertaken in 1999 along with relevant research and case studies gleaned from the research literature. The findings of the 2003 survey compliment these previous studies and provide some evidence of increased integration of CAA across the sector, although it is evident that many of the barriers to uptake identified in the original survey remain.

As a next stage we intend to use these findings as a baseline for the more detailed evaluation studies being undertaken as part of the TOIA formative evaluation study. Findings from the survey and this evaluation will be iteratively fed into the development programme for specification and implementation of the TOIA system. To date the TOIA project built on the earlier mapping exercise of the different types of users and processes involved in an ultimate CAA system and used this as the basis for the TOIA system architecture. The evaluation will focus on how well end-user needs are addressed in relation to this. The survey gives a useful benchmark of current CAA usage. One of the key developments since the 1999 survey has been increased usage of VLEs which have integrated CAA tools. The increased availability of these systems has enabled a greater degree of experimentation in the use and integration of CAA. It is hoped that analysis of the survey results alongside the TOIA evaluation will enable a richer understanding of success factors for CAA uptake and implementation. In addition, one of the primary aims of TOIA is to demonstrate interoperability and to test the degree of uptake of different question types and parts of the CAA process, so that the survey and evaluation results should enable a better understanding of end-usage.

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