INTRODUCTION

This book has explored the issues surrounding the use of CAA in higher education. It presents a picture of current activity and highlights not only the potential benefits but also the challenges and opportunities facing individual academics, departments and institutions. It is clear that a range of technologies, methodologies and pedagogies is being implemented to support CAA. There is a growing indication that CAA is increasingly being implemented with the primary purpose of motivating students and enhancing their learning. Chapters by Steven and Hesketh, Robinson and Sly and Rennie all demonstrate this. While emphasis is still placed on efficiency gains, it is evident that this is underpinned by the desire to provide valid and reliable assessments which motivate students to learn (see Sims Williams, et al). Furthermore, student views and anxieties are becoming increasingly important in the design and implementation of CAA (see Brosnan and Sambell et al).

This chapter discusses the direction in which CAA might seek to develop in the future. Developments must take on board a range of issues to be effective. The nature of CAA presents a unique challenge for all those involved. To achieve the efficiency gains which are often attributed, but rarely formally evaluated and yet to be proved, organizational structures and boundaries may need to be at the least examined and probably challenged. Technology progresses at a rapid rate and will impact the future of CAA substantially. It will not only aid the progress of CAA, but may also threaten its use as technologies are developed which can break test security (Colton, 1997). This chapter does not attempt to predict the evolution of technology but the issues discussed must be used to influence the developing technology in order to maximize the potential of CAA. There are four main issues which need to be considered and integrated, with each other and with existing structures and systems, in order to effectively utilize CAA.

PEDAGOGY

The pedagogy of CAA must evolve and advance supported by rigorous evaluation. The scope of computers to offer varied, adaptive, focused and unique assessments is still underdeveloped. This book has offered an insight into the potential of CAA, with examples of innovative practice in the UK and overseas. However, assessments are often simply converted from paper to screen and usually prove inadequate as examples of CAA. There is minimal utilization of multimedia, sound and animation. The true benefit to student learning often fails to be demonstrated, on anything other than a small scale. Methodologies for integrating CAA with other traditional and technology-based teaching learning methods must be sought and evaluated. The development which supports and motivates students to learn, collaborate and communicate, is critical if the true potential of CAA is to be realized.
MANAGING ASSESSMENT

The implementation of CAA raises issues about managing assessment, issues that appear to be rarely dealt with for traditional assessment (Yorke, 1998) a challenging and sometimes problematic activity because it forces institutions to manage the process, rather than adopt an ad hoc approach often experienced in the implementation of CAL (McDonough, et al, 1994). A cross-section of staff from a range of central support departments and faculties needs to be involved, particularly if summative assessment is developed. This requires individuals and departments to find new ways of working, dealing with activities that do not fit easily into anyone’s remit (Stephens et al, 1998). Implementation of CAA can raise issues and concerns which should be, but rarely, planned and evaluated for all assessments.

The provision of support and training for all students, particularly those with special needs, should be addressed at an institutional level. Institutions need to take responsibility for supporting research and evaluation of CAA, which can be fed back into the design of assessments, the systems and the mechanisms which support them. The time-saving aspect of CAA can be elusive, and may merely represent a shift in workload from academic to support staff. This needs to be recognized and acknowledged in order for academic departments and faculties to work effectively with central support services.

QUALITY ASSURANCE AND STAFF DEVELOPMENT

Perkin (Chapter 6) discusses the role of CAA in evaluating student performance and the possible improvements in validity and reliability of assessment. CAA allows rapid detailed statistical analysis which can be used to ensure the quality of the assessment method. Quality assurance policies and procedures may well need to be developed or amended to take account of the type of assessment and delivery mechanism used. Policies and practical measures are needed to assist staff in the development and maintenance of question banks, which utilize the statistical analysis possible ensuring questions and tests are evaluated and amended. It may be that the improved quality assurance measures possible for CAA will promote greater analysis and monitoring of traditional assessments. Standards for the construction of questions and tests is currently being considered by the Instructional Management Systems project, supported in the UK by a JISC funded project (http://www.imsproject.org.uk). Definitions and classification of question types will lead to an object-oriented model which will assist in creating open standards and compatibility in both materials and support systems.

A key obstacle to the effective implementation of CAA is time for, and provision of, staff development. The merging of technology and pedagogy requires skills and abilities which until recently have not previously been practised to a great extent in higher education. A lack of expertise in many institutions can hinder the development of high quality materials or the implementation of systems requiring more than standard IT skills. The pressure on academic staff to teach, research and perform an administrative function often means there is little time to invest in learning new skills and evaluating their outcomes. The lack of recognition at an institutional
and national level for innovation in teaching, learning and assessment means that even where appropriate staff development is provided, to encourage and support innovative assessment methods, it rarely achieves the priority it deserves.

ORGANIZATIONAL AND STRATEGIC INTEGRATION
CAA links the pedagogy and methods of teaching with the IT and administrative systems which underpin an institution. On a large scale, it requires the bringing together of IT support, individual academics, their departments, staff developers, quality assurance units and impacts on students and external agencies. It is truly an institutional concern, not simply the remit of individuals and there are strategic and long-term planning issues of importance to be considered. There is a need to focus on organizational and strategic benefits that such systems offer if properly implemented.

Systems need to be integrated and streamlined: implemented with an eye to the long-term enhancement of firstly, student learning and then, efficiency gains. They must be developed with reference to teaching and assessment methods and delivery mechanisms for administrative systems to enable faster, more efficient transfer of results and updating of record files.

But the nature of CAA can defy organizational structure, falling outside the remit of all but the recently emerging posts in the field of learning technology support and development. Such posts are frequently supported by temporary, short-term internal or external funding. This lack of stability hinders development and leads to the reinvention of wheels. A clearly identified need is for the involvement of a range of staff, including senior management, in the decision-making process and implementation of CAA systems. Effort to date has been focused on the pedagogical and technical development of CAA; in order to truly benefit from the potential, it is necessary for departments and institutions to consider the operational, organizational and strategic issues of implementing CAA. Otherwise, there will be the duplication of effort and output seen in CAL (Darby, 1996).

The cultural and political issues surrounding the implementation of CAA are deep-seated and present a serious barrier to the development of more efficient and effective assessment systems. Challenging the long-established pre-conceptions and expectations of traditional assessment is problematic. Introducing technology to the equation, which many fear will result in job losses, is adding fuel to the fire. Culturally, CAA may be seen as the established ethos of academic power over the assessment process is required in terms of the investment of time - from after the event to prior to it. This may well clash with other activities in the academic calendar needs to be addressed at an organizational level.

The nature of funding (both internal and external) of teaching and learning technology research and development is fluid and short-term, impeding progress and leading to the loss of hard to find skills and expertise. Short-term investment is unlikely to provide the efficiency gains sought. Funding at a national level needs to be provided to assist institutions in adopting effective strategies for implementing CAA as part of evolving teaching and learning strategies.
Focus must be placed on the translation of strategy into operational practice as Yorke (1998, p 111) states: 'Between strategy and operationalization fertile ground in which flaws may flourish'. Flaws may flourish to the point where strategy is lost. CAA currently lacks co-ordination within and between institutions, planning and research prior to adoption, and is often deficient strategic support from senior managers. Investment, both financial and strategic, must be made if the advances that are possible with CAA are to be made.

There is a need not only for organizational and strategic support at an institutional level but also at a national level. The Computer Assisted Assessment Centre (http://caacentre.ac.uk) is a recently funded TLTP3 project (HEFCE, 1998) that aims to meet some of these needs. The project will pilot and disseminate models of implementation and evaluation, and develop good practice documentation and staff development materials to support CAA activity throughout the HE sector. The models and guidelines will support individuals and focus on the strategic implementation of CAA within departments, faculties and institutions. The project, which is led by the University of Luton, will also provide a national centre for higher education to advise and support individuals, departments and institutions in CAA activity.

**THE FUTURE**

Bennett (1998) identifies three generations of computer-delivered tests: the first combines developments in psychometrics with technology to deliver widespread adaptive tests; the second ‘incorporates advances in technology, psychometrics and to a growing extent, cognitive science’; the third stage testing reinvents itself from traditional methods in several ways.

Bennett believes that the future of CAA lies in reinventing assessment, with the seamless integration of CAA with teaching methods driven by competitive global markets. While we are a long way from the first of Bennett’s generations, what is apparent is that CAA challenges the conceptions of traditional assessment and will eventually lead to a slow, but radical, reconsideration of the way in which assessment per se is set, delivered and managed across departments and institutions.

The true potential of CAA has yet to be realized, in every sense. The capabilities of computers to deliver unique assessments should and will be exploited. The power of networks to transfer; upload and download data automatically should also be exploited. The benefits to student learning of receiving specific, timely and encouraging feedback are utilized by only a few. The advantages of detailed feedback on student and group performance, delivered rapidly enough to allow academics to deal with student misconceptions during a module and enhancing student learning, are yet to be achieved.

A vision of the future for CAA is that it shall provide innovative, reliable and valid assessments, freeing staff to engage with students, streamlining administrative functions, motivating students and enhancing learning by utilizing the potential of computers to enrich and diversify assessment. To achieve this we need high-level technology, which retains a human touch, and is implemented strategically at institutional and national levels.
REFERENCES


Darby, J (1996) 'Eight years with the CTI: a personal reflection on learning technology in UK higher education'. Paper given at the Association of Learning Technology Conference, September, Glasgow


