Reducing the distance in distance education

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Abstract

Tutor Marked Assignments (TMAs) are the major mechanism by which Open University (OU) students receive feedback on their academic progress. This paper shows how the OU has used ICT to improve both the quality of feedback and speed of response to student work, reduce feelings of isolation and make the university seem less remote. The paper examines the system for online submission and return of TMAs, their on-screen marking, and the automated processing of scores and feedback. It shows how the system provides effective feedback to students and their tutors, using ICT to underpin the overall assessment process, and enables new teaching strategies to be used at an institutional level.

The system produces faster turnaround of marked TMAs, faster feedback to tutors on their performance and more up to date management information. Better quality feedback to students has also resulted from an interactive loop of dialogue between student and tutor, and improved management information for monitoring. The automated recording of TMA scores has lead to improved accuracy of assessment records that feed into the conflation of continuous assessment records with examination results to produce the overall course results.

These developments have enabled course teams to develop new methods of assessment, such as electronic format assignments (e.g. websites and hyperlinked documents), executable files, dynamic templates and other interactive activities.

Introduction

The Open University teaches students using a supported distance learning model with high-quality course materials presented through a range of learning media. Assessment is usually through a continuous assessment component of Tutor Marked Assignments (TMAs), which also acts as an important teaching tool, combined with an end-of-course assessment, usually an examination. The continuous assessment and examination scores are conflated to provide the overall course result. The system is required to deal with high student volume, which is currently around 150,000 students on 350 courses taught by some 7,000 part-time associate lecturers.

Each student is allocated to a local part-time associate lecturer (tutor) who provides them with general learning support, specific tutorial activities (either face-to-face or electronic) and grades and provides feedback on TMAs. The tutors are supported in their work by a monitoring system through which senior staff provide feedback and advice on their tuition and marking, and by staff tutors who provide staff development and act as their line managers. A course team is responsible for the teaching and assessment strategy of each course, and provides tutors with detailed marking guidelines and specimen solutions. Approximately 800,000 TMAs are processed by the University annually, and by the end of year 2000 it is expected that around 25% of these will be electronic TMAs (e-TMAs).

As access to Information and Communications Technologies (ICTs) become more widespread, their use has been extended from internal administration and processes to interaction with the student body and mainstream teaching practices. This has required ICT systems which can effectively support students, course teams, tutors, staff tutors, monitors and administrative staff. The e-TMAs system is centred around a database which processes and records student submissions, marked assignments, grades and feedback to students, and also monitored scripts and monitoring feedback to tutor. The system improves audit trails, and increases the University's ability to carry out research. It also provides an infrastructure which supports the possibility of automated marking of assignments and a range of labour-saving tools.

Electronic tools and intelligent, dynamically customised interfaces supplement the database to provide access to users and support for on-screen marking, quality control, management functions, and technical support. The system interfaces with the University's main database systems, retrieving a range of data about assignments, students and tutors and uploading assessment data to the University systems.

The Electronic Tutor-Marked Assignment System

Access to the e-TMAs system for most users is via a web-based interface, which is integrated with the University's network access validation system. This enables the use of intelligent, dynamically customised interfaces that recognise each user of the system individually and tailor the system interfaces to the user's requirements, responses and previous usage. This helps to keep data secure by allowing users access only to the data to which they are entitled, and reduces errors and confusion by only presenting options and menu items applicable to that user.

The e-TMAs system connects directly with the University's main computer student records and assessment systems on a daily basis, allowing an automated two-way flow of data. In one direction assessment data such as scores, submission dates, return dates and other information captured by the e-TMAs system is sent to the main University systems to be added to students' assessment records, and to generate payments for tutors. In the other direction up-to-date student, tutor and course information and assignment parameters are downloaded to the e-TMAs system databases.

Course and assignment parameters are the basic data items which the computer systems require in order to recognise a particular piece of work, its properties and, in the case of scores, its relative value. Thus the parameters will include how many assignments a student is expected to complete on a given course, whether they are summative or formative and their weighting in the overall assessment of the course. Assignment parameters will include the course and presentation codes of the course the assignment belongs to, the maximum score for the assignment, how many questions the assignment is composed of and the maximum score for each of those questions, the deadline for the assignment and the scoring scale and method.

To submit a script to the e-TMAs system a student will log in to a secure server, protected by the University's network access validation system, as shown in Figure 1. This provides the system with the student's identity, which is then matched to the course(s) for which the student is currently registered. The system will interact with the user, tailoring each screen to present only those options relevant to the user and giving warnings where appropriate. An example of this would be where a script is submitted after the deadline for that assignment, in which case the student will be warned that it may not be marked unless they contact their tutor to discuss the matter. When the student has uploaded the script, the system provides a receipt and lists the submission with the student's previous submissions. The student can then check this listing to see when the tutor has collected the script and download the marked version from this list when it has been returned by the tutor.

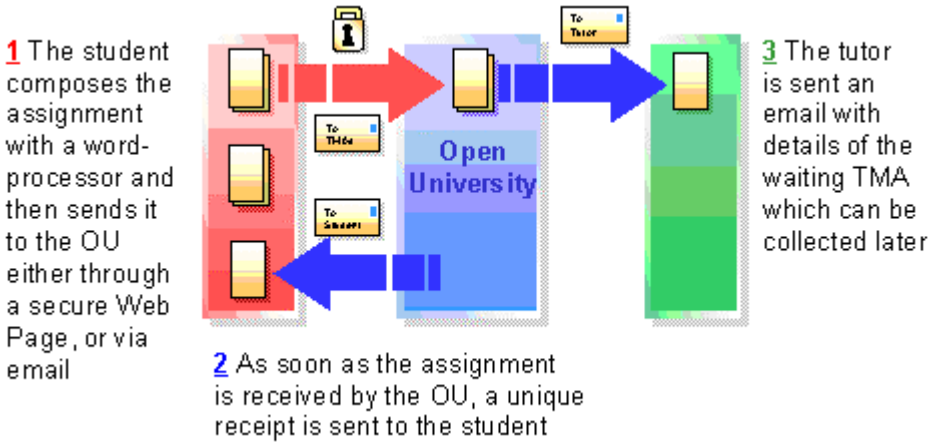


Figure 1 Student submission process

The tutor will also log in to a secure server protected by the University's network access validation system. The e-TMAs system, armed with tutor's identity, will allow the tutor access only to those courses for which s/he has a current contract, and only to those students that are allocated to the tutor on the University's main records systems. Thus tutors will see a list of the scripts submitted by their students only. Scripts can be selected individually and when the tutor has selected all of the scripts to be downloaded, they are compressed into a single self-extracting Zip file to be downloaded to the tutor's desktop. The e-TMAs system adds a small, plain text parameters file to each script, which contains student and tutor information and assignment parameters for the marking software to use during script marking. When this has been done the tutor logs off before marking the scripts. This process is illustrated in Figure 2.

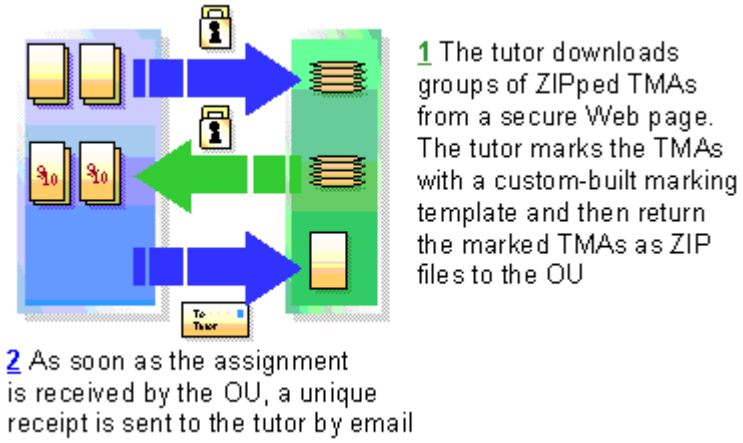


Figure 2 The tutor retrieval, marking and return process

Marked scripts are returned to the system in Zip files, which are checked to ensure that all of the appropriate files are present and that the scores awarded fall within the acceptable ranges for each question. The scores are recorded and transferred to the students' assessment records on the main University systems

and the marked versions are made available to the students for downloading on to their PCs as shown in Figure 3.

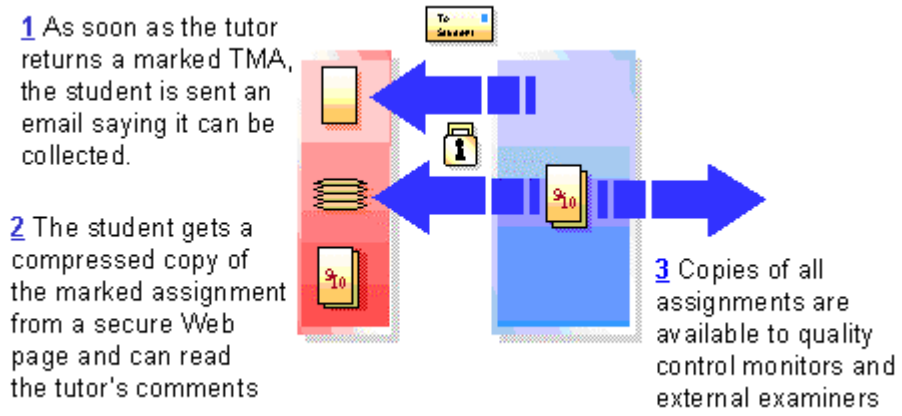


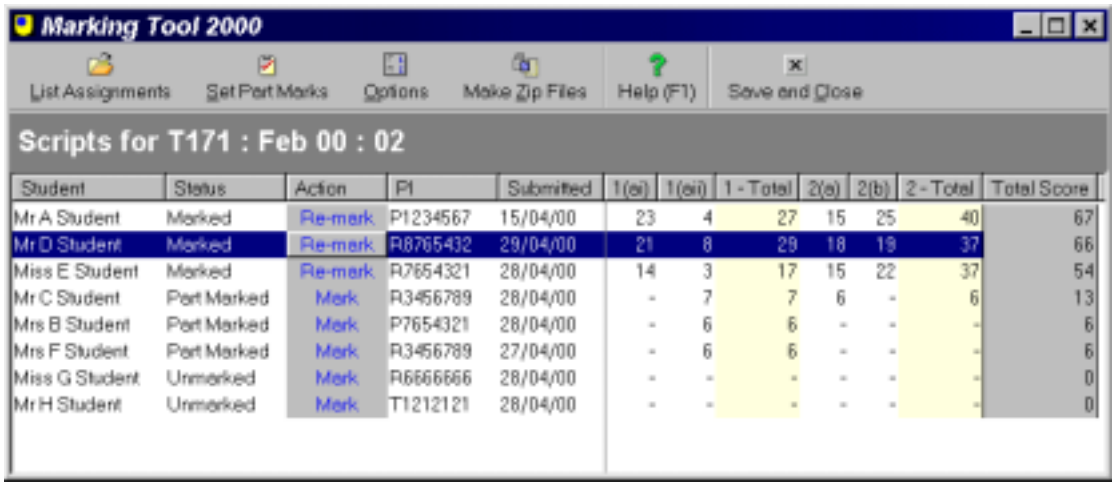
Figure 3 The student retrieval process

On-screen marking

The software which tutors use to mark assignments on-screen is a program called Marking Tool 2000. This software uses the assignment parameters which were downloaded from the e-TMAs system along with the student's script file(s) to provide a framework for the marking process. The tutor will, therefore, be constrained within set limits during marking to ensure that the scores and feedback returned to the system and student are consistent with the assessment strategy.

File management on the tutor's desktop is simplified by the use of self-extracting download files, which create a standard folder structure into which the students' scripts are saved. This standard folder structure is recognised and used by the marking tool to identify and list all of the scripts for a particular assignment and all of the files associated with a particular script. Being able to identify scripts in this way allows them to be opened from the marking tool rather than having to search through a myriad of folders for each script.

As part of the marking process, the marking tool enables a part-mark scheme to be set up so that the tutor can sub-divide the marks awarded flexibly according to how they are allocated (for example a question may be subdivided into marks allocated for overall presentation, key points, examples given etc). This scheme is then imposed on all of the scripts for that assignment, thereby acting as a quality control mechanism and ensuring that marks are awarded according to the same criteria across the whole batch of student scripts. Figure 4 shows the main marking tool window in which there a number of scripts listed with their part-marks.



Student	Status	Action	PI	Submitted	1(ai)	1(aii)	1 - Total	2(a)	2(b)	2 - Total	Total Score
Mr A Student	Marked	Re-mark	P1234567	15/04/00	23	4	27	15	25	40	67
Mr D Student	Marked	Re-mark	R8765432	29/04/00	21	8	29	18	19	37	66
Miss E Student	Marked	Re-mark	R7654321	28/04/00	14	3	17	15	22	37	54
Mr C Student	Part Marked	Mark	R3456789	28/04/00	-	7	7	6	-	6	13
Mrs B Student	Part Marked	Mark	P7654321	28/04/00	-	6	6	-	-	-	6
Mrs F Student	Part Marked	Mark	R3456789	27/04/00	-	6	6	-	-	-	6
Miss G Student	Unmarked	Mark	R6666666	28/04/00	-	-	-	-	-	-	0
Mr H Student	Unmarked	Mark	T1212121	28/04/00	-	-	-	-	-	-	0

Figure 4 The main marking tool window

When a script is opened, a scoring window (see figure 5) appears on the tutor's desktop which allows scores to be allocated according to the marking scheme and interactively checks to ensure that each score does not exceed the maximum permitted for that question or part of the question. The scoring window also allows overall feedback comments to be captured. When the script is closed, the scores and overall comments are saved to the plain text parameters file for return to the e-TMAs system and thence to the student.

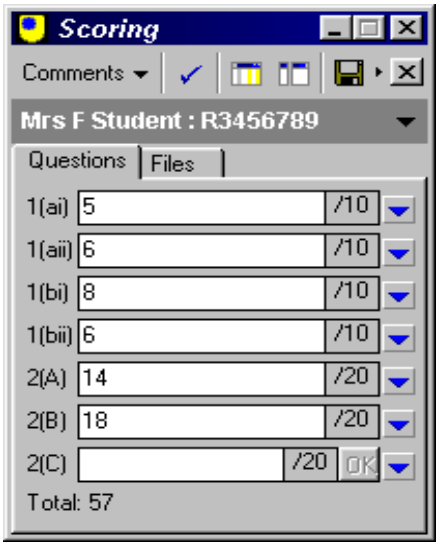


Figure 5 The scoring window

The tool can work in conjunction with Microsoft Word, in which case the scoring window also allows feedback comments and scores to be embedded in the script at appropriate points, and tick marks to be added. The track changes facility is also automatically switched on so that any comments typed into the script by the tutor are distinguished from the student's work.

When a script has been fully marked, and a score awarded for each question and question part in the marking scheme, the tutor can use the zipping functionality embedded in the marking tool to compress the files associated with the script into a single Zip file for return to the e-TMAs system. The system requires scripts to be returned within a single Zip file to prevent the various files becoming separated during uploading and to ensure the integrity and completeness of the materials being returned to the student. Returning files in this way also reduces online costs and the risk of corruption during transmission.

The effects on teaching and learning

The advantages of the electronic assignment system to both the student and the tutor would at first sight appear to be primarily convenience and administrative although there are some disadvantages that have to be taken into account. Overall, however, it has turned out that there have been some significant teaching and learning gains from the electronic system. It is instructive to see how the system has affected tutors' behaviour because it then becomes apparent how the teaching and learning advantages have accrued to the students.

The OU has been experimenting with electronic assignment handling systems since 1995 and several pilot schemes have been tried, some based on well founded experimental techniques. In this section we shall discuss the results from these trials which have influenced the development of the system to the point where it is now embedded in the University's main stream academic and administrative systems.

The initial trials were conducted during the period 1995 to 1998 in which increasing numbers of students, tutors and courses were evaluated. The details can be found in [Thomas, 1998 and Carswell 2000] and an overview of the whole process is given in [Thomas 2000]. The following is a digest of the main findings that have been confirmed as the system has moved from its development phase into its production phase.

The electronic system gives tutors the ability to pick up scripts from the central database when it is convenient for them to do so, and they can download as many or as few as they need at the time. However, collecting scripts from the database is perceived as an overhead because it takes time to connect to the web-site and even longer to download the student scripts, particularly if a slow modem is in use. The fact that Internet connections can be slow and unreliable simply adds to the frustration that tutors can feel at this time. The system reminds tutors that there are scripts to be marked by sending tutors an e-mail reminder on a weekly basis that there are scripts to be dealt with.

In addition, the cost of telephone charges in downloading the scripts, whilst normally not significant, contributes to a feeling of exploitation because there has been a cost transfer. Tutors are paying towards the electronic 'postage' of transporting the scripts from the student to the tutor (a cost borne entirely by the student in the paper-based system). Tutors are paid a small student-related fee for minor expenditures on postage and other administrative costs and various online allowances are paid to cover such costs.

Nevertheless, the fact that the student scripts have been captured electronically is a major benefit that outweighs these difficulties. To begin with, the scripts can be automatically stored on their PCs in a directory structure that tutors find extremely helpful. Scripts can be accessed easily and quickly, and certainly more efficiently than for paper-based scripts. Second, the tutor knows that, should

anything happen to a script (they get lost and damaged in both the electronic and paper-based systems) they can obtain a back-up copy from the database. In the paper-based system a loss of script, for whatever reason, puts the onus on the student to reproduce the work even when the fault was not of their making.

Third, the fact that a paper control form (known as a PT3 form – there is one for every script) no longer has to be filled in by hand is seen as a major improvement.

Fourth, in the paper-based system, tutors have often complained that they could not read their students' writing to which students have responded that they could not read their tutor's responses. The increasing use of word-processed documents, both for recording answers to questions and tutors' comments has been a major improvement in the teaching function of tutor-marked assignments, and has improved the ability of sight-impaired students and tutors to participate on a level footing. The formalisation in the electronic system of ad-hoc arrangements has improved the student-tutor relationship enormously.

Finally, once a script has been marked and commented upon, it is uploaded to the database. In the paper-based system this requires the tutor to package the scripts into pre-paid postage envelopes and physically to deposit them in a post-box. Uploading scripts, despite the overheads of connecting to the web site, is often seen as a benefit.

Overall, the benefits are agreed to outweigh the disadvantages and tutors have often commented that just the simple transformation from a paper-based postal system to an electronic submission and return system would have been worthwhile in its own right. We can conclude that tutors are pleased to have scripts delivered to them electronically and the ability to mark electronically provides additional benefits in teaching and learning.

It was recognised from the outset that there would be some tutor resistance to marking on-screen. Indeed, one of the most frequently asked questions concerns how easy is it to mark on-screen with a great deal of scepticism being expressed by those who had never experienced it. Certainly the experience would be very different from manual marking. Therefore, we were keen to develop a system that would encourage tutors to make the move from paper to electronic marking. The fact that the scripts were now captured electronically meant that we could consider computer-based tools that would support on-screen marking. The Marking Tool 2000 software is the result of this thinking.

Marking electronically provides the ability to store and retrieve comments with ease for reuse across scripts. Whilst a convenience, the ease of reusing comments has led to more comments being added to individual scripts and to the comments themselves being more comprehensive. The ability to add to a comment easily encourages tutors to embellish their feedback. The paper-based

system led to tutors either repeating their comments in long-hand, a laborious task, or eventually recognising that students were having difficulty with a particular concept that would benefit from a separate comment being prepared and copies made.

The electronic system encourages tutors to review scripts marked early on in the process in the light of lessons learned in marking subsequent scripts. It is sometimes the case that a question can be interpreted in such a way that elicits an answer that does not correspond to the specimen solution. Initially, a tutor may not recognise the validity of the alternative solution until several students have taken the same view. Also, it is not unknown for specimen solutions to be in error, a fact revealed by student answers that may have been overlooked in initial marking. Whilst these issues are not unique to the electronic system, the ease with which they can be resolved helps the tutor to provide a better quality service with better, well-thought through comments. Another important factor in this area is the student-tutor relationship.

In the paper-based system, a distinct problem was the extent to which an individual script left sufficient room for tutor comments. Despite the urgings of tutors to ‘leave more space for comments’ students would still take up all the available space for their answers. This led to cramped and succinct comments being given and compounded the difficulty of illegible writing. The ability to introduce indicators in the text with the actual comment appearing in a separate window overcomes this problem.

Layout in an electronic document remains an issue. Several tutors have reported that being able to read a script only at a ‘screen-full at a time’ is a disadvantage and prevents them from seeing a complete solution ‘as a whole’; though this tends to be more of a problem with essays rather than technical material. Once again, however, the layout of a solution can help overcome the difficulty. Course teams are beginning to think about the design of assignments to help in this respect. It is also worth noting that tutors are developing a range of advice for students that helps both the tutor in marking and the student in understanding the comments and their relevance to the student’s solution.

The second area of major concern is the extent to which on-screen marking takes longer than paper-based marking. As tutors have become more familiar with the technology, the problem seems to reduce with some tutors claiming that marking on-screen is no more difficult than marking on paper and indeed is faster. The main problem has been the time required to master the new technology. It has not been the case that the new technology is difficult to use, but it does require a new approach that initially takes time to learn and to become as familiar with as the techniques used in paper-based marking. The primary resistance comes from not being able to transfer paper-based marking techniques directly to the electronic system: new techniques have to be developed. The University has responded to this criticism by putting in place a

training scheme that rewards tutors for spending time getting to grips with the new mechanisms.

A useful recent development has been the provision of computer mediated tutor conferences where tutors can interact asking each other how they approach and solve specific problems. In this way, good ideas have been promulgated and tutors have developed their skills. There is no doubt that it is not until a tutor has to mark his or her first real assignment does the realisation of the need to get to grips with the new medium hit home. However, having marked around 20 scripts for the first assignment, most tutors have developed their own mode of working which appears to be at least as effective as their paper-based techniques based on student performance.

The one remaining issue concerns the increase in time that some tutors genuinely spend on marking. There appears to be a general tendency to provide more comments in the electronic system than in the paper-based system. Tutors, on the whole, tend to be extremely committed to their students, and feel that they must provide as good a service as they can. This is clearly beneficial to students and raises the question of whether tutors are now performing a different job (and should be recompensed appropriately for it) or whether a limit should be placed on what tutors are expected to do.

Summary and Future Developments

The e-TMAs system has been successfully implemented and will have been used by over 20,000 students and 1000 tutors during 2000. It is providing useful management information and has improved the teaching and learning process. It is encouraging course teams to investigate new methods of assessment.

Thus far, the system has been primarily used on courses that conform to the University's home computing policy where it is possible to assume that students and tutors have the appropriate computing equipment. As more courses begin to use computer conferencing for teaching purposes they will be able to make use of the e-TMA system.

The system is being enhanced to interface to the tutor monitoring subsystem. Work is starting on the detection of plagiarism and to extend the University's capabilities in automatic marking.

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