

NEW ELECTRONIC MULTI-MEDIA ASSESSMENT SYSTEM

Simon Chester, Giles Tewkesbury, David Sanders

Systems Engineering Research Group, University of Portsmouth, Anglesea Road, Portsmouth, United Kingdom

Peter Salter

Counterpoint MTC Ltd., Worthing, United Kingdom

Keywords: e-Learning, Assessment.

Abstract: Assessment for learning is a new approach to assessment. Assessment for learning is the process of seeking and interpreting evidence for use by learners and their teachers to raise pupils' achievement. The key principle of Assessment for Learning is that pupils will improve most if they understand the aim of their learning, where they are in relation to this aim and how they can achieve the aim (or close the gap in their knowledge). Studies have shown that student achievement has been raised significantly where this method of assessment has been implemented. This paper examines existing electronic assessment systems and then describes the creation of a new multi-user system that assists teachers in the implementation of assessment for learning in the classroom.

1 INTRODUCTION

In order to develop a new system for electronic assessment, an analysis of existing systems and modes of assessment was first researched. A literature search was conducted and five main methods of assessment were reviewed. Assessment for learning was identified as an assessment method that required new tools to aid teachers to implement this method in the classroom. A search for existing assessment systems was also conducted and three systems were identified. None of the systems reviewed allowed teachers within the school to share common information. Therefore, teachers' time was spent performing administrative tasks for their assessment systems rather than teaching.

The new system presented here aims to overcome the problem of entering and maintaining school-wide information by introducing software tools to share relevant information between teachers. The new system also aims to provide teachers and students with the functionality needed to implement assessment for learning. This new system was created by using a new centralised database system and a central administration web application. The results of this work are presented.

1.1 Modes of Assessment

There are five main types of assessment (Assessment Reform Group, 2002):

- Formative assessment
- Summative assessment
- Ipsative assessment
- Self-assessment
- Assessment for learning

Formative assessment is that which takes place on a regular basis involving both teacher and student in discussion about the students learning and work (Andrews, Jane as part of a review of: Torrance, H; Pryor, J, 2004). Feedback that is specific and diagnostic is given to individual students and the teacher will be concerned with moving students on as learners. This monitoring of students' progress provides teachers with an on-going record of their students' progress and also provides feedback on their own effectiveness in planning and teaching. Whilst formative assessment encourages teachers to listen to their students and identify the next steps required, it will not be effective unless the teacher is clear about what it is that they want to find out and what they are looking for (MacKrill, D, 2004).

Summative assessment is used to provide a summary of a student's progress at a given point in time measured against criteria, such as National Curriculum Levels (Winger, Steven R, 2005). It will include records of the formative assessments made over time. A common form of summative assessment is, for example, an end of year report, and in music, an instrumental grade exam. Summative assessment is important but as Harlen *et al* commented "its prime purpose is not so much to influence teaching". MacKrill (2004) suggests that Teachers have been reluctant to adopt summative assessment because it has been closely associated with unpopular Government driven data collection initiatives.

Ipsative assessment informs students how they have performed and progressed, compared with their own previous performance or efforts (Harlen *et al* 1994). It is most effective when students themselves are involved in the process and promotes independent learning. However, it is often more successful when students and teachers have access to previous work. In subjects that are only timetabled once a week, like music and drama for instance, this is even more important but is difficult to implement because of the type of work being assessed, which is invariably practical in nature (MacKrill, D, 2004).

Self-assessment forms part of the process of formative assessment and can improve student motivation whilst providing the teacher with important information regarding a student's understanding and perception (Daniel R, 2001). Pratt & Stephens give self-assessment a priority in their publication "supporting the National Curriculum for music" (Pratt, G & Stephens, J., 1995).

In the late 1990's, a new approach to assessment began to be considered by Black and William (1998) who showed that where formative assessment was used to promote learning, student achievement was increased significantly. However, they noted that this would require changes in classroom practice.

There is a clear difference between assessment of learning and assessment for learning. Assessment of learning frequently includes both formative and summative assessment and involves assessing what students have learnt, often including marks or grades from tests and assignments (DfES, 2004). Assessment for learning has a different focus and is defined as "the process of seeking and interpreting

evidence for use by learners and their teachers to decide where the learners are in their learning, where they need to go and how best to get there" (Assessment Reform Group, 2002).

Improving learning through assessment depends on five key factors:

- provision of effective feedback to students;
- active involvement of students in their own learning;
- adjusting teaching to take account of the results of assessment;
- recognition of the profound influence assessment has on the motivation and self-esteem of students, both of which are crucial influences on learning;
- need for students to be able to assess themselves and understand how to improve.

(Assessment Reform Group, 1999)

Assessment for Learning is an area for development in schools that will require changes in teacher practice (MacKrill, D., 2004).

1.2 Existing Electronic Assessment Systems

The KAAAN Keyboard And Audio Network System (KAAAN) has been produced by the collaborating company. This system was created to assist teaching of music in the classroom. From this, another system was then developed to accommodate the assessment of students' work in a wider variety of subjects. The new system was marketed by the collaborating company under the brand name 'eSAAMS' (Electronic Student Assessment And data Management System). The creation of these systems is described in Lassauniere (2003).

Student Information Management System (SIMS) is used by some schools in the UK. This product, produced by Capita Educations Services (Capita Education Services: SIMS, n.d.), provides functionality to store a wide range of administrative information (such as: students, classes, formal assessments, staff, etc). Typically, this software is primarily designed for school administrators. Although it may be used by Teachers, typically it is not used in the classroom.

AssessIT is an interactive software system, produced by Pearson Phoenix (n.d.), which tracks individual pupil attainment and group achievements.

It supports teachers when monitoring and measuring progress and alerts them when pupils fall below targets. The software places emphasis on implementing initiatives and promoting individual pupil attainment and group achievements.

1.3 Requirements of the New System

An electronic assessment system was made available by the collaborating company at the start of this work. However, it was designed for use by one teacher at a time on a single PC. Although it was possible for the software to be installed on many computers, each instance of the software required its own separate database. This caused problems because these separate databases contained some information that was common to the whole school (not just a particular teacher) and there was no mechanism for synchronising changes to this information across the disparate databases. The research described aimed to create a new system for

sharing information between teachers.

2 DESCRIPTION OF THE NEW SYSTEM

The sharing of information involved setting-up a new central database. Figure 1 shows the central database on a server connected to a school's computer network. The database server was used as a single location for storing school-wide information. A number of database systems were evaluated including 'off-the-shelf' products and some open-source systems. Microsoft SQL Server 2000 was identified as the most suitable system because it provided close integration with the software language used. Initial systems analysis was conducted and key concepts were identified. These concepts were then used to create a new database structure which was implemented on the central database server.

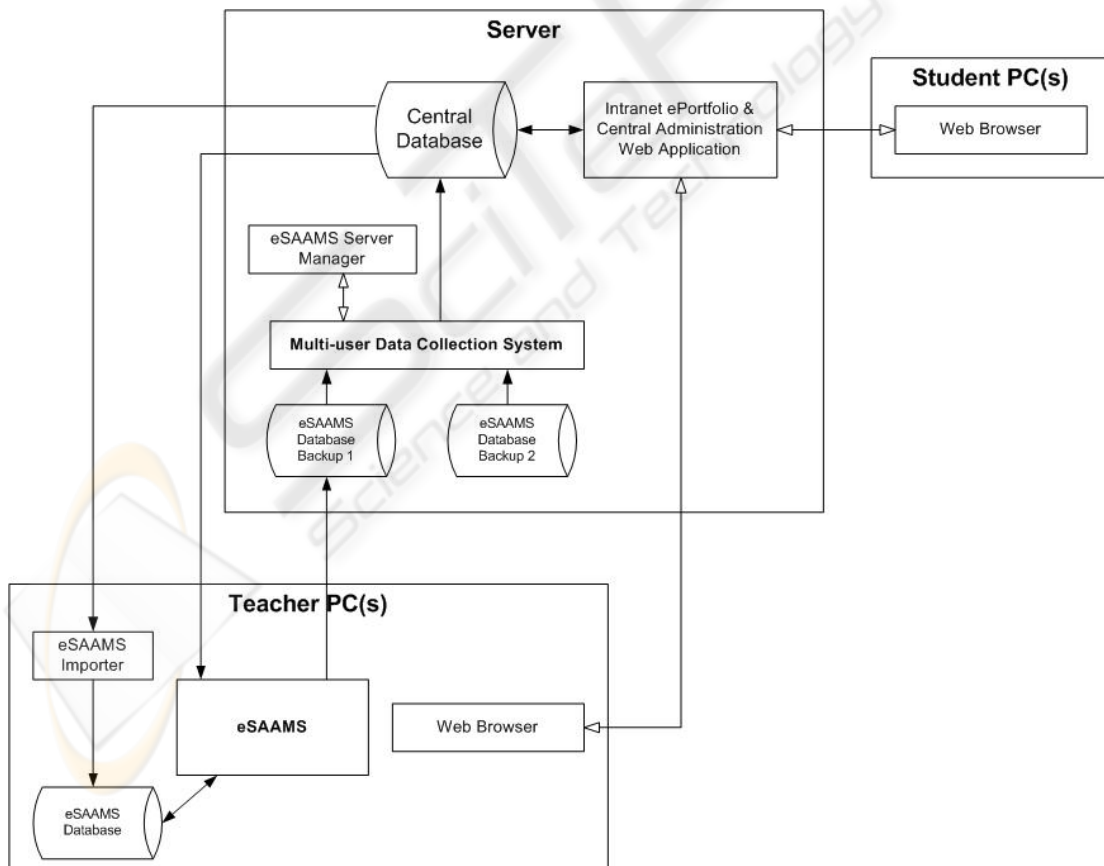


Figure 1: Components of the new assessment system.

In the new system, the eSAAMS software regularly performed a backup routine which made a copy of the database to a backup storage location on the server. This operation was performed by each instance of the assessment software to the same location on the network. The Multi-user Data Collection system was contained on the server. This new software component collected information from these distributed database backups across teachers PCs' and synchronised it with data in the new central database.

Finally, a new web-based application was created to allow students to view a portfolio of their work from any computer within a school's computer network. The web-application was located on the server. Students interacted with the web-application by using a web browser, as shown in Figure 1.

Much of the information in the central database was to be sourced from the distributed teacher databases. However, some information could not be gathered in this manner since there was no way of determining which distributed database was the authoritative source. Therefore, a new central administration system to allow teachers and school administrators to create and manage school-wide information centrally was created. This web-application was integrated with the Intranet ePortfolio system described previously in order to create a single user interface for administering Student information. These systems are shown in Figure 1 as the 'Intranet ePortfolio & Central Administration Web Application'.

The eSAAMS electronic assessment software allowed Teacher's to work in an 'offline' mode when disconnected from a network. It was therefore necessary to create a software application for copying centrally administered information from the central database system to the database for each electronic assessment system. This 'eSAAMS Importer' system is shown in Figure 1.

In order for the software applications to be able to communicate with the central database system, it was necessary to create software components that could be used to store and retrieve data from the database. Different models for data-access were evaluated and the application of an n-tier model was investigated using Microsoft Visual Studio 2003 and Microsoft Visual Studio 2005 (Microsoft Visual Studio, n.d.).

In particular, methods for automatically generating data-access code and database stored procedures were investigated. In particular, one code-generation tool was identified called 'My Generation' (My Generation Software, n.d.). This tool was designed to create templates for generating database stored procedures and code to access a database from visual studio.

3 RESULTS

The electronic assessment system made available by the collaborating company at the start of this work has been installed and tested in over 100 schools. The software, known as eSAAMS (eSAAMS Software, n.d.), allowed Teachers to capture and record evidence of Student's work. This information was stored in a database on a Teacher's computer.

Code generation software was used to create templates that were then used to generate stored procedures and re-usable software components to access the central database. These components would normally have to be created manually. The use of code generation reduced the time needed to create the data access software used by the new software applications described here.

A new Multi-User Data Collection System was created that collected information from many single-user databases (one database per Teacher) and compiled this into the central database (school-wide information). This system was tested using a test to fail method and approved by the collaborating company.

An Intranet ePortfolio system for showing student report information was then produced. The system provided students with the ability to view a portfolio of their work. This allowed Students to view feedback from assessments of their work without increasing the workload for teachers. The provision of effective feedback to students is one of the key factors in implementing Assessment for Learning (Assessment Reform Group, 1999). This software helped Teachers to implement Assessment for Learning in the classroom. The information displayed to Students was sourced from the central database system. This system was tested and approved by Teachers in 22 schools.

A new central administration system to allow teachers and school administrators to create and

manage school-wide information centrally was created. The system will be tested by the collaborating company using a 'test to fail' method.

Also, a software application for copying centrally administered information from the central database system to the database for each electronic assessment system has been created. The system will be tested by the collaborating company using a 'test to fail' method.

The completed system will be beta-tested in a two schools. At each beta testing site, the system will be used by at least two teachers and one school administrator. User interface experience information and usability information will be obtained through questionnaires issued to users and by direct observation. Also, information will be retrieved from error log files on the server and teachers' PC's.

4 DISCUSSION AND CONCLUSIONS

A new electronic assessment system was created and a number of its components were tested by the collaborating company and classroom teachers. This was the first intelligent multi-media assessment system to assist teachers implement assessment for learning practices in the classroom. Other systems, described previously, have tended to be administrative and designed for use by a school administrator.

Information in the central database was sourced from the backup databases by the new multi-user data collection software. The information in these databases was not synchronised so, inevitably, information could be duplicated. Since each teacher had equal administrative rights for the information contained within their database, the multi-user data collection software was unable to determine which database had the correct version of each entity. Therefore, information was processed on a 'first-in wins' basis. This was undesirable because there was no reliable way to determine which client database would be used to source school-wide information. In the future, new electronic assessment software to be used by teachers in the classroom will be created. Unlike the existing software, the information captured will be committed directly to the central database therefore avoiding unnecessary duplication of data described above.

REFERENCES

- Andrews, J. (Review of: Torrance, H; Pryor, J) (2004). Investigating Formative Assessment: Teaching, Learning and Assessment in the Classroom, *Language Testing*, 21(3), 432-435.
- Assessment Reform Group. (1999). *Assessment for Learning: Beyond the black box*. Cambridge: University of Cambridge.
- Assessment Reform Group. (2002). *Assessment for Learning: 10 Principles*. Cambridge: University of Cambridge
- Black, P. & William, D. (1998). *Inside the black box: Raising standards through classroom assessment*. Retrieved December 1, 2005, from King's College London School of Education website: <http://www.kcl.ac.uk/depsta/education/publications/blackbox.html>.
- Capita Education Services: SIMS. (n.d.). Retrieved December 1, 2005, from Capita Education Services website: <http://home.capitaes.co.uk/sims/index.asp>.
- Daniel, R. (2001). Self-assessment in performance. *British Journal of Music Education*, 18(3), 215-226.
- DfES. (2004). *Assessment for Learning: Guidance for Senior leaders*. London: DfES.
- eSAAMS Software. (n.d.). Retrieved September 27, 2005, from the eSAAMS website: <http://www.esaams.co.uk>.
- Harlen, W., Gipps, C., Broadfoot, P. & Nuttall, D. (1994). *Assessment and the improvement of education*. In Moon, B. & Mayes, A.S. Teaching and Learning in the Secondary School. London: Routledge / The Open University.
- Lassauniere, A. (2003). *New Music Technology Systems and Methods to Assist Teachers*. Portsmouth: University of Portsmouth.
- MacKrell, D. (2004). MA Dissertation. University of Sussex.
- Microsoft Visual Studio. (n.d.). Retrieved September 27, 2005, from the Microsoft Developer Network website: <http://msdn.microsoft.com/vstudio>.
- MyGeneration Software. (n.d.). Retrieved September 27, 2005, from the MyGeneration software website: <http://www.mygenerationsoftware.com>.
- Pearson Phoenix. (n.d.). Retrieved 29th September 2005 from Pearson Phoenix web site: <http://www.pearsonphoenix.com>.
- Pratt, G & Stephens, J. (1995). *Teaching Music in the National Curriculum*. Oxford: Heinemann.
- Winger, S. (2005). Using Your Tests to Teach: Formative Summative Assessment. *Teaching of Psychology*, 32(3), 164-166.