

15. <http://vitcarpet.com/>
16. <http://vitsilk.by/>
17. <http://medvatpharm.by/>
18. <http://www.textil.by/ru/>
19. <http://blakit.by/>
20. <http://www.sopotex.by/>

UDC: 371.263

COMPUTER-AIDED ASSESSMENT OF LEARNING PROGRESS

АВТОМАТИЗИРОВАННЫЕ СИСТЕМЫ ОЦЕНКИ УСПЕВАЕМОСТИ

Stepanov D.A., flvstu@gmail.com

Vitebsk State Technological University, Vitebsk, Republic of Belarus

Степанов Д.А.,

Витебский государственный технологический университет,

г. Витебск, Республика Беларусь

Key words: computer-aided assessment, objective tests, question banks, optical mark reader, integrated learning system

Ключевые слова: автоматизированная система оценки, предметные тесты, банки вопросов, сканер отметок, комплексная учебная система

Abstract. The article discusses ways of applying computer systems and software packages in assessment of students progress. Advantages and disadvantages of computer-aided assessment are analyzed. Ways to improve assessment quality with the help of computer tests are presented.

Аннотация. В статье рассматриваются способы применения компьютерных систем и программного обеспечения для оценки успеваемости студентов. Проанализированы преимущества и недостатки автоматизированных систем оценки знаний. Представлены способы повышения качества оценки с помощью компьютерных тестов.

Increased numbers of students in higher education and the corresponding increase in time spent by staff on assessment has encouraged interest into how technology can assist in this area. Ensuring that the assessment methods adopted reflect both the aims and objectives of the course and any technical developments which have taken place is becoming increasingly important, especially as quality assurance procedures require departments to justify the assessment procedures adopted.

Technology can be used for assessment purposes at various levels ranging from the management of the assessment information to a fully automated assessment system. Using technology for the management of assessment information can enable information to be presented in different ways to meet the needs of different audiences

(such as teachers, students, course organisers and external examiners). Not only the quality of presentation of reports but more importantly the range and scope of their content can be improved by utilising technology for this purpose. At the other extreme, in a fully automated assessment system all aspects of the system from the assessment which the student completes to the processing and administration of the marks, including the overall management of assessment information, is technology-based.

There is growing interest and increasing practical experience in the use of computers to deliver objective tests. Objective testing is often taken to imply the use of multiple choice questions (MCQs). However, objective tests can incorporate a wide range of question styles in addition to standard multiple choice questions; for example multiple response, word entry, number entry, gapfill and free-format where student entry is compared to a correct solution using a keyword search. Objective tests, and MCQs in particular, are generally considered to be an efficient method of testing factual knowledge, enabling a wide syllabus to be examined in a relatively short time. It is, however, important for academic staff to be aware of the limitations of objective tests (especially MCQs), particularly in their inability to indicate higher level and process skills. Objective tests can be used for both formative and summative assessments, and a variety of scoring systems can be applied, tailored to the importance of discouraging students from guessing answers.

Computerised delivery of objective tests offers interesting possibilities not available within paper based systems:

Electronic delivery of tests need not be restricted to MCQs, and the results recorded need not only be whether a response is right or wrong.

Consider the situation where a question has been posed, but the student is unable to get started. In a traditional setting (for a summative test) this student would be forced to omit this question and try another. In an electronic setting it is possible to include an option to provide a hint for the student. Most computer based assessment packages can operate in a choice of modes, perhaps described as tutorial or exam mode. The exact number of modes available varies from package to package, but four modes is not uncommon, each offering a different level of detailed feedback for the student, to assist them in reaching the correct answer, or explaining why their response was not correct.

Questions can be split up into several stages, and marks can be awarded at interim stages before a final answer is determined. Marks can be deducted if hints have been provided. For students who have made a slip, the computer can identify an error and offer the possibility of going back, correcting an interim answer and hence enabling the student to successfully reach the final stages of a question.

In addition to using electronic packages to create unique tests, it is possible to use the computer to generate different tests automatically.

Question banks: Electronic selection of questions from a bank has already been mentioned as one possibility for the electronic generation of tests. The creation of a question bank is a demanding task for a single individual, however, where several

members of staff (possibly from different institutions) collaborate to share questions a large bank can be established relatively quickly. From this a huge number of different tests can be generated.

Randomisation of parameters: An alternative method of generating questions electronically is the use of parameters. The format of the question will be identical on every occasion, but one or more variables in the question is selected from a list of permitted values. These values may be entered when the question is created, or they may be generated by the computer, either randomly or according to some formula.

Perhaps the most immediately obvious and most easily accessible use of technology to assist the assessment process is in the recording, analysis, general storage and management of results. A wide range of spreadsheets, statistical packages and database packages are available, into which it is easy to enter data manually if results are not already in electronic form, though enormous care must be taken to avoid transcription errors when generating the data files. Most of these packages readily accept the transfer of electronically stored data from other applications, aiding data acquisition and increasing the potential data analysis that can be carried out.

The use of electronic methods to store and manipulate data becomes pointless if the integrity of the data cannot be guaranteed. The manual entry of marks is particularly susceptible to error, time consuming and costly to check thoroughly. The use of data capture devices, such as an Optical Mark Reader (OMR) connected to a computer, can vastly reduce input errors, particularly the problem of number transposition on data entry, e.g. typing 45 instead of 54.

Once the student answers have been stored for a test, the responses can not only be scored but can be analysed in a number of different ways, e.g. by individual question, groups of questions, all questions. Thus a variety of reports can be produced such as: the results of individual students; the results of groups of students including the mean, median and modal scores; graphs of results; analysis of each question including its reliability, facility value and discrimination factor.

One obstacle which can prevent teaching staff from utilising technological solutions to administer student assessment is the worry of security.

When considering delivering assessment on computer, it is possible to password protect the file containing the test and also to disallow access until after a particular date. To overcome the possibility of students copying from each other's visual display screens, the possible responses to each test question can be displayed in a different order. Also databanks of questions can be used which means that each student is sitting a comparable but not identical test.

Plagiarism should present no greater problem in an electronic environment than in a more traditional context. However, the "cut and paste" facility of word processors and information retrieval systems may tempt students to copy sections of text directly into their work. Students should be made aware of the law relating to copyright, especially when they are asked to compile portfolios or other multimedia presentations.

There are a number of examples of Integrated Learning Systems (ILS), where entire course structures, lecture, practical and assignment schedules and supplementary resources are held electronically and available for student consultation whenever needed. The management of assessment schedules is just one small part of an ILS, and an equivalent benefit is available through the use of other, less holistic tools.

For departments where electronic mail is available this offers both tutors and students an efficient and straightforward means of communication. One application is to use e-mail to remind students of impending deadlines. Even students who are absent when the message is first posted are certain to receive the message when they next access their mail. Similarly any changes, revisions to the assignment, or hints can be delivered to all students.

Assignments can be submitted electronically. For distant learners this avoids the need to rely on the speed of postal services, and for all students the date and time of delivery is automatically attached, so meeting deadlines can be monitored accurately.

Computers are an ideal tool to track attendance or achievement records, allowing monitoring of trends, for individuals and cohorts, comparison between years or classes and early identification of problems.

Examples exist of courses where seminars are presented electronically, rather than in a tutorial room as is conventional. The student leading the seminar prepares a paper and submits this by e-mail to the group for consideration. Some electronic discussion follows, prompted where necessary by the tutor. After a few weeks the student 'presenting' summarises the discussion, and presents a revised paper.

Management of such seminars does require skill from the tutor in judging just when to contribute a comment in order to keep discussion going. It also offers possibilities for peer group assessment and other less traditional methods.

Simulations have been in use for many years to assess likely performance in hostile environments, particularly, but not exclusively, as a formative assessment tool. A simulated environment can never be quite like "the real thing", as assumptions, simplifications and restrictions will have been programmed into any simulation - creating problems of realism. However, assessment problems associated with experiments in the real world, which sometimes behaving unpredictably, can be avoided in a simulated environment.

Electronic assessment tools are unlikely to reduce significantly the burden of assessment, but they can be used to promote deeper and more effective learning, by testing a range of skills, knowledge and understanding. Using computers in assessment does not have to mean more multiple choice testing to the exclusion of other assessment techniques. A wide range of innovative assessment methods lend themselves to computer based implementation.