Computer-based Test

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Abstract

DIAGNOSYS has been used by the Department of Engineering Mathematics, now the School of Mechanical and Systems Engineering, since 1993. By 1996 there were five departments involved in using the software. Based on an interview with the administering lecturer and a student questionnaire this case study examines the procedure, results and student responses to the diagnostic testing process.

The Execution

DIAGNOSYS was first used by the Department of Engineering Mathematics at the University of Newcastle upon Tyne in October 1993. Developed under the Teaching and Learning Technology Programme (TLTP), the computer package is an intelligent knowledge-based system for testing background skills in basic mathematics or other technical subjects.

By 1996 five departments were involved in using the software: Chemical and Process Engineering, Civil Engineering, Electrical and Electronic Engineering, Marine Technology and Mechanical, Materials and Manufacturing Engineering. The testing process included entrants into the Engineering Foundation Course, Stage 1 of Mechanical and Materials degrees and all first year students to the Faculty.

Nowadays it is an essential tool in assessing students' mathematical knowledge. It is used to help individual students identify their level of attainment and to provide support for those with special needs. It is also used in the curriculum design for groups of students and in the assessment of the selection policy.

During the first week of the 02/03 academic year 49 students were observed sitting the DIAGNOSYS test within a scheduled computer session. A common logon enabled the tutor to set up in advance. Each student entered their name, department and the level of mathematics they had previously attained. Based on this information the package decides the level of questions to ask initially.

At the beginning of the test there is an optional tutorial on how to enter different types of answers (number, multiple-choice, algebra) which provides an opportunity for the student to get used to the interface.

What follows depends upon the success rate of the students: those achieving a good success rate can quickly pass from one topic to one more advanced; those less successful are taken on a 'slower' route. The test terminates when there are no questions left to be asked or when a time limit is reached. The student at this point does not have access to the performance details.

Each topic area contains several questions at a given level and one is chosen at random for each test. Coupled with the 'expert-system' approach, which gives each student a different path through the test, each student will be asked a completely different set of questions, which helps prevent cheating.

The Results

The results are stored on the server as individual text files; at the end of the group test, they are downloaded by the tutor and transferred to a disk. The information is printed out and given to each of the students.

The text files sent to the tutor create the following:

- A group profile of all the students tested
- A ranked listing of the students in terms of score
- Tabulated answers actually given to all students (to highlight common misunderstandings)
- Results of all questions and skills for subsequent spreadsheet analysis
- Combined files of individual 'profiles' ready for printing.

The Barriers

There appeared to be no major problem with the co-ordination of the test for either the students or the academic. Any problems with the computers or entering the information for the test were quickly overcome; the academic was available to provide assistance throughout the testing session.
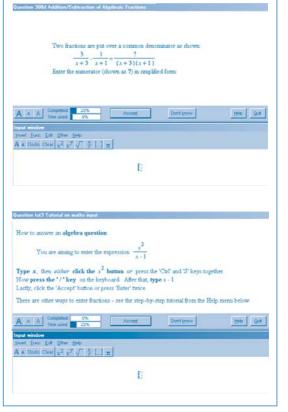
The Enablers

- DIAGNOSYS requires no time for test creation since its database contains hundreds of 'ready to use' questions, but some customisation is needed for initial menus of courses etc.

- Self-testing modes complement the main diagnostic mode, enabling students to address weaknesses and develop skills. They can re-take the test; comments enable them to monitor their own progress and have more than one attempt at the answer.

- For the academic the package is flexible and output can be controlled. The system can be customised and other questions can be designed. Full documentation on how to do this is provided with the software.

- The package incorporates automatic marking facilities, giving instant comments to both the individual student and the lecturer.

How Can Other Academics Reproduce This?

The software is available from the DIAGNOSYS Project, School of Mechanical and Systems Engineering, University of Newcastle, Newcastle upon Tyne, NE1 7RU.
Email: **DIAGNOSYS@ncl.ac.uk**

The demonstration version (time-limited) can be downloaded, trailled and customised before ordering from the website:
www.staff.ncl.ac.uk/john.appleby/diagpage.htm

Example of DIAGNOSYS questions