Development of ICT provisions for additional needs science students

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Background and rationale

The School of Applied Sciences (SAS) has one of the largest incidences of 'additional needs' students in the University, with the potential for this to increase through recruitment from linked organisations (e.g. Rodbaston College), through School initiatives (e.g. Flexible Learning) or University initiatives such as Widening Participation.

The increased emphasis placed on the use of ICT as a means of producing assignments (word-processing, spreadsheets, specialist packages etc.), coupled with an expansion in TSL (i.e. use of the SAS intranet, WOLF, and 'Subject Centre' and other specialist teaching packages) in the delivery of courseware within our standard IT provision, was considered to be exacerbating the difficulties encountered by some of our students with additional needs.

The principal objective of the project is to increase accessibility to the University standard software suites in use in SAS in addition to the specialist packages used in the school.

The basic strategy falls within two areas:

- use of appropriate additional hardware and software to enhance the display options available to students
- use of appropriate additional hardware and software to provide alternate means of inputting information into, and receiving output from, standard software packages

The innovation

The basic enabling factor for the system is the School's Printer Account Software (PAS) which gives each student a unique user name and log on password and allows access to computers on the SAS system[1].

Whilst principally intended to monitor and administer student printer credits, the PAS runs scripts during the 'log on' process which permit the implementation of customised display settings or other facilities for individual students, such as an allocation of dedicated storage capacity on the system hard drive or an individual's voice trained file for use with dictation input software.

The system is based on a standard SAS student machine[2] with the graphics card replaced by a Matrox G400 card which has the facility to drive two monitors[3]. The Matrox system permits synchronous display of output with the option to independently vary the magnification on either of the monitors within both standard or user specified parameters.

Typical settings are:

1. Both monitors showing the same output but with no magnification implemented. This is generally of little advantage except perhaps, where presentations etc. are being prepared or reviewed by a number of students in 'group work' exercises

2. The first monitor set at a zero or low magnification to provide a 'search' facility which can be used to locate a desired area of the output for displaying at greater magnification on the second monitor

3. As 2. but with a 'hot key' zoom facility permitting cycling between x1, x2, & x3 magnification on the first monitor if there is a need to resolve particular areas in a search e.g. small font footnotes etc.

In all cases the system can be set up so any magnified area displayed on the second monitor follows the position of the cursor on the first, 'search' monitor.

A Hewlett Packard ScanJet 5370C scanner is linked to the computer. This device can be operated in different modes according on the nature of the output required, i.e. either scanned images or OCR files for saving in text or 'talk back' format. Two disparate scanner programs are used to implement these different modes and are activated through appropriate icons on the Windows Desktop.

Both programs allow the selection of discrete areas of image/text and have a facility to 'zoom in' on this area for fine selection of content for scanning and subsequent saving. This zoom and selection procedure can be enhanced if necessary by using the Matrox magnification system.

Image files are saved in one of a number of standard formats (.bmp, .jpeg, .gif etc.) and can be viewed, edited or printed using appropriate software (e.g. Paint Brush, Photoshop, Paintshop Pro etc.) at magnification settings appropriate to the needs of individual students.

Text files are saved in a format (generally Microsoft Word 97/2000) suitable for subsequent editing, or incorporation into other documents or can be 'exported' to speech mode either for the student to check the content or as the principal form of output.

To cater for the large file sizes produced by these systems each student has an allocation of 50 MB of storage capacity on the hard drive[4] as well as access to a 100 MB Zip Drive.

The computer is connected to a dedicated laser printer which will only service printing requests from this machine and thus avoids the potential problems of locating work sent to a standard student printer where the output is separated in the sorting trays by 'header sheets' showing the student account number.

Establishment of individual student needs and preferences

In the initial stages the various options and facilities were demonstrated to participating students[5] who were encouraged to experiment in order to establish their own preferences or requirements. This aspect is particularly 'tutor intensive' and it is intended that the next stage of project [6] will produce a 'choice' system (self selection/self implementation system) which will enable students to establish and change their personal ICT profile 'on the fly' through an integrated menu system.

This experimental approach provided the students with enough basic knowledge of settings and options to enable them to establish their own choices which were then implemented 'manually' by the project team through the student PAS scripts. The latter will be phased out as the project facilities are integrated fully into the school ICT facilities and subsequently will generally only be implemented through the 'choice' menu system.

Outcomes

- The use of twin monitors via a graphics card with on-board magnification facility provides additional output options for the range of programs used in SAS and is particularly useful in graphics and spreadsheet type packages where voice control software may be inappropriate/ not available
- The use of 'read back' to output scanner/file content provides an additional mode of access for some students and presages the increased use of voice control software with other appropriate software suites etc.
- The facility to customise chosen display parameters (e.g. background colour) can increase usability as well as providing a sense of 'ownership' or involvement with the system

Evaluation (case studies)

Given the nature of this project all personal details of the students are classed as confidential and their views are summarised and reported anonymously. In the light of our initial experiences we decided against the large-scale test approach and proceeded with a small number of students to whom we could provide adequate support.

Student A (visual impairment)
Found the principal advantages were provided by the magnification options within the system (particularly when used with the 21" monitors) which facilitated working with Word and Excel as well as making Internet use easier. The availability of the dedicated printer simplified work collation.

Student B (dyslexia)
Found the magnification options useful when working with Word and when viewing/reviewing the lectures and other support materials made available on WOLF. Viewed the 'scanner talk back' demonstration favourably and thought it could be a useful adjunct to other facilities after further familiarisation

Student C (dyslexia/dyspraxia)
Initially enthusiastic but did not make enough use of the facility to provide any valid feedback

The facility was housed in a small office within one of our standard computer labs. Despite our concerns about students feeling isolated from their peers—with obvious implications for inclusivity—these students found the ability to (literally) shut out noise, distraction and potential interference from their fellows a positive attribute.

We were unable to implement the voice control and dictation software[7] in time but experience elsewhere suggests this will not cause significant problems in the long term. However the use of dictation and talk back facilities which are sensitive to extraneous background noise imply a need for acoustically isolated areas, such as booths as seen in traditional language laboratory design.

Future developments

The School of Applied Sciences has adopted the ethos of the project and has included an 'accessibility area' in its new ITC development plan as well as dedicating more machines to adaptive technology. The University Learning and Teaching Strategy and the School have provided funding to further enhance the system through the 'choice' profile builder and to extend the portfolio of programs available with 'talk back facilities'.

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[1] Generally restricted to SAS students or students on SAS modules
[2] RM PIII 866MHz, 128MB SDRAM, 20 GB Hard Drive, CD Rom Drive, 100 MB Zip Drive
[3] The initial testing involved two 17" monitors, but currently two 21" monitors are being used
[4] This has now migrated to the Student server
[5] Identified by the School's Special Needs Tutor
[6] Funded under the second round of University Learning and Teaching Projects 2001/02
[7] This was due to manufacturer problems in shipping the version required