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AN IMPROVED COMPUTER-ASSISTED TEST FOR ACCESSIBLE COMPUTER-ASSISTED ASSESSMENT

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An Improved Computer-Assisted Test for Accessible Computer-Assisted Assessment

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Abstract

This paper builds on work carried out in the development of a computer-assisted test to be used for staff development purposes (Harrison and Gray, 2006). The test is designed to raise staff awareness of disability issues in relation to the use of technology and of CAA, and includes attempts to simulate some of the experiences of disabled people. Some staff groups have now experienced the test, and it has been improved in the light of feedback.
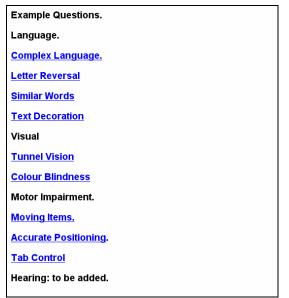
Introduction

A computer-assisted test for staff development purposes has been developed (see Harrison and Gray, 2006) and subjected to initial trials at Leeds Metropolitan University. This has been done under the auspices of the Centre for Excellence in Teaching and Learning – Active Learning in Computing, known as CETL ALiC (Durham University, 2006 and Leeds Metropolitan University, 2007). The test is designed to raise staff awareness of disability issues as they relate to the use of technology and CAA, though its aims are relatively modest in comparison with those of some staff development initiatives in other universities (see for example Pearson and Koppi, 2006). It presents questions and gives appropriate feedback on answers. Some

evaluation of the test has now taken place, improvements have been made and plans for the future have been formulated.

First version and first run of test

In June 2006, the test was tried out for the first time on a group of 15 staff from two faculties of Leeds Metropolitan University, Innovation North (the Faculty of Information and Technology) and the Carnegie Faculty of Sport and Education. A session of two hours was used, with the test plus associated discussion occupying the first hour, and the completing of evaluation forms together with lunch occupying the second. (This ensured a very high response to the evaluation!) The session took place in a room with fixed PCs, and was run by three members of the CETL ALiC team, John Gray, Gill Harrison and Jakki Sheridan-Ross (the Research Officer). An introductory talk explaining the aims and format of the session was given, and then the practical part of the session was launched. The questions in the test were designed to try to simulate the experiences of disabled people, for example by showing how a question might appear to a person with a visual impairment. Questions in the test related to motor and cognitive impairments (especially dyslexia) as well as to visual impairments. An option was generally provided to view a question with and without the simulated impairment.   See figure 1 below for the test entry page, and figure 2 for a typical question.

Participants were asked to complete each section of the test, visiting the suggested informative web links if they wished, and then to join in a discussion about that section. The interface was very simple, and the number of questions was only 9 (see Figure 1: the questions are shown as underlined, the section headings without underlining).   This limited form of the test resulted from some software development difficulties. A decision had been taken not to use the VLE (WebCT) or proprietary CAA software, so as to retain complete freedom in how the test was presented.

In practice, it proved difficult to restrain participants from going through the whole test, once they had started, so the planned structure of the session was revised into a more informal one, with the three presenters talking to small groups of participants as they worked through different parts of the test, and a final plenary discussion.

Figure 1: the entry page for the initial test

Figure 2: format of a question in first test

Evaluation and feedback from first test

A questionnaire, filled in during the hour following the test, was used to elicit feedback. The questions are shown in Figure 3.

Question number	Question
1	Please say whether you feel that the session has increased your awareness of disability issues in relation to technology in general or in relation to computer-assisted assessment (CAA) in particular: (a) increased my awareness of disability/technology in general Yes/ No If yes, in what way(s)? (b) increased my awareness of disability/CAA? Yes/ No If yes, in what way(s)?
2	Regarding the number of questions provided in the test, which of the following would you agree with: (a) too many questions overall (b) about the right number of questions (c) there could be more questions
3	What did you think of the overall session length of one hour? (a) too long (b) about right (c) could be longer
4	What did you most like about the test?
5	What did you most dislike about the test?
6	Do you think that this session will affect your actions in the future? Yes/ No If yes, how?
7	Please state any suggestions for improvements to the session, including additional features or ideas for new questions that you think could be included
8.	Would you recommend this session to others? Yes/No
9.	Would you be interested in attending a more in-depth session about disabilities and Computer Assisted Assessment?
10.	Please use this space for any other feedback you would like to give.

Figure 3: questionnaire

13 responses were received (two people had to leave before the evaluation). Responses were generally positive and are discussed in detail below.

Q1: whether the session had increased the participant's awareness of disability issues in relation to technology and/or CAA, and if so how

Apart from the Disability Support expert from Learning Information Services, who responded that this was her job so she knew a lot about it already (though not necessarily the assessment side of things), all responded yes to both the technology and the CAA parts of this question.

With regard to technology issues, responses focused on the usefulness of the empathetic aspect of the test: "useful … to present how a disabled student may feel by putting staff in the position of students". The other main point raised was that people felt they had been reminded of the wide range of impairments that exist, when they had perhaps before only tended to think of a limited number: "learned about different forms/types of dyslexia", "helped me to think of the different types of disability", "new awareness of some of the specifics of various impairments, eg colour blindness".

Regarding specifically CAA issues, responses were more limited. They included "made me realise the extent to which visual and motor impairments can limit performance on certain types of assessment" and "useful to explore CAA and paper based assessment especially in relation to students with text reading problems". One respondent commented "in terms of CAA it showed how important it is to respond to the student straight away with an explanation, good formative style", which does not clearly relate to disabled students, though perhaps the respondent's idea here is that the quick formative response afforded by CAA is especially beneficial to some such students. It is often suggested that certain types of adjustment for the benefit of disabled students, for example the striving for clarity of expression for dyslexic students, are of benefit to all students. Pearson and Koppi (2006) say that an important principle of their staff development course on accessibility (disability) issues was "to encourage participants to think not only about making resources accessible but also to consider alternative approaches in the use of online learning to maximise the benefits for all students".

Q2: the number of questions in the test

All respondents agreed that there were not too many questions. Half (7) were satisfied with the number of questions, and half (6) thought that there should be more.

Q3: length of the session at one hour

No respondents judged the session too long. 8 of the 13 thought it was about right, and 5 said that it could be longer.

Q4: what you liked most about the test

The feature commented upon most was the interactive, "hands-on" nature of the test: "people learn best from experience". This is hardly surprising as few educators today would disagree with the idea of interaction as one of the key factors for successful teaching and learning. Three of the respondents commented on the dyslexia examples, two of them mentioning in particular the "mixed-up letters" and "jumbled words" example. One respondent described the test as at an "appropriate level for staff", and liked the feedback provided on answering each question and the links to other material. One person liked "the visual interface", simple as it was. Certain problems with the software surfaced during the test, causing one respondent to say ironically that the bits he or she liked best were "the bits that worked".

Q5: what you disliked most about the test

There was quite a lot of (constructive) criticism expressed here, which is summarised as follows:

- The interface could be better. There was "poor navigation between the questions", and "design of the pages not very 'pretty'".
- 3 respondents felt that there was a "lack of structured introduction to the questions", "no explanation of what its [sic] for/trying to prove". It wasn't clear whether they were asking for an online introduction to the test, or a revision of the verbal introduction, though the former seems more likely in the light of the comment "it would be good to have some warning/info about the test before the first question".
- On the questions themselves, there were comments on the small number, the fact that they were all multiple-choice rather than of other types, that the questions on hearing impairment were not yet available, that the question on tunnel vision could have been more realistic, that moving text would be good in the visual section, and that "the questions were difficult" – though this last could be considered a positive comment, since the aim of the test was to deliver difficult-to-answer questions.
- The context of the test could be different: "it might be good to use in groups and discuss responses prior to submitting to encourage debate about the issues".
- The important point was made that the test as it stood did not clearly point the way forward: "not sure how I would use my (newly gained) awareness to build websites and create quizzes".

Q6: whether the information given in the session would influence future actions, and if so in what ways

Two respondents replied "no", one saying "probably not specifically" and the other (who was clearly the Disability Support expert from Learning Information

Services) saying "I do this already! I don't think there was enough detail for people to feel they could go away and make changes but at least they are aware".

The remainder responded with a "yes", though their responses tended to show a vague and well-intentioned attitude rather than concrete proposals, which clearly reflects on the achievements of the session. Comments raised the following points:

- The respondents would have a changed attitude: "when meeting disabled students… I will be able to empathise with their problems", "has given me considerable insight into student needs".
- There was a general, non-specific, intention to "try to use the lessons", to "try to think about disability issues" etc.
- Particular areas mentioned were colour combinations (twice), font size and type, and question construction.
- Further dissemination of the material to staff was advocated: "I will talk to others developing ALT [assessment, learning and teaching] issues in general", "I will try to promote this session throughout the INN Faculty and direct lecturers to this information".
- There was also a reference to helping to progress current research in the disability area.

Q7. Suggestions for improvement, additional features, ideas for new questions

This section provided much helpful, critical feedback, summarised below.

- The important point was strongly made once more that advice on how to put the principles into practice was needed: "more helpful to have a session which actually shows you how to build a CAA product using the good points you have in the samples", "make stronger link to people's everyday work; give examples", "more examples of good/bad practice which delegates could evaluate".
- "More" of several features was requested – more questions, more time (especially to follow the links), and more information on other types of disability, for example restricted mobility (requiring the use of a wheelchair) and other "obvious" impairments.
- The use or demonstration of specialist software (assistive technology) such as screen readers was mentioned.
- Some improvements to the set of questions were requested: "the visual and interactive features of the questions could be improved to better illustrate disability issues", "be good to get the 'hearing' section online".
- One respondent suggested the possibility of "having a student with learning disabilities attend the session to air their views".

- Another respondent said that the session might be useful for a specialised group, such as a course development team.
- Liaison with a local Further Education College was suggested, as they have "a very good set of teaching tools for teaching people with physical and mental impairments".
- Making the session available on the Leeds Metropolitan University website was advocated.
- One comment that is fundamental to the way forward for this work was: "it's too big a subject for 1 hour and can't cover 'the basics' for people who don't work regularly in this area".

Q8: whether you would recommend this session to others

9 of the 13 respondents said that they would recommend the session to others, two did not respond and two replied that they would not recommend it at the moment.

Q9: any other feedback

A few further points were made here, some of them reiterating earlier ones such as the need for "a shortlist of a few simple actions/guidelines/do's and don'ts that participants can focus on as an 'outcome'". Navigational aspects were again raised ("make 'useful links' questions open in a new window"), as well as organisational issues relating to the session. These included sharing the contact details of the session presenters and those attending, providing better background information on the presenters and the project, and providing a zip file of the question website available to the participants.

Second version and second run

The feedback provided from the first run of the test provided many ideas for improvement. The timescale before the next test run, which was timed to take place during Leeds Metropolitan's annual Staff Development Festival in September 2006 (Leeds Metropolitan University, 2006) was relatively short, given staff time commitments in the intervening period. Effort was concentrated on

- improving the interface and especially the navigability
- ensuring that the test was robust and error-free
- adding an introductory screen of explanation about the aims and format of the test
- adding more questions
- improving the set of web links referring to relevant information and advice

The original question interface divided the screen into three sections (see Figure 2). These held the question itself on the left and one or two useful

links at the bottom of the screen. The right hand section contained a short explanation of the impairment illustrated, instructions if relevant on how to view the question in its "impaired" or "unimpaired" form (normally by clicking a button), and sometimes brief advice. The re-designed screen placed the question in the middle of three sections, with instructions on the left and a set of web links on the right (see Figure 4).

Figure 4: sample question test 2

Several additional questions were created, including two questions on hearing impairment. One of these showed a video of poor practice where lip-reading is being used – the lecturer, who has a beard and moustache, turns away whilst speaking, brushes his hand across his mouth, and generally makes it difficult for the lip-reader. The other question played an audio file giving an example of tinnitus.

A much fuller set of web links was incorporated in the test, in an attempt to address some of the criticisms raised by the participants in the first test. Some of these links can be considered useful in providing constructive advice on how to prepare teaching materials and CAA tests to take account of the needs of disabled students, for example in the areas of dyslexia (CETIS-TechDis Accessibility SIG, 2006) and colour-blindness (Lighthouse International, 2005). However, there is still a considerable need for further thought and development in this area.

The test was this time presented at a workshop session during a Staff Development conference. No fixed PCs were available at the conference venue, so wireless-enabled laptops were used. These generally worked well, though fixed PCs may be preferable as using an unfamiliar laptop can slow down working. The session was an hour long, and was run by the same three presenters as before, and also by Andrea Gorra, a newly appointed Research Officer for CETL ALiC.

Evaluation and feedback from second test

A small amount of feedback was solicited at the end of the session by way of a brief questionnaire, and responses were received for 11 of the 14 participants in the session. The questions were

- did you find this session useful, and if yes, what was useful?
- any suggestions for improvement?
- any other comments?

In general, the participants said that they had found the session valuable in increasing their awareness and understanding of disability. Much of the detailed feedback was on similar lines to that received after the earlier session, though there was a greater emphasis on the need for examples to follow. A typical comment in the suggestions section read "some examples of how these considerations might be applied to a computer-aided assessment in a specific discipline (i.e. before and after)". There were several references to the need for future developments, for example "work with others in faculty and university to develop more … session[s]", and "best followed up with more detailed sessions, e.g. on hearing impairment / dyslexia". An important point about measuring what the test achieved was raised (though not entirely clearly) in "– are the results of the test then colleted [sic] …. – how might students/learners measure overall progress/learning + feedback overall on questions submitted".

Other feedback

Some additional comments were received from Alistair McNaught of TechDis , (TechDis, 2006a), regarding technical aspects of the test. He was positive in his comments on the overall concept. He also suggested the possibility of adapting and incorporating SimDis the disability-simulation section of the TechDis Web site (TechDis, 2006b), into the test.

Perception of improvements required

Arising from the feedback comments, there appear to be three main areas that should be considered – technical, pedagogical, and presentational.

Technical improvements

Whilst there has been considerable progress between the first and second versions of the test, some minor errors remain, and a revision of the implementation of the test is planned.

Pedagogical improvements

Clearly there is much work to be done here in providing examples of good practice in CAA for disabled students, clear advice on what staff can do, and

possibly (as was suggested by one participant) some "before " and "after" scenarios. The range of questions could be extended, and the current questions scrutinised for shortcomings.

Presentational improvements

Decisions on whether to continue to present the test as a short face-to-face workshop, whether to offer it as an online resource (which could then be made available outside Leeds Metropolitan University, perhaps to Further Education colleges in its Regional University Network), and whether to expand parts of it into more detailed follow-up sessions remain to be considered. A proposal to run it as a workshop of one and a half hours at the 2007 annual conference of the Higher Education Academy (Higher Education Academy, 2007) has been submitted. There is the larger question of whether the current session length is too short to be able to offer anything sufficiently useful. Pearson and Koppi (2006) discuss a staff development programme whose aim is "to enable staff to develop competence in the design of inclusive and accessible learning resources, to apply their knowledge in the development of their own projects and to encourage other staff to consider accessibility issues in e-learning resources". Although this has a wider focus than just CAA, it is interesting to note that the two delivery models that they describe for their accessibility course are "the face-to-face one-day workshop; and the flexible online course which is more intensive and may take place over one or several weeks or even a whole semester". Whether a one-hour course is sufficient to achieve anything useful needs to be reviewed, although one of the initial aims of the project was to provide a session that staff could easily find time to attend.

Limitations of evaluation

So far, evaluation has consisted primarily of feedback from the staff involved. Evaluation of staff development in universities may be undertaken in different ways, for example using the Content/ Input/ Reaction/ Output model (Northumbria University, 2006). A feature of the evaluation that has not yet been undertaken in this study is the "output" phase of such a model, which would consist of attempting to assess the impact of the staff development activity. This could include analysis of the take-up (by measuring the number of staff who choose to interact with the test, and by recording the adoption of it by other institutions such as Further Education colleges), as well as more extensive and structured collection of feedback from users. Possibly a community of users engaging in a dialogue around the test, based on current social networking principles, could be encouraged.

Conclusion and future work

This staff development test to introduce disability issues in relation to technology and CAA has been found to be instructive and useful by its participants. Improvements have been made, but further work remains to be

done in several areas, especially with regard to providing useful models to staff in how they may improve their practice and in the area of assessing the test's impact.

References

CETIS-TechDis Accessibility SIG (2006) *Cognitive Disabilities – Web design for Dyslexia*, <http://www.cetis.ac.uk/members/accessibility/links/disabilities/cogdis#web> (12th February 2007)

Durham University (2006) *Active Learning in Computing,* <http://www.dur.ac.uk/alic/> (12th February 2007)

Harrison, G. and Gray, J. (2006) *A Computer-Assisted test for Accessible Computer-assisted Assessment*, <http://www.caaconference.com/pastConferences/2006/proceedings/Harrison _G_Gray_J_s1.pdf> (12th February 2007)

Higher Education Academy (2007) *Higher Education Academy Annual Conference 2007* <http://www.heacademy.ac.uk/events/conference.htm>

Leeds Metropolitan University (2006) *Staff Development Festival 2006 <http://www.leedsmet.ac.uk/festival/06/index.htm> (12th February 2007)*

Leeds Metropolitan University (2007) *Active Learning in Computing*, <http://www.leedsmet.ac.uk/inn/alic> (2nd March 2007)

Lighthouse International (2005) *Effective Color Contrast, Designing for People with Partial Sight and Color Deficiencies*, <http://www.lighthouse.org/color_contrast.htm> (12th February 2007)

Northumbria University (2006) *Human Resources, Evaluation of Staff Training and Development: Guidance Notes* <http://northumbria.ac.uk/sd/central/hr/std/td_eval/> (12th February 2007)

Pearson, E.J. and Koppi, A.J. (2006) Supporting staff in developing inclusive online learning. In: Adams, M. and Brown, B. (eds) *Towards Inclusive Learning in Higher Education*. London and New York, Routledge.

Techdis (2006a) *TechDis* < http://www.techdis.ac.uk/ > (12th February 2007)

Techdis (2006b) *Sim-dis: A view into the unknown* <http://www.techdis.ac.uk/resources/sites/2/simdis/index.htm> (25th February 2007)