

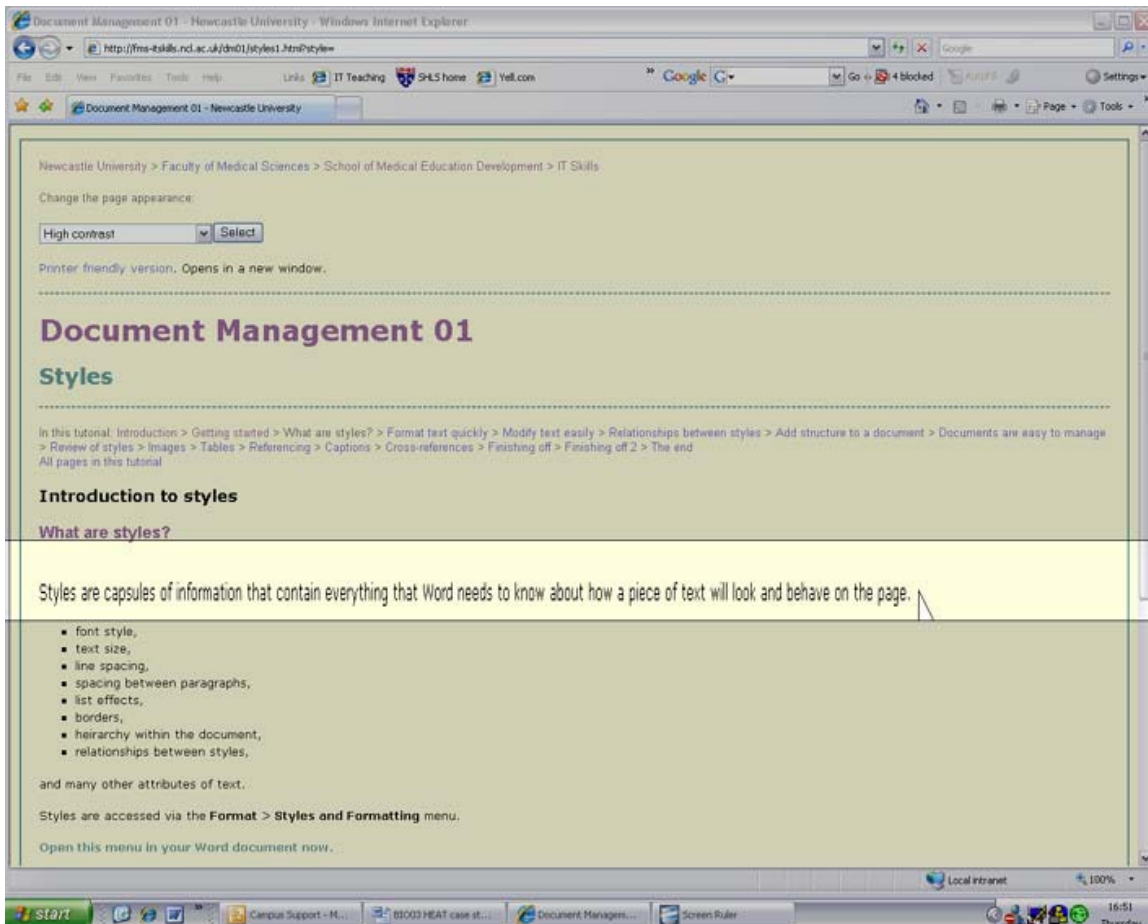
Supporting online learning using assistive software: an evaluation of ScreenRuler

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Introduction

Assistive software is designed to enable access to a computer interface for people with a range of disabilities. At Newcastle University we currently have a range of assistive software available across the campus computer network but much of this software, such as screen-reading and text magnification packages, is complex and requires significant training before it can be used proficiently.

ScreenRuler, produced by Claro Software, is designed to be easy to use and with limited but specific function: an alternative to “feature-rich” software packages that are too complex for the intended user group (Blenkhorn 2005). ScreenRuler provides a x2 magnified movable ruler of changeable width across the screen to assist with on-screen reading. Text is only magnified in the vertical plane, increasing vertical mouse movement to traverse the screen, but not introducing additional horizontal movement (see Figure 1).



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Figure 1. A screenshot of ScreenRuler over an online IT tutorial

This distorts the text slightly but does not reduce readability. The magnified ruler can invert colours and the unmagnified screen above and below can be independently darkened to increase contrast against the ruler. TechDis and the HEA Bioscience Centre purchased five ScreenRuler licences to trial within the Faculty of Medical Sciences at Newcastle University.

The School of Medical Education Development delivers academic IT teaching to undergraduate and postgraduate students within the Faculty of Medical Sciences. Three courses (Document Management 01 and 02 and Data Handling and Spreadsheet Skills) are delivered using online tutorials and involve a lot of on-screen reading. These courses are delivered in two-hour supervised practical sessions within computer clusters and the course plus associated materials are available online and can be accessed by students outside of the session too.

This trial originally aimed to identify the benefits of using ScreenRuler in conjunction with online tutorials to assist students to read the information in the courses. An investigation into attitudes towards this software and perceived benefits was also conducted, to gauge how successful uptake of this or similar software might be if used in e-learning. This report details the study and its findings, making suggestions for future work and development.

The study

The software was installed on one machine in each of the five main clusters within the Faculty building. The software was available to all students using these machines at any time throughout the study.

A short questionnaire was devised and trialled which gave qualitative feedback about the perceived benefits of the software (see Appendix 1). No quantitative or rigorous study was conducted as the purpose of this study was to identify perceived benefits of using the software by users rather than to measure actual benefits.

The software was promoted on its benefits to learning rather than as a piece of assistive software:

“It is designed to aid on-screen reading by increasing text size, making it easier to see on screen, and providing a context to read within, therefore increasing reading speed and ease.

“This software may be beneficial to people with forms of dyslexia, and perhaps to people with temporary eye impairments, including hangovers, headaches, eye strain etc.”

It was anticipated that a range of students from the Faculty would be selected to trial the software, including students declaring dyslexia and visual impairment disabilities. Time constraints and privacy of information regarding declared disabilities prevented this selection process, but a range of students participated in the study. Students were asked to declare any disability on completion of the anonymous questionnaire.

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Phase I

Students attending scheduled IT sessions were asked to use the ScreenRuler software whilst they worked through the online tutorial and provide feedback on the software via a paper-based questionnaire. Students who sat at machines with the software installed were asked to participate in the study and were not identified specifically on predefined criteria such as course, disability or ethnicity.

Phase II

Following feedback from students who had trialled the software in the IT sessions, it was clear that the software was not as beneficial in this setting as was hoped (see Results and Feedback section) due to the range of software used in the IT sessions. Therefore, students were asked to participate in the project whilst working on their own work as well as in the IT sessions. Notices were placed on the top of the monitors where the software was installed requesting student involvement in the project. The questionnaire was put online for participants to access at a convenient time. Students were also approached whilst working in the cluster, in particular those students who appeared to be doing a lot of on-screen reading.

Results and Feedback

Results throughout the study were collected from 16 students completing a range of work-related activities including:
on-screen reading (scientific journals etc);

- Document Management 01 tutorial involving Word, on-screen reading and multimedia files;
- Data Handling and Spreadsheet Skills tutorial involving Excel, on-screen reading and multimedia files;
- Using a statistics package; and
- Working with a Word document.

Two of the 16 students declared a disability: one stated dyslexia; the other a visual impairment. The others either have no disability or health impairment, or declined to comment.

General analysis

Most students configured ScreenRuler differently; the average estimated height of the ruler was 4cm but ranged from 1cm to 6cm. Eight of the 16 students had the upper part of the screen shaded to an average darkness of 8 on a scale of 0 to 10 (where 0 is off and 10 is black) however there was great variation in the darkness used with five of these students having the screen darkened to 4 or less. Seven students shaded the lower part of the screen with an average darkness also of 8 but only four of these students using a darkness of 4 or less. Two students recorded that they had inverted the colours in the magnified strip and four different students changed the pointer colour.

Whether these settings reflect those that these students would have actually chosen had they been using it on their own accord is impossible to say. It does demonstrate that they

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were willing to experiment with the software and that they altered the width of the ruler and changed the unmagnified screen brightness to suit.

Initial perceptions of the software

Fifteen students provided comments on their perceptions of the software upon initially accessing it and then whether their opinions changed whilst they used it.

Initial impressions were split: eight of the 15 students had negative opinions of the software on first using it; comments included:

- “Find it quite difficult to use as when it is on a certain section you can’t read the section directly below.”
- “Not very useful, didn’t really need it.”
- “It seems a bit strange at first...”
- “...that you could do that with the text felt a little weird.”
- “Quite awkward and strange.”

However, the students who were initially positive about it recognised its innovative quality and usefulness for on-screen reading:

- “For reading chunks of text, it’s useful as it focuses your attention and prevents you from ‘getting lost’.”
- “Simple but useful software.”
- “Helpful as it magnified the text...”
- “Interesting concept. Seemed like a nice idea.”

Student opinion changed significantly as students became accustomed to viewing the slightly distorted text and moving the mouse to reveal text immediately above and below the magnified area. Eight students changed their mind from a negative to a positive perception whilst five retained their original opinions. This resulted in 10 students liking the software against five who did not. Students cited two main reasons for their change of mind: improved ease of reading on-screen and becoming accustomed to the new interface.

Only two students who initially positively received the software changed their minds to a more negative perception, citing slower navigation, irritation with the software, not being able to see the whole page and difficulty with using Excel as reasons for the change in perception. This last reason was cited during a period of scheduled IT teaching that used Excel extensively throughout. This prompted a change to the approach of the project and phase II occurred.

Students were asked whether the software helped or hindered them in their work and the response was split: eight students thought the software helped them; six felt it did not. They provided some very detailed feedback to elaborate on their answer and all agreed that it would be useful for continuous on-screen reading but they concurred that if the activities were varied, including editing tables and diagrams and changing between a range of programs, then it was unlikely to be useful because of the distortion, distraction and overlap on the screen. This is reflected in the data: most students completing complex tasks found the software a hindrance where as most students doing on-screen

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reading found it benefited them. Two students disliked it for on-screen reading, again citing the distorted text and hidden parts of the screen as reasons for this.

Long-term perceptions of the software

Students were asked whether they would consider using the software again following their experience so far and 66% of them agreed that they would: 10 students as opposed to five who replied no. Those who said that they would use it again cited the benefits for on-screen reading as the primary reason for returning to the software. The student with a visual impairment also suggested that it would be useful if “my eyes are bad that day or if I am tired.”

Those who said they would not use the software again considered the benefit provided by the software for on-screen reading was outweighed by the increased awkwardness of navigating the screen and the hidden text above and below the magnified bar.

Students were asked to identify who they considered to be the main audience for the software and a number of suggestions were given:

1. Users with a visual impairment (9 citations);
2. Those with special reading needs (4 citations);
3. People completing lots of on-screen reading (4 citations);
4. People with general disabilities; Children; Anyone (1 citation each).

They were asked to consider whether they would be discouraged from using the software if they did not regard themselves as part of the target audience. Only one student considered that not being part of the target audience would discourage them from using the software, however four students restated that they would only use this software if they found it to be particularly beneficial or to complete on-screen reading: reaffirming previous comments.

Discussion

Three key findings are prevalent from this research.

Users require time to adjust to ScreenRuler

The changes that ScreenRuler makes to the screen including the distorted text and hidden surrounding text, plus the additional mouse input required to operate it, require time to adjust to. The software is extremely easy to use and quick to load, but users need to adjust to the changes it enforces on the screen and with the input. This change does not take very long and users should be encouraged to persevere with the software whilst they adjust.

ScreenRuler is extremely beneficial for on-screen reading

On-screen reading is an activity which will increase as it continues to be routine to access journals and other academic work electronically. ScreenRuler is complicated to use for simultaneous activities, especially those that require much interaction with icons or require whole-screen visualisation (such as movies or pictures). However, it has great perceived (and actual) value for on-screen reading and therefore should be promoted on such merit. One student suggested that a ‘hot key’ to quickly turn the ruler on or off would

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increase the value of this software as it would enable discretionary use of the software during mixed tasks.

Unfortunately, the nature of the online tutorials delivered to Faculty of Medical Sciences students at Newcastle University negates the use of ScreenRuler because of the constant change of software environment and the switch between on-screen reading and completion of activities. However, should the software be updated to include such a 'hot key' it would be worth investigating its benefits for the online tutorials again.

Being assistive software did not discourage users

Students were not inhibited from using the software if it demonstrated benefit to them, despite not considering themselves part of the target audience. ScreenRuler is assistive software and currently most assistive software is publicised on this basis which can exclude users who either do not have a disability or dislike the association.

It is encouraging that students are willing to use software that assists them in their interaction with the computer, regardless of their ability. This suggests that other assistive software packages that demonstrate benefits for a variety of disabled and non-disabled users, such as mind-mapping software and read-out-loud programs, may be well-used if promoted as aids to learning, for instance, rather than as assistive software.

Further work

The third finding from this project is worthy of greater investigation under two main areas. Firstly, whether the complexity of the software deters users and therefore whether highly usable software such as ScreenRuler and other Claro software packages would be of greater benefit to students than more complex but similar programs. Secondly, whether the way that software is promoted, either as an aid to learning or as assistive software, affects the uptake and perception of the software thereby leading to a change in software usage.

Newcastle University are currently reviewing the range and quantity of assistive software available across campus, aiming to increase the usage of this poorly utilised but expensive group of software. Conclusion from any further study will direct this review and could ultimately overhaul the way assistive software is delivered and publicised to students.

Conclusion

Software that is easy to use is likely to be used more frequently, and stigma associated with assistive software is likely to decrease if its use becomes more commonplace. Normalising the use of assistive software will improve the working environment for all users and will contribute to improving attitudes towards disability. It also has the potential for facilitating student interaction with electronic materials, thereby supporting the learning and teaching environment.

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Reference

Blenkhorn, P. (2005). Assistive Technology - A help or a barrier to access? Balancing the Equation Conference, University of Southampton, Assistive Technology Service.

Appendix 1

[ScreenRuler Evaluation Questionnaire](#) (MS Word - 33 KB)