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Reading course materials in e-book form and on mobile devices

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Chapter 13

(final but unedited copy)

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Reading Course Materials in e-book Form and on Mobile Devices

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1. Context and Background

Open University (OU) students, who are distance learners, typically have to fit their learning activities around other tasks, such as work and family commitments. On most courses they receive printed course materials, presented as course books, study guides, assignment guides and readings. They may also be sent other resources, such as video, audio or software, and may be able to make use of electronic resources and on-line conferencing. Providing access to learning resources in an easily portable form can enable students to make more effective use of time while away from the home or office environment. At the same time, use of a computer as a medium for reading and interacting with course materials offers advantages such as efficient searching, convenient storage of large amounts of information, and navigation via hyperlinks that connect sections of text. Given that handheld computers such as Personal Digital Assistants (PDAs), along with e-book reading software, are becoming more widely available, we have been considering what implications the possibilities and constraints introduced by these tools have on the activity of reading for learning purposes.

An evaluation study was first undertaken at the Institute of Educational Technology during 2001, centred on the Open University Masters level course, Applications of Information Technology in Open and Distance Education (Kukulska-Hulme 2002; Waycott & Kukulska-Hulme 2003; Waycott 2004). The study was funded by an OU Teaching Fellowship Award in recognition of the course team's 'innovation and

excellence' in global on-line course delivery. Students were supplied with Palm m105 PDAs and WordSmith, a commercially available document editor and viewer, enabling them to read some course materials on the PDA. Findings showed that while the portability of the device was welcomed by students, and the electronic format was advantageous, limitations such as the small screen size, navigation difficulties, and slow and error-prone methods for entering text, made it difficult to read and interact with documents. The PDA also changed the way students interacted with the study text: they were less likely to take notes and highlight text on the PDA, compared with the strategies they employed when reading print-based materials. However, students devised strategies to overcome limitations of the PDA, such as using abbreviated notes which they transferred to their desktop computer, and they used the PDA in conjunction with print materials and paper. The study recommended that documents should have more salient contextual clues about the reader's location within the document and more flexible navigational tools such as hyperlinks.

At approximately the same time, the Open University launched a project on e-book production and deployment (the E-Book Pilot Project 2001-3) funded by a university initiative in e-learning. The project set out to investigate technical aspects of producing Open University course books and other course materials in e-book form without increasing overall production costs. A pilot study was conducted to trial and to investigate the use of such e-book materials on a number of courses with a view to their future general use as an alternative study medium, and this was accompanied by a formal evaluation by staff from the Institute of Educational Technology. Following on from this, the university is in the process of distributing course material e-books to students on around 200 courses. It is expected that most students will access these on their desktop computer, but growing numbers of students are also users of laptop computers and PDAs. This case study describes the evaluation of the E-Book Pilot Project, focusing on teaching and learning aspects and the use of laptops and PDAs, rather than e-book production issues.

2. Rationale and Problem Statement

The evaluation was undertaken in order to identify the perceived value of e-books from the point of view of OU students, as well as course teams, i.e. the authors and developers of course materials. In relation to student use, we needed to find out:

- whether students welcomed the possibility of having materials in e-book format
- what problems were encountered and how they were overcome
- how e-books might change the learning experience
- what it would take for students to make the most of this technology
- how disabled students cope with the technology and whether they can benefit from this means of delivery.

OU students largely fall into the 25-45 age range, although there are many outside that range. The university takes special responsibility for making higher education accessible to people with disabilities; well over 7,000 students belong to this category. The e-book files formed a part solution to implementing the requirements for compliance with the Special Educational Needs and Disability Act 2001 of the UK Parliament. This came into force in September 2002 (incorporated as Part 4 of the Disability Discrimination Act, 1995) and concerned students with various categories and degrees of disability, such as motor impairments giving difficulty in handling books, visual impairments needing large print display or a degree of screen read out of text. Most of the e-books provide access to course texts via keyboard command and screen reader software. The files can be used as an 'intermediate' file format for printing to Braille printers.

From a teaching perspective, the evaluation sought to establish:

- the opportunities and drawbacks for course teams
- whether the opportunities were understood and valued
- what kinds of material might be delivered in e-book format to students
- what impact this technology would have on course team and tutor skills and roles
- any cost implications for course production.

Interviews were conducted at the start of the evaluation to establish expectations and experiences that participants already had with the technology, how they anticipated that e-book materials would be produced, and to answer and further refine the questions that the evaluation would try to address. Focus group meetings were organized at the end of the evaluation project. They enabled course team participants across the university to share their experience, and to discuss some evaluation findings and their implications.

Participants were drawn from the five courses that took part in the pilot project, from the faculties of Arts, Science, Social Science, and Maths and Computing: Exploring Psychology, Philosophy and the Human Situation, The Molecular World, Governing Europe, and User Interface Design and Evaluation.

3. Technology and Infrastructure

E-books were created from existing printed course materials by the university's Learning and Teaching Solutions (LTS) unit. It was decided to use Adobe Acrobat file format which could be used on desktop and laptop computers and PDAs. Students could download the e-book files and instructions for using them from their course web site in addition to receiving the printed materials. To read the e-books, they were expected to use the Adobe Acrobat eBook Reader software, version 2.2 (Adobe has since combined the eBook Reader and the general Reader in a single application). This software was made available via their course web sites, and on a generic CD ROM containing a number of applications and tools, which is sent out annually to students on a wide range of courses. The eBook Reader software included facilities for managing a personal library of e-books, facilities for different kinds of annotation and for book-marking, and to hear the text read aloud. Hyperlinks were not available in the e-book texts in the pilot project, but it is intended to make them available in the future.

The E-book Pilot Project determined that e-books should be complementary mirror images of existing print material to give added services to students. The e-book file is created from the PDF file that is used to print the course material. The e-book PDF files were processed to ensure small file sizes for ease of downloading from a web site, and screen readability. They were produced to other technical specifications to improve appearance on screen. The aim was

to make the file size no larger than 2Mb – 3Mb, with 4Mb being a maximum. This equated to download times on a normal Internet modem connection of approximately 6 minutes, 9 minutes and 12 minutes respectively. Where file sizes exceeded this size, the files were split into a number of constituent parts at logical points, e.g. at the beginning of a chapter. Pagination, page numbers and references were exactly the same as for the print versions.

Course teams specified which items they wished to deploy as e-books, and the deployment of e-books on a course web site was undertaken by LTS. It was also possible to give some students e-book files on a course-specific CD ROM. Students could run the e-book files directly from the CD ROM if they so wished; any notes or highlights they made were automatically stored on their own local hard disk and the software automatically associated these with the correct files on the CD ROM. Students could copy the files to their local hard disk if they so wished or to a laptop. They could also be transferred to PDAs such as Palm or Pocket PC, although no specific support for this was offered during the pilot project.

4. Engaging with students

Students were not given training in the use of e-books, however along with the e-book files they could download a set of instructions for installing and using the Adobe Acrobat eBook Reader software. The instructions covered aspects such as opening a file and creating a library, and the main features of the software. The document also explained that Acrobat Reader (though not Acrobat eBook Reader) was also available for the Palm PDA, and for the Pocket PC platform, and that they could transfer PDF files to these handheld computers and read the eBook files there if they wished. The document went on to say that the university would not be able to offer any support for use of platforms other than the standard Windows environments. Furthermore, it was pointed out that the university offers students and staff a telephone helpdesk service, dealing with course-related technical computing queries.

Students on the courses involved in the project were offered the opportunity to respond to two questionnaires – one administered early on in the course, and one at the end - regarding their expectations, experiences and opinions of e-books. The questionnaires

were administered via the First Class asynchronous on-line conferencing system used by the students, accessed through the course web sites. Students were given the option to submit their answers directly through the web site, by e-mail, by printing the questionnaire and posting it, or they could request a printed version to submit by post. Not untypically for Open University students, who are mostly mature learners, 70 per cent of respondents to the first questionnaire (and 65 per cent to the second questionnaire) were in the 31-50 age bracket. The questionnaires gathered information about students' previous experience of e-books and computers, their expectations of how they might use Open University e-book files, actual frequency of use, specific functions of the eBook Reader software, where the e-books were used, and whether they were read on screen or used to print selected sections of the course materials. They addressed disability issues such as whether e-book use might be restricted by disability and whether e-books could make studying easier.

There were also direct observations of four volunteer students. These enabled us to establish specific usability issues involved in accessing and using e-book materials, to look at how effectively students performed tasks and used software functions, and to observe student reactions. The participants undertook a series of tasks using two e-book files produced for an Arts course in philosophy. The sessions were audio and video recorded in the Data Capture Suite at the Open University's Institute of Educational Technology, capturing images of the computer screen, participant's behaviour and mouse movement.

5. Evaluation and Outcomes

5.1 Findings relating to students

Our evaluation participants turned out to be largely confident and experienced IT users. Overall, they were very positive about e-book provision. A high proportion of those who responded to the first questionnaire had access to computers at work and at home, nearly half were regular laptop users and over a fifth were regular PDA users. They saw the main advantages of e-books as being portability, especially on laptops, and they felt that e-books made it easier for them to study at work. E-books could provide a useful

extra copy of materials, and were considered good for searching, cut and paste, printing extracts, and highlighting. There was some suggestion of possible benefits from the ability to enlarge print, and for dyslexic students.

Although the majority of respondents used their e-book course materials on their desktop PC, we found that over a quarter used them on a laptop, and a small number of students used them on a PDA. Most felt that e-books should not replace print. The main usability and ergonomic issues were slow downloading of large files, some problems navigating the documents, and some discomfort in terms of eyestrain. Students appreciated being able to access course materials at work, read on the train, and print summaries for revision and study. Other positive aspects identified were using e-books as stand-ins for lost or late print materials, and easier referencing and highlighting. 'Copy/paste' and 'find' (search) were well-used facilities. Some functions of the e-Book Reader appeared to have been under-used, which we can speculate may have been due in some measure to students not accessing or reading the instructions. The students who took part in the observations certainly tended to use 'trial and error', rather than referring to the user instructions. They encountered problems with downloading files, with getting satisfactory page and font size and text clarity, with navigation and cursor control. They were confused by similar operations (select/highlight; go to page/go to bookmark), and missed some 'hidden' features which could only be revealed by right-clicking their mouse.

5.2 Findings relating to course teams

Course teams were of the opinion that the use of e-books needed to be integrated more closely into learning and teaching strategies. They indicated that pedagogical advice on e-book use would have been helpful and that the impact on study strategies should be considered. They wanted a general statement about what e-books enabled students to do; they also wondered what an e-book could not do, for example it was thought that individual diagrams could not be printed from an e-book, whereas student feedback indicated that some students would want to, or try to, print diagrams. They wanted a reference to more detailed pedagogical advice that they could perhaps adapt for their course and pass on to students. It would include advice on learning strategies, e.g.

effective use of book-marking (to deter students from book-marking ‘everything in sight’), and the dangers of ‘accidental’ plagiarism. There were concerns that pagination might be different in e-books and print, resulting in confusing or incorrect page references. They were unclear as to what differences there might be between using an e-book on a PC and on a PDA.

Course teams also wanted to see advice for tutors. This would focus on plagiarism issues and the fact that e-books can inadvertently ‘prioritize’ some course materials, as a result of their portability and easy access for students on the move. Finally, course teams wanted to know whether the computing service would be providing plagiarism detection software.

6. Institutional Aspects and ‘What Next?’

The production of e-book versions of printed material is now done as an automated process as a by-product from the print production process, thus ensuring that the service can be rolled out at very little cost. We concluded from our evaluation study that e-books were welcomed, but largely regarded as a complementary technology. E-book users relied on intuitive, sometimes inefficient, ways of working, and some potentially useful facilities remained undiscovered. However, there were indications of new study possibilities, such as printing extracts to read on the train, making summaries and compilations for revision, and reorganizing texts. Implications of the use of ‘cut and paste’ invite further investigation, both because of current concerns that studying with electronic texts may encourage plagiarism and more positively, because there are potential benefits of being able to quote and reference with precision and to discuss extracts with other students or tutors in on-line conferences. We have continued improving user instructions and the incorporation of hyperlinks is high on the agenda for the future.

The e-books pilot project was a preliminary investigation which enabled us to identify key issues. We are looking to develop pedagogical advice for course teams and students and will continue learning from research and published guidelines (e.g. Scholnik 2001; Simon 2001; Wilson, Landoni & Gibb 2002; Wilson & Landoni 2002; Bellaver &

Gillette 2003; Ingraham & Bradburn 2003). Further research should explore student rationale for selecting technology, i.e. their reasons for choosing to access materials in print, on their desktop, laptop or PDA, along with patterns and contexts of mobile use, and any differences between use patterns across disciplines and pedagogical approaches in various courses. It will be important to explore the extent to which students are accessing other e-books available through the Library and on the Internet, and any accessibility problems that may be encountered when downloading older versions of e-books and PDFs. E-books are available from many web sites such as the University of Virginia's E-book Library (University of Virginia 2004) and through subscription arrangements with publishers such as the Taylor & Francis Online eBook Library (Taylor & Francis 2004).

Future research should also seek to determine which properties of the printed document are successfully modelled on the PDA and which ones are not. It may be the case that a strong focus on the document perspective is in fact counter-productive on a PDA, and that the device is more valued for making notes, quick references, audio notes and perhaps location specific reading. We are also interested in the move toward the sharing of annotations and content between users (Desmoulins & Mille 2002).

References

Bellaver, R.F., & Gillette, J. (2003) The Usability of eBook Technology: Practical Issues of an Application of Electronic Textbooks in a Learning Environment, *The UPA Voice*, 5 (1), January 2003. On-line. Available HTTP: http://www.upassoc.org/upa_publications/upa_voice/volumes/5/issue_1/ebooks.htm (accessed 22 November 2004).

Desmoulins, C., & Mille, D. (2002) Pattern-Based Annotations on E-Books: From Personal to Shared Didactic Content. IEEE International Workshop on Wireless and Mobile Technologies in Education (WMTE'02), August 25-30, 2002, Växjö, Sweden.

Disability Discrimination Act (1995) What The Law Says. On-line. Available HTTP: <http://www.disability.gov.uk/law.html> (accessed 22 November 2004).

Ingraham, B., & Bradburn, E. (2003) *Sit Back and Relax: Issues in Readability and Accessibility for Electronic Books*, A TechDis/ILTHE Case Study Report, November 2003. On-line. Available HTTP: <<http://readability.tees.ac.uk/Techdis%20report.htm>> (accessed 22 November 2004).

Kukulska-Hulme, A. (2002) Cognitive, Ergonomic and Affective Aspects of PDA Use for Learning, Proceedings of European Workshop on Mobile and Contextual Learning, University of Birmingham, 20-21 June 2002. On-line. Available HTTP: <<http://kn.open.ac.uk/public/document.cfm?docid=2970>> (accessed 22 November 2004).

Scholnik, M. (2001) A Study of Reading with Dedicated E-Readers, PhD dissertation. On-line. Available HTTP: <<http://12.108.175.91/ebookweb/survey.miriam.scholnik.pdf>> (accessed 22 November 2004).

Simon, E.J. (2001) Electronic Textbooks: A Pilot Study of Student E-Reading Habits, Institute for Cyberinformation, *Future of Print Media Journal*, Winter 2001, Kent State University. On-line. Available HTTP: <<http://www.futureprint.kent.edu/articles/simon01.htm>> (accessed 22 November 2004).

Taylor & Francis (2004) Online eBook Library. On-line. Available HTTP: <http://www.jisc.ac.uk/index.cfm?name=coll_tandf_ebooks&src=alpha> (accessed 22 November 2004).

University of Virginia (2004) E-book Library for the MS Reader and Palm Devices. On-line. Available HTTP: <<http://etext.lib.virginia.edu/ebooks/ebooklist.html>> (accessed 22 November 2004).

Waycott, J., & Kukulska-Hulme, A. (2003) Students' Experiences with PDAs for Reading Course Materials, *Personal and Ubiquitous Computing*, 7 (1): 30-43.

Waycott, J. (2004) The Appropriation of PDAs as Learning and Workplace Tools, unpublished PhD thesis, The Open University, Milton Keynes, UK.

Wilson, R., & Landoni, M. (2002) Electronic Textbook Design Guidelines. On-line. Available HTTP: <<http://ebooks.strath.ac.uk/eboni/guidelines/index.html>> (accessed 22 November 2004).

Wilson, R., Landoni, M., & Gibb, F. (2002) Guidelines for designing electronic textbooks. Sixth European Conference on Research and Advanced Technology for Digital Libraries (ECDL 2002), Rome, Italy, 16-18 September 2002.