

## ELECTRONICALLY MEDIATED LEARNING MATERIALS

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### INTRODUCTION

In this chapter, we explore the changing dynamics associated with the shift towards electronically mediated learning materials and the potential consequences for expansion and take-up of e(text)books, dbooks and the likely impact of this shift on more traditionally published and printed material.

For the purposes of this chapter, we use the term *electronically mediated learning materials* to include digital text, digital images and video, digital music and sound, and more ephemeral *interactive* experiences associated with the web. We settled on this particular term to indicate that the threat to printed learning materials is more multi-faceted and complex than the prospect of students carrying around *etextbooks* on their ebook readers or palmtop computers.

In this chapter, we:

- Establish a rationale for our study;
- Explore the ways in which *foundational reading and learning experiences* are changing and how these changes are being enabled and mediated by various technologies;
- Examine the breadth of experimentation taking place in educational settings, both in Australia and overseas, and the ways in which teachers and students are adapting to electronically mediated learning media.
- Investigate the ways in which *modes of engaging* with learning media are changing and the *pedagogical implications* of these changes.
- Look at the various *modes of use* of electronically mediated learning media and how these modes of use affect user expectations, influencing and reinforcing decisions about the types of learning media selected.

- Broadly examine the conditions necessary for the potential displacement of traditional books and textbooks by electronically mediated learning media.
- Explore the concept of a transitional space between printed matter and digital media and identify opportunities for Australian publishers and printers based around the changing needs, expectations and behaviours of teachers and students.
- Speculate on the effects that a change in user practices and expectations may have on traditional print publishers.

## **RATIONALE FOR STUDY**

We currently have a technology that is extraordinarily cheap, light, portable, durable and stable. It requires no time to boot-up, it does not crash or create down-time, it does not require recharging, it has no wires, it requires no user manuals or instructions and it is easily notated. If we drop this technology it does not stop working. Users find this technology intuitive to use and quick to navigate. The content contained by this technology is easily archived and retrieved. We sit with it at our desk or at the dining table, we curl up with it on the couch, we take it to the beach, we read from it in the bath or in bed. We exchange titles with our friends. It is a technology that is safe, familiar and reassuring. It is of course the book.

On the other hand we have a group of technologies that are comparatively expensive, often the product of numerous compromises and that are sometimes unstable or unreliable.

Why would anyone give up a familiar, simple and cheap technology in favour of a complex amalgam of wire, plastic and silicon – regardless of the form of that amalgam? Do the benefits that accrue the users outweigh the costs of using such technologies?

Seventy years ago people were speaking in similar terms about the automobile. The first automobiles were agricultural, loud, smelly and intractable. Based on buggies and carriages, they had wooden wheels and cart springs. These contraptions shared the rough muddy roads and tracks of the time with horses and horse-drawn vehicles. Automobiles were expensive, uncomfortable and unreliable, and the infrastructure (paved roads and service/gas stations) necessary to support their widespread use was not in place. Many people of that period could not foresee a future for such technologies or the ways

in which those technologies would evolve. Why would anyone consider an automobile for daily travel when horse drawn locomotion was familiar, cheap and reliable?

Perhaps we are now in a similar technologically transitional period. Perhaps current hardware/software combinations are no match for the traditional book and the infrastructure necessary to support the shift from printed matter to electronically mediated media is not yet in place. Will electronically mediated media completely supplant the printed book as the automobile did for the horse drawn carriage?

But a book and a buggy are not the same thing. Perhaps the experience of the buggy will not be repeated for the book.

The book has some unique characteristics, the qualities of which continue to be appreciated by many people. The book can be seen as an extension of the person. Books, when displayed, reveal something about that person to others. A collection of books also serves as a projection of expertise or authority. How likely is it that barristers or academics will replace their impressively stuffed bookshelves with a handful of CDRoms and an Internet connection?

A book may be a reminder of times and places past, owning a book may be an attempt to hold onto 'moments lost in reading' (Certeau 1984) – the book as reminiscence.

The pleasure of owning a particular title, and association with that title through ownership indicates to others a certain taste or discernment or intellectual proclivity. A collection of books indicates a person who is 'well read'. How can that be mimicked by a digital collection? But perhaps people were saying similar things about their record or CD collection – how much music is now in digital, and therefore unseeable, form? Yet CDs seem to have lost little of their popularity.

Do the persistent perceptions about traditional books extend to the books and textbooks used by students at schools and universities? Will today's students and teachers continue to see the book and the textbook as the principal source of learning and knowledge? If students and teachers shift away from printed textbooks and schoolbooks how might these changes in practice spread to other people in the community? If this is a transition away from printed text how long will it be before users abandon print?

## FOUNDATIONAL READING AND LEARNING EXPERIENCES ARE CHANGING ENABLED AND MEDIATED BY VARIOUS TECHNOLOGIES

Foundational *everyday* reading experiences often begin with bedtime stories read by parents to their children. Parents with young children starting school are often provided with a promotional booklet to encourage them to read to their children. Parents are advised that 'making a special time to read books can become a comfortable and pleasurable part of the daily routine...a bedtime story is the ideal time to share the wonder and excitement contained within the pages of a book.' (Department of Education 2000).

In this setting a child may hold the book and turn the pages, learning the mechanics of reading. It has been suggested that these foundational reading experiences result in improved reading skills and pleasant associations with the act of reading. These childhood experiences may, at least in part, explain the emotional bond that many people feel for traditional books.

The act of reading a book may evoke the pleasure experienced as a child of being warm, safe and close to one's parents, 'a cherished part of childhood' (ibid p.3). So long as this practice of parents and children sharing books continues we might expect our emotional attachment to physical books and printed text to persist.

Yet the transition from reading printed books to engaging with electronically mediated materials is in full swing. The above-mentioned Department of Education booklet has three of its twenty-eight pages allotted to websites, some about books others with stories to read. Today both children and adults have access to a broad range of electronically mediated material and such interactions are, for many, a familiar *everyday* experience. Bellamy (2001 p.123) identifies 'the emergence of a new generation of readers who are familiar with text that is technologically mediated, through their experiences with online chat, reading and writing email, and reading and writing text-based short messages.' Many children supplement their reading of stories with educational videos, CDROMS and interactive experiences on the web. Then there are the not-so-educational experiences of videos for pleasure and electronically mediated games via computers, television screens or handheld gaming devices. The child expects to be entertained, to be engaged and to interact with material in these settings. The blurred

category of edutainment, where the child learns while they are entertained, has emerged. The foundational reading, learning and recreational experiences of children are laden with electronically mediated media.

We can no longer speak of modes of learning without reference to electronically mediated learning. *Reading* no longer demands a physical book or printed text, writing no longer demands inscriptions on paper. The modes of engagement required from one learning context to another are in flux. Reading is supplemented by electronically mediated seeing, hearing, watching, interacting or experiencing.

The establishment and expansion of electronically mediated *learning* experiences displaces more traditional forms of learning. A further expansion of these experiences in schools could be expected to reduce social and cultural resistances to other forms of etext, ebooks or digital media.

The transition to digital media has begun

We propose that a broadly based shift to electronically mediated learning materials has already begun.

The sharing and exchange of information, knowledge and expertise in academic environments is now more likely to take place via journals and academic 'papers' which are increasingly digital and electronically mediated.

Libraries associated with academic institutions now routinely have collections of electronic journals. Institutional libraries like the RMIT University Library make their entire electronic collection available to academics or students anywhere on campus or from home via the Internet. Ainslie Dewe, the RMIT University Librarian, speaking on behalf of the Council of Australian University Librarians, conceptualises university libraries as playing a leading role in the period between print and digital media, 'providing universal access to the products of the human mind' (Dewe 2001). She believes that the transition from print to digital media will take place over a three to five year period and that universities will resolve the issues of 'how to make the transition'. She talks about the need for universities to maintain parallel systems, print and digital resources together, while stressing the value of making the change. Amongst the benefits that flow from a shift to digital media she identifies 24-hour access to students and the potential for digital media to inform curriculum design. In an

email response to a question regarding RMIT Library's stance on ebooks, Ms Dewe responded that: 'At RMIT we have not found ebooks in the academic or research areas to have developed to a stage where they are a viable product for our users – as opposed to e-journals where we have made a dramatic shift from print to electronic resources' (Dewe 2001).

The increased availability of a wide range of electronic journals has improved access and convenience for both students and teachers, with searchable full text journal articles in multiple formats, often with direct e-mail links to authors. This changes the relationship between authors and readers, creating a sense of proximity and connection – the author as everyday person. It is now common practice for students and researchers to write directly to authors with queries or comments and for those authors to reply. These replies are often included with other elements in a research study, expanding the breadth and currency of the study. Ms Dewe's response to our query above is an example of this phenomenon.

In the following section, we examine the means by which electronic journals and papers are circulated, located and accessed.

## **REFERENCE LINKING**

The availability of hyperlinks within electronic journal articles improves navigation through different sections, making it possible for the 'reader' to move around various text elements, images, tables, footnotes, and references. Users can tailor the way information is displayed, increasing font sizes, and magnifying figures, tables and illustrations. Many of these journals now provide reference linking so that the researcher can access source materials of interest in the same way as the original author. When this linked work also provides reference linking the researcher can quickly move around a field of study in an almost topographical fashion, extending research interests laterally and across disciplines.

At present these topographical research methods are mostly restricted to other items in electronic journals, usually sister publications, but gradually reference links are being included for conference proceedings and other types of publications. Linking from any citation to any form of digital object or any other form of digital media is theoretically possible. As authors and publishers come to recognise the opportunity reference linking represents to

increase and expand readership this function may become integral to electronically published material. Some researchers in this field believe that 'such technologies are a key *raison d'être* for the move to electronic publishing' (Caplan 2001).

Reference links do not necessarily point directly to an article, but can instead point to a page on the publisher's site that may contain a link to the article or information on how to obtain it. This enables publishers, where appropriate, to charge a fee for access or offer a subscription service as well as enabling a student or researcher to access the desired information. Reference linking makes information for researchers more searchable, more locatable and more accessible.

Some academics and scientists believe that this model of charging for journal articles, or charging for individual pages of articles or in some cases per byte of information, establishes a 'toll gated digital archive' (Correy 2001).<sup>1</sup> Only those that can afford to pay the toll will be able to access information as large publishers such as Reed Elsevier, the Canadian Thomson Corporation, Wolters Kluwers and Wiley swallow up smaller content owners and with them their valuable content. These giant content aggregators will hold, and in some cases already hold, the key to huge reservoirs of academic information and knowledge in the form of refereed academic journals and papers. Some indication of the scope and scale of the vast scientific and academic publishing behemoth Elsevier Reed can be found in this short excerpt from their website.

Elsevier Science supplies scientific, technical and medical information to research libraries and scientists. In primary publishing its 15 publishing groups cover a broad spectrum of subject areas, from physical and fundamental life sciences to economics. It publishes 1200 journals containing 160,000 articles a year, 400 books, as well as CDROMs and online products. In secondary publishing it supplies abstracting and indexing databases including Embase, which features biomedical and pharmacological information, much of which is unavailable elsewhere.

The control of such a vast body of academic knowledge aggregated and managed by one company, 'much of which is unavailable elsewhere', creates a strong sellers market. This demands that libraries subscribe to their services in order to ensure access for their patrons. The delicate balance between equitable access,

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<sup>1</sup> <http://www.reed-elsevier.com/>

consistent with previous printed media, and a reasonable commercial return for publishers is currently in flux.

A group of 26,000 academics and scientists are reported to have signed a petition in the form of an ultimatum. If the large aggregators do not make the scientific and academic papers under their control publicly available then this group says that it will no longer write or referee for their journals. The outcome of this stoush will have interesting repercussions (Correy 2001).

Reference linking promises users unprecedented access to digital media but the aggregation of content and associated controls may mean that this access is quickly restricted.

Australian publishers wishing to explore the commercial possibilities of open reference linking, or wanting to find out more about this service, should refer to the International Digital Object Identifier Foundation (IDF), an organization responsible for issuing Digital Object Identifiers (DOI).<sup>2</sup>

Australian publishers of scientific, scholarly or academic work should also look to the non-profit Publishers International Linking Association (PILA), which is responsible for an associated reference linking enabler called CrossRef. CrossRef is designed to accept metadata queries and return Digital Object Identifiers. A publisher can extract bibliographic data from citations in the text of an article, run them against the CrossRef database to obtain corresponding DOIs, and insert these DOIs back into the text of the article.<sup>3</sup>

Many online journal collections offer multiple types of links, including internal links, CrossRef links, and links to proprietary databases. Some offer, or are developing, links to a library's local holdings. There are a handful of examples of DOI reference linking from commercial publishers including a PDF format ebook from McGraw Hill that has DOI based linking between ebooks. One of these links is a link to an ebook from a non-associated publisher. The reader is initially linked to the book's bibliography then to the web. DOI reference linking is being supported and promoted by some of the world's biggest publishers including McGraw-Hill, Random House, Bertelsmann and John Wiley & Sons.

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<sup>2</sup> Information regarding Digital Object Identifiers can be found at <http://www.doi.org/>

<sup>3</sup> Further information regarding this service can be found at <http://www.crossref.org/>

The above examples are really no more than proof of concept – DOI reference linking for electronic publications beyond electronic journals is still very much in its infancy. As the availability of reference linking from electronic publications expands we predict that users' perception of the value of this function will increase and with it the number of users. If Australian Publishers enable reference linking for all kinds of electronic publications a strategic advantage is possible, at least in the short and medium terms.

## **HOW DO TEACHERS ACCESS AND MANIPULATE ELECTRONIC CONTENT?**

Teachers are now more likely to draw on digital material in their teaching practice – in the form of images or text for electronic presentations that may then be posted online for students to access. This material is viewed or downloaded and may be edited and incorporated with the student's own material in assignments. But what do teachers want? The following excerpt from an interview with Barry Carbol (Carbol 1998), an expert on the implementation of educational technologies in schools from Canadian British Columbia sheds some light on what kind of support is needed by teachers. Barry Carbol is responsible for British Columbia's policies on technology for schools and for the development of distance-learning.

Teachers generally want their jobs to be made easier. And in many cases that means they want resources that are accessible and easy to use. If they happen to be on the WWW, they want easy navigation, they don't want something that is going to slow down their planning for teaching within the classroom. They also want courses and materials that are related to the curriculum that they have to teach. They don't want to have to figure out how to do that, necessarily. In our work, we have found it fairly clear that teachers don't want to become designers of course material. They don't want to become textbook writers, nor do they want to become writers for the WWW, and yet many people who try to implement the WWW technologies in classrooms are saying: 'Look at what you can do, you can design all of this material, you can make all of these things'. But the reality is that the teachers don't have the time to do that. Nor do many of them have the interest. They have other parts of their lives that they want to get on with; they don't want to spend all of their time doing that. So I think those are the most important things that we have found: ease of use and easy access to materials and make sure that it makes my job easier.

Herein may be an opportunity for publishers, the possibility of a model of access which recognises the ways in which teachers are beginning to teach – a model which enables a teacher to bring together digital materials, images, video and sound as well as text, from a wide variety of sources in a manner which allows the teacher to be always *on top* of his or her subject. Such a model would depend on the meta-tagging of materials. These materials would need to be suitably indexed and semantically grouped, edited, formatted, filtered, and *selected or rejected* by a reputable publisher. These materials could be made available through an identified, perhaps recognised, aggregator or supplier. This could be a current educational publishing supplier with strong existing relationships with schools. This supplier would have adapted their operations to enable the sale of content in these new ways.

This would allow publishers to take advantage of existing content, skills and brands. In particular, users benefit from the expertise of publishers in identifying and promoting high quality content. The selection or rejection of material is an essential function publishers perform that will continue to be valued by users. The editing, laying out, formatting and presentation of materials for effective use by students and teachers are also critical functions performed by publishers which will continue to be important.

Publishers will need to draw on the information management and knowledge management skills of librarians in developing metadata tagging, indexing and semantic grouping regimes that enable users to tap into digital resources made available by publishers. Perhaps the best-known metadata tagging regime is the Dublin Core Project, which sets out a 15 element framework for categorizing and tagging content for the World Wide Web. It is this metadata tagging which enables teachers and students to find the materials that match their research queries.

Metadata is data *about* the contents of ‘objects’ – in this case digital objects. These objects could be digital documents, digital books or any form of digital media file. The fifteen metadata categories identified by the Dublin Core Project are:

- title;
- author or creator;
- subject or keywords;
- description;

- publisher;
- other contributors;
- date;
- resource type;
- format;
- resource identifier;
- source;
- language;
- relation;
- coverage; and
- rights management.

Dublin Core metadata tagging facilitates the building of indexes around simple content descriptions, including the location and form of that resource, allowing users to locate, access and obtain those resources.

In the following selection of four case studies, we examine the ways in which two of the largest ePublishers, (textbooks and scholarly works) have adapted their respective content for digital distribution and the efforts of a number of smaller companies, including an Australian company, operating with digital content.

### **CASE STUDY 1 – McGraw-Hill Primis Custom Publishing**

Founded in 1888, The McGraw Hill Companies see themselves as ‘a leading information services provider’ rather than a publisher. They employ 16,761 people in 32 countries. Sales in 2000 were \$US4.28 billion.

The company is increasingly focused on distributing its products electronically with 90% of McGraw-Hill’s editorial content available on digital platforms, including software, CDROM, and online via the web. The company operates more than eighty different web sites and generates about 20% of total sales outside the USA.

McGraw Hill has been expanding its electronic information services since the 1980s, acquiring industry-specific publishing and information providers including Macmillan’s academic publishing arm and the Times Mirror Higher Education Group, which publishes textbooks.

McGraw-Hill sees their role as offering universities services to enhance their capacity to deliver information to teachers and students online.

McGraw-Hill Primis Custom Publishing offers teachers a number of services including the capacity to adapt and customize McGraw-Hill content – reordering or omitting textbook chapters, incorporating material from a number of different publications, incorporating the teachers own course materials or lecture notes.

This material can then be compiled and either printed according to the teacher's specifications – a hybrid of digital media and printed content – or as ebooks/etextbooks.

This service is directed at the teacher or lecturer. The digital database contains a collection of digital files that can be mixed and matched to create a book 'on demand' for a particular course. The database provides teachers with material from twenty disciplines derived from McGraw-Hill textbooks, supplements, journals, magazine articles, laboratory manuals, case studies, literary works, and historical documents. Teachers can compile and combine material from several different texts and add articles, review notes, case studies, and their own material to create in effect their own textbook.

The ebook option allows Primis to offer teachers 'McGraw-Hill's PowerWeb sites', a series of 'continuously updated' password protected sites that McGraw-Hill promise will keep teacher's courses up to date.

The range of available articles in each discipline is still somewhat limited, despite McGraw-Hill's claim of 350,000 pages of content (up from 180,000 pages in 1999) – a measurement guaranteed to give the most impressive number. The ownership, ordering, and cataloguing of content is clearly a key factor in the success of such an enterprise. McGraw-Hill's efforts to lock up the content are consistent with a worldwide trend to make academic knowledge and information a commercial commodity. The capacity to mix and match content according to the desires of the user, the choice to print content or receive it online and the opportunity to quickly keep that content up to date would seem to address the needs of a broad range of teachers.

## **CASE STUDY 2 – eBooks.com – An Australian Connection**

eBooks.com is an Australian company selling ebooks and customized digital compilations called ePacks. It hopes to take

advantage of its unique dot.com name to become 'the world's premiere ebookstore' (Costello 2001).

eBooks.com has nonexclusive licensing contracts with forty-five publishers, including Penguin Books, McGraw-Hill, HarperCollins, John Wiley and Oxford University Press. Currently, eBooks.com provides customers with access to about 2500 titles but they plan to provide access to 30,000 titles by the end of 2001.

As in the example of McGraw-Hill's Primis Custom Publishing, eBooks.com offers teachers and researchers a product they are calling ePacks, 'which allows customers to purchase specific sections or pages of different books and "bind" them together into a single digital file. The file is then available for anyone to purchase according to the publisher's price per page' (ibid).

As with McGraw-Hill's service, a teacher is able to compile a customized digital etextbook for student use. The company is developing a service to be called BooksOnCampus, which will offer virtual course-packs and e-copy services directly to universities.

The problem highlighted with this company is the very limited access they have to content. A brief examination of the site indicates that they do have content from McGraw-Hill, Penguin and Harper Collins, but few of the titles are well known or are by well-known authors. They have some interesting and innovative ideas but need access to a broader and more substantial range of content. This Australian company should be watched closely over the next few years.

### **CASE STUDY 3 – Proquest Information and Learning – The Digital Library of Dissertations and Theses**

The Proquest Digital Library of Dissertations and Theses is founded on what ProQuest Information and Learning see as their 'historic mission as keeper, indexer, and publisher of the scholarly record'. ProQuest Information and Learning, formerly known as UMI, began as a microfilm archive to preserve the scholarship of the British Museum in 1938. Bell & Howell acquired UMI in 1985, expanding the UMI offer to include electronic access products, first with CDROM products, and most recently, with the Web-based ProQuest information service.

In the past, students submitted their dissertations to UMI on paper; researchers searched for them in paper, or hunted them out

on CDROMs, or more recently, via UMI online editions of Dissertation Abstracts. Orders were invariably supplied in paper through the post, even when the transaction was completed online.

Digital technology offered an alternative that was quicker and more easily accessible, a 'natural' progression from the 'paper and post' model of distribution.

The Proquest (formerly UMI) Digital Dissertation initiative marks the transition. Students may now submit their documents either in digital format or on paper that Proquest digitises and transfers to microfilm. Subscribers have access to more than 1.5 million doctoral dissertations and master's theses from the United States, Canada and the Pacific Rim in digital format, beginning with titles published from 1997. The business model has the copyright owner providing Proquest with free content, which can then be on-sold to multiple clients. The copyright owner has the reassurance that their material is properly archived on microfilm and preserved for posterity. In addition, their work is made available to a much larger reading audience. The Proquest site has become the destination for people researching what others have published in their field of study.

Pro Quest Information and Learning, is based in Ann Arbor, Michigan. Net sales for 2000 were \$374.3 million. ProQuest Information and Learning have invested heavily in sales and marketing with the aim of capitalizing on perceived sales growth opportunities of Internet-based products. The company's flagship product Proquest ABI/INFORM, is an online aggregated database of digital journal, magazine and newspaper articles and papers. Proquest aims to make this product/service available from every student desktop in the United States and beyond.

This is another compelling example of the transition from paper and print to digital media in an academic context. Each of these relatively small changes in practice adds to a body of experience that seems to lead inexorably to permanent changes in user preferences. If there is a choice between a printed paper for research, requested and delivered by post, and that same document in digital form downloaded on demand then current trends would suggest it is almost invariably the digital document that is selected.

#### **CASE STUDY 4 – Access to Content, a Focus on Users**

The launch of the first online ebook store for technical professionals, LLH Technology Publishing, (Anonymous 2001) would seem at first glance to have little to do with electronically mediated learning materials in educational settings. However, a closer inspection reveals that this is a clear example of the ways in which digital media can be mapped against the needs of a community of users.

When technology professionals need a book, they usually need it immediately; they also need books designed for quick reference and easy retrieval of information. These requirements can be directly related to the some of the attributes of digital media:

- **Searchability** – digital format allows just the right content to be quickly located.
- **Accessibility** – digital media is available 24 hours per day, seven days per week.
- **Currency** – digital media can be quickly updated whenever changes are necessary. In the world of information technology, currency of information is a perennial requirement.

Jack Lewis, LLH Technology Publishing's vice president for technology and developer of the Deluxe eBook format states: 'For example, the full text search and retrieval function allows you to quickly locate all pages where a word or phrase is found. The index and tables of contents are hyper-linked to corresponding pages in the book. And each subheading is book-marked to make 'navigating' through the book quick and easy.'

Lewis adds that use of electronic documents is already widespread among technology professionals. 'Most electronics, computing, and technology companies have made their documentation and other literature available in electronic form... Our target readership is already comfortable using electronic versions of printed documents.'

This same shift is taking place in the Information Technology classroom where much of the content and many of the textbooks are available to students online.

## **AUSTRALIAN AND OVERSEAS EXPERIENCES – TECHNOLOGIES CREEP INTO THE CLASSROOM**

In this section, we examine the various modes of access to electronically mediated learning media including ebooks, etextbooks, and etext and the implications of these different modes of access. Specifically we examine the ways in which various platforms – including PCs, laptops, wireless and handheld devices – have characteristics that affect the ways in which electronically mediated materials can be accessed and *used* and the ways in which these technologies are actually being used.

One US state government, Maine, passed legislation in July 2001, providing a laptop computer for every 7<sup>th</sup> grader in the state, an estimated 20,000 laptop computers per year. Some of the funding provided by the legislation will be for teachers to learn ‘how best to use the wealth of new technology at their disposal.’ The computers will belong to the school and will be used by the student during classes. Students that need to use the laptop for homework will use their library card to sign the machine out.

In a program supported by hand-held computer manufacturer Palm, students at a high school in North Carolina USA, the Forsyth Country Day School, are being provided with Palm IIIc Personal Digital Assistants (PDAs). This is the first school in the United States to give high school students handheld computers and require their use. The devices are provided at a big discount by Palm as part of a nationwide program for colleges and schools. Use of the PDAs will be fully integrated into the school curriculum.

### **CASE STUDY 1 – Laptops in Class, The Balwyn High School Experience**

In 1997, Balwyn High School began a trial with laptop computers. Laptops were provided to a class of twenty-eight Year 7 students. The trial was expanded in 1998 to include three additional Year 7 classes as well as the original group who were then in Year 8. The students used the laptop computers during classes across the entire curriculum and to complete homework. The school curriculum was significantly adapted to, and altered by, the need to accommodate and integrate laptop computers into everyday classroom teaching and learning practices.

An action research project was completed by two of the teachers responsible for the trial, together with three researchers from Melbourne University. The researchers used a combination of survey questionnaires, semi-structured interviews and student diaries as the basis for their research data. Students, teachers and parents were involved in the study. One of the diary keeping tasks asked students to 'record important activities from school, homework, and out-of-school'. This task was deliberately framed to encourage students to write about all aspects of their school experience, not just those experiences related to the laptop trial.

The study found there were a variety of ways in which the computer became part of, and influenced, how students were connected with their learning. These included:

... getting work done, learning how to operate a tool that is assuming a greater prominence in their world, accessing and handling information, and learning high quality presentation techniques... for many students the recreational game playing also contributes to learning and using the tool.

Consistent themes throughout the research findings are the notion of the students being 'connected with their learning' and the idea that the computer is a 'tool' which facilitates this connection.

From an examination of the students' diary records there emerged a strong perception of the laptop computer as a 'matter-of-fact tool for getting work done' and as a means for handling information and knowledge. Not surprisingly, the students recorded how they were 'actively learning how to operate' the technology.

These reported experiences of students engaged in the trial resonated with concerns expressed by parents who wanted the laptops to enable their children to 'become proficient at using the tools of the information age' and 'to graduate into the community as skilled users of the technology'.

The applications most used by students were word processing, spreadsheet, presentation, and software to enable connection to the Internet and for sending and receiving email.

Responses from teachers indicated that the laptop program had resulted in changes in their classroom practices. Teachers reported that they were more likely to expect use of computers for routine tasks and more likely to have students use the technology for classroom presentations and in completing individual research projects.

The researchers reported that the students engaged in the program 'were generally very positive about their learning with the laptops' but 'there were however, a number of frustrations with the technology and its operation and these diverted student attention.' The researchers reported a similar mix of positive and negative responses from teachers. Analysis of parent responses led the researchers to declare 'that parents of students in the laptop classes were generally very satisfied'.

The researchers concluded by declaring that the provision of laptop computers or any other form of computer 'will not guarantee strong learning outcomes' and that 'a more extended follow-up study is needed to show whether mastery of the tool will free students to get more work done, or whether it will focus more attention on the information being accessed and manipulated'.

### **CASE STUDY 2 – The Ebook in Class, The Experiences of Students at Fordham College in Manhattan, USA**

Dr Eric J. Simon (Simon 2001) conducted a study recently involving the use of handheld ebook readers, in this case, Rocket ebook Readers, by students in his introductory science course, *Perspectives: Biology*. The study took place over three semesters during 1999 and 2000. Ebook readers were used by students for all reading matter associated with the course. The students would download a chapter each week and this would be the basis of their study for that week. Dr Simon wrote, and had converted into ebook format, all of the course materials. He saw this as important because it meant he would not have to rely on publishers for content. The company selling the devices, NuovoMedia Inc., loaned the ebook readers to Dr Simon for the purposes of the trial. Dr Simon points out that the majority of the students involved in the trial 'spent an average of one hour travelling to campus via public transport'. He saw this as pertinent because he believed that many students use this travel time to study.

The students were 'polled using anonymous questionnaires' at the end of each semester to determine the ways in which they used the ebook readers, their reading habits during the trial and their reactions to using the combination of ebook reader and course materials.

Dr Simon used the results of an earlier study (Wearden 1998) that identified what sorts of prospective features students might want, glossary lookup, book-marking, highlighting and annotation, to see whether students actually made use of those features in the ebooks they were using. The results of the study indicated that students did use those features in the same order of importance as had been reported in the earlier study. In response to questions framed up to measure students perceived satisfaction and sense of value experienced all students agreed that they would 'recommend using an ebook in college courses to a friend' and 95% of the students involved in the trial wished 'other courses offered an ebook option'.

Dr Simon also found that 84% of students would be prepared to spend \$200 of their own money to buy an ebook reader if ebooks were widely used across the curriculum.

In his concluding remarks, Dr Simon indicated that the students 'were clearly pleased with the experience and wanted more' but he saw the key inhibiting factor as the lack of content. He believed that the capabilities of current ebook reader technologies, such as the Rocket eBooks used for the trial, were already sufficient for student use. 'Once the final piece of the puzzle falls into place, namely a large catalogue of etextbooks, college students can look forward to a future where backpacks are unencumbered by the printed medium' (Simon 2001).

It is clear from these closing remarks that Dr Simon believes the days of the printed textbook are numbered - 'backpacks... unencumbered by the printed medium' - a frightening thought for the printers of textbooks and scholarly works worldwide.

### **CASE STUDY 3 – Ebooks for Postgraduate Psychology Students, University of South Australia**

A pilot study of ebook readers and course materials is currently underway at the University of South Australia. The postgraduate psychology students involved in the study each have a REB1100 eBook Reader. The content is a combination of scanned journal articles adapted for reading on the eBook Reader and content developed by the course coordinator.

Dr Kurt Lushington from the University of South Australia is conducting the study and he reports that feedback from the pilot

has been 'positive' (Lushington 2001). He believes that 'the preparation, printing and distribution of paper-based material is a costly exercise and... that many of the limitations inherent in paper-based delivery systems can be addressed by using a system based on electronic books' (Ibid). As in the US study outlined above the students have been asked to complete a diary describing their experiences. Dr Lushington plans to run a focus group at the end of the course to explore students' experiences. He plans to publish the results of his study later this year and expand the trial from the current seven students to sixty postgraduate students next year (Masters in Social Sciences – Counselling).

The expanded trial will involve an entire program of study using the ebook readers and course materials in place of textbooks and printed lecture notes. Dr Lushington is currently putting together 'a consortium involving the key players necessary to develop this technology – IT industry (EINFOsolutions), tertiary educators (University of South Australia) and publishers (Australian Library Services)... to test the feasibility of using an ebook-based system for delivering learning materials to a cohort of postgraduate students' (Ibid).

Dr Lushington has three major aims for his trial and consequent study:

- To evaluate the ebook-based system as a vehicle for delivering learning material (i.e. textbooks, readings, lecture notes, etc.) in a representative tertiary institution.
- To identify and develop the software and hardware support required to facilitate the distribution of learning materials using an ebook-based system.
- To develop a working model that identifies potential distribution and copyright issues and fully integrates the three groups necessary to achieve a paperless environment; educators, ebook providers and publishers.

From Dr Lushington's perspective, the digital format allows him to keep materials up to date and to disseminate these materials quickly and securely without time consuming manual processes. He sees the combination of ebook reader and digitally formatted course materials as providing for:

... a simplified and automated distribution system. For educators this means that all the learning materials required by a student can be easily integrated, distributed and tracked. For students, this means that all

learning materials (including texts) can be easily accessed, updated and stored in one portable device. It also obviates the need for photocopying. For publishers, the read-only format of ebook documentation allows for improved copyright protection and the necessary safeguards for digital publication to achieve wider industry acceptance. It also overcomes the copyright limitations inherent in current PC-based online web-based delivery systems. For the Australian IT industry, it represents a step closer to the ideal of a 'paperless office' with benefits to industry in general and the environment (Ibid).

The problem of dissemination of materials to students was a key reason behind Dr Lushington's interest in ebook technologies.

Dr Lushington anticipates that course material for the 22 courses that make up the Masters in Social Sciences – Counselling, will be ready for the commencement of the University year in March 2002. He plans to collect evaluative data from all those involved in the trial including the publishers, the ebook provider, students, educators and University management at the end of each term. This data will form the basis of a detailed analytical report to be published at the conclusion of the trial.

The importance of Dr Lushington's initiative relates principally to the publishing of a detailed analytical report. The dearth of published material examining student/teacher experiences with ebooks should be considered a contributing factor in the low uptake of these technologies. The results of Dr Lushington's trial are likely to influence other educators interested in such an approach.

### **TWO CASE STUDIES: The University of Southern Queensland's Web Pad Project and the John Paul College Wireless Laptop Program**

The Good Universities Guide judged the University of Southern Queensland (USQ) Toowoomba, under the leadership of Vice Chancellor Professor Peter Swannell, Australia's University of the Year for 2000–2001. This was in recognition of USQ's efforts to recreate itself as an eUniversity, using the latest communications technologies and techniques to provide education services to the university's 19,000 students. Many of these students are using state-of-the-art distance education services provided by USQ.

In keeping with the concept of an eUniversity, attention turned to on-campus services. Dr Jeff McDonnell, the Director of Information Technology Services at USQ announced in July the

university's plans to introduce wireless Internet appliances or web pads across all campuses of USQ. Web appliances are lightweight devices of about the size of an A4 portfolio that come with colour touch screens and wireless connectivity. This wireless connectivity will enable students to access the University's intranet, tapping into library information resources, access to the Internet, send and receive email and instant messages and share digital files collaboratively with teachers and other students.

In a presentation to the Queensland Education, Science and Technology Network (QUESTnet 2001) Conference in July, Dr McDonnell said that 'students need access to up-to-date information when, where and how they want it... a telecommunications environment to enable "Internet Everywhere" access'. The proposal to introduce wireless Internet appliances for all students on campus seems a radical idea, but Dr McDonnell sees this as 'student-centric'.

In his presentation, Dr McDonnell outlined the stages for this project, with the first stage being the installation of wireless LAN networks over three campuses, scheduled for completion by the end of this year, with the remaining campuses to be completed in 2002. The next stage involves a pilot project with 200 students operating web pads and/or wireless laptops on campus during 2002. Dr McDonnell expects to have 2,000 students using web pads or wireless laptops in 2003.

A similar endeavour is underway at the John Paul College, an independent school, teaching students from pre-school age through to year 12 in Queensland, except that in this school they are using wirelessly networked laptops – 1800 laptops for both students and staff.

In a presentation, also a QUESTnet 2001, they described 'an integrated technology learning curriculum and professional development program' with 'online digital curriculum and resources available anywhere, anytime.' They see this wireless enabled laptop approach as central to 'facilitating the transfer of knowledge'. John Paul College has a 'Technology Vision ... to create an anywhere, anytime school where parents, teachers, students and business partners are part of an interconnected learning community'.

This should send a clear message to those who doubt that the transition from a print dominated educational system to a digital, wireless connected system is really happening. The educational experiences of students at the University of Southern Queensland

and students and teachers at John Paul College will be very different from their predecessors.

In both examples students' everyday practices reflect a fundamental shift in how teaching and learning are facilitated.

The characteristics that count most seem to relate to whether or not a device is tethered, the degree to which it is cumbersome or portable, the connectivity the device has with other devices and their users, and the variety and combination of uses that the device enables.

The new generation of mobile devices that enable the writing, reading and transmission of *documents* between users promises further changes in practices and behaviours. Such devices will change our understanding of the meaning of the term *document* and alter the ways in which we interact with each other.

We believe the kinds of changes described in this section are the thin edge of the wedge. Continuing advances in computing and communications technologies promise shifts in teaching and learning that we are only just coming to understand. Portability, connectivity and access to resources in an environment, which encourages engagement, interactivity and collaboration, will increasingly marginalize printed texts. The time frame for this shift is not yet known but it does seem inevitable.

### **THE MODES OF ENGAGING WITH LEARNING MATERIALS ARE CHANGING**

The ways in which people engage with learning materials are changing – the mix of pedagogic forms used by teachers and students is broadening and diversifying. Many students and teachers are becoming familiar with electronically mediated material. A self-reinforcing loop has emerged. An increased familiarity has brought forward an expectation that learning in an educational setting, with few exceptions, will involve at least some exposure to materials obtained electronically.

Textbooks are expanding in scope and form to include multimedia offerings, digital imprints on CDROM, and access to proprietary websites. But the ways in which publisher's are conceptualising textbooks seems to suggest that textbooks are central to a course of study. This seems to be at odds with the ways

in which learning materials are being assembled and used in educational settings.

Universities in particular are producing their own educational material, augmenting printed matter with richer and more diverse offerings, often *hyperlinked* to many different sources. Textbooks are being supplemented, in many cases supplanted, by electronic and interactive offerings.

Teachers are strongly encouraged to make material available to students online and in many universities it is common practice to make lecture presentations available in this way. Online discussions and web-boards are being used in many courses to post comments or queries. Students are actively engaging with teachers and each other.

A variety of learning material types and modes of access are available to students and teachers. Books and textbooks sit *alongside* reading compendiums (probably a mixture of downloaded articles from the web and photocopies of book chapters that the teacher has assembled into a 'book of selected readings'), which exist *alongside* digital material obtained from the web or CDROM. Material from the web may have been obtained from lateral or rhizomorphic movements rather than linear engagement with a text. The student may have *seen* or *heard*, *read* or *watched* material. What the student captures may be the product of ephemeral interactive experiences, where interactivity and movement are *embedded* in the text read or images seen. They may have downloaded, 'cut and pasted', inserted or incorporated material with their own work. Digital text or digital images are more easily incorporated with a student's own work than material from a printed source and this ease of incorporation reinforces the selection of digital material. Students may or may not print the outcome of their work.

Dr Seymour Papert, mathematician and co-founder of the Artificial Intelligence Laboratory at MIT (the Massachusetts Institute of Technology) and creator of the widely used educational program LOGO, was asked what he thought a computer could give to a child that a book could not. He responded (Papert 1997):

We don't think of the computer giving something to a kid. To make an analogy, if you want to learn music, it's good to play an instrument. What does a piano give to somebody that a book cannot give him? The answer is the same. The piano allows you to do something with the music, to make it your own, to express yourself with it. In the book you can read about music, but it's not the same thing. With mathematical

knowledge, the computer is like the piano. It enables you to play the knowledge; the book can only give it to you.

Dr Papert implies that the crucial difference is one of a capacity for the child to interact with the technology, to *play* the computer in an active way rather than a passive engagement associated with a book. The technology does not so much *give* to the child as *enable* an active engagement. This could be a crucial distinction for publishers in framing up new product/service offerings.

Efforts by the US based international publishing software company, Adobe, to promote a shift to etext includes the establishment of Adobe eBook U. This is a project that is being conducted with a group of US colleges and universities to explore the use and impact of ebooks on educational environments. Adobe eBook U will allow teachers and students to make available and use course materials that have been adapted as ebooks based on Adobe's Portable Document Format (PDF) – in effect replacing the textbooks, course packs, and customized course readers formerly associated with those courses.

There is a long list of institutions from across America, representing a wide variety of disciplines and subjects that will be involved in these trials. At present there are very few refereed academic papers from high profile and respected journals reporting the outcomes of these sorts of experiences. It is anticipated that the promotion of Adobe eBook U and associated trials will lead to a rash of refereed academic papers over the next two years. These papers are likely to have a significant impact on the take-up of eBooks in Universities.

There are early indications that students are amenable to a shift to eBooks. A survey by US publisher Versaware at the end of 2000 indicated that 62% of a small sample of 100 college students said they preferred digitised text to printed text. The survey included students from sixty-three US colleges from twenty-two different states.

The survey, as reported in the *Library Journal* (Rogers 2001) showed:

An overwhelming majority of the students – a hefty 87% – asserted that electronic texts could be 'more interesting' than their paper counterparts. The students identified the following reasons as 'very important' in selecting etexts over print'... the ability to search and integrate information instantly on the web (75%); obtaining updates as publishers provide them (73%); the ability to perform customized

searches in one book or collections of books and papers (71%); the ability to organize research in personally labelled binders (71%); the ability to highlight text (71%); and to avoid carrying heavy textbooks (72%).

Versaware's Sol Rosenberg was reported as saying: 'Students live in a wired, connected world, and it's not just a book or even just the library that encompasses their scope of research any more'. Although Mr Rosenberg is clearly a partisan commentator and the survey is the work of a company with a vested interest in promoting e-text the results are never the less interesting.

## **HOW ARE ELECTRONICALLY MEDIATED LEARNING MATERIALS USED?**

The ways in which electronically mediated learning media are used affects user expectations, influencing and reinforcing decisions about the types of learning media selected. Issues of accessibility, flexibility of use, and speed of access are becoming more central to decisions made about the source of learning media.

Once learning materials are made accessible and manipulable as digital media, how do *users* make use of these materials? Are the identified advantages of digital media over printed text sufficient to change user behaviours? If so will users, specifically students and teachers, eventually abandon printed text? How do the various ways digital media are used influence user expectations?

In this section of the chapter, we examine the ways in which users are making use of electronically mediated learning media and how this is influencing their expectations. How can Australian printers and publishers capitalise on an understanding of how teachers and students are using digital learning media?

James Neal, the Dean of University Libraries, Johns Hopkins University, Baltimore, claims that: 'students and researchers are bringing extraordinary expectations to technology' (Neal 2001). He claims they want 'more and better content, access and convenience, new capabilities, reductions in cost, and expansion in individual and organizational productivity'. He identifies what he perceives to be the 'important advantages of the digital medium' and he calls on academic librarians to appreciate, understand and capitalise on these advantages.

Neal cites the major advantages of the digital medium as including:

- Accessibility – the ability to overcome the limitations of place.
- Availability – the ability to overcome the limitations of time.
- Searchability – the ability to probe information in new ways.
- Currency – the ability to make information available in a more timely way online.
- Researchability – the ability to ask new questions that could not be posed with printed information.
- Dynamism – the fluidity of the presentation of material and the ability to reshape the information.
- Interdisciplinarity – the ability to carry out research across multiple fields and to explore new approaches to a topic.
- The collaborative nature of the medium and the ability to incorporate conversation and debate among scholars and students into the use of a work.
- The multimedia aspects of digital media, the ability to integrate text, images, sound and video into a single presentation
- Linkability – the ability to use hypertext to connect a work to related materials.
- Interactivity – the ability of the user to not only read and view the information, but also to interact with the digital text and images and to use and repurpose them in creative ways.
- The procedural qualities of digital media provide the opportunity for a computer to carry out tasks over and over again with high accuracy and efficiency, thus allowing the user to focus on the intellectual work.
- Spatial capabilities, the ability to view objects in multiple dimensions and relationships, and the ability to navigate easily through files of information.
- The encyclopaedic quality of the digital medium, the almost unlimited capacity of the computer to store and display massive volumes of information without the limitations of the physical format (Neal 2001).

These advantages represent a potential conceptual framework for rethinking the requirements for publishing in learning contexts. If these are the perceived positive features and benefits of the digital medium how do publishers adapt their offerings to capitalize on these advantages? How can publishers take Neal's catalogue of features and benefits and turn these into a successful blueprint for

publishing content suitable for schools and universities? How will prospective users find their way to this precious content? Can smaller online academic publishers compete with giant aggregators like Elsevier Reed and ProQuest? Will these entities swallow up smaller publishers and content owners? Should Australian publishers attempt to identify small content niches that may not interest the large aggregators? How will publishers be paid for their services? Will efforts to digitise and sell content online cannibalise traditional print sales? (This has been the experience of publishers of print journals who have begun to make their journals available online).

Implicit in this thinking is an assumption that the theoretical publisher addressed has the capacity or a preparedness to translate current content holdings into digital form and the financial wherewithal to pay for the process (see information on Digital Rights Management and Format Conversion later in this chapter).

## **CONDITIONS NECESSARY FOR A DISPLACEMENT OF BOOKS AND TEXTBOOKS**

The conditions necessary for a significant displacement of books and textbooks in educational settings are not yet in place. The use of electronically mediated learning materials will be affected/promoted by the emergence of new technologies that will enable cheaper, more flexible and feature packed devices – these devices may be closer than many people think.

A shift in mindset is required to accommodate the concept of Product Service Systems (PSS). Such an orientation recognises text as a *service* offering as well as a product – many of the large publishing companies, including Elsevier Reed and Proquest, (see Case Studies elsewhere in this chapter) have already recognised this intrinsic difference between digital media and printed text. New business models and supply chains are emerging and new relationships are being forged around these Product Service Systems.

The conditions necessary for a significant displacement of books and textbooks in educational settings include:

- A broad range of easily accessible digital content.
- Screen technologies with text resolution and readability at least on par with printed text.

- Stable and well accepted Digital Rights Management software to facilitate the lending or selling of content while protecting the rights of the intellectual property holders.
  - Universal standards for digital text rather than proprietary formats.
  - Publishers that promote their electronic offerings with the same kind of effort applied to print offerings.
  - Authors who take up the different interactive and hypertextual opportunities offered by digital media;
  - Wireless networks that support the movement of information around and between students and teachers.
  - Teachers and students that have developed and are using pedagogical approaches appropriate to these new mediums.
- These conditions are examined in more detail in what follows.

### **A BROAD RANGE OF CONTENT THAT IS EASILY ACCESSIBLE**

Will the lack of digital content continue to be the Achille's heel of the emerging ebook industry? In the United States, a July 2001 court ruling has upheld the publisher Rosetta Books' right to negotiate electronic publishing deals with the legal holders of these copyrights, the authors themselves.

Ms Letty Pogrebin, President of the Authors Guild of America noted: 'it affirms the historically understood definition of 'a book' and establishes authors' control over disposition of their ebook rights.' The US court confirmed 'the ebook is separate and distinct from a traditional print-and-paper book and deserving of a separate grant of rights to be negotiated by authors or agents with each publisher.' According to Mr Klebanoff, Rosetta looks forward to defending its ongoing case for authors' rights in the near future. In the meantime, Rosetta will continue to pursue the rights to the best titles to bring before the growing e-reading public. 'It is Rosetta's belief,' Mr Klebanoff concluded, 'that quality content is, and will remain, the critical factor in the success of the ebook market'. (M2 Communications Ltd 2001) It is likely that many other people are awaiting the outcome of this legal battle. Rosetta's modest efforts to increase the availability of ebook content could open a floodgate of additional material as others join a rush to sign up authors.

Other institutions are also making inroads into the dearth of ebook content. Princeton University Press (PUP) plans to publish 500 titles from its backlist as ebooks. PUP also plans to publish what it is calling Digital Books Plus which 'will be topical frontlist titles offered initially as an ebook, then released in print with identical content about two months later' (Reid 2001). This approach of publishing direct to ebooks, followed by a printed dbook will allow authors to publish on topical subjects more quickly but may also have the effect of luring more people to electronically published books.

We wonder how many people will see the need for a printed book once they have a copy of the ebook.

A number of sites have sprung up to facilitate open source academic publishing. One increasingly well-known exemplar is ePrints.<sup>4</sup> The ePrints site provides repository software that enables scholars around the world to easily deposit their papers with a reliable and reputable organization that will ensure its availability and accessibility. In this example, scholars are literally opting out of the traditional publishing model.

Pressure and lobbying from one of the bigger players, Amazon.com, to encourage publishers to add more ebook titles is likely to lead to more content becoming available. 'That catalogue is a little too thin,' Blackburn noted. Blackburn is confident he can convince publishers to quicken the pace of ebook releases because Amazon plans to 'merchandise and sell the product. We'll be able to show them numbers' (Milliot 2001). As availability of content improves more readers are likely to be drawn to the idea of ebook readers and ebooks.

## **IMPROVED SCREEN TECHNOLOGIES**

Current generation technologies for engaging with digital media are riddled with compromises and constraints that limit the potential for expanded use of such technologies in the classroom.

Handheld computers like the Palm range of palmtop computers or Visor Handspring have tiny screens with relatively poor screen resolution particularly when it comes to displaying moving images or when used in strong light. Text resolution is about one third of

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<sup>4</sup> For further information visit the ePrints website: <http://www.eprints.org/index.php>

that provided by paper. But these devices are very light and relatively inexpensive, can operate across wireless networks, come with a staggering choice of applications and a significant volume of digital content is available. A number of schools and universities, mostly in the United States, are conducting trials around their use. Device manufacturers and software providers are promoting, supporting and in some cases funding these trials. We are beginning to see the research efforts of teachers who have used the devices as the basis for disseminating course materials. The research is just beginning to appear in refereed academic journals. The devices are receiving qualified support in the studies available so far but we are not seeing large numbers of students, teachers or schools rushing to embrace palm sized computers.

Laptops have better, larger screens, a keyboard, more powerful applications and a much bigger capacity to store and archive data. But they are heavier, larger and more expensive to buy. Text resolution and readability on screen, while vastly better than that provided by the handheld devices, still falls well short of printed text. Many schools and universities are experimenting with the use of laptops. Generally, these are more affluent schools, and some institutions are shifting to campus wide wireless networks (see Case Studies elsewhere in this chapter). These networks open up opportunities for students to interact with teachers, fellow students and to access information resources from the library or the web.

Personal computers are the most ubiquitous of the platforms available for engaging with electronically mediated learning materials but are large, tethered by cables and network connections and quite impractical for most classroom situations where they dominate the teaching environment. Screen resolution is a little better and larger than laptops, enabling bigger fonts and better text readability, but they are no match for the portability and readability of most printed text.

Will screen-based technologies always suffer from these constraints and compromises?

The next generation of display technologies will provide electronic paper (epaper), 'paper-like' screen technologies that incorporate a bundle of flexible sheets. These types of reading technologies offer transitional features that reflect and preserve long practiced rituals and ways of interacting with text, recreating the physical experiences associated with turning a page and reading

from a page. These kinds of technologies may suit people making the transition from traditional modes of reading.

Some analysts suggest that electronic paper will become widely available over the next three to five years. Such a development will significantly influence the kinds of devices designed for reading electronic text we see over that period. We may see the development of devices that emulate the books with which we are so familiar and comfortable. These devices might consist of a bound volume of electronic paper that supports all the physical interactions that we are accustomed to with a book – except that the pages will be dynamically transformable so that they can reproduce all kinds of digital media.

The key point here is that we should not judge the future of electronic publishing on existing computing technologies. The kinds of technological developments being reported suggest that new generation devices will be lighter, cheaper, more flexible, wireless and with vastly improved screen resolutions. Indications from producers of ePaper and eInk indicate that we should expect products to be on sale within two to three years, and that within five years these devices will be relatively cheap and ubiquitous.

## **DIGITAL RIGHTS MANAGEMENT AND FORMAT CONVERSION SERVICES**

Services offered by companies like Reciprocal, the digital rights management and distribution services provider, and Texterity Inc., which specializes in automated file conversion, indicate that the problem of digital rights management and easy format conversion are close to being resolved. These two companies recently announced ‘a program to offer a package of conversion, DRM protection and distribution services to small and mid-size publishers as an easy path to produce ebooks.’ (Hilts 2001)

The service combines Reciprocal’s Digital Clearing Service, which lets publishers integrate DRM software from Adobe, InterTrust and Microsoft into their products, with Texterity’s new TextCafe Open eBook (OEB) conversion service. TextCafe automates the conversion of publishers’ Quark, Microsoft Word or Adobe PDF files into XML/OEB files.

The cost of converting files, especially PDF, into ebook formats has been one of the principal stumbling blocks for many small and

medium-size publishers. According to Texterity spokesman Cimarron Buser, ‘... taking PDF to XML format is difficult... most publishers end up either re-keying the entire text or marking up the file with XML tags by hand’. Buser believes that ‘TextCafe makes the hardest part easy and affordable’.

## **UNIVERSAL STANDARDS FOR DIGITAL TEXT**

The Open ebook standard offers publishers the benefit of a format that can be read across many different hardware platforms. As publishers adopt this standard the quantity and accessibility of digital text, regardless of the hardware used, will increase dramatically.

Universal standards are part of the necessary and sufficient puzzle.

## **PUBLISHERS AND CONTENT AGGREGATORS THAT PROMOTE THEIR ELECTRONIC OFFERINGS**

The issue of sales promotion is dependent on a complex integration of closely related and interdependent factors. The sellers of ebooks and digital media are unlikely to invest in the promotion of their content if the sales are not likely to follow. Brisk sales are unlikely until the breadth and depth of content approaches that of the print medium and the technology is in place to facilitate ready access to content. The comments reported earlier in the chapter that Amazon plans to ‘merchandise and sell the product’ (Milliot 2001), suggests that sellers are beginning to see the possibility of sales. ‘We’ll be able to show them numbers’.

## **ACCESS AND TRANSITIONAL MODELS WHICH MAP TO USER PRACTICES**

Digital content aggregator and supplier, ebrary, provides an interesting access model that mimics the way in which people browse in a library or bookstore, reading books from the shelves before choosing to buy or lend. They extend this access model to include the way many people, but particularly students or researchers, photocopy material at a library.

ebrary offers users the opportunity to buy single pages for 15-25 cents, which is about the same as would be charged to photo copy a page. In this example, some of the money flows through to the publisher and author. These micro-purchases are being handled through an online 'ewallet', which accepts deposits as low as five dollars. This again mimics the photocopy access cards which many libraries use. ebrary CEO Christopher Warnock thinks that page-based purchasing will make ebrary 'a giant information store' (O'Leary 2001).

## **WIRELESS NETWORKS**

The advent of wireless data networking in educational settings opens up opportunities for further use of electronically mediated material between teachers and students.

A wireless network allows students to use notebook or handheld computers and wireless modems to link to a wireless network. In effect any room in an educational facility, or any outside space within range of a wireless access point, can become part of a university's hardware network – a place where students and teachers can use computers to network and communicate with each other.

A student using a wireless network can conduct research over the Internet, browse the library catalogue or information resources, download or upload assignments, work on joint projects and send or receive instant messages or email. Academics can use the network to disseminate course-specific content, post information such as class syllabuses and calendars, display lecture presentations, provide supplemental reading and links to other resources, as well as post group assignments and quizzes.

There are a number of examples of educational institutions opting for wireless data networks. The example of Hofstra University's School of Law in Hempstead, New York, finds students and teachers connecting via a wireless data network (Rendleman 2001). School administrators chose a wireless network because of the inherent flexibility of such an approach. The school estimated that the wireless network cost about one quarter of a fixed network. The network is popular with students, 'You have a complete library at your disposal; you don't even have to leave your chair,' commented Ely Levy, a first year student at Hofstra.

If wireless networks across school and university campuses in Australia become popular (see case studies earlier in this chapter – The University of Southern Queensland’s web pad project and the John Paul College wireless laptop program) this will represent another piece in the ‘necessary and sufficient’ puzzle of substitution and displacement of printed text.

## **TEACHERS AND STUDENTS – NEW PEDAGOGICAL APPROACHES**

The examples of the teaching and learning practices outlined in these case studies suggest that teachers and students are already adapting to electronically mediated learning settings. Over the next couple of years we should begin to see the results of a series of studies examining the experiences of teachers and students involved in these pioneering programs. Some of these studies will no doubt explore the pedagogical outcomes of this shift in practices.

## **CONCLUSION**

This is a chapter filled with information but very little of this information is in the form of answers. Looking at the changes taking place in the everyday practices of students and teachers, both in Australia and overseas, Australian printers and publishers would be wise to be a little bit anxious about the future of the industry.

How can publishers adapt to this shift to electronically mediated learning materials? Is there an opportunity for publishers to facilitate and link communities of learners across educational settings? Perhaps publishers could design rich hyperlinked learning sets around meta-data frameworks?

The future seems to hinge on digital content, the ‘findability’ of that content and the manner in which that content maps to users’ needs. This means that publishers must strive to really understand the needs of teachers and students and the multiplicity of ways in which they use content and interact with others. This is such a dynamic field that publishers will need to establish enduring links with users if they are to stay in touch with the changes taking place.

Perhaps publishers could embed interactive elements in their textbook offerings. This will re-conceptualise the notion of a

textbook as a primarily digital offering – as part of a product service system.

Printers on the other hand may need to be more closely aligned with electronic publishers, offering short runs of *out-of-print* texts, or texts for which the market is too small to warrant longer runs. At the very least printers will need to emulate the speed and convenience of downloadable electronic media. We suspect that the market for printed academic and scholarly works will begin to shrink over the next 2–5 years. Perhaps this gap could be filled with printing *out-of-print* texts and specialty titles.

Questions also arise around the perceptions and expectations of users.

- Do persistent perceptions about traditional books extend to the books and textbooks used by students at schools and universities?
- Will today's students and teachers continue to see the book and the textbook as the principal source of learning and knowledge?
- If students and teachers shift away from printed textbooks and schoolbooks how might these changes in practice spread to others in the community?
- If this is a transition away from printed text how long will it be before users abandon print?
- Are the identified advantages of digital media over printed text sufficient to change user behaviours?
- How do the various ways digital media are used influence user expectations?
- How can Australian printers and publishers capitalize on an understanding of how teachers and students are using digital learning media?
- Why would anyone give up a familiar, simple and cheap technology in favour of a complex amalgam of wire, plastic and silicon - regardless of the form of that amalgam?
- Do the benefits that accrue the users outweigh the costs of using such technologies?
- At present the cost/benefit outcome heavily favours printed books but how long will this persist?
- Will electronically mediated media completely supplant the printed book as the automobile did for the horse drawn carriage?

- How will prospective users find their way to a publisher's precious content?
- Can smaller online academic publishers compete with giant aggregators like Elsevier Reed and ProQuest?
- Will these entities swallow up smaller publishers and content owners?
- Should Australian publishers attempt to identify small content niches that may not interest the large aggregators?
- Will efforts to digitise and sell content online cannibalise traditional print sales?

We seem to have developed more questions than answers in this chapter but hopefully these questions can help industry insiders recognise the context of the changes taking place and the kind of thinking necessary to survive.

Printed text may never be abandoned, but in the context of education we believe it is only a matter of time before it ceases to dominate the marketplace.

## **POSTSCRIPT**

In researching the material for this chapter, a colleague told the authors of a great program she had 'just caught the end of' on the radio in her car. It was an ABC Radio National program called 'Knowledge Indignation: Road Rage on the Information Superhighway'. It was part of the Background Briefing series. The program was broadcast on Sunday August 12 2001 at 9:10am. We went to the ABC Radio National website and found that we could listen to the program via the website the next day, or the transcript would be available later the same week.<sup>5</sup>

What we found when we visited the site looking for the transcript was more than a text-based transcript. We could 'download the transcript in a (choice of) printer friendly format(s)'. Was ABC Radio National now a print publisher? We could listen to the original program, again or for the first time, in 'Real Audio' – overcoming the limitations of time imposed by the original medium. We could download a copy of 'Real Audio' if we did not have a copy already. We could 'cut and paste' quotes from the transcribed text (speech) directly into this chapter which you have

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<sup>5</sup> <http://www.abc.net.au/rn/talks/bbing/stories/s345514.htm>

since read. We could email the producer and comment on what we had found. Radio airwaves were no longer ephemera but had been transformed into clickable interactive content.

Many programs from the national public broadcaster, both radio and television are transcribed and made available in this way. Commercial broadcasters are also making some of the material from their current affairs or life-style programs available via the web.

Our biggest surprise though was that the transcription of this radio broadcast was laden with supporting images – was this radio with pictures? Some kind of transformation or translation had taken place in which people speaking in a recorded broadcast had been transcribed into more complex and manipulable digital media.

At the end of the transcribed text we were offered a series of web links where we could expand our research. We were directed via a web link to an online version of *Alice in Wonderland* that could be ‘read aloud’.

What would happen if this site were a DOI reference linked site? (see details on DOI reference linking earlier in this chapter). The reader could leap from this ‘chapter’ into the source data and could soon be listening to Sir John Gielgud singing ‘The Lobster Quadrille’ or visiting Steven Hanard’s (one of the panel of people/experts who spoke on the radio) website on electronic journals at the University of Southampton.

Publishing for the web is a transformative experience for authors, publishers and ‘readers’. A flood of digital media besieges books and printed texts but it is not so much a competition for supremacy as a sea change in the choices available for ‘consumers’ of information and knowledge. When these consumers are teachers and students the threat of substitution and displacement of printed books and textbooks is very real.

Does this mean that books and printed texts will disappear completely from the satchels and backpacks of students and teachers? We believe this to be highly unlikely in both the short and medium terms, but the practices of teachers and students are in transition, the everyday practices of people are changing. A shift to electronically mediated media is clearly evident, fuelled and supported by some of the world’s largest publishing companies and by the reinforcing experiences of users.

It is not yet clear what traditional publishers and printers can do in this rapidly changing landscape of practices other than be mindful and aware of the changes taking place.

Each of us must figure out how we might adapt our skills and expertise, or develop new skills, in order that we can continue to have customers that recognise a value in our product/service offering. It is a matter of survival that we understand our users and the ways in which their practices are changing.

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