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E-Books in Higher Education

Nearing the End of the Era of Hype?

By Mark R. Nelson

Why do screen reading advocates frequently assume that continuation of print genres is at the expense of screen reading? Why do they assume that any shift away from capital intensive printing will never shift back to less centralized, less costly local print genres? And why is the rapture displacement to screen reading always 12–18 months in the future?

—*futureofthebook.com*, July 19, 2007 (<http://www.futureofthebook.com/2007/07/19>)

In an interview [in February 2007], Arthur Sulzberger, owner, chairman, and publisher of *The New York Times*, noted that, "I really don't know if we'll be printing the *Times* in five years, and you know what? I don't care, either."¹ He was, of course, speaking about the transition from print to digital and not the closing of the venerable newspaper. Not long after, in response to concerns expressed by the staff of the *Times*, Sulzberger backed off his earlier comments: "So let me clear the air on this issue. It is my heartfelt view that newspapers will be around—in print—for a long time. But I also believe that we must be prepared for that judgment to be wrong."² Well, he sort of backed off.





The e-book is not limited to static pictures; it can also integrate video, audio, animation, and even interactive simulation.

This pairing of quotes from one of the world's largest newspapers illustrates a few key points relevant to those of us in higher education involved with, or concerned over, the future of printed course materials.

- If a newspaper like the *Times* could envision a point just five years away at which print distribution could end, what does that say for how college campuses distribute content and course materials?
- The organizational reaction of staff at the *Times* to such a change was visceral—as it might also be among faculty, librarians, and other content providers on campus. Can a change of this magnitude happen that quickly?

- Many believe that print will continue to be the preferred medium for much content long into the future, but it is also widely believed that change is coming and that change will be technology-driven.
- Now is the time to begin preparing for, or at least envisioning, the possibility of a future with at least substantively fewer print materials. If there is a possibility that print could go significantly digital over the next five years, what should campus communities be thinking about now in preparation?

Of course, the key questions are: What is the reality with respect to e-books? Does print really have an anticipated life span of five more years? Will e-books finally

take off? After nearly two decades of talking about how e-books are right around the corner, have we finally reached the corner? This research bulletin looks at some of the hype and the reality of e-books in higher education.

Highlights of E-Books in Higher Education

What is an e-book? While the question may sound trivial, increasingly it is not. The obvious definition is that an e-book is an electronic book that can be read digitally on a computer screen, a special e-book reader, a personal digital assistant (PDA), or even a mobile phone. In other words, e-books are consumed on a screen rather than on paper. However, underlying this simple and seemingly obvious definition are some important distinctions that may make an e-book something other than just a “PDF version of the printed book.” These differences lie in the electronic nature of e-books, which are changing the nature of what a “book” is within an electronic context.

How are e-books like electronic copies of their paper-bound ancestors? With e-books we can establish bookmarks that allow us to jump straight to a page when the book is opened. And it is possible to create an e-book that is the equivalent of a scanned, PDF copy of the original paper-bound text. This form of e-book is referred to as “digitized,” and it currently represents the majority of the e-book market. Like printed books, digitized e-books can have pictures or charts, indices, and tables of contents. That is probably where the comparable characteristics end.

On the side of differences, e-books increasingly take on a number of interactive features, unique to the dynamic environment technology allows. E-books can have built-in dictionaries and pronunciation guides. The e-book is not limited to static pictures; it can also integrate video, audio, animation, and even interactive simulation. As computer games become

more complex in storylines and character development, they are becoming a new evolution of literature in which the reader interacts with the story more actively rather than simply reading it. E-books can be delivered in segments, such as Harlequin romance novels that can now be delivered to your mobile phone in daily chapter installments.

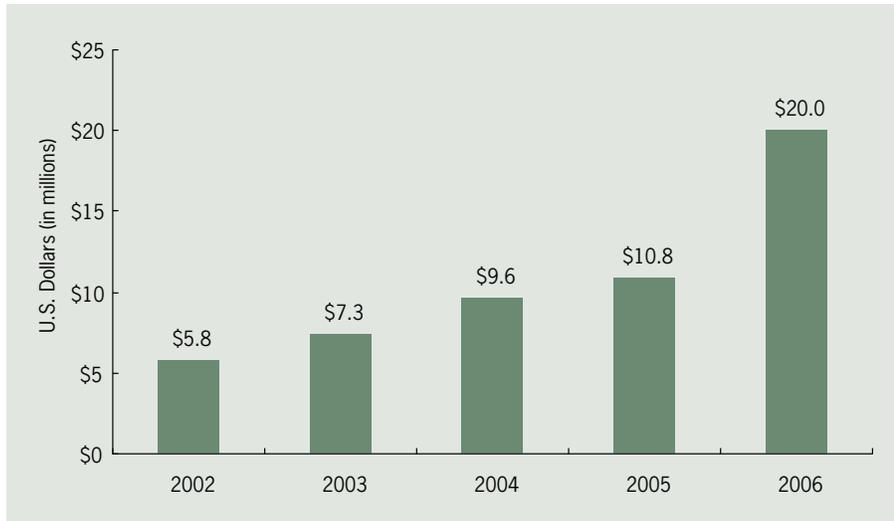
As e-books move further away from conveying a story or content in the way print-based books do, we may well ask at what point is an e-book really no longer a book but something else? As with many of the audio formats that have gone before—records, 8-track tapes, cassettes, and now even CDs—our traditional concept of content consumption is changing because of technology, which will ultimately have a profound impact on the concept of a book as new generations of readers mature and gravitate to new technologies.

Recent E-Book Developments

Technology has a habit of changing things. Certainly no one expects the printed book to disappear overnight. Oral histories were the primary means of story transmission until they were replaced by printed scrolls and books, and these have been around for centuries. However, looking back over the past several centuries, we can see how technology changed the nature of the content and its accessibility. For example, long-standing usage patterns and economic models for content creation and distribution changed as we moved from the medieval scriptorium to the printing press, from the printing press to digital production, and from digital production to digital distribution.

We have seen the precursor of the growth in e-books for at least two decades now, but still e-book sales lag far behind projections and constitute only a small percentage of the book market. The old publisher joke may apply here: “Our e-book sales doubled this year from last year. This year we sold two units, while last year we sold one.” As shown in Figure 1, e-book sales in trade books were only about US\$20 million in 2006,³ almost double the prior year, but much lower than overall book sales, which are estimated to be in the range of US\$25–30 billion annually, depending on how the figures are cal-

FIGURE 1. U.S. TRADE E-BOOK SALES, IN MILLIONS, 2002–2006



culated. There is some debate about the accuracy of the actual sales figures for e-books but little doubt that e-book sales are starting to grow at a more rapid pace.

Looking at international data, growth in e-books appears much higher per capita outside the United States. E-book sales over cell phones in Japan grew to US\$82 million in 2006 (from US\$0 in 2001),⁴ and

e-book sales in Korea reached US\$144 million in 2006, double the 2005 figures.⁵ In China, the government recently acquired 165 million e-book readers for students.⁶ Some estimates predict that as much as 50% of fiction sales in Europe could be digital within ten years and that the tipping point for e-book sales growth is very close in European markets.⁷ Sev-

eral “next-generation” e-book technologies are already being market-tested in Europe and Asia, where e-book adoption appears more visible and prevalent than in the United States.

While accurate industry sales figures for e-books might be elusive, many publishers and technology providers are gearing up for more widespread adoption in the near future. They anticipate possible sales growth to US\$3–5 billion by 2012, based on a larger portion of the mass market adopting e-books within three to five years.⁸ Indeed, in some sectors, such as scientific and professional publishing, revenues from electronic sales have already exceeded this measure.⁹ The continued digitization of books by Google, the Open Content Alliance, Microsoft, academic libraries, publishers, and other sources will greatly expand the volume of content available, further enabling the potential take-off in e-book technology.

Higher education is expected to be at the forefront of the wave of e-book adoption over the next two years. Some experts



Portability standards for content help address both supplier-user problems and multiformat issues for publishers.

predict that 2007–2009 will be transition years for the higher education e-book market, with large growth expected in both digital textbooks and digital library collections.¹⁰ Recent large investments in e-book collections by institutions like Stanford University may “send a strong signal to the academic library community that e-books have entered the mainstream of book acquisition for major university libraries.”¹¹ College stores have also gotten on board with e-book sales, with nearly 20% of the industry now offering e-books to students, up from a relative handful of stores just two years ago.¹² Initiatives such as the Digital Marketplace at California State University and OhioLink in the State of Ohio are placing substantive bets on a more widespread adoption of e-books in the campus environment within the next few years as a way to potentially help reduce the cost of education for students. Publishers and campuses alike are exploring the use of e-books and other forms of digital content. Such explorations in the educational markets, coupled with other developments discussed below, may signal a tipping point in e-book usage on college campuses from occasional oddity to a mainstream technology in less than five years.

Overcoming Adoption Barriers

So is all of this talk of change just hype? Or is real change around the corner? What has happened to e-book technology and markets to suggest that we may be nearing the end of two decades of e-book anticipation? Prior to this point, we can see a handful of distinct reasons why e-books have failed to take off as expected. In the sections that follow, we will look at some of these barriers, related recent developments, and, where possible, projections for the future.

Developing Standards for Portability and IP Protection

There are two major standards-related barriers to e-book adoption. The first

involves having a critical mass of content available for any e-reader—a portability challenge. The second involves being able to protect the intellectual property (IP) rights associated with that content by limiting illegal copying and distribution.

The amount of book content available in digital format is undeniably growing, but there is some concern about the use of proprietary formats and the lack of standards. We do not want students and institutions to have to invest in multiple different technologies for each e-textbook based on publisher. Such differences create learning and usage barriers and reduce adoption rates. While Adobe’s Portable Document Format (PDF) has emerged as an industry standard for much e-book content, we also see a variety of proprietary formats, such as the Sony e-reader Broadband Electronic Books (BBEB) format or the VitalSource Bookshelf VitalBook (VBK) format, among others. Academic publishers are working on a common XML-based format that could be universally applied to textbook content. One of the more interesting standards, within the context of academic institutions, is the Common Cartridge standard from the IMS Global Learning Consortium. Common Cartridge is being adopted by many of the major higher education and K–12 publishers, as well as the larger learning management system providers. Common Cartridge addresses content packaging, question and test interoperability, IMS tools interoperability, IEEE learning object metadata, and the Sharable Content Object Reference Model (SCORM). Simplified, the Common Cartridge standard allows content to be moved more freely into and out of the major course management systems. This standard is of interest in part because of its robust nature, facilitating portability of not just simple content but also more advanced content such as digital learning objects, learning assessment tools, and interactive capabilities beyond a simple digitized e-book. In trade

publishing we see a similar content portability standard emerging in the form of the International Digital Publishing Forum’s Common Container standard. Portability standards for content help address both supplier-user problems and multiformat issues for publishers.

The second domain in which standards are a critical challenge is in the protection of IP—who owns e-book content, and how can it be protected from illegal copying and distribution? In this domain, the relevant technology is digital rights management (DRM). While many of the other barriers to e-book adoption appear more practical—such as the lack of an effective e-book reading device or users’ being less accepting of e-books after growing up reading paper books—the problem with IP and e-books is even more fundamental, particularly on college campuses.

Concerns about IP rights have been a major force in slowing e-book adoption—and may continue to do so for some time to come.¹³ In higher education we often see differing interpretations of copyright law and the meaning of “fair use.”¹⁴ IP issues are particularly challenging in cases of books produced before e-book publication rights were part of the typical publishing contract. In such cases, “copyright law blurs the rights of authors and publishers [and academic institutions] in the electronic realm.”¹⁵ Piracy of e-book content is also more prevalent than with paper content, creating concerns for campuses already weary of suits and subpoenas from the Recording Industry Association of America and others over the theft of digital versions of music and video. Will e-books and e-textbooks be next? Such concerns have led some academic institutions to take preemptive actions—seeking campus licensing for e-books (and e-textbooks), or developing their own environments for e-book distribution that decrease the temptation for students to share files illegally.¹⁶



The solution to these problems lies in finding new business models, developing new technologies, and agreeing to some common standards for IP protection and DRM.

While most DRM and IP protection protocols are focused on protecting the intellectual property rights of authors and publishers, the frequent downside is that the technologies involved often complicate or detract from the consumer's usage experience. In many cases this results in a consumer product that is so "closed down, the value proposition gets squeezed down almost to nothing."¹⁷ The solution to these problems lies in finding new business models, developing new technologies, and agreeing to some common standards for IP protection and DRM. Some promising approaches are already beginning to emerge, such as new offerings by the Copyright Clearance Center, Microsoft's developmental metered database technology, and new

automated rights acquisition protocols being developed by the Association of American Publishers and the Automated Content Access Protocol project. The challenge here is finding the appropriate balance between usability and IP protection. Until that happens, e-books may continue to languish.

New E-Reader Software and Devices

An obvious barrier to e-books is the lack of a good e-reader device. Common complaints are that looking at a computer display causes eye fatigue, or that it is too difficult to read books on smaller devices such as PDAs and mobile phones. Harlequin has found some success delivering chapters to mobile devices via a subscription service. In Japan we see even greater

success with this chapter-by-phone approach to fiction. In general, however, an "iPod equivalent" for the e-reader has been missing. The question is, will useful e-readers ever arrive, or will they remain elusive, always "a year or two away"?

Technologies in development and on the market *should* provide a solution within two years. The current e-readers represent only the first generation. Based on e-paper technology, these readers currently display up to eight shades of gray—acceptable for text, but not as good for pictures, charts, graphics, or anything else. The first full-color e-paper displays are expected to be commercially available some time in 2008, and this could change adoption patterns for the technology substantively.

TABLE 1. CLASSROOM CONNECTIVITY

| YEAR STUDENTS WERE IN SECOND GRADE | CLASSROOM INTERNET CONNECTIVITY WHEN IN SECOND GRADE | GRADE OF STUDENTS IN 2007 |
|------------------------------------|------------------------------------------------------|---------------------------|
| 1994 | 3% | Seniors |
| 1996 | 14% | Sophomores |
| 1998 | 51% | 11th |
| 2000 | 77% | 9th |
| 2002 | 92% | 7th |
| 2004 | Nearly 100% (95% high-speed access) | 5th |

Source: Data from Julie Evans, "Listening to the Voices of Our Future" (presentation at CAMEX, Orlando, FL, March 23, 2007).

E-paper¹⁸ displays are as easy to read as print from a contrast perspective, and they consume far less energy than traditional displays. Eye fatigue is typically also less of an issue because there is less glare and no backlighting on the screen. Devices already on the market, such as the Sony Reader or the iRex iLiad reader, are examples of the current market state of this technology. Amazon.com's e-reader is expected to use e-paper technology as well. Users admit that such devices are getting close, but are not yet there for most consumers to be willing to adopt the technology.

In the interim, we see other devices that could fill the e-reader space. The display technology used in the new iPhone or iPod devices by Apple has potential, if the display size were larger. Ultra-mobile PC (UMPC) technology, very slow to get off the ground, is now showing new promise with recent additions to the market. Tablet PCs, if made even lighter and more energy-efficient, could also fill this niche. Recent developments with organic, light-emitting diode (OLED) technology show great promise as an e-paper technology. Reliability and display-life issues with the organic compounds reportedly persist, a problem that will need to be resolved prior to the technology's becoming a viable option for e-reader devices.

On the software or application side, we are seeing the introduction of more e-reader technologies in the higher education space. Products by VitalSource, CafeScribe, and LibreDigital, among others, are already being used on many college campuses. Most campus libraries now host multiple e-book services for patrons, and each typically has its own

e-reader application. These applications provide a range of functionality that can be applied to e-books, and new features, such as note sharing and rating, are being added all the time.

Cultural Acceptance

One of the most challenging barriers to e-books is cultural resistance. For those who grew up with paper books (p-books) and always read from p-books, switching to e-books is a bit uncomfortable for anything more than reference purposes. Yet institutions such as the University of Phoenix moved almost entirely to e-books and found that less than 1% of students acquire a print version of the book rather than use the electronic version that is supplied as part of the course fee. Some educational disciplines have moved quickly toward e-books. In dentistry, for example, vendor data suggest that nearly one-third of all textbooks in U.S. dental schools are now completely digital. Moving forward, cultural resistance to e-books will likely wane as new groups of students enter college.

Currently we see many publications and speakers touting that today's college students are "digital natives" while the rest of us are "digital immigrants." That perception, however, is not entirely true. The annual student studies from the EDUCAUSE Center for Applied Research (ECAR) have consistently shown that students are not as comfortable with technology as we imagine them to be—and there may be good research out there to help us understand why. Foremost is the data from Project Tomorrow.¹⁹ As Table 1 illustrates, only 3% of current college seniors had computers connected to the In-

ternet when they were in second grade in 1994. In comparison, nearly all of today's fifth graders had Internet connectivity in their second grade classrooms, and most had high-speed access. Technology usage in K-12 has changed significantly in just the past decade.

Other data from Project Tomorrow show that 22% of students in grades 6-12 are using e-textbooks, and 39% view e-textbooks as the future.²⁰ These data are reinforced by other sources citing an increased usage of e-books in K-12. As K-12 e-textbooks move from "PDF versions" of p-books to something more interactive, adoption is expected to rise quickly.²¹ As each successive grade of students enters college, they will have had more experience with technology in the classroom. Within five years we should see the first students entering college who may never have used a print textbook—for them, course materials will have always been provided in e-book form. While still taught by digital immigrants, those students may be the first true digital natives to enter higher education.

The data shown in Table 2 are drawn from a study by Ed Walton, acting dean of University Libraries at Southwest Baptist University.²² The table shows student and faculty preferences for using e-books versus p-books for three purposes: conducting research, as a textbook, and for leisure reading. Not surprisingly, both populations expressed little to no preference for e-books for leisure reading. However, when we view the "conducting research" and "textbook" perspectives, we see striking differences between students and faculty. Nearly a quarter of students prefer e-books for conducting research, and nearly one-fifth of students prefer e-textbooks. In contrast, only 8% of faculty reported preferring e-books for conducting research, and none reported e-textbooks as a preference.

These data show a distinct and dramatic difference in faculty and student preferences related to p-books and e-books. It may also help explain why e-book adoption for textbooks has been so low. Data from the National Association of College Stores continually reconfirms that the top factors in determining what students will buy for course materials is

influenced by what the faculty member recommends and uses in the classroom.

Of course, other factors may also explain why e-book adoption for course materials is lower than expected. For example, one recent study of library patrons at over 552 libraries found that the main reason students did not try e-books was because they did not know that the option exists on campus.²³ The study found that listing e-book options in the online public access catalog (OPAC) and recommendations by professors and staff were the top drivers of e-book usage. Lack of awareness was identified as the primary barrier inhibiting usage, followed by problems associated with the lack of a good e-reader device or platform. Cultural resistance was not raised as a top barrier, although we again note that professor recommendations influence student adoption of e-books.

What It Means to Higher Education

The traditional barriers to e-books have been mostly cultural and technical. IP

TABLE 2. STUDENT AND FACULTY PREFERENCES FOR P-BOOKS VERSUS E-BOOKS

| COLLEGE STUDENTS | CONDUCT RESEARCH | TEXTBOOK | LEISURE READING |
|----------------------|------------------|----------|-----------------|
| Ratio | 2.3/1 | 3.6/1 | 30.8/1 |
| P-book | 56.3% | 67.5% | 80.1% |
| E-book | 24.5% | 18.5% | 2.6% |
| No Preference | 13.2% | 7.9% | 11.3% |
| No Response | 6.0% | 6.0% | 6.0% |
| COLLEGE FACULTY | CONDUCT RESEARCH | TEXTBOOK | LEISURE READING |
| Ratio | 10.0/1 | N/A | N/A |
| P-book | 80.0% | 92.0% | 92.0% |
| E-book | 8.0% | 0.0% | 0.0% |
| No Preference | 8.0% | 4.0% | 4.0% |
| No Response | 4.0% | 4.0% | 4.0% |

Source: Data from Ed Walton, "Faculty and Student Perceptions of Using E-books in a Small Academic Institution" (presentation at ACRL 13th Annual Conference, Baltimore, MD, March 30, 2007).

issues and a lack of standards have also delayed adoption. Many of these barriers persist, but the factors enabling change are sliding into place. While we are already seeing the beginning of a shift to e-books on many campuses, higher

education has probably up to five years to prepare for significant e-book adoption on campus—at least in the area of course materials, such as textbooks. Five years is seen as a highly conservative, outside horizon for preparation based



If e-books do begin to take off as quickly as iPods have among college students, then waiting until the enabling factors have clicked into place may be too late.

on assumptions regarding some key enabling factors for the required shift:

- Within five years, today's K-12 students will be showing up at colleges and universities with substantively different cultural attitudes towards e-books than today's students.
- A commercially viable e-reader will be on the market.
- New learning technologies are nearing the tipping point of maturity.
- Standards for e-books are emerging.
- IP issues will be mostly resolved either through technology (DRM) or business models.

What does five years to prepare mean?

It means higher education must *position* itself to be ready to incorporate e-books effectively on campus, and develop the *competencies* to make such positioning possible. Positioning can be thought of as the vision of where we need to be, and competencies as the actual skills and infrastructure required to make that vision a reality. As one study on e-books notes, "It is highly debatable what will prove to be the consumer 'tipping point,' but based on the experience of other markets, the speed of adoption will be very fast."²⁴ Institutions unprepared for the rapid adoption of e-books on campus could re-experience the effect that music file swapping had on campus communities—from network performance and

storage issues, to the more sticky legal issues surrounding IP rights for digital content.

Addressing e-book opportunities and challenges on campus requires involvement from all major stakeholders—IT units, libraries, college stores, faculty, and students. This begins with the need to prepare 21st-century workers with the tools they will be using in 21st-century careers. If e-books do begin to take off as quickly as iPods have among college students, then waiting until the enabling factors have clicked into place may be too late. By considering the opportunities now, institutions have the opportunity to respond proactively to the coming arrival of e-books. The institutions that will be best prepared to seize on those opportunities are the ones that take steps to position themselves and leverage internal competencies across departmental and institutional lines.

We suspect that e-books will represent more significant percentages of the book market over the next few years. While campus libraries and some college stores already have experience with e-books, the influence of e-books will expand and mature in the next few years. Campuses that convene discussions about the educational and other implications of e-books for students and institutions will be better equipped to handle the change when the time comes. In the recent words of one faculty member on this topic, "At some point in the future, the right combination will be there and it will take off and we'll start reading. The thing is, no one knows when."²⁵ Barriers to e-book adoption still exist, but signs point to this changing within the next two to five years. That, of course, has been said for most of the past 15 to 20 years, so we approach the future with a healthy dose of skepticism as we consider the implications of new e-book technologies.

Key Questions to Ask

- What are the cultural and technical barriers to adoption of e-books on our campus? In what ways might we work to overcome them?
- How can our institution position itself for a future with e-books? What competencies will be required of IT? Libraries? College stores? Faculty? University presses?
- How are e-books currently used on our campus? What other forms of digital content are being used, particularly by faculty in the classroom? Are students aware of the e-book offerings available to them through the campus library, college store, or other sources?
- Does our campus have a clear and consistent interpretation of or policy concerning copyright and fair use across all departments (academic and non-academic)? Does the interpretation or policy consider digital content or e-books specifically? Do all departments understand and

comply with this interpretation or policy? Do our students?

Where to Learn More

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Author's Note:

The e-book landscape continues to change almost daily. Since the original research bulletin was written, two developments are worth particular note. First is the entry of Amazon.com's Kindle device to the market. This new e-reader has received widespread attention and, as expected, uses the same e-paper technology as other readers on the market. A second important development is the new publisher alliance via CourseSmart. Six of the largest textbook publishers in the United States came together in 2007 to form CourseSmart. Though currently still in beta, the company will be offering digital or e-book versions of textbooks from each of the publishers for both faculty review and student purchase. This company represents an important development in the textbook market and could significantly enhance the inventory of textbooks available to faculty and students. There are other developments, both business-based and technology-based, signaling that the e-book landscape continues to be not only dynamic but also turbulent. These and other developments suggest that a "solution" to e-books is unlikely to solidify in 2008, resulting in more time to sort out the hype from the reality.

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13. Esther Lim and Mai-Trang Dang, "United States: The Blurred Law Behind the Languishing E-book Industry," *BNA International Piracy and Brand Awareness* (May 2007), <http://www.finnegan.com/publications/news-popup.cfm?id=1997&type=article>.
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15. Lim and Dang, "Languishing E-book Industry."
16. For example, see California State University's Digital Marketplace project or OhioLink's e-book project, both of which are working with publishers to find new ways to deliver e-textbooks on campus and seeking innovative ways to address DRM issues on the participating campuses.
17. Danny Bradbury, "Are E-books Set to Turn a Page?" *The Financial Post* (May 29, 2007): SR2.
18. E-paper refers to an ultra-thin screen that displays electronic text in a format as crisp as traditional type on printed paper. This effect is achieved through one of several means of stimulating chemical ions to create a static display image with high contrast levels. This is different from a traditional computer display that refreshes the image many times a second. E-paper is reusable and uses reflected light (like paper) rather than computer screen backlighting, resulting in reduced eye fatigue and lower energy requirements.
19. Julie Evans, "Listening to the Voices of Our Future" (presentation at CAMEX, Orlando, FL, March 23, 2007).
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