E-Books for Academe: A Study from Gettysburg College

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The launch of Amazon’s Kindle platform in the fall of 2008 attracted headlines and has spurred the development of electronic books (e-books). The device emerged in a complex ecology of competing formats aimed at differing segments of the market. This ECAR research bulletin analyzes the potential impact of e-books on higher education. It draws evidence from a series of small qualitative studies and focus groups with faculty and students undertaken at Gettysburg College between the fall of 2008 and the summer of 2009. These studies cover a representative selection of currently available e-book formats: the Kindle, Sony’s e-book Reader, the iPhone, netbooks, and CourseSmart, an e-textbook company that uses proprietary reader software to display licensed versions of standard textbooks either online or offline on PCs and Macs. The studies confirmed for us that academic reading has specific functional requirements—beyond those of leisure reading—and that an e-book for academe will need to meet them.

Faculty members are starting to recognize e-books as tools for teaching and learning as well as for personal leisure reading. This recognition comes with a caveat, however. Books do not simply deliver information to their readers. They enable a set of practices that support both individual learning and classroom interactions: transcribing, note taking, referencing, and the kind of rapid navigation necessary in a group discussion. As e-books supplant paper ones, higher education leaders must take a lead in shaping the future of e-books because the practice of reading is critical to our mission and our requirements are significantly different from those of consumers.

As higher education prepares for the mass adoption of e-books, it is worth thinking about how the development of print changed the relationship between readers and texts from an earlier era. The English Book of Common Prayer, written shortly after the first English translation of the Bible appeared in print, hearkens back to a manuscript culture in which copies of the Word of God were scarce. The process of learning generally required a priest to read to a congregation:

>Blessed Lord, who hast caused all holy Scriptures to be written for our learning; Grant that we may in such wise hear them, read, mark, learn, and inwardly digest them...⁴

This process of internalization required a priestly reader and would be challenged by the appearance of the printed Bible.

The arrival of print placed affordable copies of the Bible in lay readers’ hands and in their own language. Radical Protestants, such as those who had boarded the Mayflower in 1620, encouraged more than the secure transmission of information. Puritan readers...
would engage in “commonplacing”: transcribing passages from the Bible or from printed sermons into personal spiritual diaries. An entry would include specific reference to the original text: chapter and verse or title and author. The history of 17th-century religious schisms can be largely attributed to these practices of unauthorized, individual readings and the interpretive anarchy to which they gave rise.

By the 18th century, religious controversy was giving way to empire, commerce, and consumption. For readers, this meant the development of habits of leisure reading that have endured. Newspapers and novels, both genres that we associate with personal, leisure reading, came to dominate literary production in this age. Leisure reading moved away from receiving or pursuing truth or correcting controversy. Instead, it came to inhabit the realm of conspicuous consumption: self definition through the display of one’s ability to consume time and the materials of culture.

The initial market for e-books has been just such leisure readers: subscribers to newspapers and those who have an interest in downloading the latest New York Times best seller. Consumer-level reading has different requirements from academic reading, however, and while a faculty member in political science may assign her students the New York Times, she will expect more from them than a quick perusal over a morning cup of coffee. As e-books seek adoption within higher education, it is worth gauging the distance between the needs of leisure readers and students, who will be exhorted by their faculty to hear, read, learn, and inwardly digest, appropriate, critique, analyze, and synthesize the materials in their courses.

Recognizing this need, and signaling a serious intention to enter the higher education market, Amazon will be conducting a pilot program with six higher education institutions representing a variety of Carnegie classifications in the fall of 2009. Looking from the perspective of higher education, Gettysburg College’s approach has been the mirror image of Amazon’s, and we have run a series of studies and focus groups with faculty and students using devices that span the range of currently available offerings from different classes of vendors: publishers, device manufacturers, and distributors.

**Highlights of E-Books for Academe**

Mark Nelson, of the National Association of College Stores, has detailed the potential disruption in college business processes that will be caused by digital content but points to the lack of an e-book reader as being a block to moving forward. He notes that while annual e-book sales quadrupled between 2002 and 2006, they still accounted for only $20 million in a market in which overall annual book sales are $25–30 billion. While format wars and intellectual property concerns are both slowing adoption, one of the main causes of friction is the lack of a compelling device for readers to use in accessing digital content. The other cause of friction is cultural: Nelson cites a study by Ed Walton at Southwest Baptist University in which only 8% of faculty reported that they prefer e-books for research, and 0% preferred e-books as a replacement for paper textbooks. In comparison, nearly a quarter of students preferred e-books for research, and nearly a fifth preferred e-books as replacements for paper textbooks.

Given the business, environmental, and regulatory pressure to transition from paper to digital, Nelson estimates we will have reached a tipping point in the adoption of e-books
by 2013. This bulletin appears a quarter of the way along the timeline between Nelson’s prediction and his forecast tipping point, and significant progress has already been made. Analysts currently predict that 2010 will see a $1 billion revenue for Amazon from Kindles and the sale of 6.1 million e-book readers. More importantly, however, by 2013 e-books are predicted to have taken over a third of the market for printed books, with $9 billion e-book sales in a total market of $24 billion.11

Amazon released its Kindle 1.0 in the fall of 2008 into a market that included Sony’s e-book Reader series. Both are single-purpose devices on a rapid development trajectory: each company released new versions with significant incremental improvements in the summer of 2009. Both devices use electronic paper from the same screen manufacturer, providing a reading experience that includes black text on white paper, high contrast, readability in full daylight, and images in grayscale. These devices are both making inroads into the Baby Boomer market and are being used for leisure reading, especially of newspapers and periodicals. They are well suited to these purposes, with Amazon’s Kindle able to download the morning newspaper wirelessly and Sony’s e-book Reader able to sync content through an interface that will be intuitive to any iPod user. Both devices also support the navigation and bookmarking that leisure readers expect, and their formats have clearly been refined from an ergonomic perspective. Buttons are well placed, and each device is lightweight and comfortable to hold.

Since Amazon’s main business is distributing content (books and more), the company is not tied to the success of its own device. Rather, it needs readers to adapt to digital reading and to invest in Kindle-formatted digital content. In summer 2009, Amazon released a free iPhone application that brings Kindle content to iPhone users. A survey of Gettysburg College students in spring 2009 revealed that over 25% of them already own iPhones. The great advantage of enabling phones and other multifunction devices to access Kindle-formatted content is the low barrier to entry for consumers and the potential for rapid adoption. While the current drawback with the iPhone is screen size, current display technologies including tiny projectors and future technologies such as flexible screens make the multifunctional device an intriguing option.

Barnes & Noble has also developed a free iPhone app through which readers can access content from its stores. Barnes & Noble recently announced a partnership with Plastic Logic, which is developing an e-book targeted to the business reader.12 While Plastic
Logic’s e-book is not yet on the market, its focus on the needs of business readers as compared to leisure readers brings it closer to addressing the needs of academic readers. CEO Richard Archuleta could be speaking of students and faculty needs when he states that “business users require all kinds of different content—not just books.”

It should also be noted that all of the content providers make their content available via a web browser. This means that a new hardware device category, the netbook, could enable the adoption of e-books by students. Netbooks are very small laptop computers with screen sizes from 9 to 11 inches, weighing two to four pounds and costing from $250 to $500. They are the fastest growing category in the personal computing market. Since many netbooks currently do not run full versions of Windows or Office software, students still need to purchase a full-sized computer for their productivity tools. It remains to be seen whether they will be willing to purchase a netbook in addition to the computer and cell phone they likely already have.

Figure 2. ASUS Eee PC 701 netbook, Apple iPhone

Academic publishers have seen Apple’s iTunes become the dominant distribution channel for digital music and will have noted how music publishers have been forced to exchange the dollars they earned from CDs for cents earned through iTunes. They have also seen iTunes unbundle songs from albums, and they fear the disaggregation of content from the textbook model to the custom course pack. More generally, they fear that through the Kindle, Amazon could lock up the distribution of their content and cut the margins they currently receive on e-books. These are currently $2.15 per e-book as opposed to the $0.26 per hard copy.

Their response has been to develop their own e-books, available via a PC, laptop, or netbook browser, at sites such as CourseSmart.com. These sites offer the full textbook experience: sophisticated formatting, use of color for charts, and other interactive media experiences to enhance learning. However, the digital rights management software means that students only rent the content. While the duration of the license varies between 6 and 18 months, a large number of licenses are 6 months. The academic publishers retain a significant cultural advantage in their relationship with faculty, and they understand that faculty would resist having to purchase the books they use to teach. CourseSmart allows a faculty member to request an instructor copy, although it currently takes a week to receive the access codes required.
Breaking the Culture Barrier

In the fall of 2008, Gettysburg College began a series of studies to test the suitability of e-books for teaching and learning. Faculty and instructional technologists at the college were asked to use one of a number of available options—Amazon’s Kindle, Sony’s e-book Reader, CourseSmart, the iPhone’s Kindle application—and provide feedback on how it would work in their courses. Students in an upper-level computer science course were provided with Kindles and asked to read one of the class texts on it. The students compared their experience reading with the Kindle to reading from similar books and evaluated the Kindle according to how well it supported their learning in the class.17

In the student Kindle study, the students read Thomas Friedman’s *The World Is Flat* as they would any other assigned reading for class: highlighting portions they found important for future reference or class discussion and making personal notes about the passage on their Kindle. Having used the Kindle, the students were required to make a professional assessment of the device, noting its strengths and weaknesses as a classroom technology.

The students all liked the Kindle and found it to have great potential. They liked the fact that the wireless worked without all of the encumbrances of a computer or the need to search for wireless hot spots. They saw it as a way to access their educational content more cheaply than purchasing traditional textbooks. The electronic paper that was not backlit and could be read in bright light was also a big hit. One student found this particularly appealing: “I was able to read in the car...and my eyes didn’t get tired.”

But the students did not believe that the Kindle was ready for classroom use. Their consensus was that in its present state, it was best used for leisure reading.

While continuous, linear reading works well outside of the classroom, in a class discussion it is necessary to move rapidly around a text in a nonsequential manner:

- “Flipping between page numbers…the dots, they’re good enough while I’m reading, but not sufficient for classroom discussion.”

- “I think the page number thing is important for the classroom. One common way to make sure that everyone was reading the same [thing]...would be important.”

When students know that they will be required to write about what they are reading, they use several strategies: quotation, annotation, and brief summary to help them prepare for the task. The Kindle offered tools for this, but they were not yet fully robust:

- “It was a little difficult to find the areas we have highlighted in the book that we could flip to.”

- “With a paper book it’s easier to remember what section you were in so you can find information.”

- “It really broke my workflow.”
What Does an E-Book for Academe Need to Do?

Using the kind of feedback above from both students and faculty who used these devices to inform our understanding of how e-books might be used in academe, we developed the following list of functional requirements for an e-book for academe:

- **Accessibility of content.** Higher education institutions have invested heavily in making their environments and services accessible for students with various kinds of disabilities. Accessibility services include Braille, note-taking, and textbook reading for the visually impaired. E-books have the potential to accommodate the needs of visually impaired students by providing tools to increase the size of text or to translate text to speech. In spite of the fact that the Kindle already offers these tools, the Kindle pilot studies that Amazon is conducting have attracted lawsuits from the American Council of the Blind, which is concerned that the initial interface through which users access these tools does not address its members’ needs.18

- **Navigation.** For reading outside the classroom, students must be able to navigate efficiently around the text and to move between the text and its supporting materials: footnotes, endnotes, appendixes, and indexes. In the classroom it is crucial that students are able to find notes and highlights they have made and quickly find a specific passage that is being referenced in a discussion. All of the readers give users the capability to skip around within a text, bookmark specific passages, or search for text, and those with note taking capability such as the Kindle or CourseSmart offer the ability to skip to notes. However, locations within a Kindle book or Sony reader may not correspond to pages on a printed text, making it difficult for people with printed versions and electronic ones to work together.

- **Documentation.** Students should be able to document sources accurately. The Kindle and Sony readers offer no way to integrate with Endnote or similar bibliographic systems. The CourseSmart online textbook version does integrate with the Firefox bibliographic plugin Zotero, allowing students to skip directly to a page within the textbook and to keep notes on the content of that page.

- **Writing.** When preparing for papers and presentations, students must be able to take excerpts of text for use in quotation and use them in their writing. For the Sony readers this is not possible, although it can be done with the Kindle reader including the iPhone application. The CourseSmart reader allows the student to cut and paste limited amounts of text at a time from the e-book to a standard word processor, although images, equations, and other special content may not transfer.

- **Notation.** When preparing for class, students must be able to take notes on specific passages of text and share them with other students. The Kindle and the CourseSmart readers allow for note taking within a text; the first generation Sony does not, but the newer version will. Readers that allow notation usually have ways to search these notes as well as condense them into an “all my notes” list. This feature proved very useful to one of the testers who received a
book for review, read it on the Kindle while adding notes, and then downloaded them at the end to directly form the outline of his review. These notes are typically not easily shareable: none of the dedicated readers has a feature to send your notes to another student or professor, although the CourseSmart reader allows students to e-mail notes to each other with direct page references. Ownership of these notes is problematic: if you lose access to the book, either by subscription expiration or another reason, you might either lose the notes entirely or only be able to access them without the context of the surrounding page. A class-action suit has recently been filed against Amazon by several high school students who lost their copies of 1984 along with their notes for a writing assignment when Amazon deleted the book from their Kindles.\footnote{19}

- **Equation support.** Any e-book targeted at a scientific audience will need to be able to support high-resolution mathematical typesetting, chemical structure diagrams, or similarly specialized content. Current support for this sort of content is variable even within commercial e-books. CourseSmart’s textbooks are close to exact reproductions of the text version with formatting intact, including equations, charts, pictures, and color highlights, but e-books from Amazon are less consistent. For example, “α” and “β” symbols are not flowed correctly into the text in Cox’s Inorganic Chemistry available on the Amazon store: they are clearly inserted images that are several times the size of the other characters, which leads to ugly formatting. Equations are generally inserted as images, which means that they cannot be easily scaled along with the text using the text-sizing tools and cannot be read using text-to-speech tools.

- **Faculty-generated content and course readers.** Existing electronic documents converted using various tools often are less readable than commercially published e-books. Tests on a variety of PDF versions of journal articles from several sources (Nature, Physical Review Letters, and the Journal of Chemical Education) showed that both the Mobi e-book converter (Mobipocket Creator 4.2) and the Amazon online tools failed to convert any equations in the documents, usually leaving a hash of symbols scattered around the page: even the simplest equation such as $\gamma$ was simply deleted from author-generated test documents. The Sony e-book Reader can read the journal PDF documents but cannot rescale the images, leaving many of the charts and graphs too small to make out. They also have difficulty reflowing some large and complex equations when the text is enlarged.

- **Image support.** Comparing any modern textbook to one published a few decades ago will show the enormous growth in the use of large color images, charts, graphs, and the like. The electronic ink screens of the current generation of e-books have limited capabilities to display these images. The first-generation Kindle and Sony reader screens had no color support at all and only four shades of grey, rendering images somewhat fuzzy. The updated Kindle 2 and Kindle DX can show 16 shades, still far inferior to regular ink on paper even without color. Amazon even includes a warning on some scientific texts stating, “Due to the nature of digital conversion, images included in this e-book may lack the detail and clarity of the original.” Color electronic ink has arrived on a few, very
expensive devices such as the Fujitsu Flepia, but it will most likely be several years before high resolution color images are available on the majority of e-books. On traditional computer screens e-books such as the CourseSmart reader can have a full range of color at the cost of the easier readability of the electronic ink screens of the Kindle and Sony.

- **E-reserve support**: A large number of colleges are currently using e-reserve systems in an effort to make a wide variety of content available to students and to save paper (one electronic copy is shared among many students). Typically, the professor will bring a book chapter or article to a location where copyright issues are resolved. Then the document is scanned, converted to PDF, and uploaded to a website or learning management system where students can view it. E-books without PDF support cannot access any of this content. Even e-books with PDF support can have problems when documents are scanned as images rather than being fully converted to text using optical character recognition (OCR). These image-based PDFs can end up unreadably small on a Kindle, and the device has no features to reflow the document to make it accessible. One of us made heavy use of e-reserves in a recent course, but fewer than half of the documents were readable on the Kindle after conversion. The Sony reader could read the documents directly, but it had similar image size issues.

- **Downloadable journal support**. The Kindle includes a basic web browser that operates through Amazon and Sprint’s Whispernet cell-phone-based technology. Because most academic libraries support a large number of online journal databases, it would be natural to assume that a reader would be able to access these articles directly from the Kindle. However, since the Kindle is not connected to the Internet through the campus network, most academic libraries will not allow it access to their databases directly. If the library runs a proxy server allowing access from off campus, the Kindle should be able to authenticate through it, although this adds another step. Most academic journals publish in PDF format, so many of the problems with equations and images will appear when a user tries to access these articles on a Kindle.

- **Support for music**. Students study music both in an academic and performance context. While all of the current systems can embed musical scores as images in text, none offer any form of specialized support for scores such as MIDI playback of passages. A prototype device similar to the Kindle that allows display and playback of guitar tablature, the iTab, is scheduled to ship in October 2009, but this is a single-purpose device that cannot access other content.

- **Continued access to content**. Most of the e-books currently available are purchased with a license allowing perpetual use, although CourseSmart’s textbooks have an expiration date of 180, 360, or 540 days, after which the user will not be able to access the book and must pay full price for another limited subscription. However, what “perpetual use” means to a professor, a student, or Amazon may be quite different concepts. Many academics have extensive libraries of old books and access them frequently. It is not clear how long the Amazon and Sony e-book formats will be supported, but if history is a guide,
long-term support should not be expected. For students, perpetual might mean
the semester during which the course was taught, their undergraduate career, or
truly forever. Some faculty might prefer perpetual support to include technology
that can handle a Wordperfect 4 manuscript on a 5.25-inch floppy disk. Limited-
time subscriptions on introductory textbooks such as those offered by
CourseSmart may pose serious problems for people majoring in certain
subjects: students studying organic chemistry, for example, might want to
reference their first-year textbook if they’ve forgotten about buffer solutions, but
if the book is no longer available, they have lost both it and any notes that they
have made within the book to help them with the concept.

What It Means to Higher Education

There is a long way for e-book manufacturers to go before they will have met the
requirements of an e-book for academe. However, given the number of participants in
the market and their speed of innovation, we hope that they will. And when they do, we
are also assuming that students will adopt them with the same enthusiasm with which
they have adopted laptops and cell phones. What format or combination of formats will
succeed—and when this will happen—are open questions. Will the Kindle’s initial market
of leisure readers over 40 years of age bring the stigma that the Kindle is “what my dad
uses”? Will a number of false steps, such as deleting content from customers’ Kindles,
dermine trust and allow competitors to make headway? Will students be willing to
purchase an extra device, or does the future belong to the multifunctional phone and
netbook formats?

Assumptions notwithstanding, how will ubiquitous e-books impact higher education?

Learning

One of the few studies of significant scope on the impact of e-books on student learning
was conducted at Northwest Missouri State.20 The findings of the study indicate that
40% of students report that e-books caused them to study less because using them was
too difficult. It is worth noting that 17% of students reported that they studied more
due to the convenience of the format for e-books, even in their current form. As e-books
develop and support more of what students need, it is reasonable to assume that this
ratio will change.

Academic Support Services: IT and Library

If e-books follow the path of laptops and netbooks, then IT support services can expect
to be asked to provide network resources to these devices: authentication credentials, IP
addresses, and access to shared drives. If Amazon’s Whispernet approach succeeds,
though, students will be able to access content via cell phone networks. That said,
iPhone users are already expressing interest in connecting their cell phones to campus
networks in order to enjoy faster connectivity than their cell phone service providers
offer. Even if these devices stay off campus networks, students will need credentialing
information if they are to use them to gain access to subscription library resources.
Expect to hear “network impact” and “security” from concerned IT leaders.
The headaches will not be IT’s alone. Libraries will be asked to provide access to subscription services that are currently made available to members of the institution as defined by the IP address of the network on which their computers reside. If students and faculty using e-books are not on an institution’s network, it will be necessary to provide a new means of authentication, and this might spark new opportunities. New models of information access are already being tried by academic libraries, including access to electronic versions of texts in ways similar to those for access to electronic journals. More radically, libraries might include unpurchased books in the library’s catalog, so that users interested in a book can arrange for instant electronic download of the text. Additional models such as “borrowable” licensed digital downloads that can be sent to a device and then expire after a borrowing period are obvious possibilities that cash- and space-strapped libraries will explore in the near future.

If higher education is to see student learning improve through the use of e-books, we will need to engage with the developers of devices, with digital content distributors, and, most importantly, with our own constituents. Without an understanding of the challenges and opportunities e-books will bring for faculty, students, librarians, and information technologists, we will be poorly placed to shape the future. As the class of 2013 graduates, e-books will be a real presence on campus. It is time to build on the nascent discussions, pilot projects, and focus groups that are under way in libraries at Penn State and classrooms at Seton Hall and elsewhere, and to share our findings within our institutions and with the higher education community.²¹

Key Questions to Ask

- How can the higher education community influence the development of e-books to ensure that the unique needs of academic reading are met?
- How can higher education encourage a healthy diversity of content providers?
- Libraries make great efforts to ensure that patron records are not monitored, and libraries do not keep records of patrons’ activities. How will vendors of digital content maintain the privacy of their patrons?
- How should higher education institutions plan to support students and faculty using e-books for teaching and learning?
- How will digital rights management impact students’ ability to learn from their textbooks after their courses end?

Where to Learn More


CNET reviews of netbooks. See http://reviews.cnet.com/best-netbooks.

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Endnotes


3. Gettysburg College is a highly selective four-year residential college of liberal arts and sciences with approximately 2,600 students. It is located on a 200-acre campus adjacent to Gettysburg National Military Park in Pennsylvania. The college was founded in 1832.


8. Princeton University, Reed College, the University of Virginia’s Darden School of Business, Arizona State University, Case Western Reserve, and Pace University will be participating.


10. Ibid., 9


15. Coursesmart is an independent venture that provides access to academic materials from Pearson, Wiley, Cengage Learning, McGraw Hill Education, Bedford, Freeman and Worth, and Jones and Bartlett.

16. CourseSmart.com is mainly being adopted by nontraditional students who use computers at work.

17. Students at Seton Hall used Kindles in two courses and reported similar experiences. See http://www.educause.edu/Resources/IntegratingAmazonKindleASetonH/163808.

18. For more information, see http://www.insidehighered.com/news/2009/05/07/kindle.


21. Sony has donated 100 of its e-Readers to Penn State for a pilot. See http://alumni.libraries.psu.edu/libtodaySony.html.
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