One Device to Rule Them All?

The Kindle DX in Higher Education

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Tools are made to accomplish our purposes, and in this sense they represent desires and intentions. We make our tools and our tools make us: By taking up particular tools we accede to desires and we manifest intentions.

-William Mitchell (as qtd. in Schwartz 2002, 169)

Introduction

Examinations of ereaders in educational settings tend to fall into one of two oppositional positions: one touts the transformative pedagogical potential of the devices and the formats that they display, while the other decries the technical limitations and Orwellian dangers of a device that is constantly connected. To test their usability and usefulness for higher education, pilot programs were carried out in the Autumn of 2009 at seven major universities across the country with Amazon's newest ereader: the Kindle DX.

By interviewing students, faculty, and administrators who participated in the Computer Science and Engineering department's Kindle DX pilot program, here at the University of Washington; and examining the academic, popular and promotional writing surrounding the Kindle, we will evaluate the pilot program in terms of current educational and social contexts. Through this examination we hope to elucidate the "desires and intentions" that are made manifest through the Kindle, and locate important considerations for any of those involved in assessing or adopting such technologies in the future.

For our analysis of the potential of the Kindle as an educational device we considered "usability" and "usefulness," two conceptual criteria brought together by Lam et. al. in their paper "Usability and Usefulness of ebooks on PPCs" (2009). Usability (as adapted from Wilson et al.) describes, "the practicality of the various procedures required to use the software and hardware, and the ease of use of the technology. It relates to issues such as interface design that facilitate effective human-computer interaction" (32). Usefulness (as adapted from Morton et

al.), "relates to whether ebooks can be effective learning tools" and whether ereaders are accomplishing or facilitating anything new in educational settings (33).

The Pilot Program

In May 2009, Amazon unveiled its newest ereader, the Kindle DX. With a larger screen, auto-rotate and native PDF support, the Kindle DX was marketed as an answer to demands for an ereader that would allow reading larger format materials, including newspapers, magazines, and textbooks. During the May press conference, Amazon revealed its partnership with three leading textbook publishers[1] who represent 60% of higher education textbooks (Nusca 2009), as well as an upcoming pilot program instituted in cooperation with several universities across the nation to test the Kindle's use in higher education.[2] The pilot programs took place during the Fall of 2009. Each of the schools took their own approach to the program, as can be seen from their individual web sites; Princeton, in particular, emphasized the program's possible implications for reducing on-campus printing (2009-10), while Reed focused on educational considerations (2009-10), and the University of Washington wished to compare digital delivery on the Kindle to "traditional content delivery" (UW CSE 2009).

University of Washington's Computer Science and Engineering department, under the direction of Ed Lazowska,[3] distributed the Kindle DX to all of the department's incoming graduate students. Students were allowed to keep the device after the program ended on the condition that they participated in regular feedback during the semester. Professors agreed to

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[1] Pearson, Cengage Learning, and Wiley.

[2] The initially planned participants were Princeton University, Case Western Reserve University, Reed College, Arizona State University, Pace University, and the Darden School of Business at the University of Virginia--the University of Washington was added later in the project.

[3] Professor Edward Lazowska is the Bill & Melinda Gates Chair in Computer Science & Engineering; Director of the University of Washington eScience Institute; and Chair of the Computing Community Consortium.

adapt their course material for accessibility through the Kindle, though students were not required to use the device to read the material.

Amazon remained involved throughout the pilot project. In an e-mail to the authors, Lazowska said that CSE and Amazon held weekly conference calls to discuss the progress of the program, and CSE agreed to share the results of their student surveys with Amazon. Additionally, Amazon hired an educational technology consultant to interview a number of student participants. The pilot program also gave two researchers in the Human Centered Design and Engineering department the opportunity to study student use of the ereaders.[4] These researchers gathered a significant portion of the students' responses, and a paper discussing their findings is forthcoming.

When our team first began the research process, we expected to find significant controversy amongst students and educators about the Kindle and about Amazon's involvement in higher education technology. It was our assumption that Amazon was muscling its way into the textbook market, in part through these pilot programs. What we discovered, from speaking to Lazowska, was that the universities included in the pilot program had been requesting an ereader appropriate for educational purposes since the Kindle was originally released, and that the pilot project was mainly a response to the demands of those educational institutions.

We were also surprised by how simply students, administrators and educators responded, in interviews, about the results of the Kindle pilot program. By and large, students at the University of Washington were unhappy. Likewise, professors did not find that the device added much to the classroom experience. And yet, there is still a sense amongst those involved in the

[4] We attempted to contact these researchers, but they did not respond to our queries.

Kindle program that ebooks and ereaders will have a major impact on education in the future, and will become increasingly ubiquitous and important for the classroom experience.[5]

Stakeholder: Computer Science & Engineering Department

In its mission statement, the CSE commits to producing well-rounded and competitive leaders in their field. As a part of this commitment the department has an interest in staying abreast of new and potentially transformative educational technologies. In addition to the benefits CSE students might derive from the program, involvement in the program promotes the department's image as an innovator and leader in the field.

That said, the CSE department became involved due to a personal connection between Lazowska and Amazon founder and CEO Jeff Bezos. The circumstantial nature of the department's involvement mirrors their casual and matter-of-fact attitude toward the implementation and resolution of their pilot program.

eThings in an eAge: A few definitions

Though they are very different things, the ebook and ereader are conflated in much of the writing about the Kindle and the Kindle pilot program, often to the benefit of the ereader. It is important to acknowledge the distinction between ebooks and ereaders because, in many ways, ebooks (and ematerials) have already come into wide educational use, and have shown their potential to greatly change the way that readers interact with a text, especially in the realm of scholarly reading.

An *ebook* is a digital text: at its most basic level a collection of bits and bytes that is not human-readable. The pairing of this text with a display device, however, can potentially make for textual interactions that are impossible with a paper book. For example, *ebooks* can be interwoven with hyperlinks to related multimedia material, or resources such as dictionaries for quick and easy access to definitions of words. They can be searched by word and phrase, and

[5] These opinions are evident in reports such as the Reed project overview, and in our interview with Lazowska he also made similar statements.

delivered and received almost instantaneously over a network connection. When we use the term *ematerials*, we are talking about journal articles that are indexed and made available (and searchable) on databases; scanned chapters of books; and worksheets or assignments. When grouped together, we could call these *etexts*. Not every etext can or does achieve all of the potential of the form, but we have certainly seen, over the last decade or so, the benefits of texts being put into digital form to be used, assembled and combined in new and useful ways.

When we talk about an *ereader* we are referring to a dedicated device designed to display etexts. As we talk about them in this paper, ereaders are distinct from multi-use devices such as desktop computers, laptops or phones, and are usually characterized by greater portability in the first instance, and better display in the second. In our estimation, there is no ereader on the market that currently realizes all of the potential of the etext, as we will reveal in our discussion of the functions and dysfunctions of the Kindle.

eReaders for Educational Purposes

In the press conference announcing the college pilot program, as well as in its promotional materials, Amazon has sought to highlight the ways in which the Kindle DX is useful for students. They have done this mainly by emphasizing the Kindle's physical advantages over large and heavy textbooks. Amazon CEO Jeff Bezos has said, “cookbooks, computer books, and textbooks – anything highly formatted – also shine on the Kindle DX. Carry all your documents and your whole library in one slender package.” (Amazon Media Room 2009). Case Western president Barbara Snyder puts it more viscerally: “our students will stand taller” (figuratively, one imagines, as well as literally) with the textual accessories of their daily lives condensed into a space smaller than a cereal box (Nusca 2009).

Stakeholder: Students

Any student has a vested interest in utilizing the tools and techniques that will most improve their ability to study and learn. If students are to accept ereaders as educational tools then the devices will have to be suited to their needs and learning styles. During the pilot programs, some students did find the Kindle to be a useful tool; however, these students were in the minority of the participants (Kolowich 2010).

As students of engineering, students who participated in the CSE pilot program had a further interest in gaining experience and facility with emerging technologies that may figure into their careers.

By all accounts from participants in the pilot programs, the benefit of the Kindle's portability is not enough to mitigate design features that compromised its usability. As professor Lazowska summed up the CSE experience: "[the Kindle] is deficient as an academic reader but great as a pleasure reader." Through our interviews with Lazowska, student participants, and instructors, as well as reports from other pilot programs, we identified four major critiques of the Kindle's usability as an educational device.

1) *Physical manipulation*: The Kindle features a QWERTY keyboard and two navigational buttons. The keyboard buttons—"pimples" as Professor Lazowska called them, or "tiny round pleasure-dot keys" in the words of Nicholson Baker (2009)—were difficult to use effectively, according to our interviewees. One student told us that he gave up attempting to take notes on the Kindle and switched to taking notes by hand, effectively defeating the purpose of carrying one device to hold all of your books and notes.

2) *Screen and display*: The Kindle features eInk technology, which Amazon describes as "[resembling] the appearance and readability of printed paper" (Amazon Kindle Store). The screen is not backlit, making it readable in bright light and eliminating glare. However, students

found that the black-and-white only screen was not suited to their engineering texts, which often featured charts and graphs better viewed in color.

While eInk is very easy on the eyes and reduces energy use, it unfortunately requires a long loading time for each new page, so that the simple act of turning a page on the Kindle becomes a comparatively lengthy process. As one student pointed out, in our interview, academic reading is not linear, but more of a process of cross-reference, which requires flipping between pages in a book and between different books. For this student, waiting for the pages to reload made it difficult to study.

3) *File organization and manipulation*: A common critique of the Kindle DX was its file storage and organization. Rather than a hierarchical file organization, readings are accessed through a simple index of all the materials on the device, organized by default according to most-recently used. For an academic tool, this lack of file management is especially inadequate.

Many students expressed dissatisfaction with the Kindle's note-taking and highlighting capabilities. A USA Today review of the pilot programs noted that students "wished there was some way to impose a coding system for annotations, similar to how some students use differently colored highlighters to organize their annotations in bound books" (Kolowich 2010).

4) *Support for non-native materials*: Although the Kindle DX offers some new features that were not available on older models, including support for PDF files and web-browsing capabilities, it seems that optimal functionality only exists for buying and reading Amazon's proprietary AZW format files. Many academic materials that are available digitally are in PDF format, and the ability to access and view these with ease would seem to be an essential feature of an educational ereader. The Kindle DX, however, does not allow for annotation or highlighting in PDF files (Kolowich 2010). Additionally, Lazowska pointed out that the

Kindle's web-capabilities worked best to access the Kindle Store, and he suggested that Amazon was less invested in providing high speed and fully formatted access to other websites, since Amazon paid the bill for users' time on the 3G network accessed through the Kindle.

The missing capabilities mentioned above seem to be obvious considerations for an ereader as a device for academic use—what is the good of being able to transport your entire library, if the books are not arranged in some order on the shelves? The technology to allow these functions already exists.[6] So how could Amazon make such a terrific blunder in hampering the usefulness (and usability) of its own device for the audience to which it was ostensibly targeted?

Stakeholder: Amazon.com

Although it may seem like Amazon was the first on the ereader scene, various companies have been producing and marketing digital book readers since the early 1990s (Siracusa 2009). These companies had limited success, and according to Siracusa they were the victims of a reluctant populace of book readers and a fearful publishing industry. Amazon is beginning to overcome these two major obstacles by coupling sales of ereaders and ebooks in one location and through careful engineering of design and copyright protection, and currently has the lion's share of the digital book market.

However, its position is not uncontested. Industry speculators have long discussed the possibility of Apple entering the ebook market. Siracusa, discussing the tenuous position of Amazon in February 2009, wrote, "maybe Amazon will haul the ungainly Kindle right across the critical mass threshold and it will become 'the iPod of e-books.' Then again, maybe Apple will finally figure out that the *iPod* (and, yes, the iPhone) is 'the iPod of e-books.'" Rumors of Apple's ereader device (months before the name iPad was revealed) were already circulating in the fall of 2009 when Amazon released the Kindle DX and announced the university pilot programs. Although Amazon did not force the Kindle upon administrators for use in higher education, it clearly had a lot to gain from the adoption of the Kindle as an educational tool, including a more or less captive market of students and the potential for exclusive contracts with major universities.

[6] Perhaps at the forefront of these is Blio, a software program backed by some of the world's largest publishers. It has yet to be released but is advertised to allow full format preservation of any work (including color) as well as the insertion of user-generated text, drawings, audio, images, or video notes, saved and exportable.

Beyond the Kindle: Questions of rhetoric

In the end, the functional shortcomings of the Kindle as a classroom device were overshadowed by a rhetorical debate stemming from one of these deficiencies in particular. Most of the media coverage following launch of the pilot program focuses on the issue of voice-to-text and accessibility for readers with disabilities. The way in which this became a lightning-rod for controversy illustrates the prevalence of rhetorical rather than substantial discussion surrounding the pilot program.

After the release of the Kindle 2, publishers and the Author's Guild began to object to its text-to-speech capability, with the group's executive director quoted as saying, "They don't have the right to read a book out loud. That's an audio right, which is derivative under copyright law." (Rothman 2009). As a concession, Amazon allowed authors and publishers to choose whether individual works would allow this capability, and the text-to-speech function must be turned on by an end user navigating the device menu. The lack of voice-navigability for this menu, however, renders the service nearly unusable for those with sight impairments.[7]

The subsequent use of the Kindle DX in the college pilot program prompted a joint lawsuit (and more rhetorical grandstanding) against Arizona State University by the National Federation of the Blind (NFB) and the American Council of the Blind (ACB), and complaints filed against the five other original participant universities (Danielson 2009). The suit alleged that the adoption of ereaders that are not hospitable to use by blind students would be a violation of the Americans with Disabilities Act, and the NFB press release asserted that they would "not tolerate this unconscionable discrimination against and callous indifference to the right of blind students to receive an equal education" (Danielson 2009). However justified or unjustified their

[7] As early as March 2009, Amazon acknowledged this and stated their intention to rectify the situation. Although it seems to have disappeared from the Amazon blog, we have appended a screeshot of the blogpost regarding this issue in Appendix 1.

Stakeholder: Educators

In a June 15, 2009 article in *Inside Higher Ed,* Charles Crowell writes that the Kindle has "prompted much discussion about how it can be used to help students learn, and perhaps save money at the same time." As discussed elsewhere, the impetus for the pilot program came from interested universities, eager to explore the potential of ereaders in higher education . Even if the Kindle turned out to be inadequate, for educators this program presented the opportunity to influence further ereader development in ways beneficial to the academic community at large.

position, it caught the media's attention, and when the dust had settled, four of the participant universities had agreed that they would not "purchase, recommend or promote use of the Kindle DX, or any other dedicated electronic book reader, unless the devices are fully accessible to students who are blind and have low vision" (US DOJ 2010).

This discussion, fueled by the difficult straits publishers, authors and distributors are facing, are not really about the Kindle DX as an educational tool. Though invoking broader issues of ereaders and technology in education, neither is it primarily about the growing pains of our shifting relationships to text and books in a digital world. Rather, by focusing on a few very vocal interest groups, those reporting on the program have actually obscured the more basic issues underlying the outcome of the program—including issues of accessibility affecting anyone who uses a Kindle.

DRM & Tethered Devices: Taking License

Questions regarding the use of ereaders in higher education extend beyond the physical design of the Kindle. Though these aspects have not been widely reported in the popular media, there is an existing body of thought that considers the larger implications of transferring our written materials onto digital devices. These discussions have a significant, if often overlooked, bearing on the use of ereaders in higher education.

With the Kindle pilot program, graduate students in the CSE department had the option of accessing their course material on the Kindle or on any computer with access to the University's network. This was not a simple choice about viewing their reading for class on a lightweight kindle or a clunky computer, or about viewing digital content versus ink on paper. It

was also, (though they likely did not know to what extent) a decision to use the Kindle and thereby comply with Amazon's terms of use or not to use the Kindle at all.

Unfortunately, the user is rarely fully informed about what she is agreeing to when she chooses to use a device like the Kindle. Below we discuss the concept of the "tethered device;" Amazon's rather unique "browsewrap" agreement; and digital rights management (DRM) as essential considerations in deciding whether to include the Kindle—or any ereader—as a primary mode of education delivery.

In his book, *The Future of the Internet and How to Stop It*, Jonathan Zittrain makes the distinction between a device (or appliance) that is generative and one that is tethered. The generative PC, as we have known it, is characterized by "a certain incompleteness in design, and corresponding openness to outside innovation" (2008, 101). The benefit of the flexibility and incompleteness of the generative device, in any form, is the space that it allows for the owner or user of that device to tailor it to her needs. The device and its functions are not "locked down" into only one way of working or being used. Additionally, in contrast to the tethered device, the device that is generative is, typically, under the full control of its owner.

Zittrain defines "tethered devices" as "appliances [that are] easy to use, while not easy to tinker with. They are 'tethered' because it is easy for their vendors to change them from afar, long after the devices have left warehouses and showrooms" (106). We can recognize a tethered device like an iPod, a cellular phone or a Kindle by its constant or regular connection to the "mothership"—its manufacturer or service provider—for updates or content. The tethering of a device is almost always accompanied by the actual or possible introduction of digital rights management, which we describe below, to control the use or content of that device. Typically,

use of a tethered device requires that the user trade immediate functionality and convenience for flexibility and control.

Although its validity has not been tested in a court of law, the "browsewrap" licensing agreement surrounding content purchased in the Kindle Store allows Amazon to retain unprecedented control over the ebooks that they make available. Amazon carefully frames transactions through the Kindle Store as acts of *licensure* rather than acts of *sale*. However, as Michael Seringhaus has pointed out in his extensive examination of the legal implications of these agreements, the purchaser is hard pressed to discover this fact:

> In its promotional materials and on the Kindle itself, Amazon reinforces the notion of traditional sale and ownership: the Kindle Store invites customers to 'buy' books for wireless download to their readers, presenting Kindle books as merely another 'edition' of their print counterparts. (Seringhaus 2009, 150)

Amazon employs what amounts to a hidden agreement[8] which explicitly states that materials are licensed to the user, but owned by Amazon. To this end,

- Users cannot lend, sell, or modify Kindle content;
- Amazon "may immediately revoke [user] access to the Service or to Digital Content without notice to the [users] and without refund of any fees" (2009, 173);
- Amazon may change these terms of service at any time and without notice.

Furthermore, according to Amazon, their licensing agreement binds anyone who visits the Kindle Store regardless of whether they have read the agreement or not. At no point is the user notified of these terms or asked to agree to them.

[8] For a detailed description of just how carefully Amazon hides this agreement, see Seringhaus (169-173).

Although these terms may be recognizable to us from the process of "buying" music from iTunes, they mark a dramatic shift in readers' relationships to their books in terms of ownership and control. Imagine your chagrin if an employee of Elliot Bay walked up and snatched your copy of *Scrolling Forward* from your hands as you attempted to lend it to a friend. Imagine the consequences if a student's copy of *Discipline and Punish,* full of her annotations, was erased from her Kindle the night before her term paper on the Panopticon was due. These are the rights that Amazon reserves through its browsewrap agreement.

Amazon can only exercise this control with content purchased through the Kindle Store, which is delivered in its proprietary AZW file format. Although the Kindle DX supports other file formats, such as PDFs, the functionality of non-native file formats is remarkably low (Lazowska 2010). Keeping in mind that access to Amazon through the Kindle is relatively easy and seamless, that browsing almost any other website using the Kindle is difficult due to display issues, and that functionality of any file format other than AZW is hindered on the Kindle, Amazon effectively discourages the use of files not purchased through the Kindle Store.

Going Forward: Do eReaders have a future in higher education?

Writers like Jonathan Zittrain, Tarleton Gillespie and Lawrence Lessig all make an important distinction between the way that copyright is defined in a human court of law and the way that it is simply (or not so simply) enforced by code in devices like the Kindle and applications such as Adobe Acrobat Reader. As Gillespie notes, copyright is a "terrifically complex legal doctrine" (2007, 21), and trying to make sense of it only gets more difficult when you begin wrestling with issues of fair use. When considered in human courts of law, the complexity of copyright and fair use are subject to argument and interpretation before being ultimately enforced—context becomes an essential factor in application. Or, as Lessig puts it,

> in the world before digital technology, it was generally the law that controlled whether and how someone was regulated by copyright law. The law, meaning a court, meaning a judge: in the end it was a human, trained in the tradition of the law and cognizant of the balances that tradition embraced, who said whether and how the law would restrict your freedom. (Lessig 2004, 147)

When copyright is interpreted by the copyright owner and enforced through code, contextual considerations, so fundamental to the nature and enforcement of copyright law, become well nigh impossible (Lessig 2004, 148).

The tethering of devices, "licensing" agreements like Amazon's browsewrap, which supposedly legitimize tethering, and the trusted systems of digital rights management of which these controls are a part, represent a move toward convenience and away from freedom and control for the reader. The ability to control content and ensure copyright protection, in an age when technology makes it easier and quicker than ever before to copy and distribute this content, may be an incentive for publishers, authors and manufacturers to make content available in digital form.[9] And, as we described in "eThings in an eAge," there are significant gains to be made by having access to books in digital form.

Paper books, as we know them, have the benefit of being essentially "untetherable." The way that we understand books and printed materials today (and have for the past 500 years or so) is fundamentally different than the current scenario surrounding ebooks, in which preemptive controls are commonly built into their very fabric.

It is not our opinion that delivery of information in the form of a paper book is inherently superior to the delivery of information in digital form. Nor do we assume that the sort of restrictions that have been locking down digital content are necessarily coupled with that content in any inextricable way. In fact, the introduction of etexts into higher education has added

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[9] For a full elaboration of this argument, please see Mark Stefik's Article "Letting Loose the Light: Igniting Commerce in Electronic Publication."

significant flexibility to the use of those texts—by multiplying delivery modes, increasing actual physical access, the possibility of any text being read aloud for students with impaired vision or learning disabilities, or, a function near and dear to the English majors among us, the ability to search texts for a particular word or phrase and to see how many times it occurs.

However, in the case of the Kindle and ereader devices like it, not only are the potential functionalities of etexts often delimited by poor design; the freedom to use the text itself has the very real potential of being curtailed by proprietary considerations to a degree that has been impossible with paper books.

There is a strong case to be made that the original framers of copyright had the public good at heart, and embraced the idea that there is a "benefit [to] the unhindered circulation of information, knowledge, and culture" (Gillespie 2007, 24). The educational process requires freedom of information for intellectual vigor and progress, as acknowledged by educational allowances for the fair use of copyrighted material. With each new introduction of educational technology, therefore, it is essential to ask whether that technology will open up access and facilitate use, or whether we are locking that information down and making access more difficult today and in the future.In these terms, we believe that the Amazon Kindle pilot program proves that the Kindle offers up a little convenience (a lighter backpack) at the expense of considerable functionality (turning pages, making notes, or easily finding a file), and rights for the user.

If ereaders are to be introduced in any serious way as a part of higher educational curricula, it must be done with careful thought as to what educational reading and learning requires. And that includes, most importantly, the freedom for creative thought that fair use was designed to guarantee. We, as consumers, readers and learners must demand that we are

afforded the continuing opportunity to produce, to generate—to learn—that will allow us to continue learning to develop our capacity for creative thought.

Appendix 1


Amazon Kindle's Blog: Accessible Navigation on Kindle Permalink - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://www.amazon.com/gp/blog/post/PLNK3LOIUHETXJZXJ
print screen windows xp
Most Visited Getting Started Latest Headlines Gmail Facebook UW Pandora Merriam-Webster Add To Connotea
Disable Cookies CSS Forms Images Information Miscellaneous Outline Resize Tools View Source Options
Amazon Kindle's Blog
« Go to Amazon Kindle's full Amazon Blog
Go to Amazon Daily
RSS Feed for Amazon Kindle
What is a Blog?
Accessible Navigation on Kindle
9:34 AM PDT, March 19, 2009
We've heard from many of our blind or vision impaired customers who are excited about Kindle 2's text to speech technology. Some of these customers have asked that we make Kindle even easier for them by adding navigation accessible to the blind. We want to let those customers know that this is something we are working on and we look forward to making it available in the future.
--The Amazon Kindle Team
Add a comment
Find: blog
Next Previous Highlight all Match case
Done
zotero

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