

The Kindle 2.0 Project at Southern Vermont College

Fall, 2009

(our longer Interim Report)

Kindle Project index page: www.mybte.org/KPindex.html

Abstract

In Spring, 2009, Associate Professor Charles Crowell began laying out the parameters for a Kindle 2.0 research project. Professor Crowell had been working with the new Kindle 2.0 and, based on some of his earlier research in the pedagogy of complex inquiry in virtual environments, he hypothesized that the Kindle e-Reader could be used to not only enhance learning outcomes but also significantly lower textbook costs to learners. In June, 2009, he published an article (“The Kindle Factor”, *Inside Higher Education*, 15 June 2009) to that effect. Crowell proposed to begin this research in Fall, 2009, at the same time six other colleges and universities were initiating Kindle DX research projects.

Our Kindle Project largely diverged from the broad goals of the Kindle DX pilots at the University of Virginia, Case Western Reserve University, Reed College, Arizona State University, Princeton University, the University of Washington, and Pace University to the extent that it eschewed any focus on reductions in volumes of course-related printing and photocopying and focused primarily on pedagogical applications of the Kindle 2.0. Professor Crowell’s premise was that examining the Kindle, or any other e-Reader, in the context of conventional instruction missed the real potential of an e-Reader. Further, while reductions in course-related printing and photocopying were readily plausible, the net cost benefits are more elusive. (For example, the break-even cost of the \$489.00 Kindle DX would require eliminating 16,300 pages of photocopying at \$.03/sheet.)

Professor Crowell received funding for his research project from the Edwin R. Webster Foundation, which allowed Southern Vermont College to buy 18 Kindles. Three courses were selected for our initial examination of the Kindle 2.0, which captured one faculty member (Crowell) and 15 learners.¹ The strategy in this initial phase of our Kindle Project was designed to test (A) the efficacy of digital textbooks and imported Word and .pdf documents in the classroom, (B) different pedagogical applications of the Kindle 2.0, and (C) measure the prospective cost savings to learners of Kindle use.

All three goals of our initial inquiry into the use of Kindles in the classroom were successfully achieved. Indeed, some surprisingly, deeper learning outcomes arose as learners in one course independently experimented with Kindle uses.

One significant limitation, which has been noted in other recent studies (Virginia, Princeton), was identified: the note-taking capabilities of the Kindle significantly reduced the breadth of its utility as a singular, free-standing educational device. On the other hand, as Crowell (2010) has argued elsewhere, that critique smacks of a fallacy of extension to the extent that it attributes a failure in capacity which was never intended to be attributed to the Kindle. Further, Crowell argues that the Kindle, or other e-Reader, and more multi-faceted Mid-sized Internet Devices (MID), like the Apple iPad, are only one critical part of three essential, contemporary knowledge acquisition devices: a laptop, a MID, and the iPhone or similar device. (See Crowell, 2009, 2010.)

Informal assessments by learners were consistently favourable. The Kindle 2.0 was considered to be a surprisingly easy and comfortable reading experience.

¹ The 3 courses in this initial phase were Ecological Economics, Working & Learning in Virtual Environments, and The Networked Enterprise.

(A) Testing the Efficacy of Digital Documents

One of the attractive learning features of the Kindle e-Reader is its capacity to accept documents in multiple formats, from Word documents to PDF documents to HTML documents, and have them wirelessly transmitted to the device. Word documents needed to be converted to the proprietary Kindle .azw format, as, initially, was the case with .pdf documents until a firmware upgrade of the Kindle 2.0 allowed the device to read PDF documents natively. Through that facility to manage documents in multiple formats, the Kindle becomes an “e-reader” for much more than books.

In our initial experiments, we used the Kindle as the repository for all of our course documents, from course syllabi and instructional memoranda to readings in the professional and scholarly journals.² This capacity to store and read documents from a variety of formats effectively allowed us to readily construct the entirety of the reading in one course from non-textbook sources.

In two courses, *Ecological Economics* and *The Networked Organisation*, we utilised in each a textbook available in digital format, as well as Word documents, and professional and scholarly readings in PDF documents.

Textbooks were downloaded directly from the Kindle Store at Amazon.com; Word documents, such as course syllabi, were sent as email attachments to the unique email address for each Kindle and converted for a minor fee by Amazon; and similarly .pdf documents were sent individually by each learner to her respective Kindle device.

The free 3G wireless service provided with the Kindle made this transfer process facile, quick, and functional, largely independent of physical location. It cost fifteen cents to convert any document into .azw format or a properly formatted PDF.

The sum of this capability – to transfer a variety of different documents types and formats into the Kindle – re-frames our conception of the role the Kindle, and other e-Readers, can play in a complex learning process: it allows the congregation of types of learning resources into a *mobile device* with weight, size, and screen size attributes that create a distinctive category of a learning tool. All of the informational resources, which can be a dynamic collection, can be congregated into a single, small, light weight, mobile, Web-connected device.

We also made a very modest inquiry into the efficacy of the Kindle as a reading device.

In a sense, the answer was self-apparent: learners consistently rated highly the light weight, portability, convenience for reading (and listening), and screen contrast of the device.

More specifically, we were interested to gain a depth of understanding of the efficacy for reading of the 6” (diagonal) e-ink display of the Kindle 2.0. (Clearly that efficacy has been demonstrated by the broad adoption of the Kindle as a reading medium by the general population, but we wanted to see if some difference might arise in an explicitly educational context.)

Hence we conducted some limited testing of the effects of line length, examining readings of 25, 40, and 90 characters per line (cpl), and asking some general questions which addressed both comprehension of content and self-reported ease of reading. Our purpose was to obtain a more inquiring understanding of the degree to which learners found reading on the 6” diagonal e-ink display to be viable.

² We closely observed copyright and fair use conventions when utilising our college's digital collections for accessing professional and academic journal articles available through library resources such as EBCSohost and ProQuest.

In our course experiments, the “typical” characters per line of our converted Word documents was 41 cpl; the two digital textbooks, 39 cpl; and PDFs, 62 cpl. (The PDFs were portrayed horizontally in order to have a font size comparable to our other documents.) Since our initial inquiry was the first phase of our pilot study, we did not pursue sample sizes which would give us definitive results. Our strategy has been to use the first phase of our Kindle Project to lay out broad parameters for later investigation.

Given those limitations, our line length results were indeterminate. None of the three line lengths we tested was definitively preferred over any other. One learner preferred the shortest, 25 cpl, length because she found it easier to comprehend materials “*if they are broken down into smaller fragments*”. Another learner preferred 40 cpl because “*I did not have to flick my eyes back and forth*”; a reference to eye movement.

These results, while not definitive, are consistent with much of the current research regarding line length. (See, for example, Nanavati & Bias, 2005; Shaikh, 2005; and Bailey, 2002.)

Our general inquiries regarding comprehension did not identify any significant issues which would challenge the efficacy of the 6” diagonal display of the Kindle 2.0 and the information portrayed in that smaller screen. In effect, the size of the display was judged to be highly functional for reading and comprehension. (It should be noted that our course materials only infrequently included charts, graphs, and graphics which would have benefited from a larger display screen or the capacity to zoom in on an image. This issue is later identified as a topic for further study.)

(B) Pedagogy

Rooms.

“When we think about pedagogy, about the conception and construction of the methods and plausible outcomes of inquiry (study), it is easy to think of it in the context of physical space: a physical space within which to meet and a separate physical place (like a dorm room, a library, an office or other private space) for conducting many of the practises – reading, reflecting, writing – which require documents, like physical textbooks and journal articles, notes, and results of research, as well as collaborative capacities all co-located there.

I don't mean to suggest that these attributes of fixed physical space are the necessary constituent elements of complex inquiry (complex learning in higher education, knowledge construction and application in organisations) in our modern and contemporary construction of learning. Rather, I am defining an existing state, or circumstance. One could argue that prior to the advent of wireless and widely distributed networks and mobile devices, that advanced learning, as it was situated in theory and practise, was immobile.

Advanced learning in our conventional paradigm requires DEFINED PLACE and implicit in that physical location, as a function of prior practise and concurrent communication capabilities, was an absence of mobility.

In addition to the idea of DEFINED PLACE is that of structured time. I need to be in this particular place (a classroom) at a particular time in order to learn and participate in guided inquiry. In addition, there is the practise of allocating time to study, to knowledge construction and development. I am going to the Library, to my room, in order to study now, at this time.

Hence, I would argue, defined place and structured time define the boundaries of the modern paradigm for complex inquiry and knowledge construction. It is that pedagogical concept that the Kindle, and e-Readers and other MIDs, have fractured.” (source:

<http://ccrowell.wordpress.com/2010/03/14/11-march-2010-759p/>)

The perspective of that preceding quotation situates our Kindle Project.

Wireless Connectivity

For example, the Kindle, in its several iterations (2.0, DX) has *free* cellular wireless connectivity (Whispernet) to the Sprint EVDO/CDMA network. Hence you can receive documents in many (but not all) locations in the U.S., as well as receive email and conduct Web-based research through an restricted, basic browser. In addition, the Kindle has the capacity to render text-to-speech, so that selected e-books, and, more importantly, Word documents may be “read” to the user.

What is significant is the high-speed cellular wireless connectivity of the Kindle. That connectivity gives the Kindle the *mobility* and *capacity* fracture the physical place and structured time attributes of the modern pedagogical model. (Other devices, such as the Apple iPad, may have the capacity to transform the modern pedagogical model.)

Content and Mobility

In our Kindle Project, we pursued the capacity to change the character of contemporary pedagogy by delivering, or facilitating the delivery of, all of the knowledge content for each participating course wirelessly to each learner's Kindle. In other words, whether through the actions of the mentor for each course or the learners themselves, all of the initial knowledge content for our courses was delivered to Kindles. That strategy created a new form of mobility for our three participating courses. *Mobility* of all of the course content.

Interestingly, creating mobility for our course content established the capacity for learning outside of *place*, or, in a sense, potentially every place. *Mobility* expanded the opportunity time for learning.

For example, our learners rather quickly discovered that the convenient size (8” x 5.3” x 0.38”) and light weight (10.2 oz.) of the Kindle 2.0 allowed it to be readily carried everywhere. In addition, the Kindle has a feature which bookmarks the last page you read in each and every document, so that by merely sliding the power button, you could resume reading a document wherever you had last stopped. Those features facilitated readings while standing in a queue for a meal, or waiting for an appointment, or any other delay or waiting time in the day. Learners quickly began to fill up small segments of time with reading; an activity which did not occur with bulky textbooks or an assortment of photocopied articles.

Learning Applications

I have a lecture which I offer when discussing methods of on-line inquiry and best learning practise in my f-t-f courses. It is based on C. Argyris' concept of “double loop learning” (Argyris & Schoen, 1979) in which I guide learners to initially read a document for broad understanding and, concurrently take narrative notes for clarification and explication; then they have a brief reflective period in order to consider what they have read and the notes they have prepared; and finally, in a second, closer reading which includes their notes and reflections from the first reading, they read and think with the goal of acquiring a *depth of understanding*, a greater comprehension of complexity and interrelationships.

As part of our inquiry into the features of the Kindle, our learners were asked to listen to several assigned readings as a way to evaluate the Kindle's “text-to-speech” feature. The goal of the assignment was to gather their responses to the variations in speech speed and the attributes of the male and female voice options in “spoken” text.

Interestingly, our learners largely by-passed the goal of the assignment and, instead, independently adapted the Kindle “text-to-speech” capability to the aforementioned double-loop learning process.

When they returned to class in order to discuss the original assignment, several of them offered “Oh we jumped past that and came up with our own use for the Kindle.”. They chose to use listening to an assignment as their first pass in the double loop learning process, offering the observations that (1) varying the learning process between two different modalities: reading and listening, was more engaging than reading the assignments twice, and (2) they felt their first, auditory “reading” was effective in preparing them for the deeper, more inquiring, second reading.

In addition, they felt that the capacity to “listen” to their assignments provided not only a degree of useful “cognitive novelty” (which held their interest) , but also it allowed them to make use of “down time”, like commuting time, for learning; time which ordinarily was not available to them for study because their typical learning process was time and place structured; their learning processes, typically, were not mobile.

Note-taking Adaptation

It is broadly acknowledged that the note-taking capacity of the Kindle has very limited utility. Our experience was similar in that regard, although, once again, we took a different tack in our initial research.

We did try using the note-taking and highlighting features of the Kindle 2.0, but, as has been well documented elsewhere, neither process is efficacious and there is not an adequate system for managing and copying notes. Further, typing on the Kindle 2.0 keyboard was slow.

Once these limitations became clear, we chose a new adaptation in which the course mentor (instructor) would annotate his copy of the reading assignments and, where the absence of copyright permitted, and distribute the annotated copy to learners for their use. In effect, this approach allowed the course mentor to guide a learner's inquiry, create emphases, and embed questions and topics for further study and reflection. In instances where copyright and fair use issues applied, the instructor would distribute the equivalent to lecture notes, written with the learner audience in mind. In this fashion, we were able to utilise the mobile attributes of the Kindle and augment the learning of our learners.

To be clear, though, this adaptation, while beneficial, still did not address the note-taking and document management shortcomings of the Kindle.

Two More, Briefly

We were able to include two other features of the Kindle in our inquiry.

Our learners were favourably impressed with the dictionary integrated into the Kindle. They found it to be useful general support, although less effective than web-based dictionary resources since it yielded little benefit for technical or discipline-specific references.

We also built the use of the Kindle's basic web browser feature into our initial inquiry. It was certainly a useful resource for deepening inquiry and allowing learners to explore the Web as a knowledge resource.

1, 2, and Two Minds

Importantly, we learned two things from these initial pedagogical explorations.

First, the Kindle, albeit is very useful learning tool, has a relatively narrow range of applications.

At first blush, that conclusion would seem to be readily self-evident, yet we would argue here that the self-evident is not what it would seem to be. More clearly, based on our initial investigation into uses of the Kindle, we conclude that its utility within a conventionally defined learning paradigm is indeed narrow.

On the other hand, in a more collaborative, constructivist learning paradigm, the Kindle, and e-Readers with similar educational features, become a powerful and essential learning tool, particularly as a *mobile* information resource.³

In terms of new pedagogical opportunities, the capacities (both real and potential) of the Kindle have opened the door to enormous possibilities. While we have found the Kindle to be a very useful mobile platform, it is likely to be a transitional educational device, which, while useful, is likely to be replaced *on the basis of multifunctional capacities* by other MID devices like the Apple iPad.

That said, at this stage in our research with the Kindle, we are still of “two minds” about its educational importance.

On the one hand, as aforementioned, the Kindle is likely to be replaced by more multi-functional Mid-sized Internet Devices.

Conversely, the cost differential between a functional mobile knowledge platform like the Kindle and a multi-featured MIS is probably in the order of \$400 - \$500. We have yet to entirely sort out the cost-benefit argument there. As we will outline in the following section, there are powerful economic and pedagogical arguments to be made for the Kindle, or a similarly-featured e-Reader, as a mobile information platform with a highly readable interface.

Secondly, our experience with the Kindle further supports Crowell's 2009 argument that there are three important, co-existent learning devices: the mobile phone, the MID, and a laptop. The Kindle may be a viable MID.

(3) Knowledge Resources and Costs

In our three course experiments, we provided knowledge content to the Kindles from knowledge resources off the Web, faculty-created content, and, to a limited extent, several digital textbooks.

Yet the most significant and important knowledge resource for our learners has been the college's digital professional and academic journal collection; notably the on-line research databases EBSCOhost and ProQuest. Those digital resources play a central role in the economic utility of the Kindle, or similar device, for educational applications since their extensive resources are available without cost to learners and their faculty on an individual basis. The costs of those resources are typically institution-based subscriptions.

Such large digital collections not only provide learners and their mentors /learning facilitators with current information in very broad contexts (which dwarf the capacities of a physical textbook), they also largely eliminate attendant direct costs. Even in the courses in which we used a digital textbook, the reduction in overall course textbook costs was in the range of 75.0 – 90.0%. In other words, in courses which heavily, if not solely, utilised digital resources like those identified here, the payback on a Kindle can be measured in a period of several months; certainly less than one semester. Those savings, when drawn across the entirety of undergraduate study, could be quite sizable; potentially in the magnitude of several thousands of dollars or more.

Further, our learners offered a preference for both articles about very contemporary issues and what they perceived to be issues discussed in their entirety. (While we believe this issue deserves considerably more investigation, our observations were that our learners considered journal articles to be more “complete” and “focused and exhaustive” than textbook readings.)

³ We would argue that the necessary educational features in e-Readers include, at a minimum, wireless cellular connectivity, a basic functional web browser, an integrated dictionary, text-to-speech capacity, native PDF and document conversion facility (as that instructor-created documents can be easily imported), note-taking and highlighting features, and a viable document management system. The Kindle 2.0 comes close to meeting these minimum features.

Here, then, is an economic argument for the Kindle and other e-Readers: our initial research clearly illustrates that a learning mentor can compile *current, diverse, scholarly and professional knowledge resources* in a mobile resource at a nominal cost relative to a more conventionally-constructed course which relies on expensive textbooks and fee-based resources.

Other issues.

Fair use and copyright

In our Kindle Project, we have been particularly sensitive to copyright and Fair Use restrictions and, therefore, reviewed appropriate use protocols with our learners at the beginning of the research activities. In those instances where Fair Use and copyright issues applied to our use of knowledge resources, those restrictions were typically met by each learner individually acquiring them in accordance with accepted Fair Use practises..

Learning training

When we chose to pursue innovative and new learning pedagogical applications of the Kindle for our research project, we recognised that building new paradigmatic approaches to complex inquiry would require considerable training and education. In a very real sense, the successful implementation of our Kindle Project research agenda required *effectively articulating the case for new pedagogical practise* to our course participants and then providing them with sufficient guidance, modeling, and support for new learning behaviour and practise. We had considerable success with inculcating these new perspectives and practises, as evidenced by some of the independent learner-initiated initiatives of our research project. Nonetheless, such activities remain part of research agenda.

(4) Next Steps

The summary goal for our initial Kindle Project research was to identify the prospective viability of the Kindle 2.0, and other e-Readers and MIDs, as a viable educational device. Our research proeject was not intended to be exhaustive, but rather to suggest constructive directions for additional avenues of inquiry and identify promising classroom applications.

We believe we have achieved that summary goal.

The next steps for our Kindle Project are:

- (A) to better compile and further develop the training and education practises which further situate the Kindle, and similar devices, in a more current and contemporary complex learning paradigm;
- (B) to evaluate the efficacy of reading journal articles in the Kindle 2.0 and the Kindle DX, with its larger 10.4" x 7.2" screen, relative to large blocks of both digital and physical text in textbooks; and
- (C) to examine the extent to which the multi-functional capacities of the iPad, and other comparable MIDs, may displace the Kindle as a device that can constructively impact complex inquiry.

Our presumption, at this time, is that there is a vital role for the Kindle, and similar devices, in the classroom (and particularly outside of it) as a less-expensive, *mobile* knowledge resource aggregation device.

