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Digital Content Delivery Trends in Higher Education

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Overview

“...and what is the use of a book,” thought Alice, “without pictures or conversation?”
—Lewis Carroll, *Alice’s Adventures in Wonderland*, 1865

In a recent interview in the *Chronicle of Higher Education*, Bill Gates was asked how he thought technology would change higher education in the next five to ten years (Foster, 2005a). Foremost among his observations is the expectation that there will be a move away from printed textbooks due to the growing real and perceived advantages of delivering content in digital form. An increasing number of institutions are investing in digitally delivered content, whether through electronic books and full-text journal subscriptions or electronic reserves. Digitally delivered content provides professors and students with new options for course material that go beyond the traditional printed textbook. It also provides opportunities to change the traditional models of learning in higher education.

This research bulletin introduces the concept of digital content delivery (DCD) as it relates to higher education and presents some key trends and implications. The goal is to provide higher education leaders with an overview of developments in the DCD arena that could significantly impact their institutions within the coming decade.

What Is Digital Content Delivery?

DCD falls within the larger scope of discussion normally referred to as digital content management,¹ which covers a wide range of technologies and approaches to delivering content or intellectual property via e-commerce or electronic format. Two key, related emerging technologies in the digital content management space are digital rights management and identity management. Digital rights management provides an underlying security infrastructure designed to protect digital content from illegal or unauthorized access, distribution, modification, and use, thereby protecting the content provider’s intellectual property and providing some assurance to the consumer. Identity management technologies, which may be viewed as a subset (or heavily overlapping set) of technologies within the digital rights management space, focus on verifying that creators or consumers of the content are who they say they are. Identity management is concerned with ensuring transaction nonrepudiation and identifying creators and consumers to each other. Underlying technologies that support digital rights management include cryptography, digital signatures, and digital certificates. The goal of this research bulletin is not to discuss all of these underlying technologies and intellectual property issues. Instead, the term *digital content delivery* or DCD is used to focus on how content is and could be delivered digitally and on managerial and organizational implications.

In discussions of DCD, it is important to understand that there are two fundamentally different types of digital content: one is *digitized* content, and the other is commonly referred to as *born-digital* content. Digitized content is developed for—or as if for—

traditional print. It normally follows a linear method of organization. The term comes from the concept of digitizing traditional texts—print content is scanned, run through optical character recognition, and available in digitized form. Even if the content is never printed, most online content follows the traditional print-oriented approach to content production. In contrast, content that is “born digital” is conceived, developed, and produced within the context of the full range of features and capabilities that digital media can provide. As such, born-digital content is viewed as natively interactive and nonlinear. Typically, it is richer in format than traditional or digitized content. Many of the trends discussed throughout this bulletin will begin to highlight a gradual shift from digitized to born-digital content, which will have significant implications for higher education on multiple levels.

Unlike physical transactions, such as buying a book from a bookstore, digital content transactions create a range of issues for the publishing industry and higher education, including:

- *Technical*—will consumers be able to access or read the content once it is delivered?
- *Economic*—will content providers be properly and fairly compensated for their intellectual property?
- *Identity management and trust*—will consumers be assured that the content provided is authentic, offered at a fair price, and produced by a qualified authority?
- *Social*—will rights be protected and preserved, such as copyright and fair use, information literacy, fairness and equality in student access and use, and consumer privacy?

Other issues and barriers to the successful widespread adoption of digital textbooks exist. Resolving the many challenges will require some degree of coordinated communication among the many stakeholders, if only to develop a more common and complete understanding of what the full range of issues and their implications might be for educational institutions.

DCD also provides certain advantages over traditional print. Digital content can be updated quickly, allowing students to have up-to-date course materials and reducing the need for frequent textbook editions. Digital formats can provide more flexibility for the instructor to custom package the pieces of content that best fit the goals for a course. For example, an instructor can package a collection of chapters from different textbooks, plus journal articles, cases, and other course materials. Digital formats are also more searchable, and as more born-digital content emerges, it is more interactive as well. DCD also allows for self-publishing, so faculty and students can produce and distribute course materials such as class notes and presentations. DCD also benefits the supply chain because shipments and returns of textbooks and other print material can be reduced—freeing up shelf space and reducing both operating and inventory costs. Publishers and other content producers are finding that DCD can provide new ways of

reaching customers through new products and supporting a broader array of customer format preferences. It is this set of advantages, among others, that will lead to fewer traditional print textbooks or course materials in the not-too-distant future.

Trends in Digital Content Delivery

The DCD landscape seems to change almost daily, but a number of trends exemplify what is occurring with digital content across higher education. Two trends are discussed below: the demand for choice, and the adoption of new and emerging technologies.

Demand for Choice

Supporting the drive to produce more learning content in digital form is the shift in the expectations of students, as they look for more choice and flexibility in how to receive and use content. The demand for choice is fueled by concerns over price, pedagogical interests, content portability, and other factors. To satisfy this demand for choice, publishers and other content owners increasingly produce content simultaneously in multiple formats, such as audio recording, audible format,² e-book, allowing purchase by chapter, local print-on-demand, and, of course, traditional print. For higher education, this demand creates opportunities and challenges for how and where learning occurs, for institutional infrastructures, and for educational costs.

Consider the example of custom publishing. Current models allow faculty to choose the content to be included in a text from a menu. Such custom texts might include two chapters from one textbook, two chapters from another, and then a collection of journal and magazine articles or a case study. These pieces of content could come from multiple content producers, but each is properly reimbursed for the content provided. For faculty and students, the content is provided in a single text available electronically or in print as if it were originally intended to be packaged in that way. Custom course materials can be easily changed each semester to allow for substitutions of current information. This approach to producing course materials is particularly valuable in some academic areas, such as business schools, technology programs, and natural science disciplines, where dimensions of the field can change quickly, resulting in concerns over content remaining current.

Custom course publishing provides more pedagogical freedom of choice for faculty. For example, we might see a Shakespeare class where the instructor can choose to combine a select set of plays and play analyses into one text. In this way, a Shakespearean scholar teaching the course can demonstrate to students how they, as scholars, can approach the study of Shakespeare, providing students with a unique perspective on both the plays and the process of studying them.³ Faculty members have increased control over course materials and can tailor those materials to their own pedagogical style and goals. As faculty become increasingly comfortable selecting digitally available course materials to supplement their classes, they will also expect greater control over the primary textbook content.

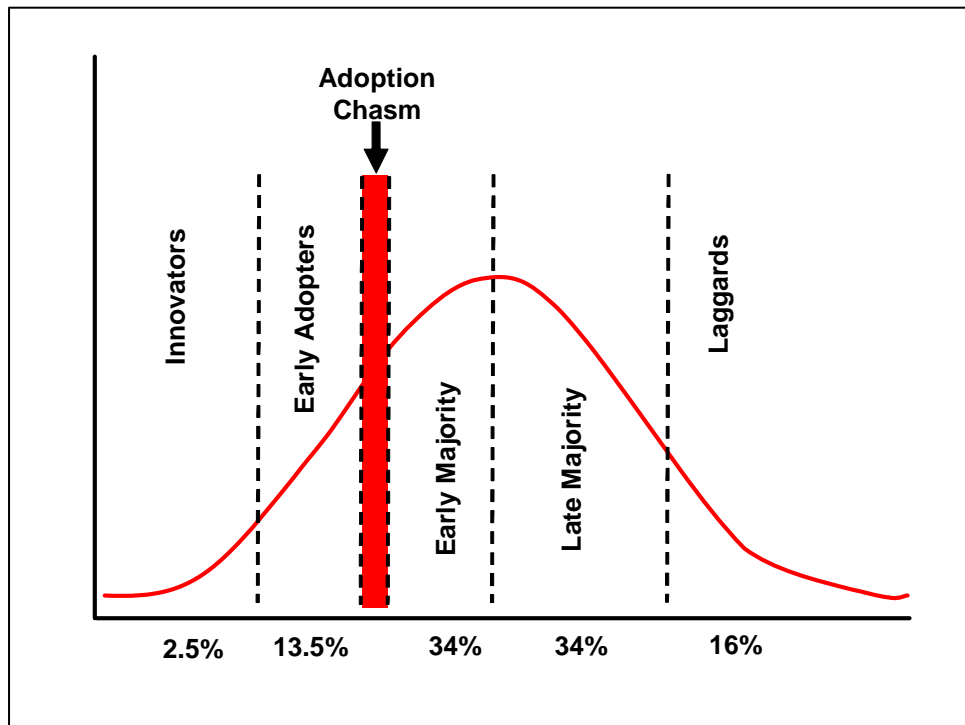
While the custom publishing examples or concepts are not particularly new, they are gaining more widespread acceptance. Custom publishing, as a simple example, is not

far along the digitized-to-born-digital spectrum, providing an easier substitute to traditional course materials. It does, however, open the door to the use of other technologies that could reduce the cost associated with traditional textbooks or increase the pedagogical alignment of course materials to courses. Other advances in course materials, such as learning objects, provide even greater opportunities for meeting the demand of faculty and students for content availability in multiple formats.

Adoption of New and Emerging Technologies

One of the best models we have for understanding the adoption of new and emerging technologies is the innovation adoption curve. Shown in Figure 1, the adoption curve demonstrates that new technologies are not adopted by everyone at once. Rather, adoption occurs in stages, with different populations adopting the technology at each stage. As we move further along the adoption curve, more risk-adverse populations become willing to try a new technology and adopt it.

Figure 1. Adoption Curve for Innovations



Adapted from Everett Rogers⁴

The innovation adoption curve begins with innovators—the pioneers or first adopters of new technology who frequently conceive of the technology and push forward prior to the development of standards. Next are early adopters, who are opinion leaders and are open to trying new ideas. Early adopters often build and support frameworks that move technologies toward a set of standards. Early majority adopters are more risk-averse than early adopters, but they are still more willing to experiment and accept change than the average person. The late majority adopters will employ an innovation only after most others have already done so. Finally come the laggards—individuals who eschew new

ideas and hold onto legacy approaches and models until they have no option but to adopt new technology.

Much has been written on Rogers's innovation adoption curve. One of the most interesting elements is the concept of the adoption chasm, shown in Figure 1 as a bar between the early adopters and the early majority. The adoption chasm represents the barrier new technologies must overcome to be adopted by the majority of potential consumers. Technologies that are unable to overcome barriers to adoption are likely not to be commercial successes. E-books are a good example of a DCD technology that up to this point has had a difficult time crossing the adoption chasm. If we are to watch any specific technology closely, therefore, it must be one that shows distinct promise of crossing the adoption chasm and becoming more widely accepted. Those technologies are likely to have the most widespread and more immediate impact on the educational environment.

For DCD, college students are more likely to be innovators and early adopters of new information technologies than the general population. Many college students are more comfortable with digitally delivered content and are more likely to be among the first to bridge the chasm when it comes to new or emerging technologies. Consider the iPod: perhaps close to half of all incoming freshmen have already adopted the technology, which has been on the market for only a few years. Students will be a driver for more DCD in the classroom and on campus. For this reason, higher education will probably bridge the adoption chasm on several DCD technologies before other industries.

The DCD technologies to monitor are those that receive more widespread interest and adoption by students. If adoption rates by students rise before the technology is mandated, then the question is, What is it about the technology that addresses student demand for convenience and choice? If a technology we believe should be embraced by students is not, then we need to learn from them why they chose not to adopt it, which might give us insight into technical or organizational barriers to adoption and help us turn potentially failing IT investments or experiments into successful ones.

What It Means to Higher Education

The shift from traditional print to digital content has significant implications for higher education. These go beyond the obvious need to continue developing more "knowledge workers" who are familiar with technology and its uses. The rapid emergence and evolution of new DCD technologies will likely change the face of higher education faster than did the Internet. This requires careful reflection by a range of stakeholders if we are to respond proactively rather than reactively. Higher education has a window of opportunity during which we must help our institutions prepare for and facilitate this transition. Sample action items that can be started include:

- *Engage in or initiate larger industry discussions regarding the issues of DCD across higher education.* This discussion should pull together the knowledge and perspectives of a wide range of stakeholders, including representatives from IT units, libraries, faculty, students, campus bookstores, institutional

administrators, business officers, instructional technologists, campus planners, and others. The goal of such discussion is not only to embrace the evolution of DCD but also to understand how it will change the face of higher education as a whole. This could help develop a clearer picture of the current and future state of DCD. It could also help institutions develop guidelines and more concrete action items to capitalize on DCD trends in a fiscally and educationally responsible way.

- *Identify a target set of technologies to monitor more closely, from iPods to next-generation e-book readers.* New developments in user interfaces and search technologies will also be particularly important to monitor, including the spread of e-ink and e-paper. Digital rights management technologies are also important to watch, as they are a key factor in the availability of vast collections of digital content.
- *Closely watch other trends.* Specific examples include trends in intellectual property protection on campuses, continued growth in digital library initiatives, pedagogical shifts within disciplines, and legislative events such as digital curriculum requirements in K–12. As information on these trends is gathered, it should be shared with the other relevant stakeholders so that current plans and actions can be adjusted more quickly to respond to changes in the environment.

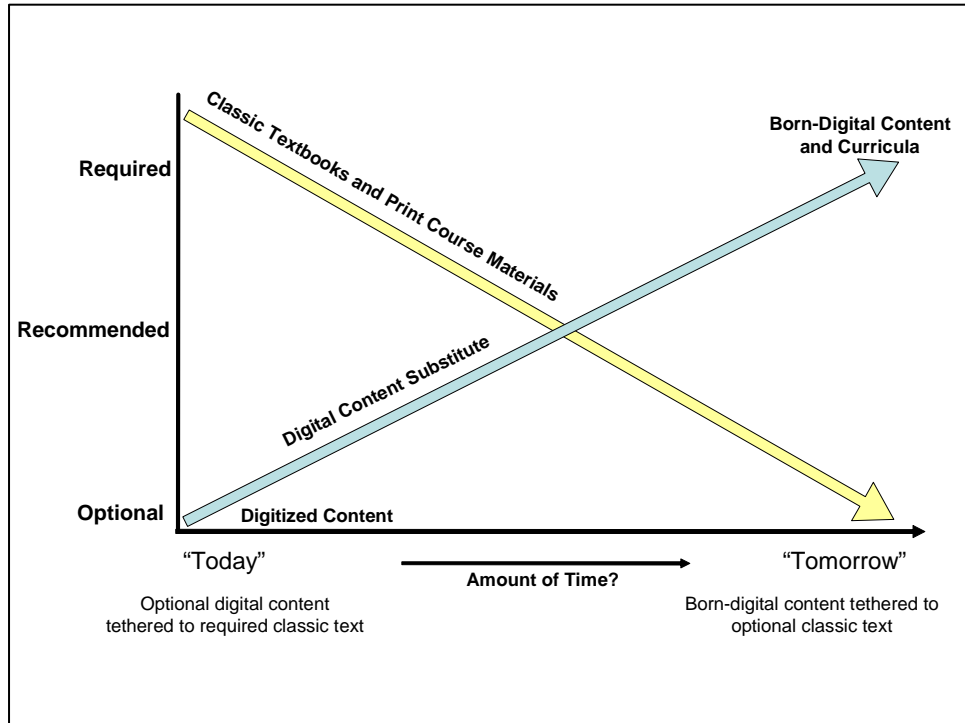
Reaching the Tipping Point

The million-dollar question is, When will we move primarily from print to digital content for textbooks and other course materials? Unfortunately, there is no easy answer. As the availability, quality, and potential cost savings of digital substitutes improve, however, we should expect DCD to comprise an increasingly larger percentage of available course materials.

Figure 2 demonstrates this shift from primarily traditional to predominantly digital for the textbook market. As we transition from “today” to “tomorrow”—some uncertain point in the not-too-distant future—classic textbooks and print course material will be required less often, becoming more of a recommendation or even optional resource. Over time, digital content substitutes will shift from primarily digitized content to content and curriculums that are born digital, and digital content will move from optional textbook supplements to the dominant required format for course materials.

These changes will require faculty acceptance of the new formats, which currently lack industry standards and are being adopted more by publishers and students. Publisher interest, of course, is in lowering costs and compensating for sales lost to the used-textbook markets. Publishers also recognize the growing threat that DCD presents to traditional textbooks, and they are investigating alternative models to ensure a place in the future of course materials. Students want lower costs for course materials and increased choice in how they receive content. Presumably, these influences will drive more faculty to consider adopting digital content substitutes. Over time, as standards emerge and more content is born digital, faculty will adopt digital content solutions as the primary method of delivering course materials to students.

Figure 2. Modeling the Tipping Point



Source: Chris Tabor, Queens University, Canada⁵

This change will not happen overnight. We will also probably observe this change occurring faster in some schools and disciplines than in others. For example, business schools are often at the forefront of digital content adoption.⁶ In the interim of more large-scale adoption, we are likely to see movement toward more hybrid distribution models where students will be given a choice as to content format—traditional print or digital. If current experiments by publishers are successful (for example, Foster, 2005b; Mutter, 2005), then we should expect to see hybrid distribution models spreading rapidly over the next couple of years. Digital format may be e-book, audio or audible, select chapters or articles, print on demand, or some other format yet to be realized. Reviewing Figure 2, we can find examples across the spectrum of “today” to “tomorrow” as we look at different faculty, academic discipline, institutional, and publisher initiatives.

Issues of Educational Equity

The push to move DCD forward raises questions about the preparedness of academic institutions for DCD and its consequences. If nearly all textbooks will be delivered digitally in the next five to seven years, how prepared are academic institutions to handle this shift? How will resource and service demands change for IT units, libraries, and other groups on campus? In its broadest sense, how will this impact educational equity in the United States and abroad?

Numerous articles and studies in recent years discuss the digital divide, which is most evident among minority, rural, physically or mentally challenged, culturally or linguistically different, and low-socioeconomic-status populations (Schrum, 2002). The

phrase *digital divide* refers to the gap that exists in access, skills, experience, and support for technology in the classrooms and homes of students from diverse backgrounds. Students on the weak end of the digital divide are less information literate and therefore have more difficulty using digitally delivered content effectively or comfortably. Their more limited access to technology also makes them more dependent on institutional resources, which could place them at a further disadvantage than students who can access and use the materials when and where they want and with greater familiarity and comfort. As we move toward more DCD, the individuals, communities, or countries on the weak end of the divide will be at a growing disadvantage unless action is taken on several levels.

In recent years, concern over the rising cost of textbooks reached its peak with a recent Government Accountability Office (2005) report, which inspired several organizations and state governments to draft legislation to reduce the cost of textbooks. DCD options figure prominently in several of these initiatives—and the belief that it is a less expensive solution to the traditional textbook. The argument goes that by providing content digitally, access to content will be cheaper for all students but especially for economically disadvantaged and minority populations.

Does moving to a digital format to reduce cost really benefit the students who most need cost reductions, or does it place them at an even further educational disadvantage? Students on the low end of the digital divide are likely to have less access to technology. While several government initiatives and other efforts have placed more technology in the classrooms of low-income communities, availability has not guaranteed the usage of that technology to its maximum benefit. It also does not mean that students will have equal access at home. These students are less skilled and experienced in using digital content and have less access to read digital materials. Combined, this will lead these students to want to print material, both for the low-tech portability of the content and for the more familiar, less complex format. Printing digital content on demand can be more expensive than traditional textbooks, so certain students may be further educationally disenfranchised with the move to greater DCD of course materials unless academic institutions, government agencies, and other organizations develop reasonable solutions to these challenges.

We can extend these issues to a global level where nonindustrialized countries have less access to technology, particularly for educational purposes. Several of these countries rely on more industrialized countries for donations of textbooks and educational course materials. What does it mean for poorer countries if educational materials are no longer available in a format they can readily use? If whole countries and populations are left behind, what impact will that have on our goal for diversity on campuses? What are the social, political, and ethical consequences of the pending technological changes? Because we can see that DCD will become a dominant element in the future of education, and that it will have some profound implications for individuals on the wrong side of the digital divide, now is the time for campus leaders to think about what impact DCD and the digital divide will have on our student populations and the more-global communities in which we operate.

Key Questions to Ask

- To what degree is our institution sharing information with campus bookstore staff and librarians about current and planned digital content delivery initiatives in each area of the institution, particularly as it relates to course materials, such as textbooks? Are faculty and students involved in these discussions?
- What approaches or models for DCD will work best for course materials on campus? What impact will each model have on campus computing resources such as printing, support for students and faculty, data storage and transfer, and funding structures and student fees?
- Who are the lead adopters of digital content on our campus? How are they using digital content in their classrooms, and how has that impacted resource or support consumption for the IT unit?
- What will the impact of the digital divide be on our institutional resources? What percentage of our students today and tomorrow come from the wrong side of the digital divide? What will we need to do to make sure they have equal likelihood of success in our educational environment and are not disadvantaged due to the increased use of DCD?

Where to Learn More

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Endnotes

1. For a more detailed discussion and introduction to the concepts and issues underlying digital content management in an e-book context, including technical, legal, and social dimensions, see the white paper "Digital Rights Management for Ebooks: Publisher Requirements, Version 1.0," produced by the Association of American Publishers, Inc., 2000. A copy of this document is available online in pdf at <http://www.publishers.org/digital/drm.pdf>. Another excellent resource on intellectual property issues in the context of digital content delivery is *The Digital Dilemma: Intellectual Property in the Information Age*, a product of the Computer Science and Telecommunications Board of the National Research Council, published by the National Academy Press, Washington, D.C., 2000, at http://www.nap.edu/html/digital_dilemma/.
2. Audio format usually implies that a narrator reads the text, which is recorded. For example, the listener might listen to an MP3 file or a book on tape that contains a recording of Jack Welch reading his book, *Jack Welch and the GE Way*. Audible format, in contrast, provides a text-based file, possibly with some special formatting, which is then "read" by a special computer program designed for the purpose. Audible technology, to this point, has been primarily used to improve access for visually impaired users when audio or Braille formats are unavailable.
3. For an example of such an approach, see the Hamlet Variorum at <http://www.hamletworks.org>, which contains more than 400 years' worth of analyses on the popular Shakespearean play, enabling detailed study from multiple disciplinary lenses. Several articles have been written about the Hamlet Variorum project. See, for example, Young, J. R. (2005, May 10). Database will hold the mirror up to "Hamlet," gathering every commentary on the play. *The Chronicle of Higher Education*. 51(38), p. A34. Retrieved January 27, 2006, from <http://chronicle.com/weekly/v51/i38/38a03402.htm>.
4. The primary and most likely original reference for this model is Everett M. Rogers's book *Diffusion of Innovations*, now in its fifth edition (New York: The Free Press, 2003). Variations on this model appear in many different sources with or without attribution to Rogers's work or alternative sources.
5. This uncopyrighted and unpublished model is part of the "Road to Clinique" concept for college bookstores under development by Chris Tabor at Queens University in Canada. As shown, it is an adapted and abbreviated version of the complete model under development.

6. The news story entitled "Libraries face electronic changes: Will book stacks give way to search engines?" appeared on CNN on August 15, 2005, and again in early September 2005. A copy of the transcript can be found at <<http://www.cnn.com/2005/BUSINESS/08/04/execed.libraries/index.html>>.

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