

U.S. Advisory Committee on Student Financial Assistance Textbook Study Field Hearing III

Testimony
Dr. Mark R. Nelson, Digital Content Strategist
National Association of College Stores
Portland, Oregon—Friday, April 13, 2007

Order of Remarks

- Question 1: What are the main forms of new digital content delivery technologies in higher education? (Please include e-books, e-readers, POD, digital learning objects, and digital libraries).
- Question 2: Have these forms impacted the higher education community?
- Question 3: What challenges do new technologies face?
- Question 4: What does it take for new technologies to be successful?
- Question 5: Are these new technologies able to effectively reduce the cost of higher education instructional content?
- Question 6: Where do you see the future going in terms of digital content delivery technologies? Is there/will there be a dominant model?

Question 1:

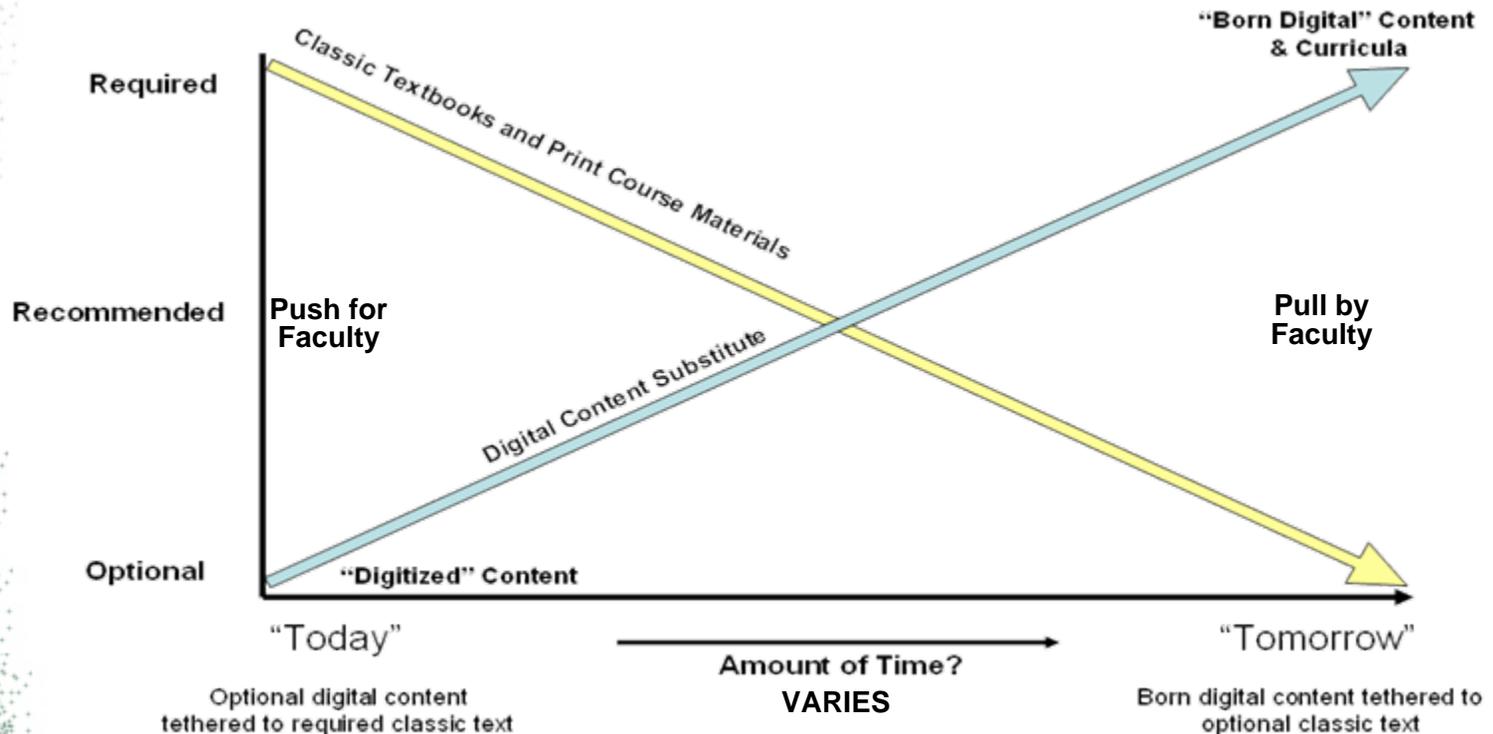
What are the main forms of new digital content delivery technologies in higher education?

We see an evolution in course materials, their production, and distribution across a very wide spectrum of forms and technologies

| Some Sample Changes | Examples of These Changes in Practice |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none">• Custom Publishing• Assessment-based Tools• Digital Learning Objects• Open Courseware• E-textbooks/e-books• Free Course Materials• Campus Licensing• Use of Common Cartridge Standards | <ul style="list-style-type: none">• POD Centre• Intelligent Exams• The Merlot Project• MIT Open Courseware• MBS Pilot Project• Freeloadpress.com• Digital Libraries and e-reserves• Course Management Systems |

Question 2: Have these forms impacted the higher education community?

- Understanding Forms of Digital Content
 - ✓ *Digitized: linear, mostly non-interactive content, like traditional print, that happens to be in an electronic format*
 - ✓ *Born Digital: non-linear, interactive content designed with electronic delivery in mind from point of conception*



Question 3:

What challenges do new technologies face?

- A Sampling of Common Issues
 - ✓ *Technical: adapts to consumer usability requirements*
 - ✓ *Cultural: adapts to consumer expectations*
 - ✓ *Legal: preservation of copyright vs. fair use; Intellectual property (IP) rights and digital rights management (DRM) solutions*
 - ✓ *Economic: fair reimbursement of content producers; cost of upfront development, producing low-cost content in the short term that students will adopt*
 - ✓ *Social: Information literacy, equality of access and use, privacy*

Question 3:

What challenges do new technologies face?

- A question of ACCESS
- The Digital Divide is a critical and growing barrier
 - ✓ *Exists along several dimensions, including: age, race, gender, geography, socio-economic status, physical disabilities, and discipline*
 - ✓ *Comfort using technology to communicate and collaborate does NOT translate into ability to use technology proficiently*
 - ✓ *The common perception of the current generation of students being “digital natives” pertains to only a percentage of the population*

Question 3:

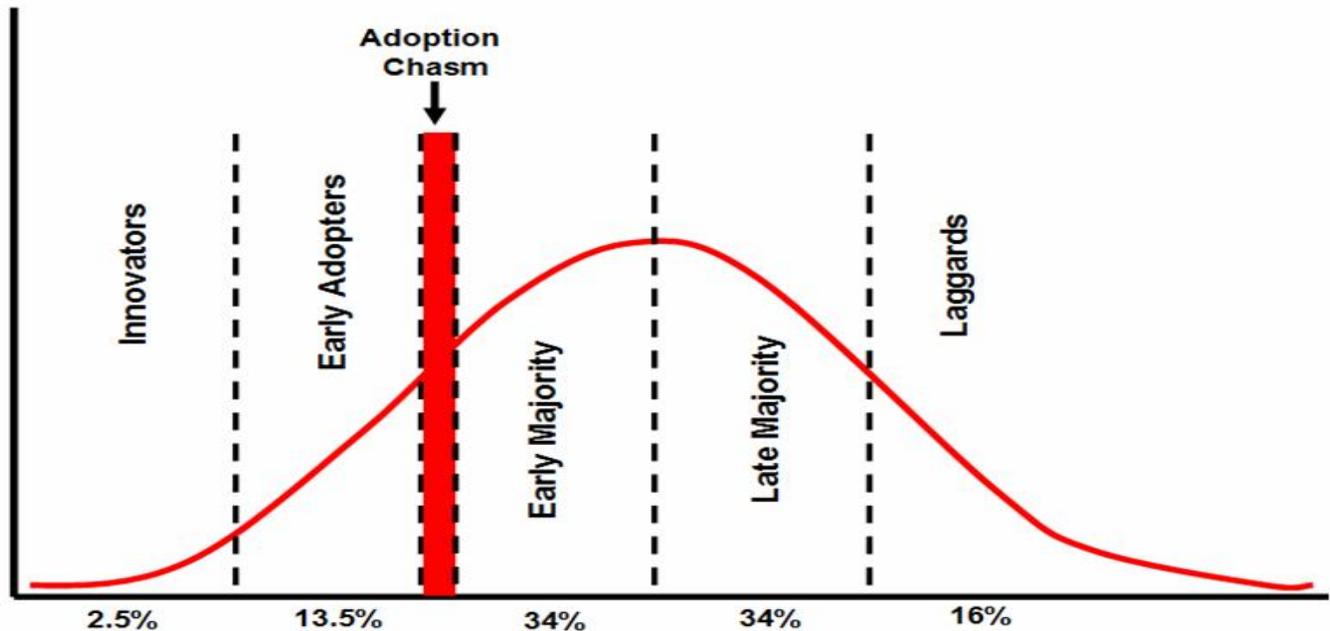
What challenges do new technologies face?

- A question of AFFORABILITY
- Understanding Total Cost of Ownership (TCO)
 - ✓ *Assume a model similar to current options where:*
 - New Textbook = \$100
 - Used Textbook = \$75
 - E-Textbook = \$50
 - ✓ *HOWEVER, the e-textbook has hidden costs:*
 - ✓ No buyback option. With buyback, TCO of ownership for the printed textbook drops by up to \$50, making it the same base cost as the electronic option and providing students with end-of-semester discretionary funds
 - ✓ Decreases the number of used book options on the market for students unable to reliably access digital content solutions, potentially penalizing those on the wrong side of the digital divide
 - ✓ If content is only digitized, most students will prefer to print pages. At 8-10 cents per page that adds \$5-40 to the cost depending on number of pages printed

Question 4:

What does it take for new technologies to be successful?

- There must be compelling reasons for students, faculty, and publishers to adopt new technologies
 - ✓ *Currency of content and edition control*
 - ✓ *Flexibility and content control for faculty*
 - ✓ *Reduced supply chain, inventory and operating costs*
 - ✓ *Ability to address student preferences based on convenience, control, choice, connectedness, and cost*



Question 4:

What does it take for new technologies to be successful?

- E-books and e-readers are a great example of the adoption chasm
- Why has e-reader adoption failed in the past?
 - ✓ *Mostly technical issues e.g., user interface & portability*
 - ✓ *Lack of extensive content, mostly “low-value” content available*
 - ✓ *Current usage mostly follows “reference” patterns*
- New and emerging technologies and trends could make e-books more acceptable to students
 - ✓ *New Technologies: E-ink and e-paper, OLEM & fabric-based displays, directed audio*
 - ✓ *Resolution of IP rights and technologies: digital rights management standards, common cartridge standards*
 - ✓ *Increase in more “born digital” content, such as digital learning objects, being available*
 - ✓ *Increasing comfort with trying technology and using technology for teaching and learning as seen in k-12*

Question 5:

Are these new technologies able to effectively reduce the cost of higher education instructional content?

- Short term: Probably not.
 - ✓ *Costs for developing a critical mass of digital learning objects may be high*
 - ✓ *Emerging standards will reduce these costs and improve interoperability*
 - ✓ *Current pricing models for digitized content have not reduced costs for students, even when priced at half of the traditional cost, due to TCO factors*
- Long term: Probably so.
 - ✓ *Improved efficiency for ordering, distribution and production*
 - ✓ *BUT it depends on content costs and ownership*
 - ✓ *For example, campus libraries have seen costs for electronic articles running about 6x more when the journal is owned by one of the four big publishers as compared to a professional society*

Question 5:

Are these new technologies able to effectively reduce the cost of higher education instructional content?

- In the interim, technologies like Print on Demand (POD) may provide lower-cost solutions
 - ✓ *New high-speed OD printers can produce perfect-bound, library quality paperbacks for about 1 cent per page, including binding*
 - ✓ *Ability to locally produce what is needed, when it is needed, and can reduce waste in the distribution channel*
 - ✓ *Two examples in practice:*
 - University of Queensland
 - ✓ *Higher copyright compliance, lower course material costs for students, higher store profitability*
 - University of Alberta
 - ✓ *Anticipating over one-half million in initial cost savings that can be passed on to students*
 - ✓ *Increased revenue through new product and service possibilities*

Question 6:

Where do you see the future going in terms of digital content delivery technologies? Is there/will there be a dominant model?

- Innovation normally unfolds in three phases
 - ✓ *Fluid phase: number of product and service offerings proliferate, there may be many new competitors in the market and a wide range of options, emphasis is usually more on product innovation than process innovation*
 - ✓ *Transitional phase: A dominant design emerges, normally following the emergence of standards, there is a fall-out in the number of players, resulting in a smaller number of market participants, emphasis shifts to process innovation*
 - ✓ *Specific phase: Longest portion of the innovation cycle; players innovate based on incremental improvements, competing on product or process differentiation*
- Result of radical versus incremental technology change:
 - ✓ *Incremental technology change: Incumbents usually win*
 - ✓ *Radical technology change: New market entrants usually win*

Question 6:

Where do you see the future going in terms of digital content delivery technologies? Is there/will there be a dominant model?

- Will there be a dominant model? YES
 - ✓ *Short-term likely based on hybrid models that may include partial content sales, POD, and CMS-based solutions*
 - ✓ *Long-term likely based on collections of digital learning objects and linked to born-digital tools for assessment*
- Where will we see the biggest or first effects?
 - ✓ *Traditional textbook sales; custom publishing packs*
 - ✓ *Large adoption courses before small adoption courses*
 - ✓ *Business schools and the sciences*
 - ✓ *K-12 environment*

Final Remarks

- Most digital solutions are probably 2-5 years from being truly commercially viable on a medium-to-large scale
- Long-term digital solutions *will* transform education at both the K-12 and higher education levels, and may improve affordability
- The key question for the transition period will be accessibility for those on the “wrong” side of the digital divide
- Thank you for the opportunity to participate

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Textbook Study Field Hearing III**

Testimony

Dr. Mark R. Nelson, Digital Content Strategist
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Thank you for the opportunity to address the role emerging technologies may play in course materials access and affordability. As a first generation college student, a former faculty member at Rensselaer Polytechnic Institute, and a current representative of the National Association of College Stores, the questions of college affordability and access are important ones to me. I even personally endowed a scholarship at my undergraduate alma mater, Saint Michael's College, to make education more affordable for future students. My remarks today will be in response to the questions I received from the Committee. This document will provide a summary of those remarks.

- **Question 1: What are the main forms of new digital content delivery technologies in higher education? (Please include e-books, e-readers, POD, digital learning objects, and digital libraries).**

The digital content landscape seems to change almost daily, and there are many examples of technologies that can be used to exemplify what is occurring with digital content across higher education. The examples provided here are listed in no particular order, and are only representative. However, they begin to provide a sense of the breadth and nature of initiatives in this area that could help transform the future learning environment.

- **Custom Publishing:** An emerging model here is the concept of Print-on-Demand (POD). POD offers the **potential** to streamline the production and distribution process for linear or print course materials. POD is capable of serving as a bridge technology between traditional print materials and those that are completely electronic. This means that the technology can be used to convert digitally delivered content to a print format for those students who prefer printed material, or who lack access to or comfort with computer resources.
- **Digital Learning Objects:** Digital learning objects are instructional modules of reusable digital content that supplement or enhance student learning of course-related information. They take many formats, from small interactive tools, to massively multiplayer educational gaming environments. There is currently an insufficient quantity of quality digital learning objects for the higher education community. There are also signals, such as in the California State University system, that the free repositories of digital learning objects may move to revenue-generating models. Ultimately, collections of learning objects could replace traditional textbooks completely. For that to occur will require significant investment of time and resources, not to mention a substantive shift in adoption rates and comfort on behalf of faculty.

- E-textbooks/e-books: The barriers to e-book adoption are likely based at least in part on the fact that most e-books are more digitized than born digital – they take little advantage of the multimedia or what the technology can provide. It is also difficult for most people to read books at length online, paper is still more portable and more comfortable for many readers. While e-book adoption is growing, we still lack the right mix of user interface and hardware devices to encourage more general adoption. The lack of uniform standards for digital rights management to prevent content privacy is also an issue.
- Digital Libraries: Libraries are often the primary source of campus expertise in working with digital content. Libraries have proven to be effective in collective bargaining with publishers or working in consortia arrangements to increase access to digital content for their patrons. A major set of concepts underlying digital libraries are digital repositories and digital-asset management systems (i.e., content-management systems). As we have seen in the area of serials (i.e., journal subscriptions), digital has not necessarily proven to be less expensive for libraries. Existing research provides evidence that nearly sixty percent of serial publications are now owned by four large publishers, and that the institutional costs per article for those journals is nearly six times those controlled by scholarly or other organizations. This has placed greater pressure on the affordability and accessibility of digital content for academic institutions.

In addition to these, there are many other digital content delivery technologies currently in use. We are at what is referred to as the “fluid stage” of innovation, where the variety of new products is often extensive. Until standards and a dominant design emerge, it is difficult to predict the future of new technologies.

- **Question 2: Have these forms impacted the higher education community?**
As many of the current forms of digital content on campus are more “digitized” (i.e., an electronic version of a print file), the impact has been limited. Students report low satisfaction rates with digitized content, and faculty have little experience with alternative forms. Over time there will be a growing volume of “born digital” content (i.e., highly interactive modules, such as interactive books, games, and digital learning objects). At the same time, faculty and students will become increasingly comfortable with the available digital options. As those shifts occur, the impact on the higher education community will increase.
- **Question 3: What challenges do new technologies face?**
While there are many issues associated with new technologies, there are two challenges relevant to current digital content offerings worth particular note, as they directly relate to the issues of access and affordability.
 - The question of access: The presence of the digital divide is still a dominant issue facing technology. Common wisdom suggests that students entering college today are “digital natives” with a universal capability to use technology effectively. Actually data and available evidence prove that common wisdom is false. A digital divide exists today along several characteristics, including age, gender, socio-economic background, geography, ethnicity, and discipline. Recent data presented to Congress by Project Tomorrow effectively

demonstrates that most students entering college today are also “digital immigrants.” Data from the EDUCAUSE Center for Applied Research (ECAR) supports this finding. As such, many students lack equal access and experience to use technology effectively for learning. Only students on the “right” side of the digital divide will be able to make optimal use of lower cost digital content solutions.

- The question of affordability: Students report that current digital content solutions, even when priced at half the cost of traditional print alternatives, do not make economic sense. We must consider the total cost of ownership. Digital content options are expensive to produce initially, particularly for solutions that are closer to the “born digital” than “digitized” end of the spectrum. Students often prefer to print “digitized” content out to paper, increasing the costs of digital solutions. Because there is no buyback option for digital books, there is no end-of-semester resource return and the number of used textbooks available on the market decreases.

The move from traditional course materials to digital could increase costs, and reduce access for students for the foreseeable future. That said, as digital learning objects and other born digital technologies increase in number and become less expensive to produce, the challenges of access and affordability will likely decrease.

- **Question 4: What does it take for new technologies to be successful?**

Typically, from the perspective of innovation theory and technology adoption, we are looking for the set of enabling factors that will lead a technology to be adopted. Or conversely, we are looking for the barriers that prevent a technology from being adopted. Prior evidence notes that nearly ninety percent of innovations that fail do so because they are not properly timed with the right enabling factors.

In the case of e-books and e-readers, as an example, the technologies have yet to be successful due to some readily identifiable factors. Technical factors, such as poor display technology and content portability problems, have resulted in consumers rejecting prior e-readers. There is a low volume of content available for e-reader devices, and most such content falls into the trade book category. An effective device, paired with a larger mass of available content, could change the landscape of digital content adoption overnight. Currently most new technologies, once successful, take seven to ten years to reach adoption by the majority of consumers. With the iPod, we saw nearly half of all first-year students adopting the technology within a three year time period. Once current consumer adoption barriers are overcome, E-readers could penetrate the college market just as quickly, changing the economics of current content offerings.

- **Question 5: Are these new technologies able to effectively reduce the cost of higher education instructional content?**

This question is perhaps the most difficult to answer with certainty. The cost of production and distribution of digital course materials should go down with time. Over the short term, “Born digital” content is currently more costly and difficult to produce than merely digitized content. Faculty members are often not rewarded

for producing additional content, reducing the pace at which content for higher education is developed and disseminated. Standards development is still in the early stages, which limits the current interoperability and portability of available digital content solutions. Over the long term, the emergence of standards, and greater economies of scale in content production, has the **potential** to reduce costs. However, as we have seen from the library market, digitization of content can increase institutional costs for materials. Thus, while digital solutions could reduce costs in the long term, there is no certainty of that outcome.

- **Question 6: Where do you see the future going in terms of digital content delivery technologies? Is there/will there be a dominant model?**

Radical innovation normally unfolds in stages. We are currently in the early or fluid stage, as discussed in response to a prior question. Once a dominant design emerges in terms of product, then we will see a transition period where the new technology takes over the market. We expect that this transition will happen quickly once a dominant design emerges. The new content providers may or may not be the traditional publishers.

In the short term, the dominant model will likely involve hybrid solutions, combining print and digital solutions. Examples might include partial content sales and POD solutions. Over the long term collections of digital learning objects and interactive gaming environments, linked to tools for assessment and self-paced learning, may replace the traditional print textbook.