From Paper to Pixel:
Digital Textbooks and Florida Schools

PALM Center
Partnerships Advancing Library Media

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From Paper to Pixel: Digital Textbooks and Florida's Schools

A White Paper
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From Paper to Pixel: Digital Textbooks and Florida's Schools

Digital textbooks will soon be part of every classroom in the United States. This trend accompanies an imperative for schools to facilitate 21st century learning in which educators prepare students to learn and live productively in a global society where accurate and current information is a meaningful part of everyday learning. School librarians, especially those in Florida, can be key players in the successful implementation of digital textbooks to foster a sensible, balanced solution for educators and learners.

What is a Digital Textbook?

Digital textbooks come in many forms ranging from:

- electronic textbooks (e-textbooks) specially created for a reader like Amazon's Kindle DX or Apple's iPad;
- read-on-demand computer-based textbooks like those from Google Books and NetLibrary;
- print-on-demand e-textbooks;
- modular assemblages of audio, visual, interactive, and text resources presented via iTunesU, wikis, and digital applications.

In this White Paper, we explore all types of digital textbooks and weigh the benefits and drawbacks of each format for schools. We examine the advantages and challenges of the growing use of digital textbooks and make recommendations for school librarians' roles in the digital textbook implementation process.

Textbooks and U.S. Public Education

The textbook is the single greatest driver of the classroom experience in U.S. public schools (Greaves Group & Hayes Connection, 2008; Schmidt, McKnight, & Raizen, 1997; Tulley & Farr, 1985) and the ways in which teachers and students interact with the information contained in textbooks is a key definer of the learning experience.

Textbook adoption is most often considered a statewide activity; all states mandate some sort of state-level review of materials used in the classroom (American Foundation for the Blind, 2010; Tulley, 1989b). State level textbook adoption was formed in response to widespread practices in the early years of public education when children used the books available in their own homes. For the most part, textbook adoption processes are long-standing, often dating back to Civil War Reconstruction because "Southern states...did not want their children to read the Yankee version of what that conflict had been all about" (Mathews, 2005 ¶10). Once graded instruction became standard practice in public schools, teachers and parents demanded uniform instructional materials.

By 1925, textbook adoption had become a state level activity in over half of the states and this adoption approach has remained stable in ensuing years (Follett, 1985). Currently, in many instances, districts are given some discretion over some of the materials selected. While historically, this process tended to result in disjointed curriculum at odds with state curriculum goals, effective technical assistance to aid local adoption of curricular materials and this technical assistance has evolved (Dole, Rogers, & Osborn, 1987).

In public schools in the United States, textbooks are important supports for a number of teaching and learning activities. Textbooks help to standardize the material teachers present in content areas; ensure that classroom content is aligned to mandated curricula; provide a focal point for instructional activities; support pedagogical approaches; and give structure to homework.

Momentum is Growing for Digital Textbooks

As technology and Internet have gained presence in classrooms, instructional materials and activities have become digitally rich and the use of digital textbooks is rapidly gaining ground in education at all levels. With an industry average of almost $56 million in wholesale sales in the U.S. in 2009 (Maneker, 2010), the digital book is an unstoppable juggernaut. While colleges and universities have moved headlong into digital textbooks as a means to reduce costs for students, K-12 education is venturing cautiously, but steadily, into using digital textbooks.

State laws, many of which have been rewritten to include digital content as an acceptable use of state textbook funding, will serve as catalysts that spur the transition to digital textbooks. Already, major advancements in–and support for–digital textbooks have occurred in Indiana, Virginia, West Virginia, California, Texas, and Florida. The State Educational Technology Director's Association (SEDTA) is currently surveying their members in attempt to form a coalition that will identify and work to overcome policy and practice barriers to pursue the use open digital content as as part of a broader strategy to rethink textbook and traditional instructional materials policies and practices in a digital age (State Educational Technology Directors Association [SETDA], 2010).

Digital Textbooks: A Boon to Learning?

The interest in and growth of digital textbooks can be attributed to several perceived advantages for learners. Some possible advantages are obvious: digital textbooks are compact and light, making them easy to transport and store; many have search, highlight, and note-taking features convenient for studying and quick reference; and digital textbooks are immediately available anytime, anywhere. Digital textbooks are also appealing for the ways in which they support learning, teaching, and technology integration as well as their potential to enhance the health and welfare of children.

Digital Textbooks Support 21st Century Learners

There have been major changes in teaching and learning styles in today's digital world and in the way students engage with materials. Digital technology has transformed how our students communicate and should influence the way teachers teach. Differentiation of instruction demands that teachers adopt a more interactive approach to delivering content through the use of multimedia and collaboration. This approach to delivering content will help to keep students motivated and engaged in learning.

> *Kids are wired differently these days...They're digitally nimble. They multitask, transpose and extrapolate. And they think of knowledge as infinite. They don't engage with textbooks that are finite, linear and rote.*
>
> *--Sheryl R. Abshire, Chief Technology Officer, Calcasieu Parish School System, Lake Charles, LA*

Digital textbooks increase opportunities to learn. The use of digital textbooks can help teachers avoid wasted instruction time due to the distribution and collection of textbooks, students with forgotten or lost textbooks and incomplete homework. The convenience of the online format means that the student textbook is always at hand.

Digital textbooks can provide access to a wealth of information that is readily retrievable from the Internet. Digital texts can make access to information expeditious and mobile, and convenient for students who have been absent. The appeal of this convenience can be seen in higher education where many universities have provided digital textbooks to students. Princeton University began selling textbooks usable on Amazon's Kindle in 2008 (Taylor, 2008). This move was so wildly popular that just one year later, in the Fall 2009 semester, Amazon partnered with Princeton and five other universities to provide new students with the devices (Williamson, 2010). Other examples of digital textbook adoption have shown that whether in K-12 schools or higher education, users appreciate the convenience of digital textbooks because they use digital resources for the majority of their work (JISC, 2009).

> *It is convenient to not have to find a ride to the local library [and] it may not be necessary. Students, such as myself, do use the Internet for nearly every assignment because of online encyclopedias/databases, online texts, blogs and other Web sites and search engines.*
>
> *--Hayley H., posted on the Room for Debate blog*

Rather than just providing versions of traditional textbooks, many companies are striving to provide schools with textbook reading devices that allow digitally-enhanced interactive functionalities. Publishers, anxious to provide schools with enticements for children to read their books, often offer companion Web sites that are graphically rich and able to engage readers in numerous ways. Along with the content on the page, children can access online videos and games, win prizes, and engage in safe social networking (Lowman, 2010).

Digital Textbooks Promote Good Teaching

While print textbooks are designed to support multiple state standards, forcing teachers to dissect and analyze the pages of textbooks create lessons pertinent to their local needs (Schachter, 2009), teachers can use digital textbooks and materials to receive customized curriculum to complement and extend their state's standards. Though information is ever-changing and can be quickly outdated in print textbooks, students using digital textbooks can access news about current events and link to information and media that enriches a learning encounter. And, teachers are encouraged to collaborate with one another to select complementary online resources and to update and refine classroom content.

> *The students in my general chemistry class almost never open their textbook. My reason: The less I use the book, the more they learn... Without a textbook, I can create curriculum [from digital resources] that engages students by relating science to their everyday lives. Lessons become clearer when I link the topic to an issue that affects them personally.*
>
> *--Geoff Ruth, chemistry and biology teacher, Leadership High School, San Francisco*

Digital textbooks enable differentiation. All teachers have an imperative to differentiate their instruction to meet the needs of all learners, but often they lack the resources and skill to do so (Gable, Hendrickson, Tonelson, & Van Acker, 2000). Digital textbooks provide support for students with various learning needs through flexibility and multimedia. Those students who have low vision or who are physically unable to hold a book or turn pages may find a digital textbook easier to use and read. Students who are easily distracted can take advantage of the multimedia capabilities of the digital textbook to stay active and focused. This variety of supports is particularly helpful to English Language Learner (ELL) students, a student population that has more than doubled in the past 15 years from approximately 2 million to well

over 5 million students, or about 150% (Waters, 2007). Students can use video and audio to augment the text, thus increasing the likelihood they will grasp concepts.

Digital Textbooks Promote Improved Technology Integration

Schools must show a return-on-investment with technology expenditures and digital textbooks help schools demonstrate the need for more and better technology and Internet connectivity (Lewin, 2009). Adoption of digital textbooks may serve as an impetus for schools to invest in 1:1 computing because all students will require a device to access learning materials. Schools that already have 1:1 laptop initiatives can maximize their investment in latptops by also using digital textbooks. In schools where 1:1 computing is mature, teachers already have the skills they need to integrate digital content into their instruction (Drayton, Falk, Stroud, Hobbs, & Hammerman, 2010). The combination of laptops and textbooks proved effective in digital textbook forerunner, Forney Independent School District (TX), where teachers integrate technology seamlessly. 1:1 computing environments are uniquely suited for digital textbook adoption because ready access to digital content may already be ingrained in school culture (Greaves Group & Hayes Connection, 2008) and part of the vision of almost all school administrators (Project Tomorrow, 2010).

> *[There is] an urgent need for teachers and researchers to address the discrepancy between the types of literacy experiences students encounter at school (paper, pencil, and print texts), and those they practice in their daily lives outside the school environment (Web 2.0). One way to bridge such incongruity is to expand the types of texts students are exposed to and engaged with at school by turning attention to electronic books.*
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> *e-Reading and e-Responding: New tools for the next generation of readers - Lorretta Larson*

Digital Textbooks Make Financial Sense

Billions of dollars are spent on print textbooks every year. Florida, California and Texas, accounted for more that $1.1 billion in textbook spending in 2009 (Baumann, 2010). The National Association of College Stores stated the average price of a new textbook for the 2008-2009 school year as $64; the price of a used textbook as $57 (Riddle & Traylor, 2010), though some textbooks can cost close to $200. As textbooks become more readily available in multiple formats, the difference in cost between the various formats can be quite significant.

> *We spend about $81 per student each year on textbooks but only $19 per student on all of the digital content we subscribe to—and that includes a broad collection of multimedia resources, databases, and interactive lessons.*
>
> *---Bailey Mitchell, Chief Technology & Information Officer, Forsyth Schools (GA)*

While school districts vary, new textbooks for the K-12 curriculum are typically replaced every 5-6 years in each subject area (Tulley & Farr, 1985). Textbooks must be replaced in order to obtain current information, particularly in the subject areas of health, science and social studies. Student textbooks in use today, perhaps adopted in 2005, will not contain information about President Barrack Obama's first day in office in 2009, Hurricane Katrina in 2005, or the downgrade of Pluto from planet to dwarf planet in 2006. Schools using digital textbooks can receive updated information by the publisher, without having to replace the entire textbook series (Reynolds, 2010).

Digital Textbooks Improve Local Control Over Curriculum

The textbook industry currently functions as an oligopoly in which a few companies control the market. In some instances, these companies are not operating in the best interests of the school districts and work to perpetuate the perception that their content is superior to any open content that may be available. They offer different pricing to different districts and force districts into replacement schedules and format limitations. Locked into long term relationships with textbook publishers based on long-standing replacement procedures and schedules, many states have had the opportunity to only review publishers' offerings rather than a wide range of material in a variety of media (Thevenot, 2009).

Slick marketing campaigns, promises of convenience, and a familiar publisher's representative can sell textbook adoption committees on adopting a new series. As a result, large textbook producers continue to get larger and guard their market share fiercely and rarely are the ways in which textbooks are actually used in the classroom studied or linked to student outcomes. So, in many ways, the ultimate impact of textbook adoption committees' decisions is never seen and classroom shortcomings might be attributed to any number of other factors (Follett, 1985).

The tension between textbook rigor and textbook appeal is decades old and seemingly unresolvable. Efforts to standardize adoption of rigorous instructional materials have been blamed for constraining learning and narrowing curriculum. Even when curriculum developers and teachers are given the option to choose in-depth instructional materials over more visually appealing, engaging materials, they choose the less challenging content (Dutch, 2005). On the other hand, the elimination of state-level controls, whether in favor of local control or no control, threatens to leave educational resources subject to the vagaries of community funding, local priorities, and socioeconomic variations among districts and students (Tulley & Farr, 1985).

Digital content has the potential to offer better material and the expanded range of content (Ezarik, 2005) while preserving the best practices of collaborative decision-making on quality content. With some digital textbook companies, students and teachers will have the ability to create custom textbooks in which they add chapters from a variety of selected books, other relevant articles and resources, and even their own materials (Fiorello, 2010).

Digital Textbooks Protect Children's Health and Safety

The Accreditation Council for Occupational Therapy Education (ACOTE) recommended that a child not carry more than 15% of his or her body weight (Hoffman, 2009), yet studies have consistently found that children are carrying 17% or more of their body weight in backpacks up to 18.4 pounds ("Backpacks for kids: Backpack, child products, school," 2008)! Bookbags with textbooks that are too heavy or are worn incorrectly can cause physical harm for children and teenagers. In addition to poor posture, damage can be done to muscles and joints, leading to back, neck and shoulder pain (American Academy of Pediatrics, 2010; Dale, 2004), back strain and altered gait (Forjuoh, Schuchmann, & Lane, 2004), and scoliosis and abnormal curvature of the spine (Sebastian, 2006). The U.S. Consumer Product Safety Commission projected more than 13,260 injuries related to backpacks were treated at hospital emergency rooms, doctor's offices, and clinics in 2000 (Dale, 2004). A study of backpack use and back pain in 1122 children showed 74.4% of them were classified as having back pain associated with the use of backpacks (Sheir-Neiss, Kruse, Rahman, Jacobson, & Pelli, 2003). Digital textbooks would decrease the physical burden placed on students who use print textbooks. They are also accessible to students online at home or at school, eliminating the need to transport heavy print textbooks in their backpacks for use to do homework assignments.

Digital Textbooks Protect The Environment

A transition to digital textbooks may also have environmental benefits. The report, Environmental Trends and Climate Impacts: Findings from the U.S. Book Industry (Godelnik, 2009) included estimates of environmental factors of publishing including high energy use and pollution related to printing and transporting books, deforestation, and other costs related to textbook production, disposal, and recycling.

The Hidden Costs of Digital Textbooks

Despite possible advantages, a move to digital textbooks poses many challenges. The cost of hardware and software licenses as well as updating the technology infrastructure and bandwidth capacity of schools is costly. Putting a laptop or other reader device in the hands of every student could cost millions of dollars. The executive director of the Association of American Publishers, Stephen Driesler, conceded that "it is likely to be funding, not logistical issues" that will prevent the adoption of digital textbooks in schools (Colin, 2005) and many parents and educators feel if a child does not have a traditional textbook, then learning cannot be taking place (Baker, 2005). For now, the financial savings and educational advantages of digital textbooks remain aspirational and may pose hidden costs for learning, teaching, and implementation.

Digital Textbooks Compromise Comprehension And Engagement

A decade of research has consistently supported the conclusion that children "perceive Web text reading as different from print text reading" (Sutherland-Smith, 2002, p. 664). Digital media does not promote in-depth reading (Liu, 2009). The reading of fixed text is the dominant form of reading in non-digital environments, but multimedia digital textbooks require a different kind of reading across interactive layers consisting of visual clues, hypertext, digital paper, and "image, audio or even ideogram" (Thomas, 2005 ¶3). This balance of focal and peripheral attention while reading digital media is not easily accomplished (Liu, 2009). And, despite improvements in e-reader devices, users read 20-30% more slowly; use more effort; and are more tired than when reading on paper (Aamodt, 2009). Perhaps the greater reading effort required by digital texts explains why many students have remarked that digital textbook user interfaces do not seem designed for sustained reading (JISC, 2009) and that they prefer to use them for shorter tasks like verifying facts.

> *When we read from the screen of a multifunctional computing device, whether it's a PC, a Smartphone, a Kindle, or an iPad, we sacrifice that singlemindedness. Our attention is scattered by all the distractions and interruptions that pour through our computers and digital networks. The result, a raft of psychological and neurological studies show, is cursory reading, weak comprehension and shallow learning...We may not want to admit it, but the medium matters. When we tell ourselves that reading is the same whether done from a screen or a book, we're kidding ourselves — and cheating our kids.*
>
> *---America's Digital Schools 2008--Nicholas Carr*

Administrators, teachers, and school librarians will need to carefully consider students' reading levels in the selection of digital textbooks. The methods for calculating comprehension in digital reading are evolving and cannot be accurately calculated for measures like the Lexile Framework for Reading (Rowsell & Burke, 2009).

Furthermore, a lack of comprehension can affect students' research and writing habits. Young readers seek immediacy when performing searches for answers to classroom assignments and homework. They may resort to copying, pasting, or plagiarizing text when attempting to synthesize ideas into writing (Sutherland-Smith, 2002).

As one elementary school principal pointed out, there is a need to make adoption decisions based on learning improvement data. She says she'll wait for the next round of scores from the state standardized test given in the spring before spending more money on any devices (Perez, 2010).

Digital Textbooks Exclude Visually-Impaired Learners

Accessibility of learning materials remains a concern for persons with disabilities. The current e-reader devices present "significant barriers that keep people with disabilities from having full and equal access" (Bagnestos, 2010 ¶4). The National Federation of the Blind (NFB) and the American Council for the Blind (ACB) successfully filed suit with the United States Department of Justice

Civil Rights Division to intervene in e-reader textbook replacement pilot projects at six major American universities (Dorn & Stein, 2010). While many e-readers have text-to-speech capabilities, most notably menu selection, voice activated navigation, note taking, and bookmarking features are inaccessible to visually impaired users. Images are excluded from screen readers, thus obscuring a significant portion of digital content to low vision users. The settlement reached between the universities and the Department of Justice required an end to the recommendation, purchase, or promotion, of any e-reader devices until the e-readers are fully accessible to all students. E-reader manufacturers are required to bring the devices into compliance with the Americans with Disabilities Act (ADA) (United States Department of Justice, 2010). In June 2010, the United States Department of Education affirmed the Department of Justice position and urged any schools considering the adoption of digital textbooks delivered via e-readers to seek for technical assistance from either agency (Schaffhauser, 2010).

> *If we don't consider individuals with disabilities when we integrate new technologies into the educational environment, students with disabilities can and will be left behind as their non-disabled peers gain the benefits of learning that are enhanced by technological advances. This result would be inconsistent with our civil rights laws.*
>
> *---Russlynn Ali, Assistant Secretary for Civil Rights, U.S. Department of Education*

Digital Textbooks Perpetuate Socioeconomic Gaps In Education

Californina Governor Schwarzennegger's 2009 California Free Textbook Initiative substitutes open source digital resources for state-adopted science and math textbooks. This move attracted national attention (Lewin, 2009). One of the main concerns with this program is its potential to negatively impact students from low socioeconomic backgrounds or children who lack equipment and connectivity at home. Over a fifth of students (22%) find reading on a screen uncomfortable and may resort to printing partial or entire texts (Allen, 2008). Printers, paper, and ink can be added to the list of hidden costs, that may, by necessity, shift to the school districts. Some less affluent districts may not be able to afford these costs, resulting in another type of digital divide for students from low-income families.

Ancillary costs of digital textbooks erode savings. School administrators cite cost savings as the main reason to select digital textbooks over print and expect to see savings of 50% or more (Allen, 2008). Even though this may be true, the cost of a digital textbook goes beyond this initial investment. Digital textbooks require student access to computers or other mobile devices, Internet connections, and hardware systems that require periodic upgrades and maintenance. And, in many instances, schools must absorb at least part of the cost of making materials accessible to all students through printing and reformatting. In Eliezer Williams, et al., vs. State of California, Superior Court officials found that districts were responsible for ensuring that "students receive printed instructional materials that are identical in content...or by providing those students with the electronic equipment and/or active Internet connections they need at home to access the materials" (Californina Learning Resource Network, 2008 ¶3).

For many schools, investing in digital textbooks results in duplicate expenditures. Learning management systems (e.g., Blackboard and Moodle) are used by an increasing number of districts. They come populated with digital resources which are as comprehensive as digital textbooks (Greaves Group & Hayes Connection, 2008). Teachers may already have integrated these systems into their teaching and may be reluctant to revise current pedagogy to switch to digital textbooks. Until a standard format for digital text is created, schools may have to invest in multiple readers. Some digital texts are formatted for specific e-reader devices; some others work on computers only. Reading devices, or e-readers, are available for netbooks, mobile devices, and tablets as well as dedicated e-book platforms and they continue to expand (JISC, 2009), leading schools to invest in multiple devices to provide content to learners and educators.

Current Internet Connectivity Cannot Support Digital Textbook Use

Despite superintendents' support for 1:1 computing and digital curriculum, curriculum directors reported skepticism that their technology infrastructures were ready to handle the demands of digital materials and the accompanying growth in devices (Greaves Group, 2006). The majority of curriculum directors surveyed for the America's Digital Schools 2006 report admitted that expenditure in digital materials were likely to triple in the next five years, but they did not see bandwith and device availability keeping pace (Greaves Group, 2006). That five year forecast is rapidly coming to fruition. The subsequent America's Digital Schools 2008 report confirmed the growth of 1:1 and mobile computing as major trends in education, making bandwidth a continuing critical concern. (Greaves Group & Hayes Connection, 2008). Web-based learning resources demand high levels of bandwidth to ensure adequate speed and connectivity. Many schools are simply unprepared to handle the volume of netwrok traffic volume and "experience the thwarting effect of inadequate connectivity on instructional innovation" (Everhart, Mardis, Johnston, & Smith, 2009).

Home connectivity is also an issue. It is estimated that about a third of Americans have no access to high speed Internet service because cannot afford it or choose not to have it (Stelter & Wortham, 2010). Although continuity of the school-to-home learning experience is essential when students do not have printed textbooks to rely upon, schools cannot afford to absorb this cost for parents and many parents do not understand the importance of the investment or are not in a position to make it. (Greaves Group, 2006).

Although some research has suggested that issues of broadband accessibility have been circumvented by the use of mobile devices like smartphones among urban poor and minority students, it is becoming clear that "not all digital experiences are created equal" (Watkins, 2009, p. 68). Mobile devices are often limitated in their educational use by small screen size, lack of display clarity, limited image size and complexity, restrictive keyboard and mouse functions, and diminished space for interactive elements (Churchill & Hedberg, 2008). Although access to the internet may be available through smartphones, data plans are expensive and some cell phone applications (apps) have an associated cost. The new "digital divide" may be an "app gap" in which high quality content cannot be used on mobile devices until a unique app is created for it.

> *The growth in machines and the changing mix of applications are driving dramatic growth in required Internet bandwidth that most school districts and states have not yet predicted.*
>
> *---America's Digital Schools 2008--Nicholas Carr*

Teachers Are Not Prepared To Make Best Use Of Digital Content

Adequate professional development is key to the success of digital innovations in schools. The majority of school administrator respondents to the America's Digital Schools 2006 survey reported that they were concerned about their teachers' and librarians' abilities to seamlessly integrate new digital technologies into the existing curriculum (Greaves Group & Hayes Connection, 2008). At about $100 per student per year, districts often do not plan for the substantial time and investment in professional development they will need to make to ensure the success of their digital textbook programs (Greaves Group, 2006). The successful integration of technology into everyday classroom practices must be sustained by ongoing professional development. The investment in infrastructure enhancements, hardware upgrades, and mobile learning initiatives, has yet to be matched with an investment in human capital (Kirsch, Braun, Yamamoto, & Sum, 2007).

Digital Textbooks Will Not Resolve Flaws In Traditional Curricula

Regardless of format, on the whole, textbooks emphasize "familiarity with many topics rather than concentrated attention to a few" (Schmidt, et al., 1997, p. 2). This lack of content rigor has been linked to lackluster U.S. performance on international tests

of mathematics and science, declining student motivation, and even lack of high school completion. Before digital textbooks can be credited with enhancing learning, curricula must be reformed to focus in depth on key topics and give students a common set of educational concepts upon which to build. In the pressure of daily instruction in a high stakes environment, textbooks become an essential tool of enacted curriculum and, as a result, teachers cover numerous topics shallowly in an effort to complete the range of material contained in the textbook. Splintered adoptions of digital textbooks without national or even statewide agreement upon the uses for and content in digital textbooks may only exacerbate this issue further.

Florida: The Next Digital Textbook Frontier?

Despite a projected decline in enrollment from 2,657,081 in 2007-2008 to 2,612,998, Florida spent $22,155,066,891 on instructional materials for its public schools, making it the fourth highest spending state behind California, Texas, and New York (Market Data Retrieval [MDR], 2009). With the passing of Florida legislation allowing school districts to use textbook funds to purchase digital content and other online educational resources (Manzo, 2009), the nation will look to Florida as one of the states to take the lead. Currently, in many districts across the state, students and teachers access digital versions of their current textbooks (Surdin, 2009). Florida educators will want to pay particular attention to discussions of digital textbooks because policymakers are often attracted to the perceived cost savings that are linked to their adoption. Each year, Florida adopts instructional materials for specific classes called major tools of instruction; ancillaries; and supplementals. Major tools are materials that cover the Sunshine State Standards, stated intended outcomes, and course objectives for the specific classes. Ancillaries are supplemental learning resources like workbooks and kits. Selected subject areas are called for adoption each year on a rotating basis, usually for a period of 6 years. Prior to each adoption, the Florida Department of Education publishes the Instructional Materials Specifications for the subjects to be adopted. These specifications outline the courses for which materials are being sought, as well as the standards that those materials are expected to meet.

Although the textbook adoption process in Florida has a long tradition, digital textbooks are coming to the fore. A new state initiative in Florida, called Orange Grove Texts Plus, provides 120 textbook titles free if students go online to view them. Students can download and print the books, or they can buy bound volumes at about half the cost of normal textbooks. As an example, students using the textbook Elementary Calculus by H. Jerome Keisler can read, download and print some or all of the 992 pages for free. But if they want it printed, bound and shipped, the cost is $47.50. Comparable textbooks retail for $100 to $160 at bookstores (Travis, 2010). Orange Grove Texts Plus, geared to college students, is proving enticing to Florida's high schools due to its free content. Clearwater High School in Pinellas County is a frontrunner in the digital textbook movement. They are planning a pilot program for a 1:1 initiative putting a wireless reading device into the hands of each of its 2100 students for the 2010-11 school year. Already, the school issued e-readers to all 100 of its teachers who are pleased with them. John Just, assistant superintendent for the district's management information systems, said Kindle officials told the district that no other high school had embarked on such an effort (Catalanello, 2010).

However, the largest consumer of digital content in Florida, the Florida Virtual School (FLVS), relies on other forms of digital content, not digital textbooks, to date. Florida Virtual School is the largest in the nation and expanding rapidly. In 2008-2009 the school's enrollment climbed to over 124,000 which represented a 25% increase over the previous school year (Center for Digital Education, 2009).

According to the FLVS Chief Development Officer (J. Smith, 2010):
"We use digital textbooks...only in our AP courses, when/if required. We really try to limit the amount of external resources we include in our courses because of recurring costs/licensing fees often associated with the resource. We also sell our courses outside

	Teacher	Instructional Partner
Access	• Promote student awareness of digital textbooks and relevant resouces available in the school and school library • Promote teacher awareness of digital textbooks and other relevant resources available in the school and school library	• Co-plan, co-teach, and co-assess assignments that make effective use of digital textbooks and relevant resources • Ensure equal access for all students (including those with disabilities) and teachers via logon and password information,and effective ways for printing needed information • Ensure equal access for all students and teachers via curriculum mapping and sharing connections and overlap with teachers
Skill	• Design professional development for using digital textbooks • Facilitate after-school learning communities in which teachers participate in online learning experiences	• Co-plan, co-teach, and co-assess lessons that include digital textbooks, relevant resources, and 21st Century Skills • Provide support and professional development for effective use of digital textbooks and relevant resources • Serve as a model for for using digital textbooks in your own instruction

	Teacher	Instructional Partner
Policy	• Educate students and teachers on capacity limitations, copyright and safety implications of digital textbook applications to promote digital citizenship	• Collect information about instructional events that make use of digital textbooks and present in annual or quarterly reports to administration and school board • Participate on technology-planning committees that make decisions about technology, equipment, and resources
Motivation	• Promote activities that utilize digital textbooks effectively and efficiently, and are engaging for learners	• Share co-teaching successes using digital textbooks and relevant resources with other teachers • Facilitate sharing of successful lessons with other teachers Set up stations in the library for individual and small group training

Resource Specialist	Program Leader	Even Further
• Determine if school library website can allow 24-7 access to digital textbooks from home and other locations • Locate sources of free, downloadable digital video, learning objects and e-books that enhance digital textbooks and integrate objects into OPAC • Correlate physical and digital resources relevant to digital textbooks in OPAC • Serve as a testing and experimental center for hardware platforms	• Develop partnerships to obtain funding and free resources that enhance digital textbook lessons • Facilitate the integration of online training in the use of digital textbooks • Conduct workshops for parents about the impact of digital textbooks on them and their children	• Guide teachers to develop and tailor online learning options that enhance digital textbooks • Design and facilitate online interactions with student, faculty and experts in remote locations • Keep detailed data on issues dealing with access for further program development
• Make available digital textbook tutorials • Build a collection of relevant resources that enhance the digital textbook curriculum	• Survey teachers on professional development needs • Seek professional development in network administration and new applications use • Educate parents on copyright, safety, and use of digital textbooks	• Promote a collection of professional learning digital videos and resources relevant to digital textbooks • Incorporate digital media and digital textbook activities into school television production • Facilitate the use of multiple sources of digital content to construct unique digital textbooks
Resource Specialist	**Program Leader**	**Even Further**
• Ensure that collection policy pertains to collecting and describing resources relevant to digital textbooks • Develop Acceptable Use Policies that include digital textbooks	• Determine future digital textbook and application needs and communicate those to district personnel	• Perform policy impact studies and adjust on an ongoing basis • Get involved in state and national committees and legislative initiatives dealing with digital textbooks
• Create an online repository of successful lessons and teacher feedback	• Share research on student learning with digital textbooks • Collect and share data on student success using digital textbooks • Develop school-wide celebrations that encourage a postive transition to digital textbooks	• Facilitate an online community for student learners to share ideas and projects as a result of using digital textbooks

the state of Florida and external resources can create licensing issues for our clients (i.e. the client would have to purchase a license to use the external resource in addition to purchasing the course)...We do have a former [school librarian] on our team who works with our curriculum specialists, project managers, etc. to help us select, contract and license external resources."

Again, Florida is leading educational trends with the growth of FLVS and the challenges virtual school educators and learners face in accessing digital content. The results of a 2010 survey conducted by Blackboard, Inc., and Project Tomorrow suggested that demand for online learning for credit forward, credit recovery, and curriculum supplementation is skyrocketing in all secondary grades (Blackboard Inc. & Project Tomorrow, 2010). As Table 1 below illustrates, virtual schooling is widespread and the lessons learned from FLVS' handling of digital content will set a noticeable example.

Table 1. Existing state-led virtual schooling programs (Center for Digital Education, 2009).

Alabama	Kentucky	North Dakota
Arkansas	Louisiana	Oregon
Florida	Maryland	South Dakota
Georgia	Michigan	Texas
Hawaii	Mississippi	Utah
Idaho	Missouri	Virginia
Illinois	New Mexico	West Virginia
	North Carolina	Wisconsin

Digital Textbooks Can Extend School Librarians' Reach

Digital textbooks represent another opportunity for school librarians to enhance their vital leadership in teaching and learning. Librarians are experts at identifying, collecting, and organizing the best content, free or for a fee, and a move to open content learning resources may even free up funds to create stronger digital collections. In an age when many school librarians are not sure about the continued relevance of their promotion of reading and love of books, ebooks and digital textbooks may represent a fresh way to continue advocacy for the importance of reading (Peters, 2009) as well as for the school librarian's crucial leadership role in technology integration. Noted author-editor Marc Aronson wrote recently on his blog, Nonfiction Matters, "Out of the rubble of the economic crash is coming this great moment of opportunity, we just have to figure out how to seize it" (Aronson, 2009 ¶3).

Pamela Smith and Denise Nye, librarians at Clearwater High School near Tampa, FL, were involved from the early stages of their school's move to digital textbooks. According to Smith (2010) they were the first to learn how the Amazon Kindle functioned, how to register them and purchase and download books. "We were given 120 Kindles to set-up for the staff and other users. We trained 110 staff on the use of the Kindles when they were issued to them." Twenty Kindles will reside in the school library. But the librarians aren't waiting until fall to get started. Smith, with the aid of English teachers, is enticing potential members of the "Battle of the Books" team with the opportunity to read the required books over the summer on a Kindle, although the U.S. Department of Education has urged the district to seek technical assistance in their plan for deployment to remain in compliance with the ADA (Schaffhauser, 2010a).

Our good and passionate teachers have long deviated from the standard textbook to add or include additional info they felt was necessary. I have watched them skip over chapter after chapter of expensive textbooks because the content is not presented in a way that was conducive to teaching and learning in their classrooms...I can even see in the future where our high school teachers will be creating their own textbooks from the digital resources they have collected over the years just as many college professors have already done. The [school library] could easily provide digital support resources such as databases and e-books 'attached' to individual chapters in textbooks. [Use of the library] would skyrocket. Collaboration with teachers would move to a new level creating more of a partnership in the learning process.

---Cana Nudi, NBCT school librarian, Chiles High School, Tallahassee, FL

Perhaps pilot projects, like those spearheaded by school librarian Brigitta McTigue at Park Vista Community High School in Palm Beach County are the answer. McTigue purchased five Barnes & Noble Nooks for an experiment to determine if students in an intensive reading class would demonstrate an increased interest in reading when using electronic readers as opposed to traditional books. The pilot project was evaluated using teacher observation and student comments through an end-of-year student survey. The teachers, reading coach, school librarian, and principal monitored the progress of the program, discussed challenges that arose, and brainstormed solutions.

Table 2. Challenges and solutions to digital textbook adoption faced by Park Vista Community High School (FL).

Challenge	Solution
Students' ability to purchase additional e-books charged to the school	Load e-books and then unregister the device from credit card account
Devices freezing up	Keep devices charged between 35%-95%, and set them to airplane mode to save power. When the devices freeze up, hold down the power button or take out the battery and plug into a power source.
Providing classroom sets of e-books at a discount similar to print editions	E-book supplier is investigating solutions.

Students who participated in the pilot project were surveyed at its conclusion and an average of 80% enjoyed using it more than a traditional book and it helped to concentrate or raise their comprehension level (McTigue, 2010). Teachers were also positive.

Brigitta McTigue observed "[M]y students really enjoyed reading on the Nook. They actually arrived early to class because they wanted one of the five I had. Usually I have to remind the students that they should be reading their books not looking around the room but since they have been reading off of the Nooks, I haven't had to remind them – they were engaged in the reading. I also liked that they could each put their own bookmarks for where they left off whereas sometimes in class with the traditional books, some of their bookmarks get lost or removed. Another teacher noted that incorporating audio would be beneficial for students' fluency and students also wanted audio in future e-books" (2010).

Clearwater High librarians are also hopeful that Kindles will assist lower level students reading of textbooks by using the read aloud feature. They are also going to keep detailed data on students' yearly gains in order to determine if this is the case.

For school librarians who currently manage physical textbook circulation, digital textbooks will not eliminate this important duty or cause a shift to classroom resource collections over library collections. Digital textbooks will represent an important transformation in the way school librarians are involved with the resource base of the school. As *School Library Journal* editor Brian Kenney (2009), pointed out, "The digital textbook could be media specialists' Trojan horse, stealthily moving materials from the library into the classroom. We could infuse these textbooks with different points of view in multiple formats, customize them to address diverse learning styles, and make them the launching point of Guided Inquiry". The tedious work of inventorying and shifting piles of weighty texts will be replaced by carefully thought-out circulation strategies that integrate digital texts with the resources already available through the school library. Just imagine how you could customize your school's textbooks, building in deep links to an array

of content from database articles to streaming media to books (both "e" and print) to open-source content from resources like the Library of Congress. Digital textbooks will justify continued subscriptions to the high quality supplemental resources we promote to teachers and students every day. Marcia Mardis, an assistant professor at Florida State University's School of Library and Information Studies who studies how school librarians can successfully integrate open content into their collections and services maintains, "Teachers don't have the time to spend searching Web sites for these resources and then learning how to use them in the classroom. They need a single integrated approach—the type that a school librarian can create" (Whelan, 2009).

Two leaders in the digital book movement for schools, the aforementioned Forney Independent School District and Cushing Academy, included their school librarians in the shift to digital texts. Forney, an early adopter of digital textbooks in 2004, included the Personal Portable Library by Vital Source on its district-purchased student laptops along with eight digital textbooks. Roger Geiger, Forney's technology director, says district librarians helped review the Portable Library which contains 2,000 works, including novels, historical documents, and major speeches, to identify sources that related to the curriculum, from Rudyard Kipling's *Just So Stories,* geared to fifth graders, to William Styron's *The Confessions of Nat Turner* for social studies (Ishikuza, 2004). Cushing Academy in Massachusetts is a partner institution with the James Martin 21st Century School at Oxford University. They have transformed their library into a learning center complete with electronic readers, flat screen TVs and laptops (Block, 2009). Surveys conducted by the school showed students were not turning to printed materials for research, instead they were going online. So, instead of a 20,000 volume collection of print books, Cushing will now have a database of millions of digital textbooks from which students will access materials using Kindles or laptops. In an interview on National Public Radio's All Things Considered, Suzie Carlisle, Dean of Academics, stated, "Part of our desire to move in this direction is to meet the students where they are most comfortable, and it's our responsibility, as well, to help students understand the emerging technologies that they are going to be faced with" (Block, 2009). According to James Tracy, Headmaster at Cushing Academy, the change has already increased the library's circulation numbers (Block, 2009).

> *The library is a place. A learning place. The Kindle, Nook, or iPad won't change the library as long as things are learned.*
> *--Scott, commenter on Room for Debate blog*

When there is a school-wide initiative and technology is involved, school libraries can also benefit. Brophy Preparatory School in Phoeniz, Arizona began the mandatory Toshiba Tablet PC program in 2006. To support the PCs, the entire campus was retro-fitted and the school has become completely Wi-fi accessible and available for all students to use (Young, 2007). Similar situations have been reported in Florida where broadband connectivity has been upgraded and school librarians provide tech coordination, support, and the leadership necessary to address access issues from district to desktop (Everhart, et al., 2009). School librarians, cognizant of these issues, can provide school-wide leadership to assist students, teachers, and parents to tackle these concerns when transitioning to digital textbooks. Working in collaboration with teachers, school librarians promote comprehension through questioning, clarifying, seeking meaning, and discussion. Librarians play a significant role in reading comprehension instruction in order to enable students' creation and application of new knowledge.

Perhaps nothing has caused more of a frenzy related to digital textbooks as Apple's iPad. On the day the iPad was launched, Apple sold more than 300,000 —and users downloaded more than one million apps and more than 250,000 ebooks from the iBookstore. Parents immediately started snapping up picture book apps from Apple's online store. In fact, children's stories held six of the top 10 paid iPad book-app sales a few weeks after the iPad was launched in April 2010 according to Publisher's Weekly (Springen, 2010). Well-respected providers of children's content are also getting in on the act. "Kids can also read International Children's Digital Library stories on regular computers, but the iPad is more like a real book," said Allison Druin, director of the Human-Computer Interaction Lab at the University of Maryland. "The way children read books is sitting on their bed, sitting with their parents. Laptops

are good, but an iPad is going to be even more freeing," she said. "The more that our technologies afford the feeling of what was once only able to be given to us through paper, the more we don't notice what the technology is, and we just care about the content" (Springen, 2010).

Recommendations

In addition to considering the possible benefits and drawbacks to digital textbooks outlined above, educational stakeholders have considerations unique to their roles.

For Educational Policymakers

- To the extent possible, allow districts to retain control over local adoption of digital materials. District officials have a much better read on the readiness of their teachers, student, and parents. Research has demonstrated that centralized state textbook adoption processes do not yield cost or time savings (Tulley, 1989a; Tulley & Farr, 1985), so nothing is lost by retaining local adoption. However, local adoption succeeds with technical assistance and this type of support should be provided.

- Create guidelines for the adoption of open content. Having no state guidance on content adoption threatens to return public education to the late 1800s-style of uncontrolled, unvetted, and often unrecorded educational resources. Open content or learning objects are digital resources that can offer the flexibility and currency that any textbook approach cannot have. The two approaches can be combined to great benefit.

- Support the creation of a national or statewide clearinghouse of digital educational material. Many states already have digital libraries for educators. Support continued funding for these resources and development of tools that allow school librarians and teachers to access them more readily.

- Pilot the use of digital textbooks in a limited number of districts. Measure the kinds of learning that results from print textbook-based activities and compare those results to similar activities based on digital texts.

- Avoid adopting or promoting digital textbooks that require printing. Printing content from a digital textbook drives up costs for the district in toner, paper, and photoduplication. However, a printing option should be available for students without home access to the Internet or computer.

For School Administrators

- Provide professional development to teachers to ease the transition to digital textbooks and ameliorate classroom management, instructional design, and technology implementation burdens that may result from the shift.

- Upgrade the district bandwidth to the maximum possible to ensure that content remains readily accessible, even in peak use times (JISC, 2009).

- Integrate school libraries into the local adoption and distribution process. School librarians have the expertise to develop circulation strategies for digital textbooks and, in many cases, already support the devices that will be used to interact with the digital content (Oder, 2009). Instead of attempting to find funding for new staff with resource selection expertise, empower the staff you have!

For School Librarians

- Become active in your district's efforts to adopt digital textbooks. After all, you have the expertise to select high quality resources. It's needed here and students and teachers are reassured by your "stamp of approval" (JISC, 2009). Table 3 provides ideas for you to use digital textbooks to enhance your leadership activities.

- Look at the content in your collection from a granular perspective--that is, think of how a video, an podcast, and image, and text can work together to promote understanding of a concept. Think of how you can assemble from songs, audiobooks, podcasts, and videos that you choose in iTunes. Enable your teachers and students to create "playlists" of high quality content you've selected.

- Catalog digital items in your collection for discovery. You can annotate catalog records in the MARC 653 field for uncontrolled vocabulary and 658 field for curriculum objective. Start with the items in a key grade level in a particular subject and get the teachers and students to try out your cataloging system.

- If your catalog has a tagging feature, let everyone use it! Encourage kids and teachers to add their own tags so that they can find the digital content they need in your collection.

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PALM Center
Partnerships Advancing Library Media

About the PALM Center

The PALM Center offers an array of services to support school librarians and other educators in Florida, throughout the United States, and internationally to improve their districts and schools. A wide range of research and evaluation services is available from large-scale surveys and evaluation of reliability and validity of program implementation, to individualized in-depth case studies of school libraries, technology implementation, and whole school change. The PALM Center has the established research-based expertise to assist with your research and evaluation needs in school and informal educational settings.

The PALM Center has consulting services related to school library modernization, broadband deployment, technology integration, rural schools, leadership development, and other critical areas to support implementation of the American Recovery and Reinvestment Act (ARRA) including Enhancing Education Through Technology (EETT), Race to the Top, Invest in Innovation and School Modernization.

Current Projects

Leadership in Action – A three-year study of school library media specialists' leadership in technology integration funded by the Institute of Museum and Library Services ($754,000).

Project LEAD is an initiative composed of two projects that resulted in a leadership curriculum for school library media specialists based on the National Board for Professional Teaching Standards which were implemented with 30 teacher-leaders. Funded by the Institute of Museum and Library Services ($1.5 million).

Digital Libraries to School Libraries (DL2SL) – A three year study of the development, deployment, and implementation of push technology and professional development for the integration of digital learning objects into online catalog software and learning experiences funded by the Institute of Museum and Library Services ($401,000).

DLConnect focuses on dissemination of National STEM Education Digital Library (NSDL) resources within school settings through workshops for preservice and in-service Science Technology, Engineering, and Mathematics (STEM) teachers and school library media specialists. This service and outreach project was funded by the National Science Foundation ($278,618)

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