The Ball State Digital Publishing Project to
Developing and Distribuing Multiple Media Texts

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An Experimental Approach to the Future of the Book

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Abstract: Computers naturally and easily combine diverse media such as text, graphics, pictures, sound and video. However, interactive multimedia in education is still in stages of early development. Digital technologies have provided unprecedented possibilities for text and image use, which could be evidence that the greatest innovation of the computer and its educational value is its foundation in a visually based thought process. The true power of interactive media--its ability to be immersive and experiential--necessitates a new way of approaching the development of educational "texts," one that makes room for multimedia as primary learning materials. Emerging on-demand technologies have removed traditional restrictions for both creating book-quality "texts" which publishers and authors want to sell in campus bookstores, and developing a variety of digital subscription models which enable teachers to build customized, interactive lessons that students can access using multiple mediums (e.g., mobile devices, laptops). When done properly, these emerging on-demand distribution models -- both print and digital -- don't threaten the "text", they enhance its long-term viability by creating flexibility for each portion of the development and distribution chain. This paper will chronicle the authors' experiences in exploring a variety of digital publishing models for different types of content, including fiction, non-fiction and multimedia texts. One portion of the project involves developing five multimedia prototypes that can be used in college classrooms and take advantage of a number of rich media opportunities, including animated/interactive information graphics, audio and video clips, still photography and traditional text-driven material presented in a more non-linear form. We will explore how this kind of content is best designed, packaged and distributed through an on-demand publishing model. We will test these models through comparative learning research and develop a suite of publishing models that can serve as the foundation for a digital university press.

"... the Web gets its value not from the smoothness of its overall operation but from its abundance of small nuggets that point to more small nuggets. And, most important, the Web is binding not just pages but us human beings in new ways. We are the true 'small pieces' of the Web, and we are loosely joining ourselves in ways that we're still inventing."
David Weinberger, Small Pieces, Loosely Joined

Part I. Overview

THE FUTURE OF the book -- and more generally, the future of publishing -- is a topic under a great deal of debate among publishing houses of all types, writers, technology companies and scholars. Even the definition of a "book" is up for debate these days. As we've worked on this project, our own definitions have been called into question. Can a book be non-linear and self-assembled by a reader? Can a book simply be comprised of images? Can a book consist entirely of user-created content which contradicts an "official" author's work?

Nowhere is the debate between "professional" and "amateur" publishing more concrete than on the World Wide Web, where citizen-journalism organizations such as OhMyNews.com place "amateur" content alongside "professional" content, allowing the collective wisdom of the masses to determine the placement of stories; where Wikipedia's sprawling library of information is developed, vetted, and edited by its very readers; and where CNN and other news organizations now solicit field reports from their readers, asking them to help cover more areas of the world than any one organization could cover given budgetary constraints.

To be sure, each of the above examples -- and the any dozens of other organizations engaging in truly interactive conversations online -- have the "invisible hand of control" approach to content development. Professional skills, peer-review and control still -- and will continue to -- play a vital role as we delve into the inner-workings of digital life. However, the Web and the Internet have changed the basic nature

of how we view information. We no longer live in an age of only one-to-many communication, where publishers create a single piece of content and distribute it to the collective masses. Digital technologies and networks, by their very architecture, encourage the one-to-one and many-to-many model, where content is customized by the user and syndicated to others.

The blogosphere, as self-referential as it can be, offers us a simplistic look at digital publishing and communication. It is, by its nature, a digital conversation, which flows freely across electronic networks, connecting readers from across the globe. Many blogs will comment on the day's news, oftentimes news produced by the mainstream media. After which other bloggers will comment on the original blogs, which themselves have commented on the original story. And in increasing numbers, the mainstream media writers are reading and then writing about what others are saying, completing the loop.

Of course, blogs are merely representative of the "new" Web, described by the O'Reilly publishing company as Web 2.0, a moniker that describes emerging, networked software applications that allow people to carry on the two-way conversations in one virtual place, such as Wikipedia, Flickr, Google Documents and Yahoo 360.

If we are involved in publishing on any level and believe Web 2.0 changes, at least on some levels, our expectations of communication when digital technologies are involved, we quickly find ourselves returning to our original question: "What is a book?"

Is it defined by its graphic layout, a researcher's labor, the editorial process or even the distribution process?

We contend that these criteria define the book because the basic concepts for book development are not changed by the advent of digital and networked technologies. The digital technologies simply create a new distribution method, not a new type of media, and that digital distribution has vastly different communication properties and expectations than analog distribution. And we don't believe that the new distribution displaces either the old medium (i.e., books) or the old distribution method, nor do we believe digital technologies eliminate the professional skills required to render the content obsolete.

Instead, digital distribution creates a series of questions that must be answered, because the world is quickly transforming from analog to digital (or atoms to bits): What happens to that industry if the current model is surpassed? Likewise, how do we effectively market and sell a product that exists in an electronic environment? How is access granted? Who pays? How to we avoid theft? And, what does

the product look like, and how is the content packaged?

All of these questions and many more must be addressed through this transitional process. Additionally, because computer technology allows us to naturally and easily combine diverse media such as text, graphics, pictures, sound and video, there is room for any number of new and effective publishing models to co-exist in the current marketplace.

In "The Battle to Define the Future of the Book in the Digital World," (2001) Clifford Lynch writes,

> *The sentimentally framed questions about digital books and electronic devices replacing printed books are largely irrelevant, an artificial and distracting controversy. Both can and undoubtedly will co-exist for a long time to come and will find their appropriate audiences and market niches. This will, I believe, sort itself out in the marketplace. The real issues are more fundamental: how do we think of books in the digital world, and how will books behave? How will we be able to use them, to share them, and to refer to them? (* http://www.firstmonday.org/issues/issue6_6/lynch/#l1 *)*

Lynch's take on this important issue is really at the heart of The Project because each debate ends with neither side being completely correct, nor completely incorrect. Oftentimes, it concludes with more questions than answers, which is an entirely uncomfortable dilemma for many steeped in the traditional worlds of publishing. For years, the nature of media has been, at its simplest level, a one-to-many broadcast. A network sends out a television signal to its audiences at a set time. A publisher delivers the newspaper to its readership in the morning and the afternoon. A movie studio releases its film on a certain Friday. A record label releases its albums on a particular date.

Although those days are not gone, and, in all likelihood, will never completely disappear, it would be disingenuous to believe that the burgeoning digital culture, driven by new interactive software applications, the spread of broadband and mobile networks, and an increasingly literate throng of digital creators, isn't sending shock waves through the media world. The nature of this digital world -- one, for example, where cell phones connect to Web pages and deliver audio, video and text sent entirely through a wireless blanket of connectivity -- is that it is a loosely joined series of connections, where users are intimately involved in the creation of and interaction with the content they receive.[1]

Making matters even more confusing, there is very little crossover between audiences. Those younger

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[1] Weinberger, David. *Small Pieces Loosely Joined*. Perseus Publishing, 2002. P. 10 (preface).

than 30, by and large, have radically different approaches to media than those older than 30. This disparate audience segregation makes developing any *one* model for publishing a difficult endeavor. It makes very little sense to abandon the traditional publishing cycles because the revenues, while decreasing, are knowable, while the digital world seemingly offers only promise and potential.

The Ball State Digitap Publishing Project Paradigm

After wrestling with the definition of a book, we realized that we were approaching the question from the wrong direction. We first needed to break the definition of "the book" into several parts, deciding which type of book we would use as a prototype. We determined the best starting point would be the college textbook, since, by its nature, it comes in modular form (i.e., chapters). With that settled, we didn't need to define a book; we needed to find authoritative, peer-reviewed texts that were broken down into their smallest components, so that we could build a prototype textbook that wasn't reliant upon any one delivery mechanism.

We gathered four authoritative modules from university professors at the Massachusetts Institute of Technology and Ball State University. Then, designers developed the content in multiple media formats that offer a number of different combinations, including text, audio, interactive graphics and animations, which could either be used as supplemental or primary source materials.

Next, we plan to take those elements and test technological systems that would enable professors at any university to self-assemble a textbook based upon the modules they would want to teach in class. The idea here is that the completed texts could be delivered in any number of ways to the readers: a traditional hardback book with an accompanying DVD, a traditional hardback with password-protected access to the digital elements online, an e-book or an audio book. In other words, the delivery mechanism becomes secondary.

This is the fundamental reason we have launched The Project. We believe we can develop a prototype for a new publishing platform that can exist within the current framework of traditional publishing, while also capitalizing on the interactive nature of the digital world.

Not everyone is ready to believe that the spread of digital culture is, in fact, a transformative event. For those people who believe that the fundamental structure of media -- the one-to-many model -- will remain the dominant structure moving into the future, our project will appear a dreamer's dream. We have found, throughout the past 10 years, that those who do not grasp the distributed and decentralized network structures of the Internet and the Web's socially-constructed distribution patterns will distrust any structure that actively involves the participation of its users (the many-to-many model). This doesn't mean they can't be swayed, particularly when it's demonstrated that this many-to-many, participatory structure works without destroying the one-to-many model from which it is derived. It simply means for those who are comfortable with traditional models, accepting this transformative process, initially, requires a leap of faith.

For the purposes of The Project, we have specifically chosen the publishing model because it can easily be argued that publishing is the last major entertainment model that is facing the transformation from atoms to bits, from analog to digital, and from paper pages to Web pages. That means we can learn from the music, movie and software development industries. We can note where they have made mistakes. See their successes. And, hopefully, devise an intelligent solution.

Our goals do not include replacing or even diminishing the value of printed texts. On the contrary, we hope to develop a publishing model that accomplishes five goals:

1. develop an effective method for taking traditional booksand distributing them in both digital and printed forms;
2. establish a team capable of developing and distributing rich multimedia that include engaging content and are innovatively designed and packaged, which can both supplement and stand alone;
3. develop a basic technological back-end system that allows publishers, authors, and readers the ability to interact with the content in non-linear ways;
4. create an e-commerce platform -- which can be used by individuals, small presses or large presses -- that allows for the delivery of media (i.e., written text, graphics, audio files, video files) in a variety of formats, which are chosen by the end user;
5. build a platform that allows for the communal development of new materials, which can be peer-reviewed for future inclusion in the self-assembled texts, and subsequently used in the classroom.

These goals, which can be viewed along a continuum of digital media, present exciting possibilities for the future of the book.

Simultaneous with the debate over how the book may evolve should be an equally important discussion of what readers will demand and tolerate through the book's evolution. While some readers

may be perfectly comfortable with multimedia content replacing printed text, others may have no desire to evolve their reading behaviors from the printed page to the computer screen or from the written word to the interactive graphic. Likewise, many argue that even extremely rich multimedia content must be accompanied by a printed companion so that, among other things, a reader can annotate key points or reference the text from locations that do not allow for digital technology.

To accomplish these goals under the backdrop described, The Project will be developed in three phases -- content creation (goals 1 and 2), technology development (goals 3, 4 and 5) and research -- throughout the next 24 months.

Content Creation

We must emphasize again that the role of the textbook publisher and author have not changed in this model. The initial texts still require the requisite time, attention and skill to develop. However, learning environments have increasingly relied on digital technology, as innovations in this area have paved the way for better design, presentation and transmission of rich multimedia content. As a result, educators can use multimedia as tools to enhance or even replace traditional educational activities, and multimedia teaching/learning materials have become common as a way to expand traditional materials.

Computers naturally combine diverse forms of media such as text, graphics, pictures, sound and video. However, the use of interactive multimedia in education is still in stages of early development. Digital technologies have provided unprecedented possibilities for text and image use, which could be evidence that the greatest innovation of the computer and its educational value is its foundation in a visually-based thought process. In an educational environment, computers offer students a multi-dimensional approach to information with few limitations on time and space. In essence, interactive media facilitate an interface between student and content and an environment that creates a more intense experience by including methods of engagement beyond simply reading.

The true power of interactive media -- its ability to be immersive and experiential -- necessitates a new way of approaching the development of educational "texts," one that makes room for multimedia as primary learning materials. Emerging on-demand technologies have removed traditional restrictions for both creating book-quality texts, which publishers and authors want to sell in campus bookstores, and developing a variety of digital subscription models that enable teachers to build customized, interactive

lessons, which students can access using multiple mediums (e.g., mobile devices, laptops).

Thus, a digital publishing company should be committed to attracting authors who understand the power of multimedia and desire to create texts with multimedia in mind, as opposed to those who wish to create traditional texts with multimedia components attached to them. We believe this concept should be at the foundation of multimedia development in order for its content to translate into effective teaching tools. So, multimedia texts could be accompanied or supplemented by traditional printed materials, or they could stand alone as primary texts for courses. Perhaps one of the greatest strengths of multimedia in the classroom is that it often allows instructors to create learning experiences that are more realistic and situational than those that result in a student's mere reading of a printed textbook. In some cases, the use of multimedia textbooks may provide instructors with a unique opportunity to rethink the way they utilize class meeting times. Simulations provide rich opportunities for virtual labs and experiments; animation and video allow instructors to engage students in a learning experience that exposes them to concepts otherwise unattainable in a traditional classroom experience; and the interactive nature of a multimedia text transforms this aspect of the learning process into a much more enjoyable and engaging experience.

The alternative distribution models created by the ability to publish digital content may also benefit instructors. When published digitally, educational materials, regardless of the content format (i.e., audio, video, text, graphic), can be custom packaged and bundled to meet the needs of a specific instructor teaching a specific course. For example, a biology instructor may choose to request access to a complete multimedia biology text for use as a primary or secondary text*; or* that instructor may choose to hand pick individual chapters or topic-specific units for a course based on the areas of biology that specific course will explore. In essence, the latter scenario is an example of how digital publishing allows instructors to tailor texts to their courses.

One extremely important aspect of digital publishing involves the exploration of all the ways content can come together in a new type of text. Likewise, it is important to acknowledge that multimedia texts provide a diverse number of opportunities that not only make use of a wide variety of media formats, but that they allow authors and producers to customize content presentation for specific types of content. Thus, the strongest multimedia texts make use of media formats that enhance the learning process by bringing the specific content to light in ways not possible with conventional texts. Those subjects that

make use of a wide variety of media formats in a single text tend to make for richer, livelier products.

Based on this ideology, The Project involves developing three educational texts as multimedia prototypes that take advantage of a number of media opportunities, including animated/interactive information graphics, audio and video clips, still photography and traditional text-driven material presented in a non-linear format. The subject matter for these prototypes -- Biology, Physics and Anthropology -- was chosen based on its potential to provide content that works well in a number of diverse multimedia formats. These prototypes will serve as the foundation for a number of future activities, including research that compares how students react to subject matter presented in both traditional and multimedia formats. We will explore how this kind of content is best designed, packaged and distributed through an on-demand publishing model. And, we will use these prototypes as examples for potential authors to help establish what can be done in the realm of digital multimedia publishing.

Technology Development

The history of software application development is one of unexpected consequences. The best applications oftentimes are those created within an open system, allowing users to improve and add refinements to those systems, and then take the best advances and packaging them within a user-friendly framework. The approach we will take as we build the technology for The Project will draw heavily from this historical approach to software development. It can be broken down into six components:

1. use the Web as a platform for interactivity and networking;
2. create tools that allow users to interact and change content, as well as develop new community tools, which can improve the back-end systems;
3. create a back-end technological system that allows for some centralized control over media creation, while also encouraging user interaction that transforms and builds upon that basic media;
4. allow for the simultaneous creation of new content formatted specifically to each individual user's desire;
5. create an opt-in "push" technology that easily allows for syndication and updates of content;
6. encourage a self-sustaining population of active users.

The technological architecture for this publishing project requires three components: a database that can store all the incoming and outgoing data, a con-

tent management system (CMS) that connects to that database and a Web site with a graphical interface that easily allows for the creation of books. The multi-functional database will store the textbook content, broken up by module (e.g., all of the multimedia elements for the Photosynthesis module). The database will have sublevel access, broken up by publisher, author/contributor, professor/teacher and student.

This model would allow publishers to have complete control over the content that they own. Thus, book publishers could easily change, update and add to their collection. Author/Contributors would have the ability to upload and tag written content, video content, audio content and graphic/flash content. The Professor/Teachers would have access to the book units they have purchased for class use along with all individual component material used in the book (e.g., JPEG, .swf files, word documents). The Student would have access to the digital versions of the text purchased by the Professor/Teacher, and within this section, they would have the ability to choose which output (e.g., textbook with DVD, e-book) they want.

The CMS would be the graphic interface that allows Publishers and Author/Contributors to access the database and change content, either by uploading new content, deleting old content, or modifying existing content. This would also contain the e-commerce area, where both groups can set pricing and restriction guidelines for their work.

The Web site would serve as the graphical representation of the press for the outside world. It should contain two parts: one for the Publisher and Author/Contributor and one for the Teacher/Professor and Student. This is broken up in much the same way online media sites are divided, with a corporate section for the business and a public section for the users.

The corporate section would contain information about the project, tutorials, a searchable module area and the content management system.

The public section would have a searchable content area and store, a user page where purchased materials can be accessed and a members section, where people can connect with other educators. The Web site should give contributors the option of an RSS feed, which informs them whenever new content is uploaded to the database, and it should employ an opt-in, push technology to keep them actively engaged with what is happening and encourage professors to contribute class materials for the modules they use (which would turn them into Contributors, and make them eligible for monetary compensation once their work was peer-reviewed).

The Project will make use of digital technologies to explore delivery systems for all forms of published writing to users in a variety of formats. We will ex-

plore the use of on-demand publishing technology for the possible creation and distribution in six formats:

1. **Traditional Book:** The primary selling point will be books -- hardback, soft back and electronic -- sold through the project Web site and Internet retailers;
2. **Audio Book:** The project will allow users to create audio versions of the text, but will use open source software to create audio versions of selected texts;
3. **E-Book:** E-books can be simple text files, PDFs or mobile-screen formatted texts;
4. **DVD:** Finished books with companion video and graphic pieces can be created through the project Web site, allowing users to either create their own DVDs or have a book delivered with a DVD companion;
5. **Web-Only Product:** Users will have the opportunity to create digital texts that exist only as password protected Web sites, which can be assembled by the user (which may be a professor who purchases a 25-seat license, or a student who purchases a single seat license);
6. **Mixed Purchase:** The books may be purchased as text, with companion access to multimedia viewed online. Or vice versa.

Research

Very little research exists regarding comparisons between traditional print textbooks and their digital counterparts. The studies that have been done are generally limited by small sample sizes and a focus on online courses or the levels of effectiveness of discreet multimedia materials. There are no studies these authors are aware of that test multimedia tools in large settings with hundreds of subjects. Likewise, no studies exist which test multimedia texts that interweave many different types of content (i.e., audio, video, text interactive graphics and photos) in a single format. The development of multimedia prototypes, as well as the establishment of a foundation for promotion and distribution of digital textbooks, provides us with a great opportunity to engage in important research that helps address these issues and assess the effectiveness of multimedia educational content in terms of students' retention of information, apprehension and/or enjoyment, and usability.

The multimedia prototypes will be complete in December 2006. While the technological architecture is developed based upon the prototypes, the authors will engage in a two-year investigative research project that will examine the value of digital learning using both a cross-section and longitudinal approach, specifically focusing on student engagement. Our work will be rooted in social science research,

drawing from theoretical bases in motivational, information-processing and pedagogical research. The studies will draw on substantive samples in both examinations to give us the opportunity to employ advanced statistical methods, exclude potential covariates and seek broader answer to our questions. We will also employ protocol analysis research that will allow us to effectively "get into the heads" of students as they engage with multimedia learning tools. This will allow us to assess navigation and design preferences, as well as hear attitudinal and usability responses to content and presentation *during* the actual learning process.

The first study will focus on students who will engage in a one-time experience with a number of prototypes that represent many methods for developing multimedia-learning tools. Prior to the study, three prototypes will have been developed in three different disciplines – biology, physics and anthropology. Each makes use of different kinds of multimedia content presented in a variety of formats. We plan to test the students' knowledge gain in this portion of our work, comparing test performance not only among various text formats, but also comparing the performance to those students who received the information in a traditional format. Furthermore, we plan to assess students' preferred learning styles (i.e., visual, auditory or kinesthetic), the level of attention/enjoyment/engagement they had with the material, the level of motivation they have to learn more about the topic and their likelihood of participating in a course that utilized the multimedia text.

The second study involves an examination of student motivation, engagement, learning styles and knowledge gain within a completely digital course that makes use of a multimedia text, as well as a number of online teaching and learning tools, including blogs, live chats with an instructor and video podcasts.

By engaging a large group of students (approximately 300) in a 16-week digital experience, we believe that we will be able to strip away any technology-based apprehension and more adequately test the important outcome variables we noted above. Furthermore, we will be able to more accurately assess student growth and engagement over a protracted period of time.

Conclusion

There's little doubt the world of publishing is rapidly changing, and the future of the book is evolving with technology. In fact, even as we are actively engaging these new ideas through The Project, we recognize that our approaches and developing models will likely evolve in a similar fashion. However, for these authors, the possibilities that come with our rapidly

evolving digital culture are neither threatening nor daunting. Rather, we have chosen to approach this process with a positive eye toward exciting new opportunities and a desire to broaden our own definitions of the book and the publishing process.

Thus, we have developed what we think is a sound plan for building, testing and researching a variety of new book models, so that we can both speak from a position of authority on best practices in multimedia and digital publishing and eventually operate a publishing house that is capable of delivering rich digital content in forms that suit any number of consumer demands. Put simply, we recognize that this evolution will occur with or without our project, yet ultimately, we believe our approach will help contribute to the body of knowledge and culture of change that is already well underway.

About the Authors

Prof. Jennifer A. George-Palilonis
George-Palilonis teaches courses in graphics reporting, multimedia storytelling and media convergence. She began her career as a news designer for the Detroit Free Press in 1996. She went on to be the Deputy News Design Director at the Chicago Sun-Times in 1999. She has been teaching since 2001 and has spoken at more than 30 conferences and seminars. Her research interests include visual rhetoric, multimedia storytelling, media convergence and digital publishing. She has a Masters Degree from Ball State in Composition and Rhetoric and a Bachelor's in Journalism. She is also the author of two books, "A Practical Guide to Graphics Reporting" (Focal Press 2006) and "Design Interactive" an electronic textbook on basic design principles.

Prof. Brad King
Brad King is an assistant professor of media in the College of Informatics at Northern Kentucky University. Previously, he worked as the Web Producer/Senior Editor for Technology Review, an international magazine published out of the Massachusetts Institute of Technology, where he oversaw the transformation of the website from a static magazine home page into a vibrant daily news site complete with blogs, daily stories, and video. That job followed on the heels of his work as director of new media at Varsity Television and Wired News, where, along with his daily technology news reporting, he spearheaded the initiative to have daily and weekly audio programs. King has been a journalist for 11 years, with his work appearing in over 20 publications, including the Wired, Technology Review, Oakland Tribune, Business 2.0, Variety,and the Hollywood Reporter. He received my Masters of Journalism from the University of California at Berkeley's Graduate School of Journalism in 2000, and received the Wired Magazine Excellence in Technology Journalism award.

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