
AC 2011-2352: DEVELOPMENT OF A MULTI-PLATFORM (PC,IPAD, MOBILE) EBOOK PLATFORM

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Development of A Multi-Platform (PC,iPad, Mobile) eBook Platform

Abstract

This paper presents the development of an eBook publishing platform capable of delivering text, multimedia (video, 3D, audio), and assessments across a variety of platforms including PC, Mac, iPad, and Mobile phones (iPhone, Android, Symbian, Win Mobile 7, Java ME).

The author presents the technology that was developed by a collaboration of faculty and an eBook publisher to meet the unique requirements of publishing eBooks. The author discusses the application of instructional design theory to the design and development of multi-platform educational activities.

eBook Instructional Modules and the Industry

The textbook industry is wrestling with how to integrate eBooks into the mature traditional textbook ecosystem. eBooks bring a wide variety of multimedia capabilities to the textbook arena. However, taking advantages of those capabilities requires a different production process than the one used to produce traditional textbooks.

Large publishers have predominantly taken the approach of offering digital versions of their traditional books via direct-to-consumer internet distribution. This approach allows these publishers to capitalize on their existing content without requiring their authors to create new content for the new medium. It also fills the student's desire of immediate access to the learning materials from a variety of different devices. CourseSmart, a collaboration of Pearson Education, Cengage Learning, McGraw Hill Education, and John Wiley & Sons, aggregates textbooks from all of these publishers into a centralized on-line store from which students can purchase or rent eBooks.¹

Some publishers have taken the approach of creating eBooks that attempt to take full advantage of the eBook capabilities. These types of eBooks tend to contain embedded audio, video, simulations, and text into a centralized platform. In a nutshell, these are books with embedded multimedia capabilities.

Our Approach

Based on the idea that we could create a process for delivering a better book, we decided to work with eAcademicBooks to develop a multi-platform eBook capable of delivering text, multimedia (video, 3D, audio), and assessments across a variety of platforms including PC, Mac, iPad, and Mobile phones (iPhone, Android, Symbian, Win Mobile 7, Java ME).

While the goal of the project was clearly grounded in the creation of the technology to create the eBooks platform, we decided early on that we needed to create a technological publishing platform that managed the entire production process. At the center of this process would be the requirements for a quality peer review publications.

The group started by setting up a process that tackled the review process for the book and then writing some custom software to implement the process (see Figure 1). In addition, the group adopted some practices from the corporate training arena.

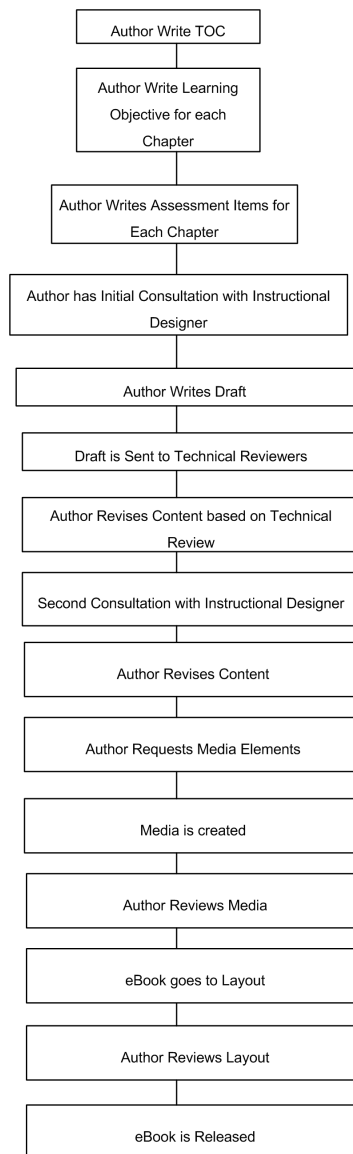


Figure 1. Process

Toward the goals of creating the most effective instructional contents, the group decided to institute a publishing process similar to that found at industrial training facilities. In this paradigm, the authors are treated as Subject Matter Experts (SME) who are augmented by a team of instructional designers and media creators. In academia, most Professors have a graduate degree in their area of expertise, but no formal training in instructional design or educational research. Our approach, allows the authors to concentrate on their subject matter, while receiving feedback from someone who is versed on the latest research findings in the design of instruction. The media creation team allows the instructor to once again concentrate on their writing and the media creation team on creating media for the instructor.

We adapted a process based on the Dick and Carrey instructional model. The author starts by creating a table of contents for his book. Then, he provides the learning objectives that he would like the learners to achieve. Using those learning objectives, the instructor then provides us with assessment items that the learner would need to master in order to show they have mastered the objectives.

The author then meets with an instructional designer from the company who provides guidance on how to best structure the content. The instructional designer makes suggestions on instructional strategies and presentation --- not on content. From that meeting, the author then writes the first draft of the chapters.

The chapters are then sent to other technical reviewers. These are other academics who provide peer-reviews of the materials. After the technical reviewers finish, they provide the author the their feedback and he makes revisions to the content. At this point in the process, we have a book that has undergone the peer-review process; so, the content should be accurate.

The Author then has a second meeting with the instructional designer. At this point, the main goal is to identify the needed multimedia elements that would best convey the author's instructional objectives. The author then sends any requests for graphics or media elements to the graphics team at the company. Animators and illustrators then create the necessary graphics. These are then presented to the author for approval. This process is iterated until the Author approves the content.

After the approval is received the book is then sent to the layout department. After it undergoes the layout process, it is presented to the author one last time for approval. If approval is given, the eBook then becomes available on the publisher's bookstore on a number of different platforms.

This process captured the best features of the traditional publishing process while providing us a novel enough process for the requirements of this unique platform.

The Platform

In order to deploy the same content across a multitude of reading platforms in an instructionally effective manner, the team developed a software platform that build the necessary assets to target the necessary platform.

The author creates the content in MS Word. The layout is done in any program that can output a PDF. From there, we then decide on a chapter-by-chapter basis, which chapters need to be created as native applications for mobile platforms.

For low-interactivity type of chapters, we use modified versions of phoneGap. This open-source software will allow us to use Cascading Style Sheets (CSS), HTML 5, and JavaScript to create native applications for iPhone (iPad), Windows 7 Mobile, Android, Symbian OS, and Blackberry.

PhoneGap is great at creating applications that show media and react to the user. It is not so good at creating applications in which the user manipulates media. For example, phoneGap would be appropriate for an eBook in which content on the page is shown to the user based on their location. For example, we could create a biology book that shows the student different animals based on their location in a zoo. However an application in which the users modified a sound file would not be achievable with this technology. To provide a concrete example, consider an eBook application that teaches Signal Processing using sounds waves as an example. If we wanted the user to have the ability to manipulate these sound waves inside of the book, this would not be achievable in phoneGap.

For high-interactive or media heavy applications, we decided to build native apps for each of the platforms using the necessary IDE. For Symbian OS, we used Carbide; xCode for iPhone; Eclipse for Android; etc.

The PC Experience

The students purchase the book via a web-page using a credit card or check. Upon the purchase, they receive a Unique Book Serial Number (a serial number) that ties their purchase to their email address. Using that UBSN the student can then log-on to the system where they can read the book (Figure 2) and take on-line quizzes (Figure 3).

Please complete any assigned readings and corresponding on-line assignments.	
The readings below have are encrypted with a password that is unique to your account. To open the files enter the Unique PDF decryption key shown below, when prompted to enter a password.	
The Unique PDF Decryption Key for rossw@purdue.edu is: #56jkikujhkukyhdaec!	
Readings and Quizzes	
Readings	On-Line Homework
Front Matter	
Chap 1 Design Process, Graphics, and Modeling	Chapter 1
Chap 2 Engineering Graphics and Sketching	Chapter 2
Chap 3 Solid Modeling and Viz Basics	Chapter 3
Chap 4 Constraint Based Modeling	Chapter 4
Chap 5 Feature Based Modeling Practices	Chapter 5
Chap 6 Interior Features and Arrays	Chapter 6
Chap 7 Introduction to Assembly Modeling	Chapter 7
Chap 8 Reference Planes & Compound Angles	Chapter 8
Chap 9 Splines, Lofts and Sweeps	Chapter 9
Chap 10 Mechanisms and Motion (very large file)	Chapter 10
Chap 11 Design Problems Projects	
Glossary	
Printable Materials Below	
Chapter 2 Printable Materials	

Figure 3. Student Dashboard

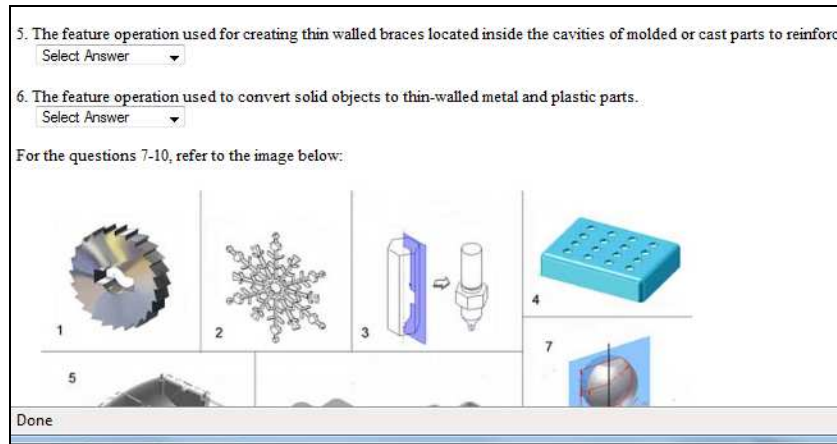


Figure 4. Student Questions

After the students take a quiz, the system grades their responses and sends an email to the TA for the course.

Augmenting the process

To encourage authors to take a stronger relationship with their books than with a traditional publisher, the academic advisors of the team convinced the company that it would be more “academic friendly” to adopt the following policies in working with authors:

1. The authors keep the copyright to the work
2. The authors receive a 70% of the gross revenue generated by the book
3. The company prepares multimedia aspect of book
4. The authors can make changes to the book as often as necessary
5. The company has Instructional Designers on staff that can server as consultants on structuring content.

We also asked the company to run extensive surveys on their students to get an idea of their expectations (summarized below):

- Students are accustomed to paying for digital goods
- Students want to access their eBooks on a variety of different devices
- Students like the convenience of not carrying around physical books
- Making digital annotations was requested by many students, but seldom used.
- Students want books that are current

Internalizing this information the group decided to create a set of tools to allow them to create annotatable eBooks that are accessible from a multitude of different devices including desktops & laptops, mobile phones, and tables such as the iPad. To accomplish this task, the group experimented with a variety of different methods that resulted in multi-platform offering of their eBooks. Interestingly the best method for each book varied depending on the content. For example, books with a potential for lots of animations and multimedia work best as native apps

on the iPad. Books with little animations could be deployed across multiple platforms using the ePub or secure PDF format.

Recommendations

While we can't pretend to offer a completely objective set of recommendations for those author's who seek to publish an eBook, we can offer some of the insight that we have gained in working with eAcademicBooks

1. Start with a clear idea of instructional objectives

In addition to writing the TOC for your instructional content, also communicate to the rest of your team the instructional objectives for the chapters in your eBook. This will help your team to create any ancillary materials.

2. Don't skip on the review process

The review process is critical and should not be overlooked. Without a proper peer review, the marketability of you eBook will be very limited. In addition, your ability to use the book for promotion & tenure will be almost non existent.

3. Rely on the technical expertise of the publisher and allow them to treat you as a Subject Matter Expert

The publisher will have people who can create multimedia items to accompany your book. Use those resources. But don't forget to review the items they create to make sure they meet your instructional objectives.

4. Use the electronic mechanism of the eBook to collect data and iterate quickly.

The electronic nature of eBooks makes it very easy to collect data about the book's usage which can be used to make improvements about the book. If you include some formative and summative evaluation questions in the text, you can also collect data about the effectiveness of the instruction. Use that information to make improvements often. The end result will be a better experience for the students.

5. Take advantage of the native capabilities of the devices

Each device has capabilities that makes it optimal for some tasks. Design your instructional experience to take advantage of those capabilities. Or at least, don't design against those capabilities.

Conclusion

In closing, eBooks offer a tremendous amount of power in their ability to communicate engineering design concepts. Using this format, it is not only possible to communicate with text and illustration but also with video and multimedia items. However, it is important to use these capabilities in manner that results in an optimal product for you and for your students.

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