MAKE IT MOBILE. BEST PRACTICES SCIENCE COURSES IN iTUNESU.

Technology in Practice Strand

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ABSTRACT

iTunes U provides K-12 educators a straight-forward yet dynamic way to design, implement and deliver complete courses that are supported by pedagogically-sound video, audio, web content, iTunes content and Apps. Moreover, the iPad provides educators a unique opportunity to move learning into a true mobile environment. The challenge for educators is evaluating and curating content from a variety of sources, while ensuring that specific learning objectives are addressed. iTunesU, for example, offers students an opportunity to engage in "meaning-making" through the acquisition of both continuous and discontinuous content. Moreover, students can connect with and interact with their peers and their environment anywhere, anytime. The key question: how do you transform an "analog curriculum" to a "digital curriculum"?

This paper will review the transformation of two 12th grade electives, AP Physics C: Mechanics and Molecular Biology, from traditional classroom courses to mobile-based, iPad courses on iTunesU. Methodology for course design and curriculum development, including App integration; innovative mobile learning activity design; student collaboration opportunities in a mobile environment; teacher-published MultiTouch textbooks; and effective formative, summative and laboratory assessment mechanisms will be addressed through the lens of current research on digital and mobile learning.
As a "work in progress," quantitative and qualitative evidence of student success as well as impact on student learning, based on a transformative learning model, will be reviewed.

PROBLEM STATEMENT AND CONTEXT

Mobile learning was defined, early on, as "Any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of learning opportunities offered by mobile technologies." (O'Malley et al 2003). Yet, as Mike Sharples notes, "Every era of technology has, to some extent, formed education in its own image. For the era of mobile technology, we may come to conceive education as conversation in context, enabled by the continual interaction through and with personal and mobile technology." (Sharples 2005:1)

Yet, as Pachler et al (2010) suggest, "by using mobile technologies and convergent media, and by working with pieces and fragments of distributed contents and information, learners generate contexts." The content that both educators and students appropriate, "be it continuous or discontinuous [is to be used] for the purpose of construction of individualized meaning."

The challenge for the authors was to redesign two senior level electives, Molecular Biology and AP Physics C: Mechanics as mobile learning courses. We wanted our students to approach the curriculum from a constructivist approach, while drawing on resources from a variety of sources. As such, we needed to consider the following:

1. Mobile devices are part of the users creation of contexts.
2. They enable them to connect different contexts but also create their own contexts for learning.
3. How to utilize our everyday life-worlds as learning spaces.
4. Being able to operate successfully in, and across, new and ever changing contexts and learning spaces with and through the use of mobile devices.
5. Focus on the process of meaning making

Our goal was to develop our courses that "relieves the recipients from passivity and affords them the role of active and constructive individuals who engage in meaningful media reception and the production of meaning individualized contents." (Seipold and Pachler). Students needed to be actively engaged in the learning process as teachers served as facilitators of learning and curators of content.

Moreover, we needed to "select those resources that are relevant for them in their meaning-making process" that allowed users to "construct new structures and contexts which are, in turn, meaningful in relation to already existing structures and in relation to the users' life-worlds.

METHOD EMPLOYED

3.1 Program Implementation Process

As this program was being implemented in a K-12 setting, a modified version of Gary Woodill's *Mobile Learning Implementation Roadmap* was used to assist in content design and development process. Table 1 outlines the implementation process.

Table 1. Application of Mobile Learning Implementation Roadmap

Roadmap Step	Description	Program Implementation
2	Identify stakeholders	Molecular Biology AP Physics C: Mechanics
5	Identify types of mobile content for project	Apptivity model used
6	How will content be developed?	Teacher generated content Student generated content iTunes U content Apps MultiTouch Books
13	How will mobile project work with IT	Project is self-managed by teachers
17	Select mobile device for project	iPad 3
21 23 26	List all project costs Prepare project budget Budget approved	24 iPads $50 App allowance per device $20 App allowance per student Budget approved: 6/8/12
41	Create and update content	Summer/Fall 2012
42	Develop policies on use of mobile devices	Acceptable Use Policy for iPad published, 8/31/12
45	Have regular evaluations and collect usage data	Ongoing

3.2 Content Development

Each course was hosted on our school's iTunesU site; course content was curated through the iTunes Course Manage. Links to each course are posted in the Resources section. The following information was posted for each course:

- Course Overview
- Instructor Information

- Course Outline
- Course Calendar

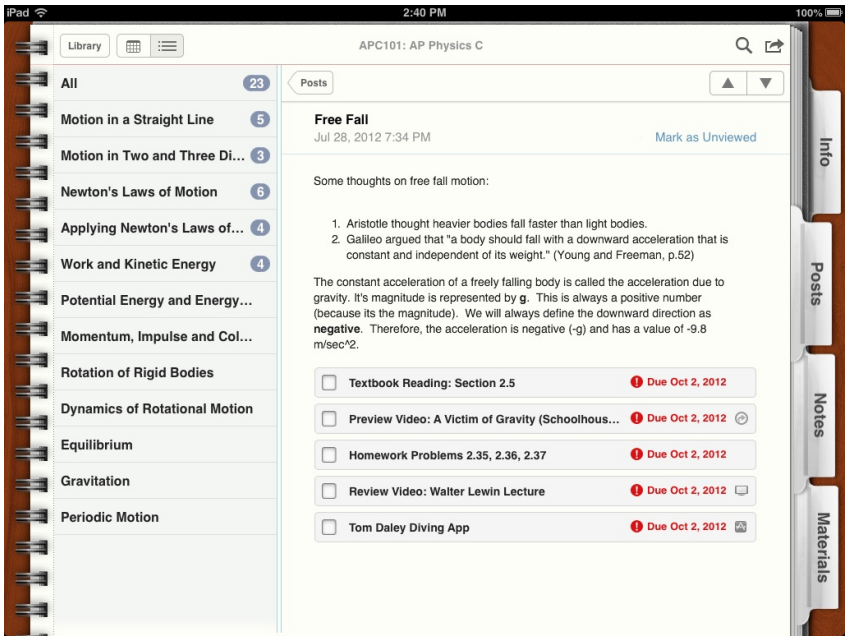
Specific content in iTunesU is curated as a Post. Each post includes a topic/title (connected to the course outline), message (often a list of learning objectives) and assignments. Assignments and curated content takes the form of web links, iTunes Store links, Apps, eTextbook readings or teacher generated content.

Course posts were developed using Apple's Apptivity Model for mobile learing with the iPad. A sample Post development using this model is shown in Table 2. A screen capture of the iTunes U Post is shown in Figure 1.

Table 2. Post Development for AP Physics C: Mechanics topic – Free Fall Motion

Step	Curriculum Development	Post Information
1	Overview and Objectives	• Write expressions for velocity, position for object in free fall motion • Use kinematic equations to solve problems involving free fall motion • Derive expressions for which acceleration as a function of time for an object under influence of drag
2	Workflow	
3	Content and Resources	• Textbook reading, 2.5 on iPad • Preview Video: A Victim of Gravity • Review Video: Walter Lewin Free Fall Lecture on iTunesU • Homework Problems • Lab Experiment: Free Fall Motion & Drag
4	Apps	• Tom Daley Diving App

Figure 1. iTunesU Post for Free Fall Motion



4. RESULTS AND EVALUATION

As this is a "work in progress," much of our evidence of success is anecdotal. We cite the following qualitative evidence of success.

- Having my own iPad is definitely helpful because I can now access my textbook anywhere. Having our coursework on iTunesU is also helpful because it keeps me organized in what I need to learn and in an interactive way." - Sophia L., Class XII.
- Having an iPad in class for labs and classwork has really allowed me to visualize the concepts we are learning. As a very visual learner, I believe the Apps we use really allow the material to jump off the page, so to speak." – Paige B., Class XII
- This has made my learning more compact, convenient and engaging, since I can find all of my assignments, textbook, videos and useful Apps in one place. It's so effective, that I think Apple will be true to their word when it comes to killing the high school textbook." – Emma H., Class XII

5. ADDITIONAL RESOURCES

Molecular Biology on iTunes U:
https://itunes.apple.com/us/course/molecular-biology/id561110059

AP Physics C: Mechanics on iTunes U
https://itunes.apple.com/us/course/ap-physics-c/id541642666

6. REFERENCES

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