# Prospects for iPad apps and learning design in medical education

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Educators are expected to keep up to date with the variety of new technologies that are available for teaching and learning. However, not all technologies will automatically increase a student's higher order thinking skills without the teacher carefully planning how the technology will fit into the educational context. It is through 'designing for learning' that a teacher conceptualises how emerging educational theories and practices can encourage students to take deep approaches to their learning. Tablet devices are increasingly being used in education, but using stand alone educational apps, which usually focus on a specific educational need, poses a potential limitation to good learning design based on scaffolding of multiple activities. This paper explores a theoretical model of how a learning design system (such as the Learning Activity Management System – LAMS) can be used to create app-based learning designs, specifically in a medical context.

Keywords: iPad, educational apps, learning design, LAMS, medical education, mobile learning

## Introduction

Research into the use of technology in teaching has matured rapidly as educators have striven to provide high quality, research-validated tools that enhance learning. Charlton (Charlton, Magoulas, & Laurillard, 2012) summarises the choices that many of today's educators face, regardless of their confidence in the use of technology in teaching:

> …a variety of tools and technologies are available and teachers are expected to use technology-enhanced learning, to know when, how and what tools to apply, and to understand the impact of taking on such a challenge.

Students expect greater amounts of flexibility with their learning (Ellis & Goodyear, 2010), however educators still remain concerned that "many learners lack general critical skills and research skills: 'digital scholarship' is poorly communicated and modelled in many subject contexts." (Beetham, McGill, & Littlejohn, 2009). Thus, educators are pressured to provide a course with high quality technology for students to access learning when they want it and how they want it (Jefferies & Hyde, 2010), while they are still unsure that these tools are the best ways to provide teaching that is authentic and promotes high order thinking skills (Oldfield & Herrington, 2012).

## Designing for learning

Laurillard (D Laurillard, 2012) argues that teaching is much more than the transmission of knowledge from teacher to student. The educationist need to be involved in scaffolding the students learning; embracing, not rejecting technology and helping learners develop the new skills they will need to be digitally literate. Educators

who embrace technology must not fall into the trap that students can do it all for themselves just because there is such wide access to information through the web.

Laurillard further argues that teaching should be considered a design science, like engineering or architecture. Arguing the need of good design skills in teaching is not a new idea, for example Boud and Prosser (Boud & Prosser, 2002) were commissioned to investigate principles for high quality learning in higher education. They argued that a good learning design should: engage learners, acknowledge the learning context, challenge the learners and provide practice.

The field of Learning Design focuses on finding systematic ways to conceptualise what good teaching and learning looks like, and to show designs that embrace emerging theories and models of how to best facilitate effective learning. This recognised need for good modeling of learning design has led to renewed interest in how good learning designs can be communicated to teachers and to also focus on how technology can be used to promote different pedagogical approaches (Diana Laurillard et al., 2013).

From a healthcare education perspective the idea of using good learning designs is particularly attractive, where a large proportion of teaching is performed by clinicians. Although they are an excellent source of highly specialised knowledge and can demonstrate the procedural skills needed in medicine, they rarely have formal training in teaching and are usually ignorant of the full range of research about teaching and learning. It is therefore important that educationalists can provide a solid framework for learning (or a learning design) to the content expert so that they can be guided pedagogically while providing their valuable content knowledge.

It was with this thinking that the School of Medicine at the University of Western Sydney (UWS) created a series of fairly loose but carefully planned templates for content experts to use when creating a series of online modules that explore the scientific basis of medicine (B. Dalziel, Mason, & Dalziel, 2009). These modules are used by the students while they are participating in clinical rotations where they do not have access to lecture style teaching. The modules are still being used successfully four years later by students, with several iterations of the project making improvements and implementing lessons learned about the value of different learning designs (J. Dalziel & Dalziel, 2010, 2012).

## How could the iPad fit into learning design theory?

In 2013, UWS initiated a wide reaching, blended learning project by giving an iPad to each student starting a first year unit at the university. This was accompanied by an increase in staff training and opportunities to learn about the educational affordances of the iPad through training sessions and online workshops.

UWS has understandably placed some pressure on staff to embrace this opportunity to use the iPad in their teaching, which is simultaneously exciting and overwhelming. There has been a huge increase in courses offered for staff to learn about different education and presentation apps (e.g. Prezi, NearPod, Blackboard and Collaborate mobile apps) with a significant demand on staff to consider all the ways that students can learn using these technologies. Some lecturers have turned away from the device, but "education must now begin to drive its use of technology" as these technologies are "increasingly impacting on work, leisure and learning" (D Laurillard, 2012).

So then, how does the use of educational apps on iPads or indeed, apps on other tablet devices fit into the conceptual framework of learning design theory? By their very nature, most apps are standalone technologies that are designed to solve one specific educational need. For example, an anatomy app might identify the bones in the skeletal system using an interactive visual approach to demonstrate these anatomy concepts (Figure 1). Another app might allow students to play a 'gene-mixing' game to understand the concepts of genetic dominance.



**Figure 1: Sample Anatomy and Physiology apps featured in Apple iTunes store (28/06/2013)**

But these apps don't usually take the concepts to the next level of deeper learning, or allow the teacher to edit the content or embed the app within the framework of a learning design. This new leap into educational technology could be argued to be a leap backwards for the pedagogical needs of good learning design where the technologies should be scaffolded within a larger framework of activities. While this could be done artificially with students being given instructions by the teacher on how to use the apps and then returning to the classroom for some face to face discussion, this seems clumsy in comparison to work on streamlining education activities all within the one system (such as in a Moodle course page or a LAMS sequence).

## Theoretical description of how LAMS can create an app based learning design

The theory and literature discussed above in relation to learning design and the introduction of educational apps offers a theoretical framework in which to investigate how a learning design technology (such as LAMS) could be used to link together a series of educational activities (including apps launched from iTunes or Google Play stores, or already on the tablet device) to create pedagogically sound, scaffolded learning designs that can be embraced by medical educators at UWS and adapted for use by other disciplines.

At the heart of an app-based learning design approach is the idea that several apps can be used in a particular sequence in order to achieve a broader educational outcome than would be possible with a single app. Careful arrangement of apps in a sequence (including relevant content within each app) can achieve more than stand-alone apps, for example, a sequence could begin with an anatomy visualisation app, followed by a differential diagnosis app (drawing on the anatomy knowledge) followed by an app which simulates a busy hospital emergency room in which solving a patient case involves synthesising the anatomy knowledge with the differential diagnosis approach in a time-constrained scenario.

From the perspective of learning design, the goal here is to not only to combine these individual apps into a sequence that achieves deeper learning outcomes than would be possible with stand-alone apps; but also to provide a template which could re-use this structure for other topics – for example, the same structure could be re-used with a heart physiology visualisation app, followed by the differential diagnosis app applied to heart problems, and then these would be applied in the emergency room app with a different patient case based on a heart attack scenario that requires decisions within a limited time period.

The approach described above is effectively using the learning design software as a sequencing engine for apps – and provided that the apps can be invoked by this engine (such as via URL-like calls to installed apps or apps in the iTunes or Google Play store), then there is the potential to achieve a hybrid of learning design and app technology. In addition, using a learning design system like LAMS for this approach would allow for traditional web-based activities (such as forums, quiz, wiki, etc) to be used as well as apps. This approach may be useful where it is difficult to find an appropriate app for a particular purpose, but where a web-based tool is available for an equivalent educational purpose.

Initial technical trials have indicated the potential for LAMS to act as an app sequencing engine where apps can be invoked using URL-like calls. Nanyang Techological University, Singapore is using LAMS to launch apps to facilitate a team-based learning (TBL) approach to teaching in medicine (Gagnon, 2013). It may even be possible in the future to send information to these tools via these calls, such as parameters for app self-configuration according to the educational goals of the sequence. And where the apps are not restricted to a particular organisational context (ie, the apps could be accessed by educators and students in other organisations), then there is the potential to share LAMS sequences that incorporate apps in the sequence structure. This would allow for community sharing of good practice in the development of app-based learning designs

An iterative process of developing and improving the concepts as outlined above, that is, a design-based research approach (Reeves, McKenney, & Herrington, 2011) will be used in student trials in 2013 and 2014. A variety of app integration models will be explored technically (including the potential for sending parameters to apps), as well as development of different pedagogical strategies (such as Predict – Observe – Explain; Problem-Based Learning, etc) and how different apps can be used both for different medical content and for different strategies.

## Conclusion

There is considerable promise in the idea of combining learning design with educational apps. It has the potential to address the growing educational challenge arising from the limits of stand-alone apps, while still using individual apps for their specific benefits. By combining various apps into a scaffolded sequence of learning activities, there is greater potential for achieving deeper approaches to learning among students. In addition, the potential for sharing app-based learning designs through learning design repositories (such as the LAMS Community) offers the potential for sharing good practice in the use of apps in medical education and, potentially, for other disciplines.

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