1-2016

Evaluation of iTunes University Courses Through Instructional Design Strategies and m-Learning Framework

Hungwei Tseng

Yingqi Tang

Betty Morris

Evaluation of iTunes University courses through instructional design strategies and m-learning framework

3 authors:

Hung Wei Tseng
Jacksonville State University
34 PUBLICATIONS **542** CITATIONS

Yingqi Tang
Jacksonville State University
21 PUBLICATIONS **210** CITATIONS

Betty Morris
Jacksonville State University
5 PUBLICATIONS **33** CITATIONS

Evaluation of iTunes University Courses Through Instructional Design Strategies and m-Learning Framework

Hung Wei Tseng[1*], Yingqi Tang[2] and Betty Morris[3]
[1]Office of Educational Technology and Support, Department of Educational Resources, Jacksonville State University, USA // [2]Houston Cole Library, Jacksonville State University, USA // [3]Library Media program, Jacksonville State University, USA // htseng@jsu.edu // tang@jsu.edu // bmorris@jsu.edu
[*]Corresponding author

ABSTRACT
As mobile learning technology promotes learning accessibility and flexibility, students benefit from social interactivity and connective learning process which will also foster students' performance and satisfaction on learning content. The primary purpose of this research was to evaluate iTunes U courses based on instructional design strategies and the m-learning framework. A total of 27 iTunes U courses were selected and evaluated based on the following criteria: (a) The course is provided by institutions of higher education; (b) the course should include instructional design components. The results revealed that all courses scored notably higher means on Content Chunking and Objective and Content Structure. However, all courses were rated low mean scores on the Instructional Strategies categories of the following attributes: Learning Engagement, Feedback, and Evaluation. Moreover, the results revealed that all courses scored notably higher means on one of the m-learning framework which is Customisation and were rated low mean scores on the Conversation attribute. The overall conclusion of this study is that the selected iTunes U courses showed some strengths but considerable weaknesses in meeting the instructional design strategies and m-learning framework. Recommendations are provided for turning mundane courses into dynamic, user-friendly ones where students are excited about their learning.

Keywords
Distance education, Mobile learning, Instructional Design, Pedagogical issues

Introduction

The emergence of mobile or handheld devices (iPod, iPad, smartphone) offers opportunities for learners to access information anywhere, anytime and to connect with global learning communities at their fingertips. Mobile devices allow individuals to post, comment and share information regardless of geographic location or time, which expands their social presence (Engel & Green, 2011). Mobile technology has a myriad of uses, from education and networking to personal productivity (Lunsford, 2010) while it offers multimedia content delivery and creation options. In the 20th century, e-learning emerged because of the rapid developments of network infrastructure and the innovative notion of teaching in a virtual environment. However, the instructional design principles and teaching strategies for e-learning are not necessarily applicable in the design of m-learning (Siemens, 2002). Traxler and Kukulska-Hulme (2005) described m-learning as "a personal, unobtrusive, spontaneous, 'anytime, anywhere' way to learn and to access educational tools and material that enlarges access to education for all" (p. 1).

Mobile technologies offer opportunities for instructors to create media-rich and active learning materials which enhance students' experience in realistic and authentic learning tasks. Students are encouraged to learn the real-world activities and tasks that are relevant to the workforce of the future. Moreover, the characteristics of the iPad, such as ubiquity, access, richness, flexibility ensure students the ability to connect with active instruction and social networks anywhere anytime. Mobile devices promote collaboration among students and extend learning beyond the classroom. M-learning is a subset of e-learning, a step toward making the educational process just in time, just enough and just for me (Peters, 2007). Mobile technology not only promotes student engagement and foster student creativity, but it is an important part of pedagogical and logistical support for implementing iPad in classroom (Cochran, Narayan, & Oldfield, 2013; Falloon & Khoo, 2014; Morrone, Gosney, & Engel, 2012). Cochrane's (2014) review of the literature indicated the following common shortcomings in the majority of m-learning research: (1) lack of explicit underlying pedagogical theory (Traxler & Kukulska-Hulme, 2005); (2) lack of the importance of pedagogical integration, i.e., aligning the affordances of m-learning with appropriate assessments or activities (Laurillard, 2007); and (3) lack of the explicit student and lecturer support and scaffolding (Attewell, 2008). Thus, before designing m-learning

instruction, instructors or instructional designers need to realize that m-learning is not about the devices and technology, but the capabilities and experience. Effective and proper usage of those capabilities open the doors to a higher level of personalized learning by delivering the right materials to the right person at the right time and place (Brown, 2010). Only a few theoretical and practical frameworks that guide the m-learning instructional design and development processes have been discussed. There is a strong need for integrating m-learning pedagogy and applicable instructional design strategies for developing and assessing m-learning courses and applications.

iPad-supported learning environment

According to the International Data Corporation (IDC, 2012), the number of mobile users in projected to increase from 174 million in 2012 to 265 million in 2016. In September, 2012, Tim Cook, CEO of Apple Inc., revealed that Apple has sold 84 million iPads. Due to the popularity of the iPad, numerous schools and universities around the world are embracing iPad into their classrooms and it is used predominantly by teachers. The proliferation of mobile devices and increasing capabilities of smartphones are changing peoples' lifestyles. As of 2012, the App Store offered more than 300,000 apps in just about every imaginable category. The iPad has functional qualities, which make this device an appropriate tool for educators to use in the classroom (Apple, Inc., 2013) and wide array of apps have been offering unique affordances particularly suited to educational use (Dhir, Gahwaji, & Nyman, 2013).

Several studies (Falloon & Khoo, 2014; Hoffman, 2013; Miller, Krockover, & Doughty, 2013) had focused more on students' learning outcomes from iPad use in the learning environment. Manuguerra and Petocz (2011) pointed out that integrating iPad into tertiary education can offer opportunity for instructors to apply and implement effective and efficient pedagogy in an easy and intuitive way. This potential advantage will enhance student on-task engagement. Moreover, Fisher, Lucas, and Galstyan (2013) considered iPad as an efficiency tool for collaboration activities. They argued that its portability, multiple viewing angels and abilities facilitate an collaborative learning environment that allow students to opt between individual and group learning spaces effectively and efficiently. In addition, Borgman et al, (2008) defined cyberlearning as "the use of Web 2.0 networked computing and communications technologies to support learning" (p. 5). Web 2.0 tools and mobile apps can be used in the classroom for various purposes including presentation, communication, research, and document sharing. Research showed that properly use of Web 2.0 tools and mobile apps in the classroom could motivate (Dohn, 2009; Lin & Jou, 2012) and engage (Schneckenberg, Ehlers, & Adelsberger, 2011) students' learning.

iTunes U learning environment

Apple launched iTunes U in May 2007, a section of the iTunes Store, dedicated to distribution of educational audio and video by universities and institutes from around the world. In January 2012, Apple unveiled a new education-related App called iTunes U Course Manager, that allows educators to create their own courses. It is a web-based tool that can bundle word documents, PDF, audio and video files together (Heim, 2012) and is currently cooperating with educational institutions and non-profit organizations to provide free resources to students. According to Yerrick (2013), there are over 900 universities working with iTunes now creating, capturing, and disseminating content on a subscription basis. One example is the *"Stanford on iTunes U"* (http://itunes.stanford.edu/) *that includes two project sites providing access to* audio and video content from schools, departments, and programs across the university: The public site which includes Stanford course lectures, faculty presentations, event highlights, music, and more; the access-restricted site that offers audio and video recordings of lectures (plus supplemental materials, assignments, exams, and posts) from actual courses only to Stanford students. Originally, iTunes U had capability to store audiovisual, podcasting, and video and are used to design and distribute courses that go beyond traditional print media. Furthermore, students can proactively annotate and contribute on digital content, so they become a co-creator of the learning materials and knowledge. The iTunes U Course Manager takes a step further that can be utilized to design a full learning course and apply instructional practices within the platform. The iTunes U course manager provides more functions for instructors to develop clear and detailed course outlines, to distribute course content through learning modules that associated with learning objectives and goals, and to provide feedback for learners to emphasize the important topics.

Shuler (2009) suggested that researchers should consider current application-based m-learning environments to determine the effectiveness of instructional delivery through the use of applications. Only a few studies investigated

iTunes U's quality on instructional design and assessed learners' experiences in academic perspective. Thus, there is reason to continue evaluating iTunes U as a potential learning supplement platform in higher education (Yerrick, 2013). Peranginangin and Alamsyah (2013) assessed iTunes U on user experience and they concluded that iTunes U fulfils the device usability aspect of mobile learning platforms by providing high quality multimedia as data output. However, they also pointed out that the weakness of iTunes U is its social aspect. It doesn't provide social communications making it difficult for learners to interact with each other in the learning process.

Instructional design strategies

Instructional design is the systematic development of instructional specifications that follow learning and instructional theory to ensure the quality of instruction. It is the process of analysis of learner's needs and learning goals and the development of a delivery system to meet those needs (Siemens, 2002). The strategies practiced in the courses, such as content analysis/chunking, realistic objectives, learning engagement/feedback for students and evaluation throughout the process are important factors for learning to take place. According to Smith (1988), design of instruction can serve as a balancing act between providing enough support for students to excel in their learning while limiting, at the same time, enough support to allow them to engage in their own learning. Students must be aware of what they need to know to master course content. The objectives must be clear and attainable, otherwise frustration may cause students to drop out of online classes. Feedback is crucial for student learning to happen. The following paragraphs will describe the categories of instructional design strategies that are important for the framework of this study and development of the instrumentations.

Course structure

Instructor needs to ensure that course outline clearly communicates what the students will be expected to learn and do in the course and what procedures for them to follow to complete course works. In addition, course syllabus that outlines expectations and requirements for successful completion of the course and it is essential for students to manage and assess their learning processes.

Content presentation

Chunking information of eLearning content is particularly important for online learning. In online learning environment, students are unable to receive real-time feedback and guidance from the instructor. Thus, eLearning content has to be organized in a logical and progressive way that is scaffolded (supportive structures) through chunking in order to accommodate learning cognition limitations.

Content sequencing is the efficient ordering of content that it is important to help the learner achieve the objectives (Morrison, Ross, Kemp, & Kalman, 2010). In addition, appropriate, logical, and hierarchical sequence needs to be determined by the instructor or instructional designer in order for learner to have the most benefit from the learning content. Particularly, hierarchical sequencing is presenting all the major sub-steps separately before integrating them into a step in the sequence.

According to Morrison, et al. (2010), instructional objectives perform three important functions on learning instruction and activities. First, they offer a means for the instructional designer and instructor to design appropriate instruction, specifically to select and organize instructional activities and resources. Second, instructional objectives provide a framework for devising ways to evaluate student learning. Third, objectives guide the learner to identify the skills and knowledge they must master. Learning objectives for each unique activity, learning unit, and overall learning process need to be specified and structured clearly through the course.

Instructional strategies

Effective learning requires students to engage proactively in learning activities (Hu & Hui, 2012) and social interactions. Students become active learners when they engage more in learning activities and take charge of their

learning, which leads to favorable learning outcomes (Hiltz & Shea, 2005). Moreover, studies have found that instructional strategies, such as learner-centered instruction (Blumberg, 2009; Doyle, 2011; Harris & Cullen, 2010), active learning (Trowler, 2010), and collaborative learning activities (Ku, Tseng, & Akarasriworn, 2013; Noohi, Abaszadeh, & Maddah, 2013) can promote learning engagement.

Students need to know upfront how the objectives and evaluations connect to their learning. Evaluation is an ongoing process from beginning to end in the instructional design process. Course rubrics are frequently used to determine when objectives have been met for assignments. All courses need to have summative (midpoint in the class) evaluations to see how students are progressing in the course so instructors can intervene when necessary to alleviate problems that are identified. Clark (1995) divides instructional design evaluation into two broad categories: formative evaluation and summative evaluation. Formative evaluation (internal) is judging the worth of instruction while activities are occurring. Summative evaluation takes place at the end of instruction and focuses on outcomes. Summative evaluation (at the end of class) may be in the form of exams administered to students to see if they mastered the content.

M-learning pedagogical framework

Kearney, Schuck, Burden, and Aubusson (2012) proposed a m-learning framework that includes three pedagogical constructs: Personalisation, Authenticity, and Collaboration. For each of these three constructs, they formulated two sub-scales (See Figure 1). According to Kearney et al. (2012), these three constructs are referred to as the following: First, m-learning experiences are typically customized at both a tool and activity level. Users can enjoy a sense of intimacy by bringing and using their personal devices for learning. Second, task authenticity refers to the extent to which tasks are realistic and offer problems encountered by real world practitioners. Mobile learning is inherently situated and dynamic and it occurs in authentic contexts. Learning progress typically involves high degrees of "task and process authenticity" (Cognition and Technology Group at Vanderbilt, 1990) as learners participate in rich, contextual tasks (setting, characters, tools), involving "real-life" practices. Problems, challenges, and explorations that mobile learners encounter allow a deeper understanding to be achieved (Herrington, Herrington, & Mantei, 2009). Finally, recent pedagogical frameworks highlight the importance of conversations (e.g., Laurillard, 2007; Sharples, Taylor, & Vavoula, 2007) and social interactions among learners. Tectonic shifts in society also have impact on learning where it is no longer an internal, individualistic activity. Learners are encouraged to connect with global learning communities, access information technology resources, and become involved in the knowledge creation process in order to make learning effective. Siemens (2005) also pointed out that learning is a process of connecting specialized nodes or information sources and it is necessary to develop and maintain connections between numerous perspectives, opinions, and concepts in order to facilitate continuous learning.
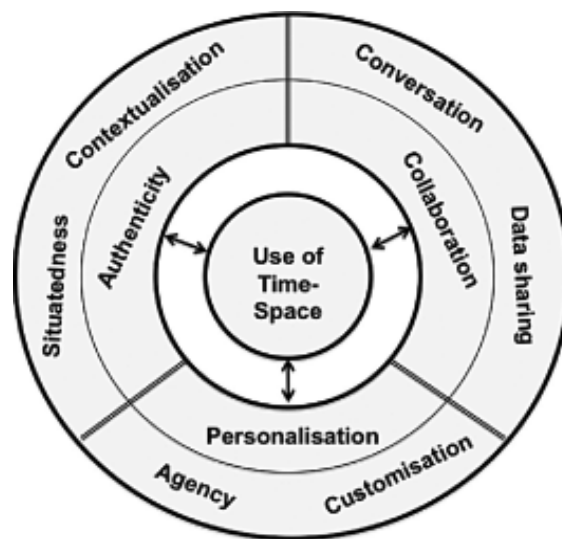

Figure 1. M-learning pedagogical framework adapted from Kearney et al. (2012)

Purpose and significance of the study

Specifically, the study focused on three primary purposes: (a) Provided mobile learning pedagogical framework and instructional design strategies that can increase learning engagement, presence, and flexibility; (b) Investigated mobile technology applied on iTunes U courses to identify mobile learning courses' strengths and weaknesses; and (c) Put pedagogical framework and course design principle theories to a mobile learning course design into practice. The study served as a model for instructors who wish to incorporate mobile technology in the classroom. The findings of this study benefit educators in their instructional design practices and m-learning instructional developments. The following research questions were addresses:

- What are the strengths and weaknesses of the selected iTunes U courses in meeting the instructional design strategies?
- What are the strengths and weaknesses of the selected iTunes U courses in meeting the Kearney, Schuck, Burden, and Aubusson's (2012) m-learning framework?

Methodology

Review team

The criteria for selecting members of the review team were: (a) knowledge of learning and teaching; (b) knowledge of information and instructional technology; and (c) knowledge of instructional strategies. Three review team members who meet all three required criteria were selected and their qualifications were listed as followings:

- One review team member is an instructional designer and has professional experience in both the corporate and education sectors for over seven years. He has conducted research and presentations in the areas of online collaboration, instructional technology, and information literacy skills. His research interests include online group development, problem-based instruction, and innovative learning technologies.
- One team member teaches Instructional Design in the Library Media program and has designed and implemented 10 new totally online courses currently being taught. She teaches her students the critical thinking and decision-making skills they need through problem-based and collaborative learning strategies.
- One member has worked in two academic libraries for more than seven years, mainly supports online students and faculty using the digital resources in the library. She has been working on projects and library instructions that are integrating advanced information technology and innovative instructional strategy to effectively enhance library patrons' information literacy capability.

Selection and sampling of the courses

The iTunes U courses that were selected to be evaluated must meet the following criteria: (a) The course is provided by institutions of higher education; (b) the course should include instructional design components. For instance, learning goals and objectives are clear written and are measurable for measuring desired learning outcomes; instructional strategies are clearly described and are easy for students to follow; communication activities are designed to help students building a learning community, etc. The keywords used for searching iTunes U courses in four fields were listed as followings:

- The field of Library and Information Science - The review team searched for iTunes U courses to evaluate using the following key words: Library, library science, and library information science. However, no course was found that implied an adequate amount of instructional design or m-learning components.
- The field of Education - The key words used to search for iTunes U courses were: Education, teaching and learning in education, teaching strategies, educational technology, and instructional design. The review team decided that only 9 courses were worthy for evaluation.
- The fields of Business and Finance - The following key words were used: Business, business marketing, finance, and financial study; and ten courses were selected.
- The field of Science - The set of key words used for courses in the field of Science were: Science, science and engineering, natural sciences, and computer sciences. The review team decided to select 8 courses that met all criteria.

Instrumentation

To evaluate those selected iTunes U courses, two instruments were developed by researchers of the present study: (a) Measures of Course Development and Instructional Design: Three categories (course structure, content presentation, and instructional strategies) that consists of eight attributes were used to evaluate the selected iTunes U courses from the perspective of instructional design strategies; (b) Measures of m-learning Pedagogical Framework: Three pedagogical constructs that consists of six attributes in Kearney et al.'s (2012) m-learning pedagogical framework were used to evaluate the selected iTunes U courses. All attributes were measured on a 5-point Likert-type scale.

Data analysis

The data analysis in this study involved descriptive analysis. In order to answer two research questions, means of all instructional design strategies and m-learning framework attributes were calculated and reported in the results section. The SPSS 21.0 for Windows was utilized to perform the above analysis.

Results

In terms of the sampling process of the iTunes U courses, a majority of search results were iTunes U Episodes and iTunes U Collections and their purposes focus on library seminars, library tutorials, and library information on services and resources. Results also showed more courses that contained topics related to learning materials such as podcasts, videos, course documents, and resource links that contained more instructional structures. Moreover, most of these courses still lacked specifications on course outlines, learning objectives, and assessment strategies. The review team found one higher education institution that offered an impressive amount of iTunes U courses, but the majority of them were far from being solid well-developed ones that followed instructional design and m-learning frameworks.

Evaluation of instructional design strategies

Research question one examined how successful are the selected iTunes U courses in meeting the instructional design strategies (See Table 1). The results revealed that courses in the fields of Education ($M = 4.75$, $SD = 0.46$) and Business and Finance ($M = 4.50$, $SD = 0.85$) scored notably higher means on *Content Chunking*, compared to courses in the fields of Science ($M = 3.88$, $SD = 0.83$). Moreover, courses in the fields of Education ($M = 3.88$, $SD = 1.64$) and Business and Finance ($M = 3.70$, $SD = 0.82$) also scored notably higher means on *Objective and Content Structure*. All courses were rated low mean scores on the Instructional Strategies categories by the review team: *Learning Engagement* (Business & Finance, $M = 1.20$, $SD = 0.63$; Science, $M = 1.00$, $SD = 0.00$; Education, $M = 1.13$, $SD = 0.35$), *Feedback* (Business & Finance, $M = 1.70$, $SD = 1.06$; Science, $M = 2.00$, $SD = 0.00$; Education, $M = 1.00$, $SD = 1.00$), and *Evaluation* (Business & Finance, $M = 2.60$, $SD = 1.07$; Science, $M = 2.38$, $SD = 0.92$; Education, $M = 1.13$, $SD = 0.35$).

Table 1. Measures of course development and instructional design

Category	Attribute	Description	Means (*SD*)		
			Education (*N* = 9)	Business & Finance (*N* = 10)	Science (*N* = 8)
Course Structure	Clear course outline	Include clear course outline: - Show chucking information in outline - Show summary schedule of sessions - Provide syllabus	3.25 (1.04)	3.90 (0.74)	3.25 (0.71)
Content Presentation	Content Chunking	Instructional content is chunked/self-contained units	4.75 (0.46)	4.50 (0.85)	3.88 (0.83)
	Sequential Presentation	Presentation in sequential, logical order	4.63 (0.74)	4.20 (0.63)	4.00 (0.53)

	Hierarchical Presentation	Fundamental/foundational content presented by objective of this session, then followed by the preparation for the next session	2.38 (0.92)	3.10 (0.57)	2.38 (0.74)
	Objective and Content Structure	Objectives were easily located within the course. Objective and structure stated at the start of the content	3.88 (1.64)	3.70 (0.82)	2.75 (0.89)

Instructional Strategies	Learning Engagement	Learner-centered and active learning potentials:
		  - Group discussion using discussion board or blog
		  - Presentation of group work
		  - Share works with classmates
			1.13 (0.35)	1.20 (0.63)	1.00 (0.00)

	Feedback	Provides feedback about progress through frequently asked questions and formative evaluation	1.00 (0.00)	1.70 (1.06)	2.00 (0.00)

	Evaluation	Includes evaluation of conceptual understanding through:
		  - Frequently asked questions
		  - Post tests
		  - Quizzes/exams
			1.13 (0.35)	2.60 (1.07)	2.38 (0.92)

Evaluation of m-learning pedagogical framework

Research question two examined how successful are the selected iTunes U courses in meeting the Kearney, Schuck, Burden, and Aubusson's (2012) m-learning framework (See Table 2). The results revealed that courses in the fields of Business and Finance scored notably higher means on *Contextualisation* ($M = 3.44$, $SD = 1.06$), compared to courses in the fields of Science ($M = 2.38$, $SD = 0.52$). Moreover, courses in the fields of Business and Finance ($M = 3.22$, $SD = 0.92$) and Science ($M = 3.38$, $SD = 0.74$) also scored notably higher means on *Agency*, compared to courses in the fields of Education ($M = 1.44$, $SD = 0.73$). All courses were rated low mean scores on one Collaboration category by the review team: *Conversation* (Business & Finance, $M = 1.22$, $SD = 0.63$; Science, $M = 1.00$, $SD = 0.00$; Education, $M = 1.00$, $SD = 0.00$). It is worth mentioning that Education iTunes U courses modules were least effective in all m-learning pedagogical components. Further discussions and recommendations for course design improvements are provided in the next section.

Table 2. Measures of m-learning pedagogical framework

Category	Attribute	Description	Means (SD)		
			Education (N = 9)	Business & Finance (N = 10)	Science (N = 8)
Personalisation	Customisation	Activities are customized for the learner to meet their different learning style and approaches: Web Link, Podcasting, Video Lectures, Papers, iBook, Apps etc.	3.00 (0.50)	3.11 (0.82)	3.38 (1.06)
	Agency	Learners can make decision and are in control of their learning	1.44 (0.73)	3.22 (0.92)	3.38 (0.74)
Authenticity	Contextualisation	Learners participate in rich, contextual tasks (setting, characters, tools), involving "real-life" practices.	1.78 (1.30)	3.44 (1.06)	2.38 (0.52)
	Situatedness	Collaboration includes authentic tasks that provide real world relevance and personal meaning	1.22 (0.44)	2.56 (0.71)	1.88 (0.35)

Collaboration	Conversation	Instruction fosters social interactions among learner by open, global conversations amongst learners	1.00 (0.00)	1.22 (0.63)	1.00 (0.00)
	Data sharing	Instruction makes rich connections with content, other learners and resources.	2.22 (0.44)	3.00 (0.88)	2.63 (0.74)

Discussion

There has been very little research understanding how iTunesU courses are designed and developed and exploring their uses as a teaching and learning tool across disciplines in higher education. This study contributed to the literatures and knowledge in the field of mobile tools for personalized and active learning. The rapid development of technologies has made a big impact in personal life of individuals but also significantly influences the dynamic of learning. Instructors and instructional designers need to pay closer attention to the perspective of learners' experiences and their abilities to be critical thinkers rather than allowing technology-driven approaches to control instruction (Harris & Sullivan, 2000). In the following section, the researchers identified instructional design weaknesses and recommendations that can improve iTunes U courses. As part of the revamping design process, the weaknesses can become instructional strengths. In many cases, instructional designers may be cognizant of the best practices, but fail to apply them effectively. They ignore the importance of certain design strategies in their attempt to include sufficient content available in a variety of locations throughout the course. As a result of these practices, the course is not as student-centered or learner-friendly as it could be. Students begin to feel frustrated and lose interest in the course.

Course development and instructional design

With respect to the first research question dealing with the evaluation of selected iTunes U courses' strengths and weaknesses in meeting the instructional design strategies, the results suggested that clear course outline is included and descriptions of each learning unit are presented in an organized manner. Moreover, content is chunked in manageable segments and it flows in a logical progression. Hence, students can easily follow those guidelines to plan their learning process and navigate course content in an efficient way. In comparison to iTunesU courses in other two fields, Science courses revealed notable low score in particularly on attribute of *Objective and Content Structure*. This did not mean that science instructors do not see the importance of declaring learning objectives for course and learning activities. However, they should realize that it is an essential element for students to understand what they are expected to learn and to achieve in the course. Learning objectives need to be clearly written at the appropriate level and reflect desired outcomes, other than that, they need to be made available in a variety of areas in learning content (syllabus, each learning unit, and each assignment) for students to easily locate them.

Overall, those courses are not designed in a way to engage students in the learning process and enhance a knowledge-sharing opportunity in a socio-cultural learning environment. Instructors who plan to use iTunes U as a m-learning platform for teaching should also focusing on fostering social presence via quality communication media and communication sequence (Kekwaletswe, 2007). If students are not encouraged to be engaged in their learning, they might set a low standard and just try to barely pass the course. Therefore, purposefully design active learning activities (i.e., group discussion, role-playing, and debates) and encourage students to participate and engage with classmates will enrich their learning experience and make learning more meaningful. Without doubt, acquiring, sharing, and processing knowledge are all essential activities of learning. Students also expect themselves to give and receive feedback to feel that they are part of learning and by sharing knowledge and arguing with others can enforce them to think critically.

M-learning pedagogical framework

Based on the study results, instructors focused on more of content delivery features than collaborative learning activities in iTunes courses. One of the reasons is that collaborative tools are not being well developed in the course

manager. Instructors have to seek a third party's applications to fulfill the needs. One drawback to the course design showed that learners taking the courses made very few decisions to control their own learning because most of the content is structured. Little provision was made for presentations of group work in the courses so students could share their work with classmates. Collaboration, including authentic tasks, needs to be fostered more in the course content to provide real world relevance and personal meaning to the learners.

According to Oldfield and Herrington (2012), computers, smartphones, mobile tablets can all be used as cognitive tools. Cognitive tools have been described by Jonassen and Reeves (2004) as "technologies, tangible or intangible, that enhance the cognitive powers of human beings during thinking, problem-solving, and learning" (p. 1) and they are knowledge construction and facilitation tools that can support , guide, and extend the thinking processes of their users (Derry, 1990). As educators and instructional designers, we need to adapt technologies to function as intellectual partners with the learners. Thus, learners can generate deeper information processing results and transfer new information to their own knowledge. The first priority of m-learning or cyber-learning design is to focus on engaging learners in a shared social context for learners to socialize and construct knowledge (Gao, Baylor, & Shen, 2005). Moreover, Viola, Giretti, and Leo (2007) *stated that learning will be meaningful and applicable when new information and learning tasks are linked to previous experience and knowledge in the formation of personal and unique understandings.* Authentic learning experience and higher order thinking skills are important factors for preparing today's students to be competitive in a global job market because they must become comfortable with the complexities of ill-defined real-world problem and tasks (Lombardi, 2007). An authentic activity implies real world experiences, which makes the content relevant and engages the learners in their own meaning-making. These activities are achieved through collaboration, simulating situations, and solving relevant scenarios.

Conclusions and future study

The overall conclusion of this study is that the selected iTunes U courses showed some strengths but considerable weaknesses in meeting the instructional design strategies and m-learning framework. Using m-learning platforms to design and deliver courses for learning is a new emerging technology and need to be carefully conferred and assessed from various aspects. Educators argue that mobile technologies can provide a way to engage students (Franklin & Peng, 2008; Hutchison, Beschorner, & Schmidt-Crawford, 2012), promote creativity, and communication. However, the principle we need to keep reminding ourselves to follow is that "the only defensible rationale for making mobile learning part of pedagogy is because it enhances student learning" (Kinash, Brand, & Mathew, 2012).

The following recommendations were provided for educators who are interested in developing an iTunes U course that allows learning flexibility and effective learning experiences to learners at the same time:
- Emphasize instructional strategies that are learner-centered and active, such as blogs or discussion boards, and allow presentations of group work to be shared with classmates.
- Prepare students for their next online session each week during the lesson.
- Develop a *Frequently Asked Questions* (FAQs) list to aid students in navigating the course content.
- Provide post-tests and quizzes/exams to assess student work.
- Provide authentic and diverse activities for learners to meet their own learning styles.
- Enhance communication and social interaction between learners through blogs or discussion boards to build a friendly online community.
- In terms of learning assessment, evaluation progress could be monitored through formative evaluation, post tests, and quizzes. Frequently asked questions could also make available for student guidance.

Prensky (2001) argued that the ways of students thinking and processing information are totally different compared to their predecessors due to the ubiquitous environment. The features of iTunesU course allow course developers to apply and deliver multi-media formats of content and resources to facilitate learning engagement that meets student needs of different learning styles. An array of applications (apps) and Web 2.0 tools running on mobile devices can be easily commissioned for local use (Melhuish & Falloon, 2010), many of which are suitable for an individual's learning requirements. Cochrane (2014) reviewed longitudinal (2006-2011) participatory action research on mobile Web 2.0 and concluded the following two critical success factors – technological and pedagogical support – and the creation of sustained engagement facilitating ontological shifts for the participants. Instructor can use apps and Web 2.0 tools (i.e., Blogger, Tumblr, Weebly, Skype, Google Group) effectively to develop open and global conversations

with students and to facilitate learning engagement. If m-learning wants to win a place in future education, this function should be seriously addressed. In regard to future studies, there are needs to explore various instructional strategies and instructional design processes that are applied to design iTunesU courses in different disciplines, and to discover the perceptions of instructors, instructional designers, and administrators on how m-learning management platforms can benefit a student's learning in the long run.

References

Apple, Inc. (2013, February). iTunes U content tops one billion downloads [Web log post]. Retrieved from http://www.apple.com/pr/library/2013/02/28iTunes-U-Content-Tops-One-Billion-Downloads.html

Attewell, J. (2008). Towards sustainable large scale implementation of mobile learning: The Mobile learning network (MoLeNET). In J. Traxler, B. Riordan, & C. Dennett (Eds), *MLearn08: The Bridge from text to context* (pp. 28–35). Shropshire, UK: University of Wolverhampton, School of Computing and IT.

Blumberg, P. (2009). *Developing learner-centered teaching: A Practical guide for faculty*. San Francisco, CA: Jossey-Bass.

Brown, J. (2010). Can you hear me now? *Training & Development, 64*(2), 28-30.

Clark, D. R. (1995). Types of evaluation in instructional design [Online article]. Retrieved from http://www.nwlink.com/~%E2%80%89donclark/hrd/isd/types_of_evaluations.html

Cochrane, T. D. (2014). Critical success factors for transforming pedagogy with mobile Web 2.0. *British Journal of Educational Technology, 45*(1), 65-82.

Cochran, T., Narayan, V., & Oldfield, J. (2013). iPadagogy: Appropriating the iPad within pedagogical contexts. *International Journal of Mobile Learning and Organisation, 7*(1), 48-65.

Cognition and Technology Group at Vanderbilt (CTGV) (1990). Technology and the design of generative learning environments. *Educational Technology, 31*(5), 34-40.

Derry, S. J. (1990, April). *Flexible cognitive tools for problem solving instruction*. Paper presented at the annual meeting of the American Educational Research Association, Boston, MA.

Dhir, A., Gahwaji, N. M., & Nyman, G. (2013). The Role of the iPad in the hands of the learner. *Journal of Universal Computer Science, 19*(5), 706–727. Retrieved from http://jucs.org/jucs_19_5/the_role_of_the/jucs_19_05_0706_0727_dhir.pdf

Dohn, N. B. (2009). Web 2.0: Inherent tensions and evident challenges for education. *Computer Supported Collaborative Learning, 4*, 343–363.

Doyle, T. (2011). *Learner-centered teaching: Putting the research on learning into practice*. Sterling, VA: Stylus Publishing.

Engel, G., & Green, T. (2011). Cell phones in the classroom: Are we dialing up disaster? *Tech Trends, 55*(2), 39-45.

Falloon, G., & Khoo, E. (2014). Exploring young students' talk in iPad-supported collaborative learning environments. *Computers & Education, 77*, 13-28.

Fisher, B., Lucas, T., & Galstyan, A. (2013). The Role of iPads in constructing collaborative learning spaces. *Technology, Knowledge and Learning, 18*, 165–178.

Franklin, T., & Peng, L. (2008). Mobile math: Math educators and students engage in mobile learning. *Journal of Computing in Higher Education, 20*(2), 69-80.

Gao, H., Baylor, A. L., & Shen, E. (2005). Designer support for online collaboration and knowledge construction. *Educational Technology & Society, 8*(1), 69-79.

Harris, M., & Cullen, R. (2010). *Leading the learner-centered campus: An Administrator's framework for improving student learning outcomes*. San Francisco, CA: Jossey-Bass.

Harris, P., & Sullivan, M. F. (2000). Using technology to create a new paradigm for a learner-centered educational experience. *Technos: Quarterly for Education and Technology, 9*(2), 35-36.

Heim, A. (2012, July). Apple's iTunes U now lets teachers create their own courses for iPad [Web log post]. Retrieved from http://thenextweb.com/apple/2012/07/25/apples-itunes-u-now-lets-teachers-create-their-own-courses-for-ipad/

Herrington, A., Herrington, J., & Mantei, J. (2009). Design principles for mobile learning. In J. Herrington, A. Herrington, J. Mantei, I. Olney, & B. Ferry (Eds.), *New technologies, new pedagogies: Mobile learning in higher education* (pp. 129-138). Wollongong, Australia: University of Wollongong.

Hiltz, S. R., & Shea, P. (2005). The Student in the online classroom. In S. R. Hiltz, & R. Goldman (Eds.), *Learning together online: Research on asynchronous learning networks* (pp. 145–168). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Hoffman, A. M. (2013). Students' perceptions of on-task behaviour and classroom engagement in a 1:1 iPad school. *English Leadership Quarterly, 36*(2), 9–18.

Hu, P. J., & Hui, W. (2012). Examining the role of learning engagement in technology-mediated learning and its effects on learning effectiveness and satisfaction. *Decision Support System, 53*, 782-792.

Hutchison, A., Beschorner, B., & Schmidt-Crawford, D. (2012). Exploring the use of the iPad for literacy learning. *The Reading Teacher, 66*(1), 15-23.

International Data Corporation (IDC). (2012, October). Consumers increasingly using mobile devices as their default gateway to the internet, IDC says. Retrieved from http://www.reuters.com/article/2012/10/29/idUS104726+29-Oct-2012+BW20121029

Jonassen, D. H., & Reeves, T. (2004). Learning with technology: Using computers as cognitive tools. In D. H. Jonassen (Ed.), *Handbook of Research on Educational Communications and Technology: A Project of the Association for Educational Communications and Technology* (pp. 693-719). New York, NY: Scholastic Press.

Kearney, M., Schuck, S., Burden, K., & Aubusson, P. (2012). Viewing mobile learning from a pedagogical perspective. *Research in Learning Technology, 20*. doi:10.3402/rlt.v20i0/14406

Kekwaletswe, R. M. (2007). Social presence awareness for knowledge transformation in a mobile learning environment. *International Journal of Education and Development using Information and Communication Technology (IJEDICT), 3*(4), 102-109.

Kinash, S., Brand, J., & Mathew, T. (2012). Challenging mobile learning discourse through research: Student perceptions of blackboard mobile learn and iPads. *Australasian Journal of Educational Technology, 28*(4), 639-655.

Ku, H. Y., Tseng, H. W., & Akarasriworn, C. (2013). Collaboration factors, teamwork satisfaction, and student attitudes toward online collaborative learning. *Computers in Human Behavior, 29*(3), 922-929.

Laurillard, D. (2007). Pedagogical forms of mobile learning: Framing research questions. In N. Pachler (Ed.), *Mobile learning: towards a research agenda* (pp. 153–177). London, UK: WLE Centre, Institute of Education.

Lin, Y. T., & Jou, M. (2012). A Web application supported learning environment for enhancing classroom teaching and learning experiences. *Procedia - Social and Behavioral Sciences, 64*, 1–11. doi:10.1016/j.sbspro.2012.11.001

Lombardi, M. M. (2007, July). Approaches that work: How authentic learning is transforming higher education. *EDUCAUSE Learning Initiative (ELI),* Paper 5. Retrieved from https://net.educause.edu/ir/library/pdf/ELI3013.pdf

Lunsford, J. (2010). Using handheld technologies for student support: A Model. *Journal of the Research Center for Educational Technology, 6*(1), 55-69.

Manuguerra, M., & Petocz, P. (2011). Promoting student engagement by integrating new technology into tertiary education: The Role of the iPad. *Asian Social Science, 7*(11), 61–65.

Melhuish, K., & Falloon, G. (2010). Looking to the future: M-learning with the iPad. *Computers in New Zealand Schools: Learning, Leading, Technology, 22*(3). Retrieved from http://researchcommons.waikato.ac.nz/bitstream/handle/10289/5050/Looking%20to%20the%20future.pdf?

Miller, B. T., Krockover, G. H., & Doughty, T. (2013). Using iPads to teach science to students with a moderate to severe intellectual disability: A Pilot study. *Journal of Research in Science Teaching, 50*(8), 887–911.

Morrison, G. R., Ross, S. M., Kemp, J. E., & Kalman, H. (2010). *Designing effective instruction*. Hoboken, NJ: Wiley.

Morrone, A. S., Gosney, J., & Engel, S. (2012, April). Empowering students and instructors: Reflections on the effectiveness of iPads for teaching and learning. *The EDUCAUSE Learning Initiative (ELI)*. Retrieved from http://net.educause.edu/ir/library/pdf/ELIB1201.pdf

Borgman, C. L., Abelson, H., Dirks, L., Johnson, R., Koedinger, K. R., Linn, M. C., Lynch, C. A., Oblinger, D. G., Pea, R. D., Salen, K., Smith, M. S., & Szalay, A. (2008). *Fostering learning in the networked world: The Cyberlearning opportunity and challenge*. Washington, DC: National Science Foundation. Retrieved from http://www.nsf.gov/pubs/2008/nsf08204/nsf08204.pdf

Noohi, E., Abaszadeh, A., & Maddah, S. S. B. (2013). University engagement and collaborative learning in nursing students of Kerman University of Medical Sciences. *Iranian Journal of Nursing and Midwifery Research*, *18*(6), 505–510.

Oldfield, J., & Herrington, J. (2012). Mobilising authentic learning: Understanding the educational affordances of the iPad. In M. Brown, M. Hartnett, & T. Stewart (Eds.), *Proceedings of Australasian Society for Computers in Learning in Tertiary Education (ASCILITE) 2012.* Wellington, New Zealand: Massey University. Retrieved from http://researchrepository.murdoch.edu.au/13615/1/oldfield,_james_-_mobilising.pdf

Peranginangin, Y., & Alamsyah, A. (2013, June). *Assessing iTunes U on user experience in higher education using FRAME model*. Paper presented at the 5th Indonesian International Conference on Innovation, Entrepreneurship, and Small Business, Bandung, West Java, Indonesia.

Peters, K. (2007). M-Learning: Positioning educators for a mobile, connected future. *International Journal of Research in Open and Distance Learning, 8*(2), 1-17.

Prenksy, M. (2001). Digital natives, digital immigrants. *On the Horizon, 9*(5), 1-6. doi:10.1108/10748120110424816

Schneckenberg, D., Ehlers, U., & Adelsberger, H. (2011). Web 2.0 and competence-oriented design of learning—Potentials and implications for higher education. *British Journal of Educational Technology, 42*(5), 747-762.

Sharples, M., Taylor, J., & Vavoula, G. (2007). A Theory of learning for the mobile age. In R. Andrews & C. Haythornthwaite (Eds.), *The Sage Handbook of E-learning Research* (pp. 221-247). London, UK: Sage.

Shuler, C. (2009). iLearn: A Content analysis of the iTunes App Store's education selection. In *The Joan Ganz Cooney Center at Sesame Workshop.* New York, NY: The Joan Ganz Cooney Center. Retrieved from http://joanganzcooneycenter.org/Reports-21.html

Siemens, G. (2002, September). Instructional design in elearning [Web log post]. Retrieved from http://www.elearnspace.org/Articles/InstructionalDesign.htm

Siemens, G. (2005). Connectivism: A Learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning, 2*(1). Retrieve from http://www.itdl.org/Journal/Jan_05/article01.htm

Smith, P. L. (1988, January). *Toward a taxonomy of feedback: Content and scheduling*. Paper presented at the Annual Meeting of the Association for Educational Communication and Technology (AECT), New Orleans, Louisiana.

Traxler, J., & Kukulska-Hulme, A. (2005, October). *Evaluating mobile learning: reflections on current practice*. Paper presented at the mLearn 2005, Mobile technology: The future of learning in your hands, Cape Town, South Africa.

Trowler, V. (2010). *Student engagement literature review*. New York, NY: Higher Education Academy.

Viola, S. R., Giretti, A., & Leo, T. (2007). Detecting differences in "meaningful learning" behaviours and their evolution: A Data driven approach. *International Journal of Computing and Information Sciences, 5*(2), 63-73.

Yerrick, R. K. (2013). Evaluating students' responses to iTunes U as rich media delivery solution for teacher education. *International Journal for the Scholarship of Teaching and Learning, 7*(1), Article 15.