Students' perceptions on using iPods in accounting education: a mobile-learning experience

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Abstract

Purpose – The purpose of this study is to assess the benefits derived from the application of mobile devices as part of the students' online learning experience and the extent to which the perceived benefits are linked to student learning styles.

Design/methodology/approach – A small group of students enrolled in an exclusively online graduate accounting program were issued with iPods as part of their learning materials. Two data collection instruments were issued: a questionnaire to elicit students' opinions on the usefulness of the iPod as a tool for learning; and a questionnaire to establish their learning styles (using a VARK$^{©}$ questionnaire).

Findings – The findings indicate that the primary advantage of iPods lies in its portability, which, in turn, facilitated efficient and effective use of time and study planning. The portability attached to iPods allowed students to take advantage of what otherwise have been down-time, such as commuting. Students with a preference for visual learning rated the iPod as being important to their learning.

Research limitations/implications – The generalizability of the findings is limited due to the low sample size (23) that constrains the robustness of the results.

Originality/value – The exploratory nature of this study provides preliminary evidence on the perceived usefulness of handheld devices as a learning tool.

Keywords Online learning, iPods, Podcasting, *m*-Learning, Accounting education, Learning styles

Paper type Research paper

Introduction

In the 1990s, the Australian Department of Employment, Education, Training and Youth Affairs commissioned a report (*Internet, AARNet and Academic Work: A Longitudinal Study*) to investigate the influence of internet use on academic productivity. The recommendations of the report encouraged the university sector to proactively investigate ways of implementing new technologies to better meet the needs of their students (Bruce, 1996). Technology has since become a significant component of education policy (de Freitas and Oliver, 2005) with universities allocating considerable resources to new technologies (Love and Fry, 2006). Incentives for universities to invest in new technology arise from a desire to use cutting-edge technology in delivering educational programmes (Blin and Munro, 2008; Selwyn, 2007) as well as the economic benefit derived from maintaining a market share of students (Carr and Mathews, 2004). In spite of universities investing heavily in technology, IT plays only a peripheral role in most teaching practices (Blin and Munro,

2008) with many academic staff developing a negative attitude towards its use and adoption (Siritongthaworn *et al.*, 2006). This may be in part because the traditional face-to-face lecture continues to be the main focus of subject delivery and it does not necessarily follow that the introduction of new technology will add value to the student experience (Bryant and Hunton, 2000; Dowling *et al.*, 2003). In spite of new technology creating challenges, lecturers who are willing to adapt, do so on the basis that they are making a connection with their students (Hughes, 2005; Schrum and Hong, 2002).

Traditional forms of distance learning activities included correspondence, broadcasts through radio and television and CD-ROMs. Recently, the Pocket-PC has emerged as an additional medium where students can access course content that can be downloaded and stored on handheld mobile devices. Students in the "net generation" (millennium learners) have been raised in a media-rich environment in which the popularity of the internet and wireless technology suggests that students are constantly connected via peer-to-peer communication (Windham, 2005). This ongoing connection characterised by immediate communication is causing universities to rethink the way they use technology to interact with their students (Carr and Mathews, 2004). The advancement and ever-expanding availability of learning technologies has witnessed the introduction of cloud-based learning and the adoption of online mobile content that has seen the advent of "*m*-learning" (mobile learning). Mobile learning is a derivative of *e*-learning and represents the ability to receive educational content on handheld devices such as PDAs, smartphones and mobile phones (Kim and Ong, 2005). The extent to which *m*-learning is represented by the device that receives the educational content or the mobility of the learner or the mobility of learning, is uncertain (Traxler, 2010). Whilst all three elements are interlinked, the focus in this study is centred on the first of the three elements in which the positivity of students' learning experience with mobile devices is examined.

The primary purpose of this study is to assess students' attitudes and the benefits, if any, of using iPods and podcasts within an online learning environment. Whilst many studies have examined the application of web-based technology in the delivery of course material (see, e.g., Jones and Madden, 2002; Jones *et al.*, 2005; Zahay and Fredericks, 2009), this study is focused on examining students' perceptions of the use of iPods and podcasting as the means by which students receive and interact with the learning material. In addition to assessing the value of handheld devices as a tool for learning, this study also examines student learning styles to determine whether the perceived effectiveness of iPods is related to students' preferred approach to learning. Such knowledge will assist education designers in their policy decisions and in knowing who benefits most from such devices.

This study represents a response to a call for research that examines the effectiveness of an alternative delivery method so that education providers may make informed decisions on whether new technologies meet their goals and the needs of their students (Bryant and Hunton, 2000). Existing empirical research is embedded in *e*-learning that examines a variety of learning technologies, but relatively little research has been undertaken to examine the effects of *m*-learning (e.g. Belanger, 2005; Kim and Ong, 2005; Yee and Hargis, 2009). The contribution of the present study to existing literature resides in the use of *m*-learning technologies in a cloud-like environment and its perceived benefits to student learning. Student perceptions are an important component in implementing and assessing new initiatives with policy implications in relation to the implementation of mobile-based learning technologies

(Apostolou *et al.*, 2009). It is, therefore, important to include students as end-users and beneficiaries of new learning technologies in the assessment of such practices. Overall, this is an exploratory study that attempts to provide preliminary evidence on whether the perceived usefulness of handheld devices and podcasting better meet the needs of students in a distance learning programme.

The remainder of the paper is structured as follows: second section outlines the literature of IT teaching technologies. The literature review is constructed in three parts, *e*-learning and related issues in order to inform the survey instrument, followed by the notion of mobile learning, ending with a discussion of learning styles. Third section describes the method, data collection and analysis. Fourth and fifth sections report, analyse and discuss the findings in relation to iPods as a *m*-learning experience and learning styles. Last section concludes the paper.

Literature review
From "e-learning" to "m-learning"

Early attempts to adopt technology in education relied on radio and television (see, e.g., The Open University in the UK) and CD-ROMs (Moore and Kearsley, 1996; Passerini and Granger, 2000). These attempts represent the initial use of additional technology-based resources in the delivery of course content. In the 1990s, improvements in internet access led to the provision of online resources via the world wide web (WWW) (Passerini and Granger, 2000). This new technology, while initially developed in response to the needs of students in distance education (off-campus) programmes, has in recent years been increasingly used to augment the learning resources available to all students. The WWW now provides a dynamic tool for learners and teachers to access the advances in the online environment that give students and academics the freedom and responsibility to control and direct their learning (Becker and Dwyer, 1994).

Online learning, or *e*-learning as it is commonly known, has many descriptions but at its heart, it refers to innovations in education where the learning materials are delivered using some form of web-based virtual learning space using multi-media resources (see, e.g., David *et al.*, 2003; Hiltz, 1995; Siritongthaworn *et al.*, 2006; Zhang *et al.*, 2004). A key objective of *e*-learning in an off-campus programme is to provide an equivalent (or better) learning experience relative to traditional modes of learning (Bothel and Enfinger, 1999). However, in order to achieve this objective, a number of barriers must first be overcome. These barriers generally relate to students' attitudes towards new technologies and the possible failings of the technology-based hardware and software. Some students express unease with using online resources, which is exacerbated when technical problems arise (Cappel and Hayen, 2004). Students must, therefore, learn to adapt to new technologies before they can actively participate and embrace them (Marriott *et al.*, 2004; Park *et al.*, 2007). Student reticence also arises when universities adopt inadequate or incorrect hardware or software that prevents the benefits of *e*-learning from being received without excessive effort on the part of the student (Nixon and Leftwich, 1998). Good software used poorly is as ineffective as inappropriate software (Zhang *et al.*, 2004). Unless careful consideration is dedicated to these issues, there is a danger that students, particularly those who are studying exclusively off-campus, become disconnected to the course and/or the institution leading them to take a passive role in their learning (Motiwalla, 2007). Disconnection is particularly salient when you consider that connectivity is a major attraction in adopting learning technologies. There is a further risk that students may become

particularly focused on success in the course assessment at the expense of broader learning outcomes (Yining *et al.*, 2001).

The increasing accessibility of mobile technology is linked in part to its affordability. The cost of technology and its acquisition is reducing significantly. Bryant *et al.* (2005) noted that over 51 per cent of households in the USA had at least one computer in their homes and over 41 per cent had access to the internet. In Australia, there is an increasing use of mobile-based services climbing to approximately 29 million services (phones, internet connections, internet TV, etc.) (Australian Communication and Media Authority (ACMA), 2012). However, it is the hidden cost of online delivery that represents a barrier to effective implementation of *e*-learning strategies. Online delivery requires significant preparation time and administrative workloads that are inherent in online delivery (Bryant *et al.*, 2005). Furthermore, staff development in relation to new technologies may also represent a significant cost (Swift *et al.*, 1997). The development costs associated with the establishment of an online delivery system can in some cases be prohibitive (Case *et al.*, 2001; Swift *et al.*, 1997). Ernst & Young (2012) sight digital technology and the online (cloud) availability of knowledge as a significant driver for change in the way universities will operate in the future. It can, therefore, be argued that the benefits derived from the development of online mobile-based course delivery would significantly outweigh the costs in the long run.

In spite of the limitations noted above, *e*-learning provides a number of benefits that centre on the notion of flexibility. The online learning space acts as a repository for a broad variety of learning resources that gives students quick and easy access to a huge library of information that can be downloaded from any location, and at a time of the student's choosing (Zahariadis and Stamatios, 2003). This flexibility liberates students from the constraints of having to attend a face-to-face lecture at a specified time and is particularly beneficial for students located off-campus (Hiltz, 1995; Zahariadis and Stamatios, 2003). The flexibility of *e*-learning allows students to learn at a time that suits them, whenever and wherever they desire, all they need is access to the internet (Evans, 2008; Maag, 2006). Where students have scheduling conflicts it is likely that online learning will be seen as advantageous (Hiltz, 1995). This technology also gives students the opportunity to share knowledge and collaborate unconstrained by time and location (Schneberger *et al.*, 2007). The convenience offered by online mode of learning is a major reason why students select the online mode of learning in preference to the more traditional on-campus mode (Dunbar, 2004).

Research in student performance and satisfaction that compares the traditional and online learning environments has yielded mixed results. Some studies suggest that there is little difference between the performance of students in a traditional environment and those studying online (Dunbar, 2004; Moore *et al.*, 2008; Pankey, 1998), whilst other studies indicate that students in an online environment outperform their counterparts in a traditional classroom setting (Zhang *et al.*, 2004; Hiltz, 1995; Schneberger *et al.*, 2007). Academic success in an online environment appears to be dependent upon motivation (Bryant and Hunton, 2000), appropriate pre-course attitudes to technology (Hiltz, 1995) and computer literacy (Siritongthaworn *et al.*, 2006). Empirical evidence on student satisfaction comparing traditional face-to-face modes of learning to an online learning environment is also mixed. Research evidence suggests that students are more satisfied, and value courses that have a rich, distance education environment (Sheppherd and Martz, 2006), whilst other studies report no significant difference in satisfaction levels (McFarland and Hamilton, 2005).

The source of differences in academic performance between online and traditional learning modes, when they exist, is unclear. It could be that millennium learners prefer online learning spaces because they are comfortable with the technology, however, research suggests that performance is dependent upon students' propensity to learn independently (Stapleton *et al.*, 2007). Independent learning, also known as autonomous learning and self-directed learning, has its roots in adult and distance education. In distance education, the separation of the learner from the teacher means that students must self-manage the learning process and take responsibility for their own learning. To this end, independent learners are motivated and persistent, and demonstrate a greater awareness of their responsibility by self-monitoring their progress and making learning meaningful, whereas, students who rely on receiving teacher-led direction claim that they would be unsuccessful academically without the structure that is created by traditional delivery methods (Bryant *et al.*, 2005; Love and Fry, 2006; Stapleton *et al.*, 2007). Consequently, self-directed learners tend to perform better in an online environment compared to students who call for direction. The critical success factor of independent learning is connected to the degree to which the learner maintains active control of the learning process. Therefore, control alongside self-management and motivation, are key attributes for successful performance in an online and distance learning environment. The interaction between students and learning technologies should be such that it encourages and allows the student to learn independently.

m-Learning and podcasts

Whilst *e*-learning provides students with a degree of temporal and spatial flexibility, the requirement to be seated in front of a personal computer introduces an element of rigidity that restricts the any time-anywhere flexibility that online learning attempts to achieve (Zhang, 2004). Students are unable to move from the desktop computer without resorting to print media, making it disadvantageous for students constantly on the move. The problem of being chained to a computer has been addressed by mobile learning (*m*-learning) facilitated through handheld devices that rely on portable wireless technology such as MP3 players, smartphones and Apple iPods and iPads (Pan and Sullivan, 2005). These devices can store large amounts of multi-media resources which can be drawn upon whenever the user needs (Maag, 2006). Whilst the iPod began as an audio device for music, its ability to hold large amounts of audio and video content in a pocket-sized device, makes it a convenient tool for learning (Blaisdell, 2006). Today's generation of students have matured with such technology and are now accustomed to having quick access to information as well as the ability to multi-task (Blaisdell, 2006).

Podcasts provide an innovative way to improve communication and social networking by disseminating knowledge and broadcasting news. Podcasting, a by-product of iPods, is a term that combines "broadcasting" and "iPod" (Maag, 2006). Podcasting allows the user to download files through an internet connection to an individual's file management software, such as Apple's iTunes (Evans, 2008; Maag, 2006). The main advantage of the podcast is that content is pushed through to the user rather than the user having to search for content (Maag, 2006). Once entered in the file management software, these items can be accessed either directly from a personal computer or loaded onto a handheld device such as an iPod for listening asynchronously at a later time (Maag, 2006). Where the device has its own wireless internet connection such as an iPod, mobility is further enhanced because students

may access online resources directly from their mobile device without having to connect to their personal computer, which enhances the any time-anywhere principle (Motiwalla, 2007). An advantage of using an iPod rather than a personal computer is the ability to make use of unexpected free time, such as travelling on public transport (Evans, 2008). *m*-Learning is also self-paced as students control when they want to receive the information and how it is received (fast-forward, rewind, etc.) (Motiwalla, 2007; Zahay and Fredericks, 2009). This can be a significant advantage when students are affected by attention-loss when dealing with lengthy broadcasts. Whilst print media provides a similar but more bulky "mobility" advantage, it is the lecture presentations in the form of podcast communicated through iPods that potentially add value to the learning process.

Whilst educators can see the scope for podcasting becoming an essential part of online learning that has the potential to change the way students learn, change has been evolutionary rather than revolutionary (Lazzari, 2009). Only a small number of studies have reported the introduction of iPods and podcasting as a learning technology in universities (Belanger, 2005; Cebeci and Tekdal, 2006; Yee and Hargis, 2009). iPods were widely accepted by students in these experiments with few problems encountered mostly pertaining to hardware technology and its implementation. Whilst the focus of these studies centred on the institutional implications associated with the introduction of *m*-learning devices, a few student-related benefits were noted including convenience, flexibility and greater student engagement. Although some interest has been shown in *m*-learning technologies, the use of this new technology as a tool for learning is still in its infancy, particularly in accounting education.

Learning styles

The ways in which students learn in higher education has been the focus of much investigation with researchers identifying and categorising various approaches that students demonstrate towards a learning task. A student's learning approach, often referred to as learning style, is broadly defined as an individual's orientation to learning that allows them to learn best. More specifically, an individual's learning style refers to how they receive, interact and respond to learning environments and materials. Several classifications of learning styles can be found in the literature, including: Kolb's (1984) experiential learning model (a cyclical-based learning model of four interlinking component – abstract conceptualisation, concrete experience, active observation and active experimentation); and Ramsden's (1992) deep vs surface approach to learning (a continuum of two distinct approaches to learning separated by the depth of understanding and learned conceptions). One of the most common and widely used categorisations of learning styles is Fleming and Mills' (1992) VARK model (visual learners; auditory learners; reading/writing learners; and kinaesthetic learners). The VARK model deals in perceptual modes, or senses (except taste and smell), that determine how students receive, interpret and disseminate information (Fleming, 2001). The four modes of learning are discussed in more detail below.

Visual learners learn through seeing their teacher's body language and facial expression to fully understand the content of a lesson. They tend to think in pictures and learn best from visual displays including diagrams, presentation slides and videos. Visual learners generally display a preference for visual aids or images (e.g. pictures and diagrams) to organise information and seeing written words that help to describe

meaning and understand instruction. Auditory learners learn from listening (e.g. lectures, discussions, recordings) that is best achieved through verbal lectures and participation in discussion groups. They like to work with sound and benefit from listening to speech that includes the tone and pitch of voice to interpret the underlying meaning(s) of a presentation. Kinaesthetic learners learn through experience by taking a hands-on approach to problem solving. They prefer experimenting and becoming physically active in their learning environment such as role plays and field trips. These students tend to be less responsive in a lecture setting in which the role of the learner is passive. Students who rely on reading/writing learn meaning through both written and spoken words. They enjoy reading and writing and have little difficulty expressing themselves either verbally or in writing. Printed text is an important learning tool for this type of learner.

It is widely accepted that students possess a variety of learning styles, with some students preferring to listen, some preferring to read and others learning by being active in a hands-on environment. Researchers also recognise that individual students possess a mix of learning styles and have a tendency to prefer one dominant style of learning with less emphasis on other styles (Hawk and Shah, 2007). All students display a mix of learning styles with some students indicating a dominant style of learning with far less use of the other styles, while other students may find that they use different styles in different circumstances. The VARK model does not categorise learners into particular learning modes but recognises that, as students, each person is capable of learning under almost any style. The four learning styles identified in the VARK model should be viewed as points along a continuum rather than a discrete set of categories. Students will appear on some point of the continuum indicating a preference for a particular learning style. No one style should be viewed as more effective than another, they should be viewed as complementary with an inclination to adopt a particular style.

Learning theories suggest that learning styles and preferences influence the effectiveness with which individuals learn. The success of educational programmes involving web-based technologies depends to some degree on students' acceptance and ability to adapt their learning to the new technologies. Knowledge of students' learning styles and preferences can help instructors select or emphasise appropriate methods of instruction that best support learning preferences. A single-mode approach to course delivery assumes that students all learn in the same way, in reality, however, students display a range of approaches to learning and a single-mode approach to delivery means that instructors will only reach some of the students. Zapalska and Brozik (2006) claim that understanding learning styles is critical in online education in order to effectively enhance course delivery. Instructors who are knowledgeable about learning styles and their implications are better able to modify or adapt their teaching strategies to ensure that the learning environment maximises the learning potential of each student (Zapalska and Brozik, 2006). Designers of online learning spaces should, therefore, be cognisant of student learning styles to ensure that the approach to content delivery addresses the needs of the students who have different learning approaches (Lazzari, 2009; Love and Fry, 2006; Zapalska and Brozik, 2006). Consequently, a major benefit of understanding learning styles centres on the opportunity to better match teaching and learning styles. This study evaluates the success of using wireless technology and podcasting by assessing students' attitudes and perceptions of such technologies in relation to their learning styles.

Research method

Research setting

Students enrolled in a graduate accounting programme in a mid-sized Australian university were invited to participate in this project. The graduate degree programme is an exclusively online programme delivered through the university's Learning Management System. Students from this programme were selected for this study in order to isolate the benefits of an *m*-learning strategy to students enrolled in an online environment. The perceived benefits and learning value of mobile technology may have been difficult to determine if students were able to exercise learning options (mobile and traditional learning) in a blended learning environment. The course is a technical accounting unit; students do not attend face-to-face lectures and workshops, but instead are provided with pre-recorded audio and visual topic summaries and worked examples (podcasts) that were recorded using Camtasia software in MP4 format. The material used in the course included a recommended textbook, lecture slides (in PDF format) and worked examples (PDF format). iPods were used as a proxy for mobile devices with audio and visual functionality (iPod Classic) so that students could download podcasts of 12 recorded lecture presentations (consistent with a 12-week course schedule) to support course content. The recorded lecture summaries consisted of the topic overview with examples and calculations in the application of the theories and concepts introduced in the lecture presentation. Students, as part of their course requirements, were expected to download the podcasts at regular intervals for viewing. The subject content of the podcasts was identical to the content delivered in standard face-to-face lectures with the difference resting mainly in the mode of delivery. Face-to-face tutorials were replaced with two online workshops, using eLive technology. Together with other online resources such as weblinks to quizzes and textbook resources, as well as more traditional hardcopy study guides and textbooks, the students had a range of resources available.

The sample

iPods were procured and allocated to 30 volunteer students on loan for the duration of one teaching period, with the understanding that the iPods would be returned to the university upon completion of the project. Of the initial 30 participants, two students withdrew from the degree programme leaving 28 students to participate in the study. A total of 23 students responded to the surveys, representing a response rate of 82 per cent. The degree programme in question is a graduate programme designed for students seeking an academic credential that qualifies them for entry into the chartered accounting programme of the Institute of Chartered Accountants in Australia (ICAA). The primary entry criterion for this degree programme is an undergraduate degree of any discipline. The students enrolled in this programme were mature, full-time employees in an accounting-related job undertaking studies to qualify for membership of the ICAA (see Table I for sample description). In general, the sample of students who participated in this study was predominantly Australian, with a mean age of 30 years and approximately one-and-a-half years of accounting-related work experience. In broad terms, the mean age is within the bounds of what is classically referred to as millennium learners, who represent someone born in the 1980s and raised in an era where digital technologies and daily activities are inextricably linked (Pedró, 2006). It could be argued that the sample may also fall generally into late Generation X or early Generation Y; there is a thin line between these definitions (Howe and Strauss, 2000). The students in this study, however, were

Age	Years
Mean	30.30
SD	5.89
Gender	$n = 23$
Male	12
Female	11
Country	$n = 23$
Australian	17
Others	6
Affiliation to professional body	$n = 23$
Yes[a]	6
No	16
Accounting work experience	Years
Highest	5
Lowest	0
Mean	1.51
SD	1.55
Major area of study[b]	$n = 36$[b]
Business	23
Non-business	13

Notes: [a]Five respondents were affiliated to the Institute of Chartered Accountants in Australia, and one respondent was affiliated to the National Institute of Accountants; [b]respondents were asked to indicate the major area of study for their undergraduate degree(s), therefore, some respondents had multiple selections (14 respondents gave details of only one degree, seven respondents gave details of two degrees, one person had three degrees and another one had five)

Table I.
Demographic questions

born in the relevant period making them eligible participants as millennium learners (persons comfortable with technology).

Data and method
The data were gathered at the end of the learning period when the students were invited to complete and return to the researchers two questionnaires: first, a purpose-designed survey to establish the perceived benefits of, and their attitudes towards using iPods in their learning; and second, a questionnaire designed to establish the student's preferred approach to learning using the VARK[©] questionnaire[1]. The survey was used primarily to ascertain the value of iPods as a student learning device, and was analysed based on ten criteria referred to as outcome variables. Student opinions regarding the use of the iPods as a learning aid were measured using 15 ten-point Likert-type scale items, where the scale anchors were pairs of contradictory statements (e.g. finding recordings on the university's Web-CT to download onto the iPod was easy/difficult). A response of 1 indicated strong agreement with the first statement, and a response of 10 indicated strong agreement with the contrary statement. Items were coded so that a high score indicated satisfaction with the iPod. The 15 statements were designed to measure ten outcome variables (see Table II) derived from issues raised in the literature on *e*-learning that include attitudes towards self-directed and independent learning (statements 1-6); flexibility (statement 7); significance of iPods to learning and performance (statements 8-10); perceived benefits compared with other forms of delivery (statements 11-12); satisfaction (statement 13); and connectedness (statements 14-15). All measures consisting of more than one item demonstrated satisfactory levels of internal consistency; α ranged from 0.70 to 0.90.

	1-10		Mean	SD	Rank
(a) Organisation – plan (reliability 0.71)					
1.	The iPod had no effect on my ability to plan my studies ahead of time	The iPod allowed me to plan my studies ahead of time	6.00	2.90	11
2.	The iPod had no effect on preparing my study plan	The iPod enabled me to better prepare my study plan	6.78	2.60	6
(b) Organisation – time (reliability 0.95)					
3.	The iPod had no effect on managing my study time more efficiently	The iPod allowed me to manage my study time more efficiently	7.35	2.53	2
4.	The iPod had no effect on using my study time more effectively	The iPod allowed me to use my study time more effectively	7.17	3.07	4
(c) Independent learning (reliability 0.76)					
5.	The iPod had no effect on my ability to work independently	The iPod allowed me to work independently	6.70	2.47	7
6.	The iPod had no effect on my becoming a more self-directed learner	The iPod encouraged me to become a more self-directed learner	5.87	2.56	12
(d) Flexibility					
7.	The iPod had no effect on my flexibility to listen and view recorded material	The iPod provided me with greater flexibility to listen and view recorded material	7.61	2.56	1
(e) Importance (reliability 0.94)					
8.	The iPod is not an important component of my learning	The iPod is an important component of my learning	7.09	2.98	5
9.	The iPod is not an important component in helping me to prepare for exams	The iPod is an important component in helping me to prepare for exams	6.17	2.48	10
10.	The iPod had no impact on helping me achieve higher final grades	The iPod is an important component in helping me to achieve higher final grades	6.43	2.54	9
(f) Comparison to a computer					
11.	I get better learning value from viewing materials on a computer via the internet compared with using the iPod	I get better learning value from using the iPod than I would from viewing materials on a computer via the internet	5.70	2.08	13

(*continued*)

Table II.
Outcome variables

1-10		Mean	SD	Rank
(g) *Comparison to on-campus*				
12. I get better learning value from attending on-campus classes compared with using the iPod	I get better learning value from using the iPod than I would from attending on-campus classes	5.17	2.96	14
(h) *Enjoyment*				
13. The iPod had no effect on making my course more enjoyable	The iPod made my course more enjoyable	7.26	2.13	3
(i) *Connected to materials*				
14. Viewing lectures on the iPod did not make me feel more connected to the course material	Viewing lectures on the iPod made me feel more connected to the course material	6.57	2.24	8
(j) *Connected to online community*				
15. The iPod had no effect on making me feel more connected to the online student community	The iPod made me feel more connected to the online student community	5.00	2.55	15

Table II.

The VARK questionnaire represents the second instrument relied upon in this study. The data provided by the VARK questionnaire are indicative of an individual's preferred learning style: visual – a preference for information that is graphical or symbolic; aural – a preference for information that is heard; reading/writing – a preference for information that is written down; and kinaesthetic – a preference for information acquired through experience. A number of studies (see, e.g., Hawk and Shah, 2007; Leite *et al.*, 2010) have been undertaken to confirm the reliability of VARK as a diagnostic tool and to determine the extent to which students have a particular learning preference, or whether they have a multi-modal learning style (Fleming and Mills, 1992). In addition to the questionnaires, students were encouraged to record their thoughts throughout the learning period on a message board made available through the university's Web-CT system. Some students sent their comments directly to the researchers via e-mail. The responses to the two questionnaires as well as the qualitative comments constitute the data for this study.

Findings on iPods as a *m*-learning device

In order to gauge the students' competency and relative comfort with using iPods, they were asked in the survey to indicate (on a ten-point scale) the extent to which they agreed or disagreed with five statements, each of which was related to ease-of-use (a low score indicating difficulty, and a high score indicating ease). Consistent with the notion of a millennium learner, the data in Table III suggest that the iPods, in practical terms, were user-friendly devices that presented few problems. This is important because difficulties experienced in using new technologies that were experienced with the advent of *e*-learning, could hamper the iPod's perceived effectiveness. The instructions were clear and understandable, and using the iPod was uncomplicated, including the technical aspects of its functionality. Consistent with the expectation of a millennium learner, students were competent users of mobile technology and did not require help in using the iPod. However, in cases in which assistance was required in setting-up the iPod, students deferred to their friends rather than university technical support. In general, the students used their iPods regularly, two to three times per week for a period of one to three hours, suggesting that the iPods were used, on average, for approximately one hour at any one time, which is consistent with the average length of a podcast.

Correlation analyses was also undertaken to assess the association between students' perceptions of usability and the ten outcome variables listed in Table II. The responses to the first five questions in Table II on ease-of-use statements were collapsed into a single score (EASY – $\alpha = 0.90$). The remaining questions were coded as follows: first, the extent to which they received help in setting up the iPod (HELP); and second, the extent to which they sought university technical support (IT helpdesk) for assistance (HELPDESK); frequency of use in sessions per week (USE) and hours per week (HOURS). The correlational results, displayed in Table IV, suggest that there was a significant positive association between the ease of using the iPod and the ability to plan and manage their own studies. Those students who found the iPod easy to use were better able to organise their study plan, use their study time more efficiently and, effectively, be an independent learner and flexible in the way they learned. Receiving help to use the iPod was not significantly correlated with the usefulness of the iPod unless the help was sought from the university's IT helpdesk. Two measures of the extent to which iPods were used included, hours per week and number of times the iPod was used in a week. Both scenarios were significantly and positively related

EASY: Statements about how easy it was to use the iPod	Mean (SD)
The information provided on using the iPod was clear and understandable	6.70 (2.39)
Learning to use the iPod as part of the course was easy	7.48 (2.54)
I had no difficulty in synchronising the iPod	7.39 (2.35)
I had no difficulty in organising iTunes library on my iPod	7.57 (1.68)
Finding recordings on the DSO to download onto the iPod was easy	8.09 (1.68)
HELP: I received help in setting up the iPod from[a]	$n = 24$[a]
No-one	14
Instructors	1
Friends	5
Students	0
Work colleague	0
University technical support	3
Nil response	1
HELPDESK: How often you contacted university technical support for assistance	$n = 23$
Nil	17
1-2	1
3-5	4
6-10	0
>10	0
Nil response	1
HOURS: Number of hours (per week) you used your iPod in any one unit	$n = 23$
<1	4
1-3	15
4-8	3
>8	1
USE: How frequently (per week) you used your iPod in any one unit	$n = 23$
Daily	2
4-5 per week	2
2-3 per week	9
1 per week	4
1 per fortnight	3
1 per month	3
Statements about recommending use of iPods in a university course	Yes (no)
iPods should be a compulsory component of the course materials	5 (18)
Would you be prepared to pay a fee for the loan of an iPod?	4 (14)[b]
Would you recommend using an iPod to fellow students?	19 (4)

Notes: [a]One respondent indicated that they had help from both an instructor and the university technical support; [b]two respondents did not answer this question; one indicated "yes" if optional, "no" if mandatory

Table III.
Practical issues in implementing the use of iPods

with a range of the outcome variables (except comparison with on-campus learning and connectedness to the community of students). The implications of these findings suggest that students developed a positive attitude towards the iPods when they were easy to operate, used more often and for longer periods. Students appear to be positively disposed to the use of iPods, with 83 per cent of respondents indicating that they would recommend using iPods to fellow students. Having said this, only five respondents thought that iPods should be a compulsory component of the course, and only four students indicated that they would be willing to pay for the use of an iPod (see Table II). However, it is unclear from the findings whether the students would prefer to acquire an iPod at their cost (for those who do not have one already), or pay for the use of an iPod which is provided by the university, either on loan or as part of the course material.

	EASY[a]	HELP[a]	HELPDESK[b]	TIME[b]	USE[b]
Organisation – plan	*0.48**	0.08	0.36	*0.67**	*0.55**
Organisation – time	*0.52**	−0.04	0.26	*0.50**	*0.59**
Independent learning	*0.45**	0.18	*0.43**	*0.60**	*0.60**
Flexibility	*0.46**	0.19	0.31	*0.52**	*0.65**
Importance	0.26	0.17	0.40	*0.57**	*0.64**
Comparison to a computer	0.03	0.26	*0.50**	0.31	*0.42**
Comparison to on-campus	0.04	−0.01	0.14	0.29	0.01
Enjoyment	0.37	0.23	0.40	*0.64**	*0.76**
Connected to materials	0.36	0.22	*0.46**	*0.61**	*0.61**
Connected to online community	−0.04	0.19	0.14	0.40	0.04

Notes: [a]Pearson's correlations reported for difficulty, and H1; [b]Spearman's correlations for H2, T1 and T2; *correlations are significant at $p < 0.05$

Table IV.
Correlations between
practical issues and
outcome variables

Outcome variables
Descriptive statistical results of the outcome variables are displayed in Table II. The mean scores for each statement were rank-ordered to assess the relative importance of each statement. In analysing the ranking, students clearly identified with the flexibility offered by using iPods (statement 7), followed by the efficiency and effectiveness of time usage (statements 3-4). Interestingly, students found the iPods enjoyable (statement 13), suggesting a level of satisfaction and an important component of learning (statement 8), but not so important in preparing for exams (statement 9) or achieving higher grades (statement 10). The data in Table II also indicates that participants perceived the iPods to be good support for study planning (statements 1-2) and exercising independent learning skills (statements 5-6). Connectedness with the community of online students received the least support from respondents (statement 15), but connectedness with the course materials was somewhat better (statement 14). This might be because of the ongoing connection with the instructor and subject material via the podcasts. In comparison with other delivery approaches (using a personal computer, attending on-campus classes), students expressed reservations about the learning value from using an iPod (statements 11-12). However, in all cases, the statements received at least a neutral score of 5 out of 10, suggesting that the iPod is a tool with positive implications. Correlation analyses that explored the relationships between the outcome variables and demographic variables indicated that there were no significant relationships between the demographic variables and the students' attitudes towards iPods. This finding suggests that the benefits derived from using iPods are not restricted to students within any specific characteristics. However, it should be pointed out that this finding might be the product of low power due to a small sample size. Overall, students identified a number of practical benefits from using iPods, which appeared to enhance efficiency, satisfaction and independent learning skills (e.g. flexibility, time and planning), but were less beneficial in improving learning outcomes (e.g. higher grades and learning value) and connectedness with the community of online students.

Qualitative data analysis
The findings above suggest that students realised a number of benefits from using iPods in their learning, including flexibility and enhanced independent learning skills

(study planning and time efficiency) that improved overall course satisfaction. This section explores the potential reasons underlying these responses by examining the students' qualitative responses in relation to the perceived benefits of mobile learning. Overwhelmingly, students highlighted the benefits of flexibility as the primary advantage of iPods. Flexibility in this context is synonymous with portability. Students felt there was a distinct advantage in being able to listen and view podcasts at their discretion. Such comments were often linked to time efficiency: "better time utilisation" and making more productive use of the non-value-added time in their daily commute to work:

> It really helps those of us working full-time and studying off-campus to catch up on the topics while travelling.

The link between an iPod and its practical advantages during one's commute was reinforced by one student, who suggested that the potential benefits of iPods associated with travel were limited because he had a short commute and had little opportunity to use the time effectively:

> Didn't use it as frequently as I intended, as I only have a short commute time so couldn't concentrate then. Had to set aside time to listen to lectures rather than incorporate the listening into my established schedule.

For some students, the portability provided by iPods provided a sense of relief when it allowed them to retreat from their personal computer:

> The greatest advantage has been that it freed me from the confines of my desk, and allowed me to listen to lectures anywhere.

The ability to retreat from one's personal computer was particularly beneficial for one student who appeared to be competing for access to the computer with members of their family:

> […] having kids who also have access to a PC, the iPod is very good to offer more flexible solutions to listening to lectures.

Overall, the students in this study who were challenged with time constraints and limited computer access welcomed the opportunities created by iPods to use their time more efficiently and effectively.

Students who compared the iPod with traditional modes of learning highlighted the accessibility of the iPod compared to the personal computer: "materials, once downloaded, always ready and available" and "no need to set up computer and log on". Similarly, students found that iPods compared favourably with textbooks. One student claimed that using iPods was "more easier [sic] than reading a textbook". This evidence provides initial support for the adoption of e-books which, in their simplest form, replace textbooks with a softcopy or online versions of the same. Another student linked time efficiency with the advantage of viewing subject matter using an iPod, rather than reading text-based material:

> […] by listening to lectures before reading the text was a great way of reducing book time.

In terms of maintaining control of the learning process, which is a dominant attribute of distance learners, some students appreciated the ability to be able to revise and replay (rewind and fast-forward) lectures in a portable fashion. According to one student, iPods were useful to "[…] replay lectures to refresh memory". In addition to

revision, the ability to pause, rewind and replay became a tool to enhance progressive learning:

> The beauty of having an iPod is that it allows me to stop the recording at any point and take down additional notes – something that I struggled with during my undergraduate studies. Again, this allows me to stop, think about what is being said, and fully absorb the material.

Unfortunately, not all students were impressed with the iPod's fast-forward/rewind functionality. Students expressed concern about the iPod's "seek" and "bookmark" functions, claiming that it was imprecise causing them to make several attempts to move to a precise point in the podcast.

Some less positive comments were also made by students. Students expressed concern about the size of the screen on the iPod and the strain it placed on their vision: "strain your eyes a bit because it is small and text is small". However, such concerns are likely to be overcome as new technologies evolve such as the Apple iPad and the Amazon Kindle. Some of the podcasts appeared to be of poor quality which caused problems for some students; however, this appears to be an issue for the university and its recording procedures rather than the iPod. In spite of students' reluctance to use university IT support services, as noted above, some students expressed a number of problems in downloading and synching podcasts. Most of the problems appeared to be encountered in setting up the iPod:

> I was really frustrated at first. I had all sorts of problems. From operating system not compatible, software downloaded in the PC does not like the new model of iPod, the errors in software not allow me to synchronize files/folders from PC to iPod.

In closing, students acquired a number of newly developed skills from using an iPod. Many skills related to the technical aspects of iPods such as a demonstrated improvement in using IT and iTunes. Other skills centred on time management and study planning, the sorts of skills that are linked to self-directed learning. One student specifically referred to becoming a "more self-directed" learner.

Discussion
Advances in technology allow online courses to be used more extensively and, in some cases, to be used as a substitute for more traditional forms of teaching. The WWW, the catalyst for online development, provides education providers with a dynamic environment for learners and teachers to advance in distance and online learning environments. Podcasting is a developing technology compatible with online delivery and is a cost-effective way to deliver instruction, limited only by the resourcefulness and creativity of the provider. From the provider's perspective, the main usefulness of iPods and podcasting is the ability to disseminate course content efficiently and cheaply. However, from the user's perspective, the most important benefit identified by students is the "any time-anywhere" principle. In a society where time is a scarce resource, iPods allow students to decide where and when they can listen to podcasts, according to their needs and availability. Many students commented that the characteristics of the "any time-anywhere" principle allowed them to use the time dedicated more efficiently. A potential implication associated with the portability of iPods allowing students to make better use of their time, is that they will have more time to devote to their studies which may, ultimately, have implications for academic performance (Kim and Ong, 2005). The findings also suggest that iPods enhanced student satisfaction through enjoyment and a perception of proximity to the lecturer.

The physiological space between students and instructors that can disengage students in an online learning environment, appears to shrink with iPods and podcasting.

Without drawing tenuous links, the lack of impact of iPods and podcasting on student performance was not particularly evident. Whilst the students' perceptions of iPods would have been shaped by the way in which it was used, most students seemed indifferent about the connection between iPods, podcasts and performance. This could be because podcasts were designed to augment the subject matter of individual topics and were less focused on guiding students' performance in summative assessment tasks. This finding is contrasted with Copley (2007), who found that the most popular podcast was that relating to "revision/preparation for assessments". Evans (2008), similarly, found that students viewed podcasts as an efficient and effective tool for revision compared with print text.

The majority of students in accounting education learn in a traditional classroom setting where the contents of the course are communicated through the voice of their teachers and are underpinned with text-based materials. However, online learning has permanently altered the way in which courses are being delivered, by giving students a variety of access points to different kinds of teaching materials. The prior literature on e-learning is centred on students' perceptions of online learning resources and the factors related to performance in accounting education (Bhattacharjee and Shaw, 2001; Love and Fry, 2006). This study extends the scope of the existing literature by addressing a recent development in technology that enhances portability, referred to as m-learning. The findings in Fernandez et al. (2009) suggest that podcasting is a powerful complementary tool but is not a substitute for traditional resources; however, in an online learning environment, the findings in this study suggest that the students' learning experience benefited from using iPods, with flexibility, portability and time efficiency touted as its greatest advantages. As a tool of mass communication, podcasts provide an opportunity to rethink the way subject matter is received and processed by students.

Findings on learning styles

Students' learning styles were measured using the scores obtained from each element of the VARK instrument: visual, aural, reading/writing and kinaesthetic. The VARK questionnaire is comprised of four sub-scales that correspond to the four different learning styles in the instrument. The result of the VARK score for each individual is a sum of the responses for four categories, which indicates a tendency towards one or more learning styles. Each individual's learning style was measured as a raw score (a sum of the number of times they selected each of the four VARK categories) and also as a proportion of the total (the number of times they selected a particular category divided by the total number of selections made over the 16 statements). The VARK questionnaire allows participants the option to select more than one response to each statement. Thus, rather than classifying an individual into a single category, the scale yields four separate scores for each individual. Therefore, the various learning styles should not be seen as dichotomous categories but rather as separate continuums where individuals are capable of adopting any style depending on the learning context.

The measured score for each element of the VARK instrument is indicative of a student's learning style preference. The mean score for each sub-scale in this study ($V = 5.0$; $A = 5.0$; $R = 5.8$; $K = 5.7$) suggests that the students are bimodal, that is, they have equally strong preferences for two learning styles, reading/writing (R) and kinaesthetic (K) learning styles, and weak preferences for visual (V) and aural

(*A*) learning. This finding is somewhat inconsistent with Drago and Wagner (2004) who contend that MBA students in an online learning environment are more likely to adopt visual (*V*) and read-write (*R*) approaches to learning. It appears that the students who participated in this study have a preference for dealing with written words, particularly (*R*), and by doing (*K*), and actively attempting problem-solving exercises that are common in accounting education. The VARK scores (both raw and proportional) were then correlated with the outcome variables listed in Table II (see Table V for results). The learning styles of individual students, generally, had no significant correlation with the attitudes towards using iPods, implying that iPods provide similar benefits to students, irrespective of their preferred learning style. However, a significant positive correlation was detected for visual learners who considered iPods to be an important component in their learning, in particular, items relating to performance in exams and achieving higher grades (see Table II for statements underlying importance). This finding is interesting, as exam performance and grades (statements 9-10) were not highly ranked in terms of their mean score, but were significantly important to visual learners.

Discussion
Research evidence suggests that students' conception of learning is an important variable that influences their approach to learning which, in turn, affects the quality of learning outcomes (Byrne and Flood, 2004). Therefore, online learning spaces should consider different learning styles so that delivery is appropriately matched with students' approaches to learning (Lazzari, 2009). By assessing students' learning styles, teachers can adapt their instructional methods to best fit each student's learning style. In this study, students expressed a preference for reading/writing (*R*) and kinaesthetic learning (*K*), however, it was visual (*V*) learners who felt that iPods were an important component of their learning. Consistent with Drago and Wagner (2004), this finding lends some support to research evidence indicating that online learners express a preference for visual learning. This finding is interesting because podcasting is commonly seen as an audio broadcast that is likely to be suited to aural learners (Cebeci and Tekdal, 2006). However, the findings here suggest that when iPods are used by students as a visual medium to interact with the subject material, reliance upon aural senses becomes less important. Overall, podcasting, and online courses more generally, should appear attractive to visual learners stemming from the notion

	Visual	Aural	Reading/ writing	Kinaesthetic	V_{prop}	A_{prop}	R_{prop}	K_{prop}
Organisation – plan	0.18	−0.03	−0.11	0.05	0.23	−0.03	−0.24	0.02
Organisation – time	0.20	−0.01	−0.01	−0.06	0.26	−0.02	−0.10	−0.17
Independent learning	0.02	0.05	−0.09	−0.21	0.13	0.19	−0.08	−0.22
Flexibility	0.18	0.11	0.04	−0.10	0.24	0.12	−0.09	−0.27
Importance	*0.45**	0.19	0.02	0.14	*0.46**	−0.04	−0.30	−0.17
Comparison to computer	0.30	−0.09	−0.22	0.04	0.40	−0.13	−0.35	0.01
Comparison to on-campus	0.10	0.14	−0.20	0.05	0.08	0.23	−0.32	0.04
Enjoyment	0.35	0.10	−0.05	0.10	0.39	−0.06	−0.32	−0.06
Connected to materials	0.39	0.04	−0.12	0.16	0.37	−0.13	−0.32	0.03
Connected to online community	−0.07	0.16	0.01	0.12	−0.16	0.05	−0.08	0.21

Note: *Correlations are significant at $p < 0.05$

Table V.
Correlations between
learning style and
outcome variables

that online resources are inherently full of imagery. Further, a preference for *m*-learning and podcasting suggests that students could benefit most from the utilisation of videocasts rather than podcasts. The flexibility provided by *m*-learning technologies to change the presentation of the same content into various formats (video and aural) provides an advantage to students who possess a dominant learning preference.

Conclusion

The findings in this study suggest that iPods are an important component of student learning and appear to be of greatest benefit to students who are time-poor, and students who value the ability to plan and organise their time efficiently and effectively. In particular, iPods appear to provide a significant advantage to off-campus students who are employed full-time, commute regularly and prefer to listen and visualise rather than read. With improved study planning and time management skills, students appear to be able to take charge of their learning and enhance their abilities as self-directed learners. The WWW provides a dynamic environment for independent learners to excel in an online environment, however, it is handheld devices such as iPods that give students the freedom and responsibility to control and direct their learning environment. Zahay and Fredericks (2009) suggest that students were positive about podcasting when it was used to complement rather than substitute the classroom experience. The findings in this study indicate that podcasts contribute to effective learning as the primary mode of delivery.

The burgeoning use of the virtual learning environment and the move away from "bricks and mortar", have witnessed significant support for the adoption of mobile and cloud-based technologies in university education (Ernst & Young, 2012). The potential disengagement from academic staff and students by learning in an online community did not arise in this study. Positive evaluations from students claimed that iPods engendered connectedness with the learning material, which, in turn, has implications for improving the overall learning experience. With the advent of new technologies, mobile devices are fast becoming the means by which students are connected with the university. Combined with student enthusiasm for podcasted lecture material (Copley, 2007), the implications of this study are likely to take on increasing significance.

Changes in technology are revolutionary with iPods competing now with similar and more powerful devices. This should be considered as an exploratory study that may be carried into a larger study using new devices such as Apple iPads and similar tablets such as Motorola Xoom, Samsung Galaxy Tab or Asus Eee Pad. In this study, the iPod's basic function was used which was to download podcasts so students had the flexibility to view the materials at their discretion. Future research could extend the findings in this study by investigating more advanced applications of iPod technology such as field recordings, synchronous live communication, reflective blogs and mobile testing. Research should also consider the potential impact of teacher pedagogy, which was assumed to remain constant in this study. Another possible future direction in research could consider the association between mobile learning and student learning outcomes.

The results of this study should be interpreted with caution. Student participation from an exclusively online course ensured that the results were not contaminated with blended learning opportunities. However, the lack of a comparable data from students enrolled in a traditional course to assess the effectiveness of mobile learning is

a limitation of this study. Furthermore, while there was a high response rate of 82 per cent, the sample size was constrained by the total number of iPods issued to students (30 iPods) that threatens external validity. Even if the sample is representative of millennium learners, the generalisability of the findings is limited due to the low power of the data that constrains the robustness of the results. Nevertheless, the evidence in this study provides a useful insight into student perceptions in relation to mobile learning. Whilst the limitation of a small sample size is duly acknowledged, the authors believe that the combined qualitative and quantitative analysis conducted in this study is appropriate in addressing the specific research question posed in this paper.

Note

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