Chapter 11
Designing Smart Apps to Enhance Learners' Engagement in Online Learning

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Abstract In China nowadays, the majority of online learning students are digital natives, and there also exist many digital migrants, including middle-aged and retired professionals and senior citizens. This paper addresses the concept and context of current online learning in Ming Chuan University (MU); and, after a survey of learners' needs, it discusses the design of the apps for smart learning to enhance students' engagement with online learning. It also discusses MU's smart apps and the potential benefits of adopting this new alternative route to the learning platform, with an expectation of more engagement with learning activities, learners' satisfaction and versatility.

Introduction

With the quick expansion and penetration of the Internet, people, old and young, in the mainland prefer to log in and browse websites for accessing the information they need. Of course, needless to say, they not only access texts on the Web – videos and entertainment websites are often frequented by them. Computer-mediated education with the Internet is appealing for investment by Internet corporates and some training organisations. Online education is the buzzword in China.

In recent years, using social media apps has become a trendy movement in every walk of life, with the market for large-screen smartphones being dynamic and vibrant. According to an informal survey, people tend to use mobile phones or

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tablets to communicate with their friends by keying in words, use apps to browse the Internet for news and blogs and conduct learning activities on some specific websites. According to the fiscal reports of the three telecommunication network giants in China, mobile phones with larger screens sell well. Moreover, the 4G network has joined the wireless service throughout the nation. Therefore, it is high time for online learning universities to integrate mobile learning into the conventional online learning based on desktop/laptop computers with the Internet. Working adult learners can access the Internet through their wireless devices anytime and anywhere without any constraints.

This paper first addresses the concept of ubiquitous and mobile learning and then considers the context of current online learning in Ming Chuan University (MU). Next, after a survey of learners' needs, it discusses the design of the apps for smart learning to enhance the students' engagement with online learning. Finally, the article discusses the smart apps in MU and then looks at the potential benefits of adopting this new alternative route to the learning platform, with the expectation that it will result in more engagement with learning activities, learner satisfaction and versatility.

Ubiquitous and Mobile Learning in the Digital Age

The Internet has penetrated the daily life of our society in diverse ways – it has changed the ways we live, work and communicate in the world. In this digital age, information communication technologies provide abundant opportunities for people to gain access to knowledge and information: learning is no longer confined within the walls of classrooms in which students gather. The rapid developments in technologies have brought changes in societies and the economy (Alley, 2009; Tsinakos & Alley, 2013). Modern technologies have created ubiquitous learning and blurred the divide between formal and informal learning in education (Kinshuk & Huang, 2015; Sampson, Isaias, Ifenthaler, & Spector, 2013). In facing the challenges of high technology, conventional educational institutions should be aware of the following changes in this digital age:

1. People open up and express themselves with rich media, such as texts, videos and photos, for entertainment.
2. With the Internet, people in developed, developing or underdeveloped countries can access and share information with each other, thus in a certain sense reducing the digital gap in information.
3. People can take control of their lives by such a small thing as holding a remote control to switch on/off a channel.
4. People feel worried about not knowing the true causes of issues or events which are happening.

5. In the Internet, people are in a state of confusion and apprehension and tend to seek soulmates via the Internet.
6. In the Internet community, people tend to exchange, disseminate or share information.
7. Those born in the prosperous and peaceful years of the 1980s or 1990s make up the bulk of Internet users, who are called 'digital natives'.

Mobile learning, or sometimes ubiquitous learning, refers mainly to the provision of education services with handheld devices. With the integration of handheld devices into education, learning can happen anytime and anywhere with wireless and Internet technologies. Mobile technologies not only bring mobility, and ubiquity but also have an impact on the pedagogies of conventional educational institutions (Pachler, Bachmair, & Cook, 2010; Unhelkar, 2009). As regards smart education with smart mobile devices, there are six dramatic changes which will have an impact on education: mobile devices can be viewed as an extension of human organs and are more viable for real personalised learning; learning moves from being closed to opening up; learning is not confined to a physical classroom; learning time, location, courses, knowledge and activities can be fragmented, not necessarily prefabricated; texts, sound, videos, rich media, AR and holograms can connect the classroom to the outside world; and the individual can use the Internet to connect and establish diverse communities and access knowledge, no longer relying only on instructors because of the explosion of information in the Internet age.

Learners' Engagement

In the digital age, the conventional educational context has changed radically – it is not an evolution, but a revolution, in learning. Teaching in higher education in China has become more demanding for academics. With knowledge accessed from the Internet, students dislike the slow and boring lecture-based classroom instruction. The demand for multilayered delivery of high-tech media has become stronger than ever before. But online courses are still text-based, dotted with prefabricated video lectures and audio learning materials. Therefore, engaging learners in doing 'meaningful learning is a profound and ongoing challenge' (Barkley, 2010, p. xii) to online course providers and designers.

There exists a prevailing misunderstanding that engaging students in learning involves entertaining them in their studies; but they are not young learners in school – they are adult learners who have come to learn something pragmatic for use in their professions. They have prior learning experience and work experience and bring their experiences, ideas, insights and attitudes to their learning.

The problems which remain for course providers to solve are how to motivate the learners, facilitate their learning desires and reshape their expectations for successful achievement of learning outcomes.

Smart apps might be the solution to fulfilling these goals by enhancing the learners' engagement in online learning with ubiquitous use of smartphones and connecting students in a social community. In the learning community they set up, the learners will foster a sense of belonging (Brown & Mbati, 2015; Herrington, Herrington, Mantei, Olney, & Ferry, 2009). They will also feel comfortable in communicating with their peers by raising questions and seeking answers and feedback from them, exchanging or sharing some comments from the tutors and confirming some important information or issues about learning activities (Wakefield, McNally, Bowler, & Mayne, 2007). With smart apps, the learning community will remove the sense of isolation or alienation which distance learners often feel in conventional distance learning.

The Context for Using the Internet and Mobile Technologies in China

China is a large country for manufacturing smartphones and is the biggest market for them. Growth in the use of mobile phones in China has been quite rapid and has been accompanied by the availability of relatively inexpensive smartphones. According to the 34th S*tatistical Report on the Internet Network Development in China* issued by the China Internet Network Information Center (2014), by the middle of 2014, netizens in mainland China reached 632 million, of whom 46.9% accessed the Internet (Fig. 11.1).

Access to the Internet and wireless networks has brought a boom in using mobile phones for logging into the Internet. By the middle of 2014, the population of mobile netizens reached 527 million (83.4% of them accessed the Internet via mobile phones), which shows that mobile netizens outnumbered computer netizens for the first time. The chief reason for this quick expansion is that, since 2009, there has been an increase of more than 100 million mobile users each year, and the market for smart apps has a bright future, with newly designed smartphones attracting more buyers, young and old. Above all, the wireless technologies are very helpful for people on the move, including rural residents and temporary workers in the cities and towns. In China, smartphones cost much less than desktop computers and have the advantage of easier access to the Internet and apps. Also, as noted earlier, the fiscal reports by the three biggest telecommunication networks in China show that mobile phones with larger screen sell well; and since 2014, the 4G network has joined the wireless service throughout the country (Fig. 11.2).

The rapid development of the Internet and mobile technologies has a potential impact on education. Various shifts for education have occurred in the discourse of
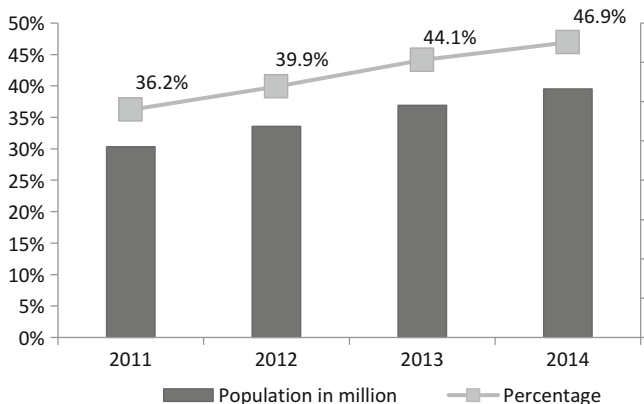
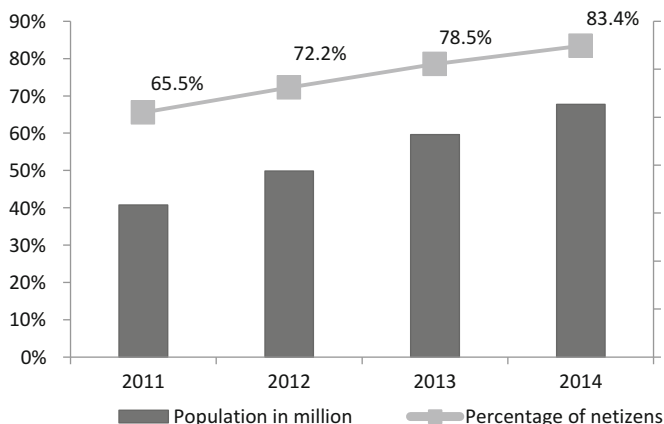**Fig. 11.1** Internet users in China (2011–2014)

Fig. 11.2 Mobile netizens in China (2011–2014)

mobile technologies in the digital age, viz. shifts in instructional development, technical integration, the user interface and learners' experience.

Online Learning Mode of MU

MU is a conventional education institution with campus-based education as the mainstream activity. In the university, the Moodle learning system is used mainly to support technology-assisted teaching and learning, viz. to supplement courses

Fig. 11.3 The Moodle system in the university (Hung & Zhang, 2014, p. 96)

offered at the university and facilitate students' learning in and after class. Figure 11.3 shows the front page of the Moodle system used in the university.

In the autumn semester of the 2013 academic year, the university offered 3228 courses. Among them, 2779 courses used the Moodle system to support teaching and learning in and outside classroom instruction. The Moodle system is used mainly to upload and download files related to the courses, and 2548 courses have set up such files, with 2398 having used it to provide learning resources, 1463 for homework, 338 for testing and 34 to do student learning surveys. At present, the online presentation of learning materials is just a supplement to individual learning or face-to-face classroom tutorials with the BBS forum. The current practice in MU has received positive and complimentary responses and feedback from the faculty and students.

In the presentation of some courses, QR codes are used to support the mobile learning. For instance, by scanning some QR codes, students can watch video lectures by downloading them into their big screen smartphones, though this is not a common practice. At present, according to a survey conducted by www.medu.org. cn, 80% of students have smartphones, which suggests that there will be a growing and prosperous market for mobile leaning in the near future. With the cost of wireless communication reducing, it is the right time to plan a mobile learning system with smart apps to assist seamless learning (Aberdour, 2013).

A Survey on the Learners' Needs for Ubiquitous and Mobile Learning

According to Bates (2015), 'our educational institutions were built largely for another age, based around an industrial rather than a digital era' (p. 3). The conventional distance education institutions are faced with a massive change in their students. How can the online course providers ensure that the contents are delivered to the learners in the way that best suits these digital natives? This is the key issue that education institutions should be taking into consideration in designing online programmes.

The ubiquity of the Internet creates the potential for providing learning to new cohort of learners, to 'ease capacity constraints, and to capitalise on emerging market opportunities' (Rinear, 2003, p. 3). The online computer-mediated platform, as Bielawski and Metcalf (2003) point out, should integrate the wireless devices into the existing scenarios, mapping out site plans to ensure that, in a typical learning environment, wireless will cover 'device selection, possible support for multi-devices, and device management issues, such as synchronization, connectivity, and scalability' (p. 332).

An informal survey was conducted before planning the mobile learning system design to find out the needs of the younger students in the university. The questionnaire was issued in a special website which the students could log into and respond to the items. The website summarises the responses and does the statistics automatically. Around 1384 students responded to the questionnaire online.

Here is a summary of the survey results (Tables 11.1, 11.2, 11.3, 11.4, 11.5 and 11.6).

According to the above summary of the questionnaire statistics, the students have already got some sense of what mobile learning involves. Smartphones, especially big screen smartphones, are rather popular among the students. In the new learning platform, the social media apps will be integrated with the virtual class. The students can access the learning communities by desktop/laptop computers or simply by their smartphones. The prerequisites for the smart learning apps are there – what is waiting to be done is the decision-making.

The Design for Adult Learners on the Move

In collaboration with the Department of Learning Technologies at the Open University of Jiangsu, which is now a fully online teaching institution, a team has been set up to work with some high-technology firms to develop and upgrade the mobile learning system with smart apps which makes a composite of mobile learning with the online learning. The mobile learning system encompasses course learning,

Table 11.1 Main factors affecting online learning

1	Contents of the courses are rather boring	76%
2	Online learning and mobile learning have advantages over other formats of learning. Multi-platforms and seamless learning apps are what the students cherish	70%

Table 11.2 Factors affecting the desire for mobile learning

1	Students do not want to learn.	24%
2	Lack of mobile learning awareness	37.17%
3	Not easy to use and less functions needed	62.83%
4	Dry content, not appealing to students	61.06%
5	Slow linking speed	46.90%
6	Less promotion	38.94%
7	Others	15.04%

Table 11.3 Problems encountered by the mobile learners

1	No strong desire	44.25%
2	Complicated operation of apps	24.78%
3	Lack of genuine developers of apps	35.40%
4	Lack of funding	18.58%
5	Lack of initiatives	1.77%

Table 11.4 The future of online and mobile learning

1	Mobility and ubiquity	77.88%
2	Big data	64.60%
3	Intelligence	53.10%
4	Socialising	46.90%
5	Seamless learning	37.17%
6	High efficiency	37.17%
7	Gamification	52.21%
8	Hybrid learning	46.90%
9	Take the place of conventional education partially	53.98%
10	Replace conventional education	3.54%

Table 11.5 Attitudes towards mobile and conventional online learning

1	Both have their own advantages	71%
2	Mobility will surpass the online learning	16%
3	Mobility will not surpass the online learning	9%
4	No connection between the two formats	4%

Table 11.6 The weaknesses of mobile leaning (open questions)

1	Not so convenient for keying in text on the mobile device screens
2	Most of the screens are not big enough
3	Limitation of the width of the broadband

educational training, educational management, educational information collection, outdoor learning support, mobile Q and As, education blogs and educational game modules. The mobile learning system is a multi-platform compatible with android and IOS.

The following functions of the mobile learning platform have been considered:

- Small, delicate, specific, low-cost learning mode
- Free, flexible learning mode; easy to fragment the learning process
- Break the limits of time and places; easy to learn anytime and anywhere for any purposes
- Integrate pictures, texts, sound and videos to enhance the efficiency of learning
- Revolutionise the mode of assessments; conduct statistics smartly; and improve the management of learning
- Embedded with social media apps, such as Line/WeChat or Facebook/QQ to set up learning communities
- Synchronous live webcast/recording, VOD, synchronous directing of the webcast; automatic tracing of learning activities for the learners
- A special sign-up system for the learners to make them adopt better learning habits

With this mobile learning system, the users are expected to post and upload information, notices etc., make the trees of knowledge in detail but in branches of categories, contact the instructors/tutors, watch the short video clips, browse the data needed and use learning management and learning support.

The Plan for Implementing a Ubiquitous Learning System

To date, the core designs of the mobile learning system at the Open University of Jiangsu have been completed and the smart apps for course learning and assessment have been developed and tested among the civil engineering students, who will be the first cohort to enjoy the benefits of the ubiquitous and mobile learning system. The reason for this is quite obvious: they are scattered around the country in diverse worksites, away from the reach of the Internet for months. Learning fragmented knowledge in fragmented time will surely facilitate their engagement in learning.

The action plan has been initiated and submitted to the University Senate for its approval for implementation. The action plan will be executed in three phases: a pilot phase, trying out the smart apps in the civil engineering programmes; a modification phase, modifying or redesigning some apps to be applied in three other programmes in the humanity disciplines; and, finally, the overall implementation of the smart apps in all the programmes of the baccalaureate and associate degrees. All the phases will be completed in 1 year, and the evaluation report on the implementation will be published after that.

This point should be emphasised again: the smart apps are not designed for one course or one programme – they will bridge the online learning Moodle platform and the mobile learning system to create a seamless learning system. The potential

benefits of adopting this new alternative route to the learning platform are greater engagement with learning activities, learners' satisfaction and versatility.

Conclusion

At the time the authors prepared this paper for publication, the Ministry of Education proposed an initiative to promote online learning, which depicts a bright future for education institutions getting involved in open and distance learning. In China, big screen smartphones sell well, and this suggests that ubiquitous and mobile learning will have a very major expansion in education and there will be a massive market for it. Smartphones with smart apps will benefit learning whether formal, non-formal or informal in the future of education.

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