Mobile-Learning: Thai HE Student Perceptions and

Potential Technological Impacts

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Abstract

Higher education appears to be changing in the Thailand, as students, especially younger students whose social networking concerns match their obsession with mobile technology, may take issue with past academic teaching patterns and practices and opt for more contemporary approaches such as mobile-learning (m-Learning).

This research used a qualitative approach and conducted a focus group of students (N=15) drawn from a target population of 256 using a simple random sampling process exploring their recent experiences of m-Learning at a small HE institution in Thailand.

The major results yield a mixed response in terms of student readiness for m-Learning technology demands. The analysis would appear to suggest that there are crucial technological constraints that have to be overcome relating to mobile devices, the media used and the effects of the delivery mechanism; and that these technological constraints have a considerable impact on student's pedagogic engagement.

Future research implications and issues surrounding the development of mobile-Learning in Thailand higher education are also discussed.

Keywords: M-Learning, Higher Education, E-Learning, ICT

1. Introduction

Higher education appears to be changing in Thailand. Students, especially younger students (Wilson and Velayutham, 2008) – whose social networking concerns match their obsession with using mobile technology (Conole et al., 2006) – may take issue with past academic teaching patterns and practices and opt for more 'sexy' contemporary approaches such as m-Learning (Weller, 2008). These students can be characterised essentially as *digital natives* (Prensky, 2001a). Robinson's (2008) notion of students learning behaviour as *collaborative, problem solving and task based* may not reflect a universal student phenomenon and could perhaps be somewhat imprecise when applied to Thailand settings. This may be considered in terms of the disconnected discourse (Lippincott, 2005) between what higher education offers students and what they demand in terms of learning attributes and the technological provision that encompasses their pedagogic needs (Senge et al., 2000). However, Bates (2001) claimed that many HE institutions in developed countries may not move towards more focused and integrated e-Learning practices and this may thus offset and reduce the pattern of HE institution engagement in the newer and subsequent leading trend of m-Learning (Seppälä and Alamäki, 2002; Donnelly and McSweeney, 2009).

Consequently, student demands could add pressures to Thai higher education to make their educational provision more personalised, interactive, responsive and facilitative (Oliver and Herrington, 1995) – using and adapting technologies in the same way as expected through students' normal social-networking behaviours (Brusilovsky, 2001) thus emphasing the positive effect of social-learning patterns (Jonassen et al., 2003). However, engaging higher education processes to consistently meet student's requirements comes at a cost. Besides the usual costs of media development, universities in Thailand will also have bear the costs of on-going staff training (Prendergast, 2001; Groves et al., 1998); upgrades to hardware and software; and of course the cost of understanding what students want. Whilst these are upfront costs, which burden the higher education purse, there is also the opportunity-cost associated with not engaging with such contemporary technologies as the competition seizes such opportunities to increase student recruitment and retention (May and Bousted, 2003). This also puts pressures on higher education internal changes such as quality assurance mechanisms and how these are changed to facilitate assessments. Thus, changing one part of the technological equation creates fundamental and on-going issues that

underpin exactly what higher education needs to do in order to match ongoing student technical and pedagogic demands. Web 2.0 and any corresponding use of mobile devices are seen as technological tools (Alexander, 2006) in helping to link the HE institution to meet these current student demands. The power of Web 2.0 underpins e-Learning 2.0 and helps create and communicate towards a more effective distributed learning environment.

What are mobile devices? Petsas et al. (2001) suggests that mobile devices are often technologies such as personal digital assistants (PDAs); smart mobile phones; iPods; and the now ubiquitous iPad etc.; and this could also include such things as web-based systems that support both internet and mobile access. This is seen by some as innovative (Nyiri, 2002), reflecting newer and broadening learning channels that seemingly offer organisational flexibility. According to Bowles (2004), m-Learning can be characterised as the ability to perform training and assessment tasks using any device connected to any network – whether mobile or fixed (Prensky, 2001). Ally (2004) defined m-Learning as the delivery of electronic learning materials to mobile devices. Unfortunately, targeting remains one of the ubiquitous problems of electronic media personalisation developments (Perugini and Ramakrishnan, 2003) through which to deliver appropriate adjustments in learning content provision as flexibility is required as a consequence of heterogeneous mobile technologies relating to student device software capabilities and hardware limitations.

Numerous researchers have discussed digital system developments (Petsas et al., 2001; Cheng et al., 2000; Tsai et al., 2000) and have shown how user data can be used to provide appropriate content/information streams that match targeted user learning needs. More appropriate to this paper, Zhang and Shijagurumayum (2003) used the concept of *user metadata* as a profile underpinning the delivery of targeted and customized content to mobile-phone users. This has not been lost in pedagogic developments, as research has focused, for example, on how students may be assisted in receiving individualised and personalised knowledge content (Dahn and Schwabe, 2002) whether as assisted learning in the classroom (Carchiolo et al., 2003) or through distance-learning programmes (Qu and Shen, 2002; Dadarlat et al., 2002), whilst also empowering students to become far more productive (Metcalf, 2006). This raises the context for the first research question – *What is it that students want from m-Learning*?

Further, student engagement in m-Learning appears to encourage independent and collaborative learning experiences (Metcalf, 2006); helps learners identify areas where they need ICT support (Vermetten et al., 2002); and helps combat resistance to use of ICT (Hunt et al., 2002). This raises the context for the second research question - *What technological issues surrounding m-Learning practices would help students learn more effectively*?

m-Learning appears from the literature to remove formality from the learning experience (for example Wilson, 1996); helps learners remain focused (Blackboard, 2006) and raises student confidence (Johnson & Johnson, 1999). Consequently, it has become an operational imperative for universities to deliver appropriate learning requirements to interested stakeholders/students (Freeman and Thomas, 2005; Lancaster and Reynolds, 2002) directly through contemporary technologies such as mobile devices (Tapp et al., 2004). Coupled with the technology limitations are the issues surrounding delivery band-width (Jones et al., 2006), which has an impact on the effectiveness of the whole m-Learning experience – irrespective of the mobile-device capability or the content design. This raises the context for the third research question - *What are the technological constraints and opportunities affecting student's engagement of m-Learning at the HE level*?

2. Methodology

To consider more closely the technological issues involved in the application of m-Learning in a Thailand HE institution, this empirical paper employed an interpretive approach. This used a semi-structured questionnaire utilising a focus group as is now common practice for such enquiries (Krueger, 1994). This provides an appropriate element of context and flexibility (Cassell and Symon, 2004). Given the lack of purposeful research in the area of m-Learning at universities in Thailand, this methodology is seen as appropriate for generating contextual data supporting the purpose of underpinning enriched theory development (Cayla and Eckhardt, 2007), and informing *professional practice* (Brown et al., 1994).

The population for this study were all registered 4th year undergraduate students of a business faculty in a single HE institution in Thailand (derived from Carman, 1990; and Glaser, 2004). The criteria of theoretical purpose and relevance (Glaser and Strauss, 1967) were applied to the identified population whose ages ranged from 20-24 years of age. Consequently, all 4th year undergraduates in the business faculty were included in the population frame as individuals (material objects) that form the focus of the investigation (Burgess 1991) – resulting in 256 available students. This was based on the notion that they had spent nearly 3 years at the HE institution, and it was also assumed that they had sufficient experience of using mobile devices and could account for their views in terms of the research orientation (Morse, 1994). Each student was given a number and the resultant sample frame was based on simple random sampling (after Harrel and Fors, 1992) and a group of fifteen (15) were chosen (Onwuegbuzie

and Leech, 2005a; Carrese et al., 2002) as this was the number considered optimum for the operation of a focus group (Vaughn, et al., 1996; Johnson and Christensen, 2004) in order to provide expected levels of interaction. This was also considered the appropriate sample size for this qualitative research orientation as it is driven by the need to uncover all the main variants on a research conception (Kember and Kwan, 2000). Levine and Zimmerman (1996) suggest that a further important consideration of using the focus group was that this method innately acknowledges *participants as experts* and is designed to obtain perceptions for a defined research purpose in a positive, interactive environment (Krueger, 1994), as well as its ability to link effectively with other qualitative methods (Vaughn et al., 1996). This supports the notion that all 4th year students were sufficiently experienced to provide appropriate opinion and context for the research questions. The focus group was conducted in English and audio recorded for future analysis. The focus group interview took approximately one and a half hours and was later transcribed verbatim. The conduct of the interviews follows a similar process as used by Gray & Wilcox (1995), where the group was asked a small set of prepared questions modified through ancillary questioning (probes and follow-ups) in the same way as Balshem (1991).

The focus group outcome was manually coded initially using Acrobat according to sub-themes that 'surfaced' from the interview dialogue whilst employing a form of open coding which was derived from Glaser (1992a) and Straus and Corbin (1990). This treatment was also reinforced through deep and surface approaches (Gerbic & Stacey, 2005) and extended through the use of thematic analysis conducted using the NVivo qualitative software package (Walsh et al., 2008). In this way, no portion of the focus group dialogue was left uncoded and the outcome represented the shared respondents views and perspectives through an evolving coding sequence (Buston, 1999). Various key and sub-themes were detected using the NVivo qualitative software package, as well as from the application of manual coding. This dual form of interrogation was an attempt to increase the validity of the choice of both key themes and sub-themes through a triangulation process. NVivo was further used to explore these sub-themes by helping to pull together each of these sub-themes from the focus group interview (Harwood & Garry, 2003). It was thus possible to capture the respondent's comments on each supported sub-theme and place them together for further consideration and analysis.

3. Presentation of Research Framework Outcomes

The research questions were mapped to the 15 generated major themes as seen in Table 1, as below.

Table 2, below indicates the Major Themes and relevant student examples associated responses used in exemplifying the research discussion as below.

4. Research Outcomes

Three major questions were asked in the focus group interview. The style adopted for reporting and illustrating the data is influenced by Gonzalez, 2008; Carpenter, 2008; and Daniels et al. (2007) and is discussed below, focusing on the raised research questions. The questions and the resultant main themes are presented in Figure 1 - Model of Research Outcomes, below.

4.1 What is that Students Want from M-learning?

Students appeared to desire media that they could use to collaborate with other students (Moriarty, 2008; Clarke and Hermens, 2001) as depicted by one student (S4) who indicated that ...*what's the point of using technology instead of class, if you can't connect and work together?*... This was supported by another student (S6) who stated that ...*we're used to getting together online – it's what we do best*... (Main Theme - Collaborative Capability).

This requires that the core course media is flexible pedagogically in terms of learning engagement, consequent learning outcomes and social integration (Duin, 1996), as one student (S8) stated ...*we all learn in different ways, and so the technology should help us do just this*.... Another student (S4) insisted that ...*we've paid for our phones* [sic technology] *so if we sign-up for online courses we should get more* [than] *that with just normal lessons*... This would seem to be a crucial factor which could use the inherent capabilities of mobile devices through social discourse mechanisms (Mathews, 2004), as one student (S2) seems to underpin this with a comment that ...*since we are socially aware online, then the university could tap into this to make our learning better*... as well as reducing the element of *perceived* distance (Zhao et al., 2002) as depicted by one student (S9) ...*by bringing us closer*... (Main Theme - Flexibility).

Many students did not seem to want m-Learning (based on Mason, 1998) which differs from Chan (2001) in terms of helping develop learner autonomy, as depicted by one student (S1) ...*I have to pay the extra phone charges, for what?...the same as in class – you've got to be kidding me!*... Another student (S7) suggested that [in class] ...*I like to sit down and ponder... I like the atmosphere... I like the jokes... you can't get this from a mobile-phone can you?*... This was an interesting outcome. This was intimated through expressions of not wanting to lose *classroom time*. It

would seem that face-to-face engagement (Schifter, 1999) was required more than their use of a mobile-device. This may reflect social aspects that goes beyond just technological possession and its consequent use (Bitner and Bitner, 2002) and it may also expose learning concerns (Rakes and Casey, 2002) relating to technology adoption within the learning sphere. (Main Theme - Learner Engagement).

Students appeared to want more say in what was actually presented, as some "programmes" used copied material that was used in a normal face-to-face teaching session without any *apparent changes* (similar to that as raised by Rovai, 2000). For example, one student (S6) indicated that *...we can download material from the class web-site when we have a normal class, why would we want to have only this?...* Another student (S3) suggested that *...I think the lecturer is lazy when they do this. At least when we have a class I can say what I think and the lecturer hears it....* This has a number of implications: firstly, students appear to understand from prior experience, that m-Learning should be different in terms of delivery and media content following advice from Moriarty (2008); secondly, students appear to demand that if they use their technology then the "system" must understand this and deliver a more robust and personalised learning outcome (Chard, 2000) in terms of student learning portfolios (Chen, et al., 2000); thirdly, programme design and delivery issues are raised that students overtly recognise, and these need to be mitigated through appropriate e-Learning developments (Clayton, 1997) in order to shape the mobile learning outcomes (Andrews and Haythornthwaite, 2007) more effectively. As such, some students felt "left out" with the level of institution m-Learning engagement where technology was perceived as only a *delivery mechanism* (HEFCE, 2005), rather than an integrated and shared pedagogic/learning support process. An example underpinning this is stated by one student (S10) who expressed that *...I just don't understand it. I mean like... if they force us to do this, shouldn't they also know what we want...* Another student (S1) further indicated that *...I mean it's not as if we have choice is it... It can't be that difficult can it?...* This suggests that universities may need to undertake and deliver more appropriate media, through more effective channels to satisfy student needs (Waller & Wilson, 2001) whom *expect* to engage with the power of mobile-learning, not just through copy-learning but also in terms of how the technology could be used (Rahm and Reed 1997). (Main Theme - Delivery and Media Content).

4.2 What are the Technological Constraints and Opportunities Affecting Student's Engagement of M-learning at the Institution?

Students didn't appear too concerned about what they could use their devices for, as typified by one student (S12) who suggested that *...I love my mobile - it's me, it's everything about me, why wouldn't I want to use it for study?...*; but there were practical concerns raised about the speed of connection (Cunningham et al., 2000). An example to support this, was raised by one student (S8) who stated *...I can't seem to connect very well... it's not me... when I want to view the material, it is just so slooooow...*; further, access issues were raised by students (Magnussen, 2008) and their subsequent costs associated with downloads (Sekikawa et al., 2001; Dames and Handscomb, 2002). This was typified by one student (S2) who indicated that *...it isn't just the extra costs but the waiting time...* This issue can easily be overcome with increased number of sets of Wi-Fi or 802.11 networking components wireless networks that enable greater *mobility and facilitate mobile learning* (Corbeil and Valdes-Corbeil, 2007). This would also provide for enhanced coverage and network speed (see later) thus mirroring Turnbull's (2010) notion of providing *staff, students and visitors to the university with the best experience of using the Wi-Fi network*. (Main Theme - Speed of Connection).

When students used Wi-Fi capable/enabled mobile-devices their use was considered as essentially 'free of charge' and were thus not be seen by these students as a constraint – but the cost associations of mobile-devices capable of only connecting through GPRS or Edge raised some student cost issues. For example, as one student (S2) indicated *...we are willing to use our phones for learning, but the material... well, it's not what I would expect...* Another student (S7) suggested *...we paid the same course fees...* It was perceived by some students that they subsidised the "system" whenever they engaged with on-line courses, as one student (S8) suggested *...we help the university. Why can't they make sure that what we get is fair... and useful...* (Main Theme - Costs Associated with Downloads).

Mobile viewing of media content was initially accepted by students, but many thought that this went away from the need to be in class (Rovai, 2000) supporting Chan et al. (2003); as was the negative impact of the large file size of the presentations (Magnussen, 2008); and often, the presentation's lack of interaction (Ponzurick et al., 2000) – seemingly ignoring the need for student media/interaction (Wong, 2007; Chan et al., 2003) (see further above). As one student (S7) intimated *...why we need to do this...I don't know... I prefer listening to my lecturer directly...* Another student (S2) stated that *...I wait very often for the file to download only to find that I can't view it properly...* Technological constraints were therefore perceived to be related to how student's viewed how they could use the m-Learning material provided (Rovai, 2000), as well as related to design issues surrounding the media's development and delivery. In order to make sense of this and to help students engage more effectively with the

material offered, students may need more tutorials from university lecturers on how to gain the most from such media (Aakhus and Katz, 2002) and also the university system could also utilise avenues such as Facebook by allowing shared experiences in order to provide streamlined channels for improved course communication in order to *construct their own knowledge and share among themselves* (Goh and Kinshuk, 2006). (Main Theme – Use).

Further, students continued to advise that there appears to be a disparity between most students' ownership of the mobile-device (Rishi, 2007), their use (as reinforced by Clark, 2001), and the implications for these in terms of HE institution operations. For example, one student (S5) stated that *...I bought this phone for me, not for university materials – it takes up a lot of like my memory and leaves little for my photos and vids...* This is perhaps seen as a major stumbling block to m-Learning developments. An ad-hoc assessment of the students own personal technology demonstrated that few mobile devices were presently 3G capable and that suggested that it is the diversity of technology that student's own that is a major barrier to m-Learning developments in Thailand. This is typified by one student (S5) who indicates that *...just because the university is rich doesn't mean all students are rich... ...like I have this mobile but the university seems to ignore me 'cause I can't see everything that is given...* This could be remedied in some part by the application of technological surveys (Stone, Alsop and Tompsett, 2003) designed to understand what platforms and level of technology students possess (Öquist, Goldstein and Chincolle, 2004) for any given year and to provide guidelines to lecturers and students on how best such technologies could be used, and to be less disruptive (Funk, 2004) – with the possibility of influencing what mobile technologies should be purchased by students in order to increase m-Learning participation (VanDeGrift et al., 2002). (Main Theme – Ownership).

Student's suggested that they are willing to engage as long as the m-Learning platform was configured in a way that made the learning experience appear seamless (Chan et al., 2003), rather than a mirror of class materials (Burch, 2001) which is a matter for lecturer ICT interactive skills development (Sharples, Corlett and Westmancott, 2002). An example, from one student (S11) suggested *...if we knew in advance of what the tech requirements were, then maybe we could update our phones. But you can't blame students for bad vids...* Another student (S1) indicated that *...phones are expensive, so I can expect the university to know what I use... ...all they need to do is ask...* Although this is perhaps an opportunity, there are considerable technological issues to consider and mitigate as students struggle to engage in the provision of contemporary higher education m-Learning practices and to be able to treat such practices as a flexible learning platform for both staff and students as portrayed by Lehner and Nosekabel (2002). (Main Theme – Learning Experience).

4.3 What Technological Issues Surrounding M-learning Practices would Help Students Learn More Effectively?

Some students perceived that they favoured face-to-face over mobile-device technology (Rovai, 2000); but others recognised that more interactiveness (Lau and Bates, 2004) may help students learn in a more personal way (Armstrong and Hagel 1996). An example, indicated by one student (S6) *...there are too many tech issues...* Another student (S4) further suggested *...until they get it right I prefer to see my teacher...* Further, another student (S14) suggested *...I'm forever going to the ICT department – I may as well download them onto my home-computer and upload it to my phone from there... ...not very mobile is it?...* Thus, many students appeared to prefer interactive media (Wong, 2007) and learning from some student experiences of game-play (Prensky, 2000) this suggested that prior technology experience may have a positive effect on student perceptions of, and engagement with, m-Learning needs, requirements and capabilities. As one student (S7) asserted *...all the software is like interactive, so why not what we get from uni...* Consequently, it would appear that university lecturers need to build in much more interactiveness with their mobile offerings (Sharples, Corlett and Westmancott, 2002). Lecturers may also need further training and conduct appropriate university testing in order to provide more visually interesting (Earle, 2002), interactive, as well more pedagogically tuned and engaged media (Bates 2001) by using the concept of targeted *user metadata* introduced by Zhang and Shijagurumayum (2003). (Main Theme – Interactiveness).

However, mobile broadband which is considered by many as a very fast, ubiquitous, and an *always on* technology (Wong, 2007) will affect how universities connect to students. An example as typified by one student (S5) who indicated that *...I can connect anytime I like... it's great.* This will possibly create a new digital divide (Andrews and Haythornthwaite, 2007; Carnaby and Rao, 2003) - as another student (S11) suggested *...you have to be rich to have the kind of tool that's always connected. I mean.. uh.. like it needs a huge monthly cost... I can't afford that now...* but more importantly, as a consequence it will bring about substantial changes to mobile pedagogic provision (Conole, 2004) as determined by one student (S1) who indicated that *...the university may have to standardise and subsidise students mobiles, by... say, I mean like... providing us with mobiles while we are on their courses...* This will also raise issues in how the university deals with the costs of such developments and using Taylor's (2004) notion of a task-centred approach may also help the university engage successfully with technology aware students. (Main Theme – Mobile Broadband).

Coverage issues were raised by many students, as the programme content and accuracy was brought into question (Corbeil and Valdes-Corbeil, 2007). An example typified by one student (S8) suggested ...*even when we are in town the signal isn't all that good sometimes*... Another student (S9) indicates ...*it's a pain downloading for 20 minutes and then the connection is broken and you have to like, start all over again; it's a pain*... These issues were perceived as important by students as the lack of face-to-face engagement left students feeling on their own, isolated and seemingly vulnerable to different interpretations of the course pedagogic arrangements and outcomes – as one student (S3) typified ...*it's OK that we can connect and download at anytime, but what if you have questions at 2am – no one is awake then are they? I mean.... like lecturers are sleeping at that time of day*... thus suggesting that lecturers must make educational provision for students more personalised (Kramer et al., 2000), interactive (Chan et al. (2003), responsive (Wong, 2007) and facilitative leading to more connectedness, and a reduction in isolative perceptions (Castells, 1999). (Main Theme – Coverage).

A final model of the questions and the resultant main themes underpinned by relevant literature is presented in Figure 2 - Final Model of Research Outcomes Supported by Examples of Relevant Literature, below. This model illustrates the diversity of literature engagement in the m-Learning environment and also shows that although the literature has come from a variety sources it is possible to coalesce them into a more targeted form. It would appear that each question has raised significant issues that are addressed in the discovered key themes and sub-themes generated through this analysis. More importantly these key themes have been modelled to illustrate their influences and associations and thus help focus the research outcomes.

5. Future Research

Although this was an exploratory study, there are issues that were revealed that could possibly need further research focus. Suggestions for future research include examining the implications and issues surrounding the development of mobile-Learning in Thailand higher education with a focus on mobile-broadband developments; seeking wider student opinion (Reigeluth & Garfinkle, 1994); assessing lecturer needs and engagement of m-Learning technologies (Zurita and Nussbaum, 2004); and evaluating the impact of ICT support requirements and how these could enhance student learning experiences through collaboration within and outside the classroom (Taylor, 2004).

6. Conclusion

The major outcomes of this m-Learning exploratory inquiry targeted to final year students suggest that there are many and varied issues that may be assessed before m-Learning could be more widely adopted in Thailand higher education. Student responses suggested that many had thought that they would not like m-Learning to become a mirror of classroom use supporting the engagement in web 2.0 (Anderson, 2006). A different and more personalised learning model was asked for by students and this signals that there could be a new HE institution applied learning-provision model will need to be developed as m-Learning capable mobile-devices become more popular in Thailand; and the potential opportunities to enhance the mobile-learning experience by connecting directly to students increases through the possible development of mobile-broadband.

However, this will require changes in overall HE institution management strategy (Inglis et al., 2002) and possibly result in the future development of a new paradigm in university pedagogic operations in Thailand as the take-up of mobile computing trends appears to be fuelled only by substantial technological adoption by students (Varvel and Thurston, 2002). It will take Thai HE institutions beyond technology change per se, to a more enlightened pedagogic techno-cultural ethic based on advanced technology developments and improvements. This will change the structure and orientation of universities through demands for more interactive social-learning experiences (Downes, 2005b), and as such this will put pressure on the development of more open and flexible organisational characteristics (Bates, 2001). Nevertheless, developing learning media that is pedagogically innovative, fresh and unobtrusive in terms of technological constraints will remain a major obstacle to its integration (Farrell, 2001) into the Thailand higher education system for the foreseeable future.

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Table 1. Research Questions and Major Themes

Research Question	Major Themes
What is that students want from m-Learning?	Collaborative Capability
	Flexibility
	Learner Engagement
	Delivery and Media Content
What are the technological constraints and opportunities affecting student's engagement of m-Learning at the institution?	Speed of Connection
	Costs Associated with Downloads
	Use
	Ownership
	Learning Experience
What technological issues surrounding m-Learning practices would help students learn more effectively?	Interactiveness
	Mobile Broadband
	Coverage

Table 2. Major Themes and examples of Student Associated Responses

Major Themes	Number of Student Responses Used
Collaborative Capability	12
Flexibility	14
Learner Engagement	22
Delivery and Media Content	31
Speed of Connection	39
Costs Associated with Downloads	18
Use	16
Ownership	24
Learning Experience	27
Interactiveness	19
Mobile Broadband	23
Coverage	15
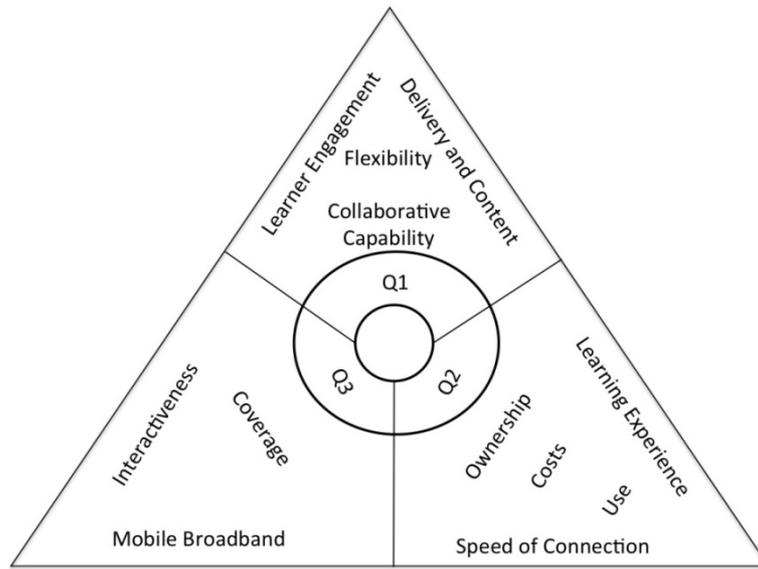
Figure 1. Model of Research Outcomes

Figure 2. Final Model of Research Outcomes Supported by Examples of Relevant Literature