ASSIMILATE OR ACCOMMODATE?
THE NEED TO RETHINK CURRENT USE OF THE TERM 'MOBILE LEARNING'

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Abstract

Mobile devices are now ubiquitous in many areas of the globe and used for all kinds of communication modes in all walks of life, notably for learning as well as for entertainment. So what exactly do we understand by mobile learning? For a decade now, as mobile devices are found in an ever wider range of learning situations and contexts, mobile learning researchers have sought to define (Sharples, Taylor and Vavoula, 2007; Wexler et al., 2008) and redefine (Crompton, 2013) mobile learning in a way that is meaningful within this increasing range. However, the need to categorise educational applications of mobile technologies has become a progressively more complex challenge (Park, 2011), also including the classroom as a pedagogical context for mobile learning.

However, Sharples and colleagues' (2007) original definition of mobile learning emphasised the assumption that, for learning to be mobile, learners must be continually on the move which is clearly not the case for students using mobile devices in class. Yet the mobile learning research community continues to try to assimilate these instances into their understanding of mobile learning. Is it not now time to create a new concept reserving the original term 'mobile learning' for mobile technology supported learning opportunities that involve the learners physically moving between contexts?

Keywords

Mobile learning, mobile devices, learning, classroom, definition

1. What do we understand by Mobile Learning?

The concept of mobile learning came into being along with the twenty-first century and was largely driven by the new learning opportunities offered by personal, portable technology that could connect to the Internet via mobile phone networks or wireless networking. Pioneers from both higher education and business introduced us to the term mobile learning in the year 2000. In the UK Mike Sharples published a framework for the design of personal mobile technologies for lifelong learning (Sharples, 2000) in a well-established academic journal. In the US, in an online magazine targeted at the 'New Economy', Clark Quinn announced a working definition of mLearning (short for mobile eLearning) - using a Palm OS personal digital assistant as a learning device (Quinn, 2000). So, for Quinn, mobile learning was eLearning delivered via mobile computational devices which, at the time, were Palms, Windows CE machines and some digital mobile phones. However, Sharples' work focussed more on the role of the learner than the technology and, with colleagues, he developed the definition of mobile learning to be used by Mobilearn, the first international research project to explore mobile learning. This was:

> «Any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies» (O'Malley et al., 2005, p. 7).

This was insightful as the technology changes rapidly however, the contrast in approaches has been an issue for researchers seeking clarity over the concept of mobile learning ever since. Another early authority Agnes Kukulska-Hulme recognised the challenge as she wrote in her introduction to the first Handbook of Mobile Learning edited with John Traxler:

> «Readers will probably position themselves differently in their own definitions of mobile learning, as indeed do the various contributors to this book: there are many ways to conceptualize, theorize about and experiment with mobile learning» (Kukulska-Hulme and Traxler, 2005, p. 5).

Yet, by and large, the community of researchers and innovators in mobile learning have not been content with this eclectic approach and continued to define and redefine mobile learning. Changes to these definitions have been regularly prompted by the ever increasing range and contexts where mobile devices can be used. Brown (2005) describes this growth as the background to his placing of mLearning firmly as a subset of

eLearning but one that provides «more mobility, flexibility and convenience» (p. 10).

One of the most widely cited definitions gains credence from the authors' association of it with their aim to develop a widely applicable theory of mobile learning relevant to the broad range of learning opportunities available in the twenty-first century. Sharples, Taylor and Vavoula (2007) point out that the first step in developing a theory of mobile learning, surely, is to distinguish what is special about mobile learning compared to other types of learning activity. The obvious answer is that it starts from the assumption that learners are continually on the move. Their definition of mobile learning ia «the processes of coming to know through conversations across multiple contexts amongst people and personal interactive technologies» (Sharples, Taylor and Vavoula, 2007 p. 4), therefore reflects the dynamic, changing nature of mobile learning contexts and the authors' conception of learning as an interaction within a system.

Other definitions, not unsurprisingly, also reflect their authors' predominant conceptions such as this one emphasising productivity by Wexler et al. (2008) that was aimed at eLearning professionals in the US and presented in a report for the eLearning Guild exploring what mLearning is, why it matters and how to incorporate it into a learning strategy. Thus the eLearning Guild defines Mobile Learning (m-Learning) as follows:

«Any activity that allows individuals to be more productive when consuming, interacting with, or creating information, mediated through a compact digital portable device that the individual carries on a regular basis, has reliable connectivity, and fits in a pocket or purse» (Wexler et al., 2008, p. 7).

Another US based professional association, Educause, that was formed to serve the interest of higher education information technology community also starts their definition of M-Learning with a technological focus however it then moves on to restate the importance of mobility emphasising learning opportunities outside the traditional classroom:

«Using portable computing devices (such as laptops, tablet PCs, PDAs, and smart phones) with wireless networks enables mobility and mobile learning, allowing teaching and learning to extend to spaces beyond the traditional classroom. Within the classroom, mobile learning gives instructors and learners increased flexibility and new opportunities for interaction. Mobile technologies support learning experiences that are collaborative, accessible, and integrated with the world beyond the classroom» (Educause, 2015).

This definition also includes mobile technology enabled collaborative learning experiences, a notion also introduced by Sharples, Taylor and Vavoula (2007) as new pattern of mobile learning. However, for Educause

the focus on mobility of mobile learning as «an essential defining attribute - is beyond dispute» as Oller (2012, p.1) pointed out in a research bulletin on the future of mobile learning created specifically for Educause.

However, this view is not endorsed by all within the mobile learning community. John Traxler, in reflection on both the content of this debate and its length, notes «After extended discussions within the mobile learning research community about the definition, it is probably just 'learning with mobile devices'» (2011, p. 4). He then takes a different approach listing four key ways in which mobile learning opportunities can enhance, extend and enrich both the concept and the activity of learning itself. He labels the first as contingent mobile learning and teaching, where learners can use personal, mobile devices to react and respond to their environment and their changing experiences both inside and outside the classroom. A typical scenario, where a 10th grade class studying ecology have walked a mile or so from school to a local river to collect data such as its pH and flow and to record nearby flora and fauna is shown in Figure One below. Their data collection is guided by pre-planned spreadsheets created by the teacher as shown in Figure Two alongside.

Fig. 1 Field data collection with mobile devices

▲	A	B	C	D	E	F	G	H	I
1	River Data Study								
2									
3	Location 2								
4	flow rate	d less than 1							
5	pH	8.2							
6	temperature		16.6						
7	oxygen		73.0						
8									
9		0	1	2	3	4	5	6	7
10	depth profile								
11									
12	to record) Totals								
13									
14	Mayfly lava	1							
15	Stonefly lava								
16	Caddis-fly lava								
17	Dragonfly nymph								
18	Snails								
19	Alderfly lava								
20	Leech	1							
21	Bloodworm	1							
22	Flatworm								
23	Shrimp								
24	Damselfly lava								
25	Pondskaters								
26	Water beetle								
27	Chironomid	9							
28	larvae	5							
29	stickleback	1							
30	hoglouse	1							

Fig. 2 Spreadsheets for data collection

The second is situated learning, where learning takes place in surroundings that make learning meaningful. Traxler exemplifies this with the examples of learning religious studies whilst visiting temples, mosques, churches and synagogues or learning about fish biodiversity whilst at sea. The above scenario meets this description as well as the first. His third category of mobile learning opportunities are those that enable authentic learning, where learning tasks are meaningfully related to immediate learning goals, for example an app supporting nurse trainees doing drug calculations on hospital wards. Another, now commonly seen, example would be learning to cook a particular dish through following a recipe retrieved from the Internet in your own kitchen. The fourth key way in which mobile learning extends and enriches the concept and activity of learning itself is context aware learning, where learning is informed by information on the history and surroundings of the learner, for example in art galleries, botanical gardens and museums that is delivered via their device. A typical example of this is the 'uMuseum', a mobile learning system set up using RFID tags attached to museum exhibits in a cultural museum in Taiwan (Chen and Huang, 2012). Visitors

could use their mobile devices to scan the RFID tags to access more information about each tagged exhibit.

Other areas noted by Traxler (2011) where mobile learning is enriching the learner experience include location-specific student support systems such as the open source Mobile Oxford and My Mobile Bristol applications. These systems enable students at Oxford and Bristol universities in the UK to find any information they need, such as, for example, which bus to take them to the library holding the book they want at a particular moment in time, even allowing for multiple buses and multiple copies of the book being lent and returned at different libraries. Also he notes that assessments and tests are now increasingly exploiting mobile technologies, for example with physiotherapy students capturing visual proof of treatments in situ and trainee motor vehicle mechanics capturing evidence of their competence at engine maintenance procedures. In addition, ePortfolio systems used by universities and colleges for their students such as Pebble Pad are migrating onto mobile phones allowing reflections on learning to be captured straightaway at the location they occurred.

This wealth of learning opportunities afforded via mobile devices goes some way to demonstrate why the community has found it so hard to settle on a single, agreed definition of mobile learning. One of the latest converts to mobile learning opportunities, UNESCO, tries to cover these multiple aspects.

> «Mobile learning involves the use of mobile technology, either alone or in combination with other information and communication technology (ICT), to enable learning anytime and anywhere. Learning can unfold in a variety of ways: people can use mobile devices to access educational resources, connect with others, or create content, both inside and outside classrooms. Mobile learning also encompasses efforts to support broad educational goals such as the effective administration of school systems and improved communication between schools and families» UNESCO (2015).

Others have even announced that mobile learning is undefinable. Winters (2006) reflecting on the Big Issues in Mobile Learning workshop held by the pan-European Kaleidoscope Network of Excellence in 2006 reports «there was general agreement that a precise definition of mobile learning is unattainable» (Winters, 2006, p. 6). The expert group discussions moved on instead to propose four key characteristics of mobile learning. These included:
- that it enables knowledge building by learners in different contexts;
- that it enables learners to construct understandings;
- mobile technology often changes the pattern of learning/work activity and
- the context of mobile learning is about more than time and space.

This stands in stark contrast to a recent, much more succinct definition, put forward by Helen Crompton in her historical overview of mobile learning in the, almost encyclopaedic, Handbook of Mobile Learning published by Routledge. She defines mobile learning as «learning across multiple contexts, through social and content interactions, using personal electronic devices» (Crompton, 2013, p. 4).

Others take a different approach, aiming to frame (Koole, 2009) or categorise mobile learning (Park, 2011) thus avoiding the need to first wrestle with a definition. Koole's model, developed as a basis for assessing the effectiveness of mobile devices for distance learning, makes it clear that she defines mobile learning in terms of three distinct aspects: the device (technology and usability), the learner (their knowledge, experience and attitude), and the social (socio-cultural context). These aspects overlap and considering what happens at the intersections of these aspects will usefully inform the design of different mobile learning opportunities. For Koole, therefore, mobile learning is a combination of the interactions between learners, their devices, and other people. However, this conceptual model does not acknowledge the potential mobility of the learner whose technology enables them to use information and data from one context in another.

Park's aim is similar to Koole's in that the purpose of her categorisation of the educational applications of mobile technologies is to support instructional designers of open and distance learning in learning about the concepts of mobile learning and how mobile technologies can be incorporated into their teaching and learning more effectively. This categorization is based on a modified approach to transactional distance theory that includes opportunities for social mediation as a separate dimension to the transactional distance between learner and the source of that which is to be learned. Transactional distance itself is a concept based on the pedagogical, psychological and geographical space between instructor and learner introduced to distance learning by Moore (1997). It centres on the interactions between the learners, the learning resources, their tutor or instructor and their environment. The transactional distance itself is controlled and managed by three interrelated factors: 1. the taught programme's structure; 2. the dialogue that the tutor and learners exchange; and 3. the extent of the learners' autonomy. To this Park added a third factor, social mediation, acknowledging the potential for collaboration via mobile technologies. Whether learners are working individually or collectively in a group was termed individualised m-learning or socialised m-learning respectively. This results in four categories: high transactional distance socialized m-learning in classroom based, group activities, 2. high transactional distance, individualized m-learning where there is instructional support or tightly structured content and resources such as in nurse education or mobile assisted language

learning (MALL), 3. low transactional distance socialized m-learning which as loosely managed, unstructured group work is rarer and 4. low transactional distance individualized m-learning such as outside classroom, individual informal learning opportunities such as those involved in Citizen Science projects. Yet, as Park herself acknowledges, though it is obscured by the emphasis on creating the four category model, transactional distance is, in fact, a continuum rather than discrete categories.

The approach of expanding the concept of mobile learning into a continuum was also taken up by Sharples (2013) in an overview of mobile learning research and practice written for the distance education community in China. He moves away from seeking to define what has, despite the efforts described above, become a nebulous concept that is difficult to seize and presents mobile learning on a continuum. This continuum or dimension, as Sharples labels it, extends from enhancing classroom learning via devices such as handheld response systems and tablets to learning as part of everyday life through informal communication and knowledge sharing by mobile phone. Thus it extends from curriculum led learning opportunities in a fixed setting to informal, highly mobile learning opportunities. However, on closer inspection it actually comprises two dimensions, from the formal (curriculum based) to the informal (interest or hobby led) and from fixed (in a classroom) to mobile (in the field, crossing contexts) that can be represented orthogonally as shown in Figure 3 below.
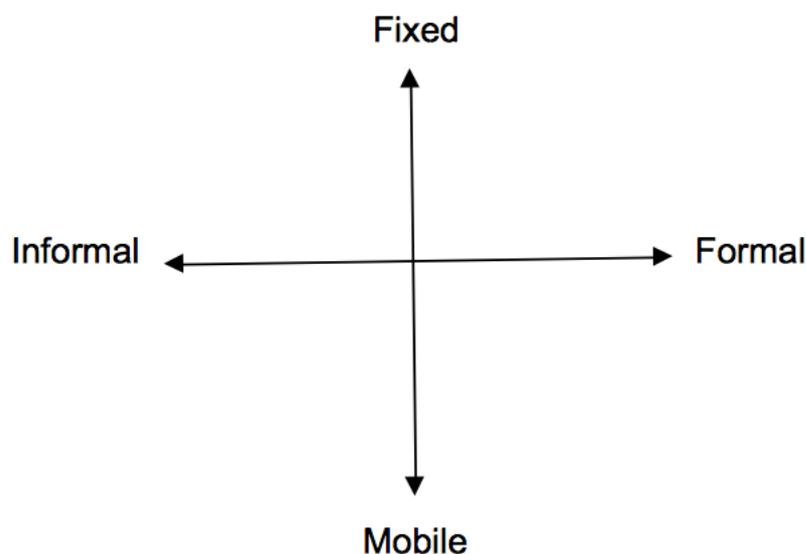

Fig. 3 Two possible dimensions of mobile learning

If we acknowledge the potential of collaboration via mobile devices and add in the individualised-socialised dimension as proposed by Park (2011) we have a neat three-dimensional model that encompasses a myriad of opportunities to engage in learning via personal, mobile technologies as shown in Figure 4 below.
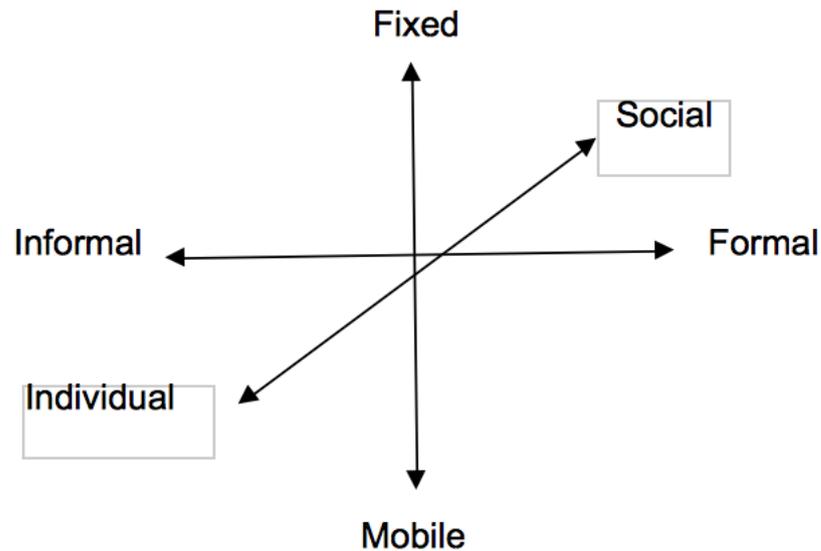

Fig. 4 Three possible dimensions of mobile learning

However, whilst this structure fits a range of learning opportunities that have been characterised as mobile learning such as Zurita and Nussbaum's (2004) mobile computer supported collaborative learning (MCSCL) activities in Chilean primary schools [Fixed, Social, Formal]; Priestnall and colleagues' (2010) work on augmenting reality via mobile phones for earth science teaching [Mobile, Individual, Formal]; and the nature spotting app iSpot developed by the Institute of Educational Technology at the Open University, UK [Mobile, Individual, Informal], it is both hard to envisage and complex to work through all eight possible combinations. This is reminiscent of the way the definitions reported above increased in length and complexity as researchers struggled to capture the increasing range of mobile learning opportunities new and emerging technologies offer. On further reflection, how, for instance, should we include the rich visual learning opportunities now offered through augmented reality in the same model as a text-based quizzing app? With a fourth dimension?

2. The Dilemma: to continue to assimilate or to accommodate?

Thus all of the framings, dimensions and categories discussed above have in common, along with the opportunities listed by Traxler (2011) and the more complex of the definitions presented earlier, the sense that their authors are trying to 'fit a quart into a pint pot'. The following concept map (Figure 5) produced by Mirandanet, the global knowledge sharing online community for professionals engaged with digital technologies, members at a mobile learning conference in 2009 makes a valiant, if perhaps futile, effort to bring order to the resulting messiness.
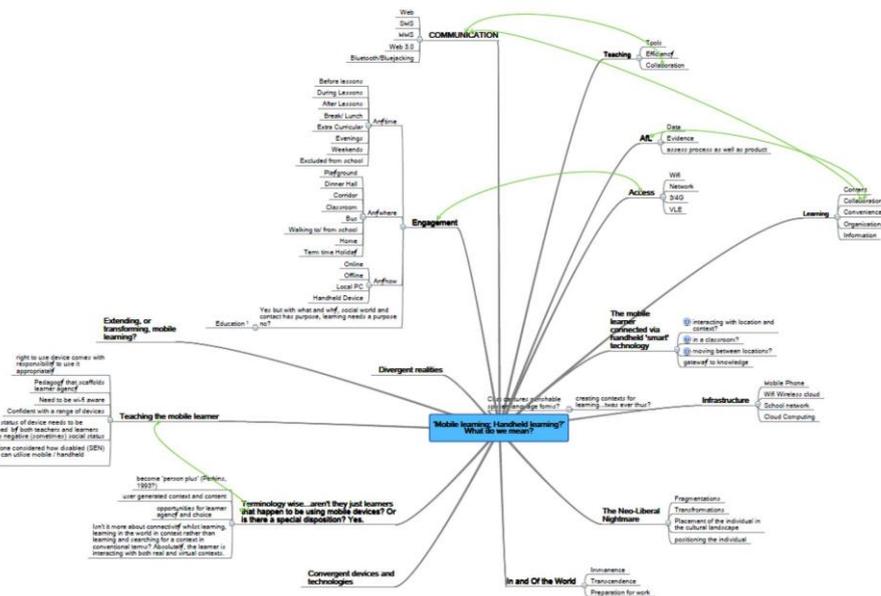

Fig. 5 Mobile learning: Handheld learning? What do we mean?

However, if we take a step out and reconsider this continual assimilation of new learning opportunities via mobile technologies into our conceptual framing for mobile learning we can see that, whilst generating discussion and debate, it is not helping foreground mobile learning as a mainstream pedagogy. Rather, as pointed out by one of the reviewer of this paper, it has become a cyclical debate with similar arguments made nearly a decade ago. For example, in 2007, John Traxler wrote «advocates of mobile learning attempt to define and conceptualise it in terms of devices and technologies; other advocates define and conceptualise it in terms of the mobility of learners and the mobility of learning» (Traxler, 2007, p. 1).

Is it therefore not time, taking our lead from Jean Piaget's (1952) ground-breaking work on the origins of human intelligence, for us amend our concept of mobile learning the better to accommodate the range of learning opportunities available today? This process of accommodation features in Piaget's descriptions of conceptual development which takes place firstly through the process of assimilation of new information into a growing schema (a framing for that concept) and then followed by its break up or 'accommodation' into several schemas when the range of assimilated information becomes too unwieldy to manage.

Thinking therefore, through the definitions presented above about the possible presence of sub-schemas, we note a prevailing distinction between those definitions that tend to lead with a focus on the technology being a mobile device and those which emphasise the mobility of the learner using such a device. When reviewing this latter point, the «essential defining attribute» of mobile learning (Oller, 2012), a question arises as to how this is managed when many researchers today, for example Park (2011), include the classroom as a pedagogical context for mobile learning. Here, learners such as school students using mobile devices in class for recording audio or video to support learning, or university students providing feedback via a classroom response app on their phones in a lecture, are clearly not continually on the move. There are indeed other context relevant learning opportunities for mostly classroom based learners such as learning in the field (Priestnall et al., 2010) or on visits outside the classroom (Chen et al., 2004; Vavoula et al., 2009). Or even, as highlighted by Yatigammana Ekanayake and Wishart (2011), for bringing personally relevant examples from the outside world into the classroom. However, fixed location teacher set classroom based tasks involving educational apps on phones or iPads, whilst involving handheld, mobile technologies do not match this mobility focused concept of learning.

3. Conclusion: keep mobile learning to the truly mobile

Whilst, it could be argued that the move from the virtual to the real when going online in the school classroom traverses learning contexts realising Crompton's recent definition of mobile learning as «learning across multiple contexts, through social and content interactions, using personal electronic devices» (2013, p. 4), classroom based learning is, in no way, truly mobile. Much of what we call classroom based mobile learning is Quinn's (2000) m-learning, simply «using the current model of Smartphone as a learning device» and, largely follows what Cochrane (2014) describes as merely repositioning traditional teaching and learning

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resources and activities to online sources. It is now time to disassociate this perspective from that of location led, context relevant, situated and authentic mobile learning opportunities. This would create two conceptual framings with mobile learning being one and fixed location m-learning being the other. Thus examples of classroom based learning via mobile devices such as teacher set tasks involving educational apps on iPads now common to schools in many countries would need renaming. To call it m-learning would be confusing where 'm-' stands for mobile. One suggestion could be 'hand-e-learning' though that invites the question as to whether renaming is necessary. Is that not just e-learning on a different device? We have not previously renamed e-learning every time a different type of desktop or laptop is used.

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