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SUPPORTING LANGUAGE LEARNING ON THE MOVE

AN EVALUATIVE FRAMEWORK FOR MOBILE LANGUAGE LEARNING RESOURCES

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Introduction

A number of important developments of direct relevance to mobile learning (or m-learning) took place in 2013. In that year, the number of internet-enabled mobile devices surpassed the number of desktop and laptop computers worldwide (*The Economist*, 2012); sales of smartphones surpassed sales of feature phones (Blodget & Danova, 2014); and mobile-generated traffic reached 20% of all internet traffic (Blodget & Danova, 2014), before increasing to more than 25% in the first half of 2014 (Meeker, 2014). It is timely for teachers and researchers to seek to identify and capitalize on the educational potential of these developments.

There is some disagreement over exactly what constitutes a ‘mobile’ as opposed to a ‘portable’ device, but Puentedura (2012) suggests a rule of thumb by which the latter is a device which is typically used at Point A, closed down and transported, then opened up again at Point B; while the former is a device that can be used at Point A, Point B and everywhere in between without stopping. From this perspective, today’s most common mobile devices include mobile phones or cellphones (both feature phones and smartphones, with the latter running on mobile operating systems and being largely app-driven) and tablets. Older mobile devices, which are becoming less common as their functionality is subsumed into smartphones and tablets, include personal digital assistants (PDAs) and MP3 players. Newer mobile devices which are beginning to emerge include wearables such as fitness trackers (often in the form of wrist bands), smartwatches and smart glasses (or augmented-reality glasses). While laptops, especially smaller notebooks and netbooks, share some similarities with mobile devices, they in fact fall into Puentedura’s portable category.

Smart mobile devices have a range of input mechanisms, thanks to the move towards natural user interfaces which can be operated by touch, gesture and voice. These devices also allow optical recognition of text, quick response (QR) codes

and other augmented-reality (AR) markers; they are location-aware, thanks to inbuilt GPS receivers, compasses, gyroscopes and accelerometers; and they can pick up signals from Bluetooth, radio frequency identification (RFID) and NFC (near field communication) tags. Output modes include the visual, auditory and haptic (that is, tactile output, such as the vibration of a phone).

There are two main ways to engage in learning with a mobile device. The first involves using a general web browser to access websites, some of which may have been optimized for mobile access; the second involves downloading dedicated, single-purpose pieces of software called apps, which are normally sourced from online app stores. Apps provide a smoother, more streamlined experience, with most social media platforms and many educational services offering app versions, and increasing numbers adopting an app-first or app-only approach. At the same time, however, end users often find themselves with less control over their online experience than on the wider web 2.0, and with far less ability to move easily between apps, which effectively operate as walled gardens isolated from each other and the wider web (Pegrum, 2014). Some educators worry that the kind of active, collaborative learning facilitated by web 2.0 is being eroded by a slick, corporatized ‘appification’ of the web (Quitney, Anderson, & Rainie, 2012) which, if it progresses too far, could eventually lead to a learning landscape populated almost exclusively by individually purchased, independently used, stand-alone apps training limited sets of knowledge or skills. Fortunately, the situation is not yet so bleak.

There are two categories of *mobile resources* (whether general m-learning or specific mobile-assisted language learning [MALL] resources) available to teachers and students. First, there are *mobile materials*, in the form of websites or apps (or collections of websites or apps); and secondly, there are *mobile activities*, in the form of activities designed around websites or apps (see Table 14.1).

Mobile materials include dedicated web services and apps that are content-specific and do not require adaptation for language learning. In many cases, not only the content but the pedagogy has been designed into these sites and apps. Particularly in the case of apps, the pedagogy tends to be rather traditional, leaning towards information transmission and especially behaviourism; this is true not just of MALL apps but of educational apps in general (Murray & Olcese, 2011; Oakley et al., 2012; Searson, 2014). Some more recent apps are overlaid with social networking and sharing channels which offer more active learning options, and simple app design is now coming within the reach of teachers and students thanks to the availability of easy-to-use app-building software (Miller & Doering, 2014; Pegrum, 2014), thus increasing the collaborative, constructivist potential.

While dedicated language learning materials can be used in a stand-alone manner, they can of course also be incorporated into the design of broader *mobile activities* for language learning, which may have a more collaborative and/or constructivist orientation. Thus, a pedagogically limited information transmission app (say, an online dictionary) or a behaviourist app (say, a set of grammar drills) might form part of a larger collection or activity underpinned by a more sophisticated pedagogical design. Generic materials, like social networking services and videosharing sites, also offer many possibilities for active, collaborative learning, though they need to be adapted

TABLE 14.1 Classification of mobile learning resources

Mobile Materials	Web-based	App-based
Dedicated	Dedicated web services	Dedicated apps
Generic	Generic web services	Generic apps

Mobile Activities	
Dedicated	<i>May use any combination of dedicated and/or generic web services and/or apps within the design of a broader learning activity. If only generic web services and/or apps are used, they must be incorporated within the broader design of a language learning activity, which may be fully digital or blended.</i>

to different content areas (such as language learning) and their pedagogical use needs to be carefully considered in the overall design of a learning activity. Such learning activities may involve either a fully digital approach, or a blended approach where digital materials are combined with analogue materials in a face-to-face context.

As Burston (2014) notes, the vast majority of MALL implementations to date have been underpinned by “a behaviorist, teacher-centred, transmission model of instruction” despite the potential for “more innovative constructivist, collaborative, learner-centred instruction” (p. 344; cf. Beatty, 2013). Given the disjuncture between the promising future potential and the disappointing current reality of m-learning and MALL, it is important that educators have an evaluative framework which can guide them in assessing the benefits of the mobile resources they are considering using with their students, as well as guiding them in the design of mobile resources they may create themselves.

Evaluating MALL Resources

The evaluation of MALL resources ultimately comes down to an evaluation of the learning design of those resources. With the increasing rollout of technology, there is a growing emphasis on the importance of learning design (Phillips, McNaught, & Kennedy, 2012; Milrad et al., 2013), with teachers increasingly being required to adopt the role of learning designers (Garcia, 2014; Hockly, 2013; Laurillard, 2012). While it is true that the nature of the available access to hardware, software and connectivity, as well as various aspects of the hardware and software itself (such as input and output mechanisms with the former, or customization options with the latter), have an impact on the learning that is possible, these elements fall outside the area of learning design and are not considered here.

The learning design can be evaluated with respect to a number of categories: The extent to which the potential educational affordances of mobile devices are exploited in the learning design (see Category 1 in our framework); the extent to which the learning design corresponds to general pedagogical approaches (Category 2); the extent to which the learning design corresponds to specific second language (L2) pedagogical approaches (Category 3); the extent to which the learning design corresponds

to second language acquisition (SLA) principles (Category 4); and, finally, the extent to which the learning design takes into account affective principles (Category 5). While the measurement of learning outcomes is an important consideration in the implementation of MALL or indeed any educational resources, this is only possible post-implementation. Thus, while it may impact on subsequent reuse or redesign, it cannot influence initial use or design, and is therefore not considered here.

Category 1: Educational Affordances Exploited in Learning Design

All technologies have their own particular affordances, that is, uses to which they seem most readily to lend themselves. For Klopfer, Squire, and Jenkins (2002), the five key affordances of mobile devices are portability (which may allow distributed learning, for example), social interactivity (which may promote collaborative learning), context sensitivity (which may support situated learning), connectivity (which may foster networked learning) and individuality (which may permit differentiated learning) (cf. Klopfer & Squire, 2008). In a more recent perspective which partly echoes Klopfer et al. (2002), Dennen and Hao (2014) list four key affordances of mobile technologies: Portability, connectivity, input devices and sensors (which may promote personalized and situated learning) and recording abilities (which may support situated and immersive learning).

Pegrum (2014) has suggested that mobile devices have at least three major sets of affordances which are relevant to learning, and which subsume many of the elements described in earlier accounts. First, they allow *a linking of the local and the global*: We interact in and with our local environments while simultaneously remaining connected to global networks, from which we can learn about our local contexts and through which we can share learning generated in our local contexts (thus, for example, there is support for distributed learning, situated learning and networked learning). Second, they allow *a linking of the episodic and the extended*: We can engage in bite-sized learning whenever and wherever we find ourselves with moments of downtime, but we can connect those bite-sized chunks into extended learning by simply taking up our learning where we left it the next time a free moment arises (thus, amongst other things, there is support for autonomous learning). Third, they allow *a linking of the personal and the social*: We make individual choices about our hardware and software and can tailor our learning journeys to our own needs and preferences, but we can also hook into global networks and learning communities anytime and anywhere we please (thus, there is support for autonomous and differentiated learning but also for collaborative and networked learning, as well as for specific SLA principles such as comprehensible input and output, and negotiation of meaning).

It is also important to consider the different possible levels of mobility inherent in mobile learning. At the most basic level, only the *devices* are mobile while the *learners* and the *learning experience* are not, for example in a connected classroom where students use a class set of tablets while sitting at their desks. At a more sophisticated level, the *learners* also become mobile, for instance when they move around or

between learning spaces to share their learning with peers; but while such student mobility may foster collaboration and creativity, the *learning experience* itself is not mobile in that it could take place in any space or spaces, and remains unaltered by those spaces. At a still more sophisticated level, the *learning experience* itself becomes mobile as the changing environment feeds into and alters the learning process, for example as students make annotated multimedia recordings of their surroundings which can be shared with and commented on by peers in online networks. The greater the overall level of mobility, the more fully the affordances of mobile technologies for learning are likely to be exploited, and the more closely their use is likely to align with contemporary pedagogical approaches; hence the importance of the criterion of *mobility* within Category 1 (see the framework below).

Category 2: General Pedagogical Design

As noted earlier, most MALL resources remain pedagogically very traditional, which leads Burston (2014) to comment: “MALL has yet to realize its full potential and [. . .] achieving this aim is more a matter of pedagogy than technology” (p. 344). In light of this, it is vital to consider how MALL learning design relates to established pedagogical approaches, both general and L2-specific.

Over more than a century, but particularly over the last 30–40 years, we have seen a move away from *traditional pedagogical approaches* based on information transmission and behaviourism towards *progressive approaches* such as *social constructivism* (see Burston, 2014 on constructivism in the context of MALL) and its many offshoots, like *inquiry-based learning* and *task-based learning*. These are based on the notion that individuals construct their understanding of the world by integrating new knowledge with existing knowledge as they engage in learning experiences and learning interactions with others. While this does not mean there is no place in education for information transmission or behaviourist learning – foundational content like vocabulary or grammar may be usefully consolidated in drills and simple games, for instance – there is now a widespread recognition that this cannot be the whole picture of learning. At the progressive end of the spectrum, there is much more room for the kinds of active, collaborative learning that we know to be effective. There is also room for a range of recent sociocultural approaches to learning, many of which sit comfortably with social constructivism (Pegrum, 2014). These include *situated learning*, which involves learning in real-world contexts (see e.g., Comas-Quinn, Mardomingo, & Valentine, 2009, on situated MALL); *embodied learning*, which involves taking into account the connection between the mind, the body and the wider environment (see, e.g., Driver, 2012, on embodied MALL); *informal learning* (see, e.g., Comas-Quinn et al., 2009, on informal MALL); and of course *student-centred learning* (see, e.g., Burston, 2014, on learner-centred MALL). In addition, at this end of the spectrum there is room to incorporate a focus on the *21st-century skills* that are now regarded as increasingly essential (Gee, 2013; Mishra & Kereluik, 2011; NCTE, 2013; P21, n.d.): These are generally seen to include *creativity* and innovation, linked to entrepreneurship (Barber, Donnelly & Rizvi, 2012; Khan, 2012; Robinson, 2011; Zhao, 2012), along

with *critical thinking* and problem-solving, *collaboration* and teamwork, and *autonomy* and flexibility (Pegrum, 2014). Naturally, there is some overlap between progressive pedagogical approaches and 21st-century skills approaches, and indeed between individual approaches and skills within these categories.

Category 3: L2 Pedagogical Design

There are a number of recent L2 pedagogical approaches which are widely regarded as particularly effective in the teaching of languages. They generally sit comfortably with social constructivism and other progressive approaches, of which they are sometimes a more specific inflection, and they generally sit comfortably with each other. The *communicative approach* represents a move towards authentic, situated interaction in line with SLA principles (see Category 4 below) (see e.g., Pegrum, 2014, on communicative MALL). The *task-based approach* focuses on situated meaning and the achievement of real-life goals, and technology has been shown to facilitate its implementation (see, e.g., Thomas & Reinders, 2010, on task-based computer-assisted language learning [CALL]). An *intercultural (communicative) competence approach* or *intercultural literacy approach* goes beyond simply teaching and learning about other cultures and focuses on situated intercultural interactions (see, e.g., Palfreyman, 2012, on intercultural MALL).

Category 4: SLA Design

SLA research over many years has identified a number of core requirements for effective language learning. These include the need for *comprehensible input*, *comprehensible output*, *negotiation of meaning* in interaction, and *noticing* of new language, the last of which can be promoted through corrective *feedback* (e.g., Ellis, 2005). Kukulska-Hulme and Bull (2009) have linked MALL to noticing, a connection reiterated by Burston (2014), who makes a further link to constructivism. Many MALL resources capitalize on the capability of mobile devices, which at their most sophisticated can track our situated learning in real-world contexts, to provide immediate, detailed, automated feedback, which can later be complemented by human feedback (Pegrum, 2014). In fact, progressive pedagogical approaches and their specific L2 inflections can be employed in such a way as to make room for all of the above SLA principles in MALL (see, e.g., Nah, White, & Sussex, 2008, on combining progressive approaches and SLA principles in MALL).

Category 5: Affective Design

It is widely accepted that affective factors play an important role in language learning. Teachers have explored many strategies for increasing students' *engagement* and motivation through the use of interesting, relevant resources (see, e.g., Beckmann & Martín, 2013, on engagement through MALL), while simultaneously attempting to *lower students' affective filters* (see, e.g., Edge et al., 2011, on lowering affective filters through MALL).

Mobile design guidelines developed over recent years have taken many of the learning affordances and pedagogical possibilities of mobile devices into account in varying combinations (e.g., Herrington, Herrington, & Mantei, 2009; Sharples

et al., 2009). Our own framework, outlined below, has a slightly different aim, as it focuses on evaluation rather than design, but it nevertheless details a set of principles which could be considered in the design phase of mobile resources.

The Framework

Based on the foregoing analysis of affordances, pedagogies and principles, we have developed a framework for evaluating the learning design of *mobile resources* for language teaching and learning, whether those resources are *mobile materials* like websites or apps, or collections of websites or apps, or *mobile activities* designed around websites or apps. It is important to evaluate a mobile resource at the macro level; that is, while a website or app used alone may be evaluated in isolation, a collection should be evaluated at the level of the whole collection, and an activity incorporating one or more websites or apps should be evaluated at the level of the whole activity.

The evaluation framework consists of five different categories, subdivided into criteria which may be rated on a continuum from 1 to 5 (with the exception of two criteria with higher possible scores, in Categories 1 and 2 respectively, as explained in the table notes). This results in a total score for each criterion, each category, and the mobile resource as a whole. Brief explanations of each category and criterion have been given in the preceding section, 'Evaluating MALL resources'. Of course, this is necessarily an inexact science, with educators being required to estimate scores on the various continua to achieve a total. Absolute scores are not important in themselves, but where two or more resources are compared, the resource with a higher score is likely to be the one with more sophisticated pedagogical potential. Criteria or even categories considered irrelevant may be omitted, but the act of evaluating resources against multiple criteria and categories may help practitioners to improve their use – or their design – of mobile materials and activities in previously unconsidered ways.

Applying the Framework

This section presents a worked example of an evaluation conducted with the above framework. In the activity being evaluated, university-level English language learners use an AR app to create a virtual campus tour for foreign visitors. Working in teams, they annotate physical objects (such as buildings and natural landscape features) with written and audio comments, which are geotagged to the relevant sites, and can be accessed in those locations by visitors taking the tour via the AR app on their mobile devices. The comments consist of historical, cultural and practical information to help visitors get to know the campus. The activity requires smartphones with wifi or 3G/4G Internet access, which can be shared among students (one per four students). The teacher and the students must know how to use an AR app, meaning that some preparation may be necessary for the teacher, followed by some pre-teaching for the students. The skills that students develop are transferable. For a description of a pilot version of this activity, see Reinders, Lakarnchua, and Pegrum (in press).

TABLE 14.2 Framework for evaluating the learning design of mobile resources for language teaching and learning

<i>Criterion</i>	<i>Evaluation Continuum</i>					<i>Score</i>
Category 1: Educational Affordances exploited in Learning Design (___/50)						
Local learning	1	2	3	4	5	little potential for local learning ⇔ much potential for local learning
Global learning	1	2	3	4	5	little potential for global learning ⇔ much potential for global learning
Episodic learning	1	2	3	4	5	little potential for episodic learning ⇔ much potential for episodic learning
Extended learning	1	2	3	4	5	little potential for extended learning ⇔ much potential for extended learning
Personal learning	1	2	3	4	5	little potential for personal learning ⇔ much potential for personal learning
Social learning	1	2	3	4	5	little potential for social learning ⇔ much potential for social learning
Mobility*	4	8	12	16	20	devices mobile ⇔ devices & students mobile ⇔ devices, students & learning experience mobile

* Note: It is suggested that this criterion should be worth more than the others in this category, since it is arguably the most important, as explained under 'Evaluating MALL resources' above.

Category 2: General Pedagogical Design (___/50)

<i>Criterion</i>	<i>Evaluation Continuum</i>					<i>Score</i>
Constructivist learning*	2	4	6	8	10	transmissive/behaviourist learning ⇔ (social) constructivist learning
Situated learning	1	2	3	4	5	abstract learning ⇔ situated learning
Embodied learning	1	2	3	4	5	disembodied learning ⇔ embodied learning
Informal learning	1	2	3	4	5	little informal learning ⇔ much informal learning (may be alongside formal learning)
Student-centred learning	1	2	3	4	5	teacher-centred learning ⇔ student-centred learning
21st-century skills: Creative learning	1	2	3	4	5	uncreative learning ⇔ highly creative learning
21st-century skills: Critical learning	1	2	3	4	5	uncritical learning ⇔ critical learning

21st-century skills: Collaborative learning	1	2	3	4	5
	uncollaborative learning ⇔ collaborative learning				
21st-century skills: Autonomous learning	1	2	3	4	5
	student dependency ⇔ student autonomy				

* Note: It is suggested that this criterion should be worth more than the others in this category, since (social) constructivism is arguably today's most important pedagogical approach and in some senses sets the scene for many other progressive approaches, as explained under 'Evaluating MALL resources' above.

Category 3: L2 Pedagogical Design (__/15)

Criterion	Score				
Communicative learning	1	2	3	4	5
	non-communicative learning ⇔ communicative learning				
Task-based learning	1	2	3	4	5
	no meaning-based task focus ⇔ meaning-based task focus				
(Inter-)cultural learning	1	2	3	4	5
	no cultural element ⇔ cultural learning ⇔ intercultural learning				

Category 4: SLA Design (__/25)

Comprehensible input	1	2	3	4	5
	little comprehensible input ⇔ much comprehensible input				
Comprehensible output	1	2	3	4	5
	little comprehensible output ⇔ much comprehensible output				
Negotiation of meaning	1	2	3	4	5
	little negotiation of meaning ⇔ much negotiation of meaning				
Feedback (nature)	1	2	3	4	5
	automated feedback ⇔ human feedback ⇔ automated & human feedback				
Feedback (detail)	1	2	3	4	5
	limited feedback ⇔ detailed feedback				

Category 5: Affective Design (__/10)

Engagement	1	2	3	4	5
	unengaging ⇔ highly engaging				
Affective filter	1	2	3	4	5
	anxiety-inducing ⇔ anxiety-reducing				

Total	Overall score out of maximum 150 points				
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The activity was rated separately by each author and our respective scores are given. This demonstrates that small variations are likely in both the category and overall scores, reinforcing the point made earlier that this is an inexact science.

*Educational Affordances Exploited in Learning Design: 41/38
Out of 50*

The activity exploits both local and global learning as well as social learning, and is highly mobile. A little personal learning is possible, but the activity does not exploit either episodic or extended learning, as it is designed to be carried out only once, without follow-up.

General Pedagogical Design: 37/38 Out of 50

The activity is constructivist, situated and embodied in nature, is student-centred, requires collaboration, and leaves plenty of scope for creativity and autonomy. On the other hand, there is little scope for informal learning, and critical thinking is not foregrounded.

L2 Pedagogical Design: 12/14 Out of 15

The activity is communicative in nature, involves carrying out a task, and encourages students to consider intercultural factors in the production of their tours.

SLA Design: 15/12 Out of 25

Comprehensible output is essential in the annotations students add to the landscape, though its effectiveness will not be evident until visitors take the tour. Similarly, feedback will be delayed; it will take the form of human rather than automated feedback, but probably with little detail. Opportunities for comprehensible input and negotiation of meaning are limited to the interactions among the students, assuming they follow the instruction to interact in English.

Affective Design: 9/9 Out of 10

The activity is new for the students and involves using English for a real-life purpose, which should prove engaging. Because students are working with peers in groups away from a formal classroom environment, their affective filters should be lowered.

Summary

Although the above framework is primarily designed for evaluating resources before deciding whether to adopt them, it is of course possible to carry out evaluations before, during and after the use of resources (Breen, 1989), and

our framework may contribute to all these kinds of evaluations. With MALL materials and activities, which are likely to be new to many teachers, such evaluations are extremely important in identifying potential and actual obstacles to use, and establishing professional development needs. Post-use evaluations can also include the views of the learners about their experiences with the resources, and in the case of MALL can be helpful in bringing to light technical issues (such as a lack of wireless coverage), institutional issues (such as a lack of clear policies on the use of mobile devices for learning), and personal issues (such as privacy concerns over the sharing of individuals' data). Ideally, post-use evaluations should be complemented by mechanisms for measuring improvements or changes in learning outcomes.

Conclusion

We hope to have shown that MALL carries the potential to enhance language teaching and learning in line with recent pedagogical thinking and SLA research, and that this potential can be identified and approximately quantified when deciding whether to adopt, adapt or reject MALL resources in particular teaching contexts. The framework we have introduced above foregrounds educational affordances, general pedagogical approaches, L2 pedagogical approaches, SLA principles and affective factors. While designed for evaluation of resources prior to their use, the principles in our framework could also be used to guide the development of mobile materials and mobile activities, as well as contributing to evaluating MALL resources during and after their use. Through a consistent, wide-ranging approach to evaluation, ideally in each of the pre-, during- and post-implementation phases, our understanding of the ways in which MALL resources can support language teaching and learning processes will be greatly enhanced.

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