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Potential of SoundCloud for mobile learning in music education: a pilot study

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Abstract: This article considers a mobile application known as SoundCloud in light of its potential for use in music education contexts. In relation to four affordances of effective mobile learning tools, and situated learning theory, the benefits of making learning mobile, contextual, and visible are explored. A survey of 19 music students provides a window into their experience of mobile learning within the context of a high school music course. The purpose of this pilot study is to consider whether a specific application of mobile learning, i.e. SoundCloud, is appropriate for use in high school music education.

Keywords: music education; SoundCloud; cloud-based computing; mobile learning; situated learning.

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1 Introduction

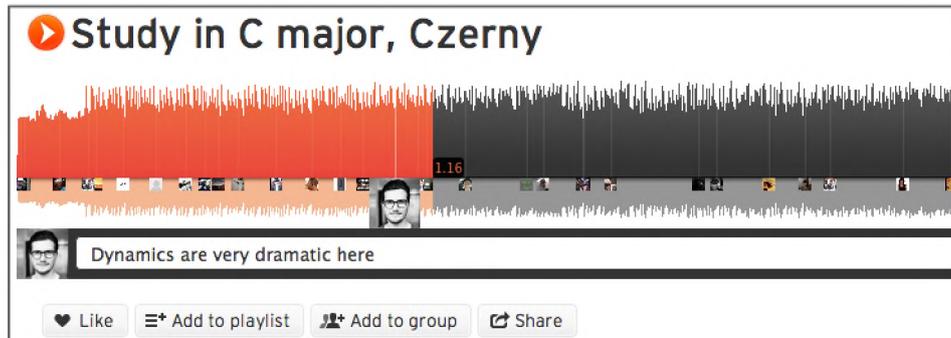
Mobile learning has been defined as that which reaches across time and space (Stanton and Ophoff, 2013), and affords learners with a variety of opportunities to connect with people and technology in multiple contexts (Kukulska-Hulme et al., 2009). Mobile learning is, by nature, wireless, referring to how users are not tethered in any way to that which would keep them from moving around (Cavus and Uzunboylu, 2009; Sharples, 2000; Yordanova, 2007), and is therefore, naturally ubiquitous, meaning that it can take place anytime and anywhere (Botha et al., 2010; Costabile et al., 2008). These definitions

position mobile learning as a powerful tool for use in educational contexts. Indeed, several research studies have posited the benefits and challenges of mobile learning in the context of science (Hwang et al., 2010; Looi et al., 2014; Looi et al., 2011), environmental education (Kamarainen et al., 2013; Ruchter et al., 2010), math (Fabian et al., 2016; Sawaya and Putnam, 2015; Shih et al., 2012), and language learning (Demmans Epp, 2015; Liu, 2009). Mobile learning in music education has been discussed in the context of early childhood (Paule-Ruiz et al., 2016), and higher education (Riley, 2013). This paper specifically considers mobile learning in the context of a group of high school music learners, with reflections on what can be learned from this example, and how similar initiatives, informed by situated learning theory, may be undertaken.

The example of mobile music learning under consideration is within a classroom in Ontario, Canada, a province where initiatives are underway to ensure that all schools are equipped with Wi-Fi. As suggested by Lai et al. (2016), policies such as this demonstrate that mobile learning is recognised as a possible approach to learning. However, simply providing the conditions for mobile learning is not sufficient for it to take place. Access to Wi-Fi may enable the use of innumerable apps for mobile devices, but those apps may not fully capitalise on the affordances of effective mobile learning tools. Or, the learning activities associated with apps may not highlight their mobile capabilities. In order for mobile learning to be effectively integrated in classrooms in ways that maximise student learning, both teachers and students need an intentionality which acknowledges and values mobile learning. Teachers need a specific understanding of how to integrate mobile learning activities with curriculum expectations, keeping in mind students' learning needs, interests and preferences (Lai et al., 2016). Students must develop an awareness of the potential benefits of using their mobile devices, not just for personal enjoyment, but for learning (Tabor, 2016).

2 What is SoundCloud?

SoundCloud is a mobile application which has potential applications for mobile learning, particularly in formal music education contexts. The app streamlines the process of recording and uploading sounds where they can be stored online. Once a user signs up for a free account, they are eligible to upload sounds. The only equipment needed is a mobile device with an enabled microphone. Users can categorise the sounds they create by specifying the type of sound (sound effect, loop, work in progress, spoken, live, remix, original, etc.), by indicating the genre, and additionally, by adding tags and uploading a corresponding image. Sounds may be organised into set lists, and marked as public or private, and are represented by visual waveforms. If a listener wants to respond to a sound, they can 'like' or share the sound on various social media platforms; they can also click on an exact point in the sound where they want to leave a comment. When anyone listens to a sound, comments pop up at the specific point in the waveform where each comment was left. Figure 1 depicts a sound with a number of comments inserted at various points throughout. Each comment is represented by the profile picture of the user who commented.

Figure 1 Screenshot of comments on a SoundCloud sound (used with permission)

The example of SoundCloud use considered in this paper involves a high school music program at a school where approximately 150 students choose to enrol in music classes. Students study vocal and/or instrumental music, and do both ensemble and solo or duet work. Ensemble performances are routinely recorded and uploaded to a school music SoundCloud account. In some cases, this results in more than one class uploading the same piece, which allows for students to listen to other renditions of the same pieces to detect similarities and differences, and consider other musical ideas. In addition, as students are becoming familiar with new music, the teacher records individual parts separately, and uploads them to SoundCloud so students can listen to them, and learn the notes. Other musical artefacts which are uploaded to the school SoundCloud account include solo and duet performances, examples of technical exercises, play-along and sing-along tracks, rhythm studies, and vocal warm-ups. So then, many of the activities which happen within music class are accessible to students, through their mobile device, at any time.

A 14-question, online survey of 19 of these music students, from a grade 11 and 12 vocal music class, provides a window into their experiences of using SoundCloud for music learning. A description of the affordances of SoundCloud, along with a summary of the students' experiences follows, and paints a picture of the possibilities for mobile learning in high school music education. The students surveyed are ages 15 through 17, and have taken music classes for at least two years previously. When asked to describe their greatest musical strength, one of the 19 students indicated that they did not know, while four of them described their confidence in front of a group, and the other 14 cited specific musical elements such as tone, volume, range, harmony, and expression, as their greatest strengths.

3 Affordances of SoundCloud

Considering the affordances of a mobile application is a means to investigate the technology, and to consider it "in terms of the actions they make possible and obvious" (Gaver, 1991, p.83). Affordance theory allows us to consider the strengths and weaknesses of a mobile application, in terms of what possible experiences they offer to users (Gaver, 1991). The mobile learning potential of the SoundCloud application will be

explored through considering the affordances of nomadicy, ubiquity, personalisation, and social interactivity (Stanton and Ophoph, 2013), and applied to a music education context.

3.1 Nomadicy

Nomadicy relates to how tools can be easily carried around from place to place (Kleinrock, 1996); it is “understood as a form of being-in-the-world” (Fällman, 2003). Because students have mobile tools and are travelling everywhere with them, the tools are naturally part of their everyday existence, and world. They come to rely on them, and view them as part of themselves (Gikas and Grant, 2013; Rogers et al., 2010). The surveyed students in this pilot study each indicated that they have their own mobile device which they use while travelling to and from school, as well throughout the school day, and at home.

Mobile tools are not extraneous to students’ learning, but rather, a very natural part of it. SoundCloud facilitates nomadicy in that musical artefacts created by teachers, or by students at school and at home may be accessed and listened to in any location. Once a playlist of sounds is created by a set of learners, such as the members of a music class, those learners may engage in listening to the playlist, providing them with opportunities for reflection, self-reflection, commenting, and future goal-setting. Repeated listening to artefacts created for a formal learning setting is a natural activity for students to engage in, since one of the main uses of their mobile device is likely, listening to music (Hargreaves et al., 2002; Randall and Rickard, 2013). All surveyed students report that they listen to their own performances, which have been posted on SoundCloud. While 16% of students only listen to themselves once, 79% of students listen to their own performances repeatedly. A majority of students indicated that they sometimes, or always adapt their future performances based on the self-reflection enabled through listening on SoundCloud. The fact that it is so convenient to access recordings of their own performances through their personal devices, maximises opportunities for this reflective listening.

The students in this pilot study expressed an awareness of the potential for mobile learning when they described how they use SoundCloud as a reflective tool. Jordan said, “There is much to be learnt from listening to your own performance, you hear things that you wouldn’t have noticed otherwise!” and Jamar said, “So we can listen to ourselves to see how we can improve and so that our family and friends can listen to how we are doing.” Lucy described how accessing the mobile platform is “... like getting a test back, you want to see how you did, and where you need to focus on for next time.” Some students pointed out that SoundCloud is useful, simply for allowing them to hear themselves sing, since you can “... hear what everyone else hears when you’re singing rather than just yourself” (Ron), and “because it allows them to hear what everyone else hears not what they think they heard” (June).

3.2 Ubiquity

Ubiquity refers to how a “mobile device is interconnected with its environment, with other devices, and provides instant, fluid access to information (Nyíri, 2002).” This affordance allows for spontaneity (Ozdamli and Cavus, 2011), and refers to how learning can easily happen anywhere (Chen et al., 2008). Ubiquitous capability dictates that

minimal work be required to set up learning opportunities in varied locations, so they can automatically happen with no arranging, pre-planning, or lengthy set-up. The ability to record sounds and play them back is not unique to mobile applications, but the ubiquity and ease of the mobile tool for recording and playback is unprecedented. The instantaneous nature of uploading recordings to SoundCloud makes it applicable for ubiquitous use. Even if students do not have continuous internet access, they can create sounds, and then upload them later when access is available. Also, sounds can be downloaded when students have access to the internet, and then later listened to, without internet access. SoundCloud recordings can function as artefacts in the digital portfolio of a student, documenting their progress and allowing them to revisit their performances and engage in self-reflection. The instant access to SoundCloud uploads that students can listen to anytime and anywhere, allows them a multitude of opportunities to make connections between various pieces of music and what they are learning about music theory, and music performance.

This notion of ubiquitous learning which views learning as an integrated, whole, continual experience, is important for music educators to understand and embrace. If educators assume that school is the only place where real learning occurs, this may isolate and disenfranchise students who may, indeed, be learning a lot in out-of-school contexts. Not only do students move to and from school, but their mobile devices move with them, giving those students continual access to learning materials (Sharples et al., 2009). The surveyed students in this pilot study report that they listen to their performances outside of class time, while travelling to and from school, or at home, using their smartphone. Four students report that they download their own performances so they can listen on their mobile devices, even if they are offline. Another four report that they download their classmates' performances; four other students report that they download both their own and their classmates' performances from SoundCloud so they can listen more than once.

As students are listening to musical activities from class, outside of class, they demonstrate that thinking is mobile in the sense that, even if learners are stationary, their thoughts can move around to different activities and tasks, and make connections between them (Sharples et al., 2009). Thus, while students are in one location, perhaps riding the bus to school and listening to music, they may turn their thoughts to the elements of the music, and connect that information to what they learned in music class at school about tempo, rhythm, and metre. While thinking has always been mobile, the opportunity for mobile tools to give access to learning materials in a variety of locations and circumstances expands the possibilities for mobile thinking; ubiquitous access may prompt students to think more often about extraneous learning contexts. This has the potential to facilitate more frequent learning connections.

The fact that students listen to their own and their classmates' recordings outside of class, for the purposes of reflection and consideration of improvements, highlights the fact that learning is not confined to that which happens in a building designated as a school, nor is it confined to that which is sanctioned by a school, or by teachers; rather, people learn in a variety of physical locations that they move to and from (Sharples et al., 2009). If students can continue interacting with learning materials they received or produced during school, or interacting with materials which they used or produced at home, then student learning can continue no matter where the student is physically located. The mobility of students' physical bodies, then, facilitates learning in a multitude of locations, and potentially increases the overall amount of learning that is done

by students. Reinders and Pegrum (2015) describe the “bite-sized learning” which can take place throughout the day in time segments which are not consecutive, yet which are a series of continuous opportunities to pick up learning wherever it left off.

3.3 Personalisation

Since mobile tools are not necessarily context-aware, the affordance of personalisation is crucial. Indeed, the mobile tool or application does not have an awareness of whether it is being used in the context of a classroom, or a living room (Fischer, 2011). Giving users the chance to personalise their learning experience is crucial, and perhaps especially in the case of adolescent learners (Tsai et al., 2011; Wu et al., 2011).

Williams (2009) describes how learners should have options when it comes to deciding when, where, and how much learning they will do using their mobile devices. As a learning tool, SoundCloud is a wide open platform for users to upload any types of sounds they want, and as many or as few sounds as they want. The importance of having a choice about what songs to learn and perform for upload to the classroom playlist is extremely important (Al-Hmouz et al., 2010). A deep connection between learners and the learning materials can happen through allowing students to choose what songs and musical expressions they would like to perform, record, and share. In the high school music program considered in this pilot study, guidance is given to students in order to broaden their musical horizons, such as suggesting that students prepare a selection by a Canadian composer, by a musician from a specific decade, from a musical, or from the religious canon. Within these specific categories, students still have the opportunity to choose from innumerable songs they will listen to, learn, and produce in their own way. It need not be the case that every student learns the same number of songs, at the same rate; rather, they can learn as many as they themselves can personally master (Cheon et al 2012; Naismith et al., 2004). The musical performances by the high school students in the pilot study school which are posted on SoundCloud include hundreds of different songs in a variety of genres. Not only do students have access to the performances of their peers, but to thousands of other tracks uploaded by professional and amateur musicians, which they can choose to listen to, and use as exemplars for their own musical performances. These exemplars are opportunities for students to learn from others, but also to connect with others, and gain information about other contexts in which people make music around the global community (Reinders and Pegrum, 2015).

3.4 Social interactivity

Collaboration is extremely important in effective mobile learning contexts. Mobile technology can remove the constraints of creating and communicating about music only with those in close proximity. Space opens for worldwide collaboration and discourse. Using SoundCloud, students can find any sound, such as a piano part, and record their own flute part or vocal part as a harmonic or melodic layer. Alvarez et al. (2011) suggest that “one way of ensuring that learners engage in fruitful collaboration is to engage them in structured interactions, based on prescribed rules establishing how they should form groups, collaborate and solve problems.” As an example, teachers can direct students to form duet or trio groups to create musical performances, and upload them to SoundCloud. These groups would first choose a song or create their own, decide on

accompaniment and an arrangement, practice together, decide on performance aspects such as dynamics and articulation, and then record; intense, sustained and focused collaboration is needed.

Social connections are forged between musicians who perform together, but also among those who listen to and evaluate the performances of one another. Uploaded performances are available instantly to parents, students who missed class that day, the performers' classmates, as well as the performers themselves, and anyone else who visits SoundCloud, and is looking for something to listen to. The design of the SoundCloud interface is effective for providing students with access to mentors, as well as peers, to help those students reach learning goals. The learners are connected with one another in the sense that the music classroom playlist becomes like an album that showcases the performances the class recorded. The class is able to comment on one another's performances, and give each other 'likes.' Teacher guidance can be valuable for instructing students to provide comments on specific musical elements they hear in performances, to make connections based on what they hear while listening, between that performance and their own, between that performance and a professional performance, or between that performance and a person's last performance. The students' own performances can be reflected upon, to develop metacognitive skills, and self-assessment skills.

In the pilot study considered here, teacher guidance about how to interact with the mobile platform outside of class was minimal. Further research is needed to determine how specifically assigned learning activities in the context of SoundCloud would influence student learning. Even without teacher direction, some of the high school students in this pilot study naturally gravitated toward engaging in conversational activities such as liking and commenting on one another's performances. As Crawford and Fitzpatrick claim, "The immediacy of being able to post, share, and comment from in situ situations using mobile digital technology has instant appeal." One student who responded to the survey noted that a highlight of using SoundCloud in music class is the ability for students' family members to listen to their progress and improvement throughout the year. Sample comments include: "Wow, beautiful voice!" and "This is really, really good." These types of statements from mothers and grandfathers may encourage students, and let them know their family is listening. Feedback which is specifically focused on the qualities of the performance may contribute more deeply to student learning. With teacher guidance, peer feedback such as this could be part of the mobile learning environment. Peer feedback in music learning has been shown to be reliable, well-received by students, and a means for developing critical thinking and self-evaluation capabilities (Furby, 2014; Ho, 2014).

4 Situated learning

Situated learning refers to a model developed by Lave and Wenger (1991), which describes learning as a process where learners join a new community, gradually gain understanding and skills, and as a result, advance toward increased, and eventually fully realised participation in that community and its sociocultural practices. As learners obtain more knowledge and higher skill levels, their identity develops and they move toward integration into communities of learners. Garrison (2011) suggests that mobile technology has the potential to establish and maintain such communities of learners. In

the case of uploading recordings to SoundCloud, students take on the role of “musician.” As Lave and Wenger (1991) describe, the students are active in legitimate peripheral participation, where they become inducted into the world of music through observing models, and being part of a community of practice. When they begin, students may not yet identify as musicians. As they observe and possibly interact with professional musicians and producers on SoundCloud, put their music out into the world, and get feedback on it, they gradually move closer and closer toward the centre of the community of musicians. Students may not even realise they are learning throughout this process (Woodruff, 2014). Students experience a distribution tool for their music, and they participate as creators of music culture, not just consumers. This process is facilitated through the discourse that occurs in the form of comments within SoundCloud sounds, as well as through classroom discourse which can be facilitated by the music teacher through informal discussions, or structured activities.

Discourse in the context of SoundCloud can take the form of both formative and summative assessment. Two students who responded to the survey mentioned that the mobile platform allows you to cross-reference teacher feedback with your performance. If a teacher gives specific feedback on a performance, the student can then easily access that performance artifact, and listen to it repeatedly, until they hear what the teacher described, since it might not be immediately obvious to the student. Two other students mentioned that the mobile platform is useful for teachers who may want to easily refer to various performances, or specific sections of performances as resources for teaching moments, or as opportunities to assess student improvement over time.

One student mentioned how the mobile music learning platform is of interest to other students in the school who do not take music, saying that “a lot of students in vocals and even students who don’t take vocals enjoy listening to the performances” (Rayna). One student, Zohra, suggested that the mobile music platform is “beneficial to the singer and to the community.”

5 Conclusions

The important question about the role of mobile learning in music education is not whether it should have a role, but how. It is not for us to ask how we can take the notion of mobility as an element to be considered, asking how to conform it to our current context, or add it to what is currently happening; rather, it is important to acknowledge the pervasive nature of mobility, and to ask how we can leverage its affordances to maximise learning (Woodruff, 2014).

SoundCloud is only one example of a mobile technology which may be used in the context of music education. The students in this pilot study responded positively to its use, and without any specific direction from the teacher, described its benefits for learning. Positive comments included, “I loved it!” (Jessica) and, “It’s a fun way to share the talent of students” (Robin). Any mobile platform with similar affordances to SoundCloud has the potential to be positively received by students, and provide opportunities for reflective and situated music learning.

Since the teacher in this context did not design specific learning activities to maximise the potential of SoundCloud for mobile learning, further research is needed to determine the possibilities. However, even without assigning specific learning activities, students naturally gravitated toward accessing the mobile platform both inside and

outside of class, and using it for learning purposes. The majority of the learning happened in self-reflective listening contexts, but also included “liking,” reflecting and commenting on peers’ performances, reflecting on performances of alumni from the school, as well as musicians from around the world, accessing and sharing basic building blocks of musical pieces, to be used for practicing and creating, sharing personal compositions. Teachers benefit from having access to their students’ performances, as a means of demonstrating their own pedagogy and practice, assessing students over time, and referring to specific student performances in specific teaching moments. This pilot study revealed that SoundCloud is an appropriate tool to facilitate music learning within formal high school contexts, since it facilitates nomadicity, ubiquity, personalisation, and social connections. Three students in the pilot study class report that they already post musical performances on their own social media channels, apart from the classroom music SoundCloud account, while another ten students plan to share their music with the world in the future. Encouraging mobile musicianship within formal music classes provides a synergy between the students’ love for music which they actively engage in outside the classroom, and creative musical behaviour which represents authentic musicianship in the 21st century.

References

- Al-Hmouz, A., Shen, J., Yan, J. and Al-Hmouz, R. (2010, November) ‘Enhanced learner model for adaptive mobile learning’, *Proceedings of the 12th International Conference on Information Integration and Web-based Applications & Services*, ACM, pp.783–786.
- Alvarez, C., Alarcon, R. and Nussbaum, M. (2011) ‘Implementing collaborative learning activities in the classroom supported by one-to-one mobile computing: a design-based process’, *Journal of Systems and Software*, Vol. 84, No. 11, pp.1961–1976.
- Botha, A., Herselman, M. and van Greunen, D. (2010, October) ‘Mobile user experience in a mlearning environment’, *Proceedings of the 2010 Annual Research Conference of the South African Institute of Computer Scientists and Information Technologists*, ACM, pp.29–38.
- Cavus, N. and Uzunboylu, H. (2009) ‘Improving critical thinking skills in mobile learning’, *Procedia - Social and Behavioral Sciences*, Vol. 1, No. 1, pp.434–438.
- Chen, G.D., Chang, C.K. and Wang, C.Y. (2008) ‘Ubiquitous learning website: scaffold learners by mobile devices with information-aware techniques’, *Computers & Education*, Vol. 50, No. 1, pp.77–90.
- Cheon, J., Lee, S., Crooks, S.M. and Song, J. (2012) ‘An investigation of mobile learning readiness in higher education based on the theory of planned behavior’, *Computers & Education*, Vol. 59, No. 3, pp.1054–1064.
- Costabile, M.F., De Angeli, A., Lanzilotti, R., Ardito, C., Buono, P. and Pederson, T. (2008, April) ‘Explore! Possibilities and challenges of mobile learning’, *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, ACM, pp.145–154.
- Demmans Epp, C. (2015) ‘Mobile adaptive communication support for vocabulary acquisition’, *Journal of Learning Analytics*, Vol. 1, No. 3, pp.173–175.
- Fabian, K., Keith Topping, B.J. and Barron, I.G. (2016) ‘Mobile technology and mathematics: effects on students’ attitudes, engagement, and achievement’, *Journal of Computers in Education*, Vol. 3, No. 1, pp.77–104.
- Fällman, D. (2003) *In romance with the materials of mobile interaction: A phenomenological approach to the design of mobile information technology*, Doctoral dissertation, Retrieved from Digitala Vetenskapliga Arkivet (urn:nbn:se:umu:diva-170).
- Fischer, J. (2011) *Understanding receptivity to interruptions in mobile human-computer interaction*, Doctoral dissertation, University of Nottingham.

- Furby, V.J. (2014) 'The effects of peer tutoring on the aural skills performance of undergraduate music majors', *Applications of Research in Music Education*, Vol. 34, No. 3, pp.33–39.
- Garrison, D.R. (2011) *E-learning in the 21st Century: A Framework for Research and Practice*, Taylor & Francis, Inc., New York, NY.
- Gaver, W.W. (1991) 'Technology affordances', *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, ACM, New York, NY, USA, pp.79–84.
- Gikas, J. and Grant, M.M. (2013) 'Mobile computing devices in higher education: student perspectives on learning with cellphones, smartphones & social media', *The Internet and Higher Education*, Vol. 19, pp.18–26.
- Hargreaves, D.J., Miell, D. and MacDonald, R.A. (2002) 'What are musical identities, and why are they important', *Musical Identities*, pp.1–20.
- Ho, P.W. (2014) *The effects of peer-evaluation on self-evaluation skills in the music classroom*, Doctoral dissertation, Teachers College, Columbia University.
- Hwang, G-J., Shi, Y-R. and Chu, H-C. (2010) 'A concept map approach to developing collaborative Mindtools for context-aware ubiquitous learning', *British Journal of Educational Technology*, Vol. 42, No. 5, pp.778–789.
- Kamarainen, A.M., Metcalf, S., Grotzer, T., Browne, A., Mazzuca, D., Tutwiler, M.S. and Dede, C. (2013) 'EcoMOBILE: integrating augmented reality and probeware with environmental education field trips', *Computers and Education*, Vol. 30, pp.1–12.
- Kleinrock, L. (1996) 'Nomadicity: anytime, anywhere in a disconnected world', *Mobile networks and Applications*, Vol. 1, No. 4, pp.351–357.
- Kukulska-Hulme, A., Sharples, M., Milrad, M., Arnedillo-Sánchez, I. and Vavoula, G. (2009) 'Innovation in mobile learning: a European perspective', *International Journal of Mobile and Blended Learning*, Vol. 1, No. 1, pp.13–35.
- Lai, C-L., Hwang, G-J., Liang, J-C. and Tsai, C-C. (2016) 'Differences between mobile learning environmental preferences of high school teachers and students in Taiwan: a structural equation model analysis', *Educational Technology Research and Development*, Vol. 64, pp.533–554.
- Lave, J. and Wenger, E. (1991) *Situated Learning: Legitimate Peripheral Participation*, Cambridge University Press.
- Liu, T.Y. (2009) 'A context-aware ubiquitous learning environment for language listening and speaking', *Journal of Computer Assisted Learning*, Vol. 25, pp.515–527.
- Looi, C.K., So, H.J., Toh, Y. and Chen, W. (2011) 'The Singapore experience: synergy of national policy, classroom practice and design research', *International Journal of Computer-Supported Collaborative Learning*, Vol. 6, No. 1, pp.9–37.
- Looi, C.K., Sun, D., Wu, L., Seow, P., Chia, G., Wong, L.H., Soloway, E. and Norris, C. (2014) 'Implementing mobile learning curricula in a grade level: empirical study of learning effectiveness at scale', *Computers and Education*, Vol. 77, pp.101–115.
- Naismith, L., Lonsdale, P., Vavoula, G. and Sharples, M. (2004) *Literature Review in Mobile Technologies and Learning*, Birmingham, UK.
- Nyíri, K. (2002) 'Towards a philosophy of m-learning', *IEEE International Workshop on Wireless and Mobile Technologies in Education*, pp.121–124.
- Ozdamli, F. and Cavus, N. (2011) 'Basic elements and characteristics of mobile learning', *Procedia-Social and Behavioral Sciences*, Vol. 28, pp.937–942.
- Paule-Ruiz, M., Álvarez-García, V., Pérez-Pérez, J.R., Álvarez-Sierra, M. and Trespacios-Menéndez, F. (2016) 'Music learning in preschool with mobile devices', *Behaviour & Information Technology*, doi: 10.1080/0144929X.2016.1198421.
- Randall, W.M. and Rickard, N.S. (2013) 'Development and trial of a mobile experience sampling method (m-ESM) for personal music listening', *Music Perception: An Interdisciplinary Journal*, Vol. 31, No. 2, pp.157–170.

- Reinders, H. and Pegrum, M. (2015) 'Supporting language learning on the move: an evaluative framework for mobile language learning resources', *Second Language Acquisition Research and Materials Development for Language Learning*, Taylor & Francis, Inc., London, UK, pp.116–141.
- Riley, P. (2013) 'Teaching, learning, and living with iPads', *Music Educators Journal*, Vol. 100, No. 1, pp.81–86.
- Rogers, Y., Connelly, K., Hazlewood, W. and Tedesco, L. (2010) 'Enhancing learning: a study of how mobile devices can facilitate sensemaking', *Personal and Ubiquitous Computing*, Vol. 14, No. 2, pp.111–124.
- Ruchter, M., Klar, B. and Geiger, W. (2010) 'Comparing the effects of mobile computers and traditional approaches in environmental education', *Computers & Education*, Vol. 54, pp.1054–1067.
- Sawaya, S. and Putnam, R.T. (2015) 'Using mobile devices to connect mathematics to out-of-school contexts', *Mobile Learning and Mathematics*, Routledge, New York, NY, pp.9–19.
- Sharples, M. (2000) 'The design of personal mobile technologies for lifelong learning', *Computers & Education*, Vol. 34, Nos. 3/4, pp.177–193.
- Sharples, M., Arnedillo-Sanchez, I., Milrad, M. and Vavoula, G. (2009) 'Mobile learning: small devices, big issues', *Technology-Enhanced Learning: Principles and Products*, Springer, pp.233–250.
- Shih, S.C., Kuo, B.C. and Liu, Y.L. (2012) 'Adaptively ubiquitous learning in campus math path', *Educational Technology and Society*, Vol. 15, No. 2, pp.298–308.
- Stanton, G. and Ophoff, J. (2013) 'Towards a method for mobile learning design', *Issues in Informing Science and Information Technology*, Vol. 10, pp.501–523.
- Tabor, S.W. (2016) 'Making mobile learning work: student perceptions and implementation factors theoretical foundations & definitions', *Journal of Information Technology Education: Innovations in Practice*, Vol. 15, pp.75–98.
- Tsai, P.S., Tsai, C.C. and Hwang, G.H. (2011) 'College students' conceptions of context-aware ubiquitous learning: a phenomenographic analysis', *Internet and Higher Education*, Vol. 14, No. 3, pp.137–141.
- Williams, B.T. (2009) *Shimmering Literacies: Popular Culture & Reading & Writing Online*, Peter Lang, New York, NY.
- Woodruff, E. (2014) 'Mobile and ubiquitous learning', *Technology, Psychology and Play*, Toronto, ON.
- Wu, P.H., Hwang, G.J., Tsai, C.C., Chen, Y.C. and Huang, Y.M. (2011) 'A pilot study on conducting mobile learning activities for clinical nursing courses based on the repertory grid approach', *Nurse Education Today*, Vol. 31, No. 8, pp.8–15.
- Yordanova, K. (2007, June) 'Mobile learning and integration of advanced technologies in education', *Proceedings of the 2007 International Conference on Computer Systems and Technologies*, ACM, p.92.