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Mobile Collaborative Language Learning: State of the Art

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Bios

Agnes Kukulska-Hulme is Professor of Learning Technology and Communication in the Institute of Educational Technology at The Open University, UK. She is Past-President of the International Association for Mobile Learning. Kukulska-Hulme has led numerous research projects in mobile and contextual learning, including informal language learning by distance learners and migrants.

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Abstract

This paper presents a review of mobile collaborative language learning studies published in 2012-2016 with the aim to improve understanding of how mobile technologies have been used to support collaborative learning among second and foreign language students. We identify affordances, general pedagogical approaches, second- and foreign language pedagogical approaches, second language acquisition (SLA) principles, and affective designs. The results indicate that affordances such as flexible use, continuity of use, timely feedback, personalization, socialization, self-evaluation, active participation, peer coaching, sources of inspiration outdoors, and cultural authenticity have been emphasized. These affordances were found to be particularly suited to promote social constructivism, which is often sustained by game-based, task-based, and seamless learning. In terms of second and foreign language pedagogical approaches, the combination of individualised and collaborative learning prevails, along with task-based, situated, and communicative language learning, and raising orthographic awareness. Among SLA principles, negotiation of meaning and opportunities for feedback are highlighted. Affective aspects include increases in motivation, engagement and enjoyment, mutual encouragement, reduction in nervousness and embarrassment, and a few negative reports of risk of distraction, safety concerns, feelings of uncertainty and technical problems. The reviewed studies present a convincing case for the benefits of collaboration in mobile language learning.

Introduction

In this paper we conduct a literature review with the objective of mapping the landscape of contemporary mobile collaborative language learning. Mobile phones, smartphones and tablets in principle enable individuals to learn whatever they wish to learn, whenever it suits them to do so. In many cases, such learning conditions open up possibilities for collaborative learning (CL). CL is understood here as “a fundamentally social process of knowledge building” (Miyake & Kirschner, 2014, p. 420), where learners work together to complete a task or solve a problem, and communicate with one another in this process.

The aim of this study is to improve understanding of how mobile technologies and applications (both generic and language-specific) have been used to support CL among second and foreign language learners. Collaboration in language learning can create opportunities for practising language skills and building new knowledge and relationships inside and outside the classroom, as well as in settings where there are no classrooms but there may be other meeting spaces or joint activities. In this study, mobile collaboration comprises physical co-location as well as collaborators being separated in time and place. Iglesias Rodríguez, García Riaza, & Cruz Sanchez Gomez (2017) suggest that CL “involves groups of learners working together to solve a problem, complete a task, or create a product” (p.665), and it is not just a synonym for students learning in groups. We would add that CL can take place between two learners, or even a learner and a teacher, so a group is not always required. Furthermore, in language learning even a simple practice conversation in the target language could be seen as working together to solve a problem (e.g., overcome unwillingness to communicate), complete a task (e.g., understand and be understood), or create a product (e.g., produce correct target language utterances).

Earlier review studies provide an ambiguous picture of the use of mobile technologies to support collaborative second and foreign language learning practices. Kukulska-Hulme and Shield (2008) examined the extent to which mobile devices can support

collaborative listening and speaking, with a focus on the needs of online and distance learners. They found that there was little research related to collaboration in Mobile-Assisted Language Learning (MALL) but existing examples (2002-2007) showed that collaborative speaking and listening learning practices could be successfully supported. Burston's (2013) annotated bibliography of MALL studies (1994-2012) includes 41 papers that reported on CL; these were all published in the period 2003-12 and the majority in 2007-12 (26 papers, some relating to the same project). This suggests a growing but modest focus on CL. Burston (2014) also points out that 75% of all MALL applications (apps) are focused on individual learning as opposed to CL and most are teacher-centred.

Through the quantitative meta-analysis of mobile devices' effectiveness for language learning in the period 1993-2013, Sung, Chang, and Yang (2015) found that they mostly generate larger effects than desktop computers. However, the study's results show a statistically insignificant and small overall effect size for CL, as most of the research did not provide clear instructions for stimulation of learners' interactions in collaborative tasks (p. 79). Still, the results show that CL can be effective for enhancing learners' performance, i.e., producing positive learning outcomes and motivating learning. The authors conclude that more scenarios designed to increase the frequency and depth of interactions among learners are needed to explain features and functions of mobile technologies with regard to CL. More general overview papers on mobile learning in education have similarly considered the role of mobile CL practices and their influence on students' learning performance; for example, Sung, Chang and Liu (2016), suggest that despite the fact that CL researchers used mobile devices' features of individuality and sharing, together with mechanisms for enhancing social interaction, these methods did not enhance the students' learning outcomes compared with the CL scenarios without mobile devices.

The ambiguity of the previous research results suggests the need to delve further into how mobile technologies have been used to support CL among second and foreign language learners.

Method

The review was guided by the following research question: "What is the current knowledge about the application of mobile technologies to support collaborative language learning?" A literature review and analysis was conducted covering journal publications from 2012 to 2016. We chose to focus on the last five years since we did not find any reviews of collaborative mobile language learning research covering this recent period. Qualitative review of MALL studies with a specific focus on collaborative learning has not been sufficiently carried out in recent years and this study aims to fill in that gap.

Literature search strategy

We initially searched for relevant publications through the PRIMO search tool (Peer-Reviewed Instructional Materials Online Database), which contains sundry databases, e.g. Web of Science, ERIC, and Scopus. The following search terms were applied in different combinations: MALL, language learning, collaborative learning, cooperative learning, collaborative language learning, mobile technology, mobile devices, tablets, smartphones, and iPads. Some examples of combinations of these terms include "Mobile technology AND collaborative language learning" and "Smartphones AND language learning AND collaborative learning". In addition, to ensure reliability we followed Webster and Watson's guidelines for conducting literature reviews (2002), where the authors suggest to start with contributions published in leading journals, when identifying relevant literature. Consequently, we manually searched for relevant publications in seven key high-ranked educational technology and language learning journals, namely *Computers & Education*, *British Journal of Educational Technology*, *Journal of*

Computer-Assisted Learning, Computer Assisted Language Learning, ReCALL, Educational Technology and Society, Language Learning and Technology, and two mobile-specific journals, *International Journal of Mobile and Blended Learning* and *International Journal of Interactive Mobile Technologies*. Initially, through the chosen search tool, we identified 1,241 articles. To further guarantee reliability, search results were refined by carefully examining all the retrieved articles' titles, abstracts and keywords, where we looked specifically for the terms "collaborative learning", "collaboration" and "interactions" in the context of MALL. Publications concerned with "cooperative learning" were also scrutinized as this term is often used as a synonym for collaborative learning. When searching for relevant articles in the PRIMO tool using the above mentioned search terms, 97% of the identified publications included ones that represented one or more of the search terms (e.g., they were about mobile technology, or about collaborative language learning), however they were not about mobile collaborative language learning. Thus we excluded those articles. Our manual search in the leading journals confirmed the already identified articles. The 33 articles included in the review, published in 21 peer-reviewed journals in the period 2012 – 2016, cover second and foreign language learners' use of mobile technology for collaborative purposes in educational settings, and report the effects of collaborative use of mobile technology on the acquisition of linguistic knowledge and skills. All the articles included were screened by two reviewers independently.

Data analysis

We conducted content analysis, using a directed approach, which starts with a relevant theory or research findings (Hsieh & Shannon, 2005). All the identified articles were analysed by both reviewers according to the following categories: *affordances, general pedagogical approaches, L2 (second language) pedagogical approaches, SLA principles, and affective design principles*, which constitute Reinders and Pegrum's evaluation framework for MALL (2015). The framework was initially intended for evaluation of the learning design of MALL resources in the form of mobile materials, i.e., web services or apps, or in the form of mobile activities. It was developed for practitioners' use, to "appraise particular MALL resources or even guide their own production of such resources" (p. 116). This framework is relevant here as it uncovers several key aspects of mobile learning design, which are likewise important in understanding second- and foreign language students' use of mobile technology for CL practices. Even though one of the framework's categories, *L2 pedagogical approaches*, centres explicitly on *second* language learning designs, this category is no less important for *foreign* language learning designs, which are included in the current review. According to Reinders and Pegrum (2015), all technologies have their own particular "affordances", which are "uses to which they seem to most readily lend themselves" (p.119). The findings are presented in accordance with the categories in the above-mentioned framework.

Findings

Affordances

Authors of reviewed papers ascribe to mobile technologies and mobile learning a number of affordances, including flexible use, continuity of use, timely feedback, personalization, socialization, active participation, peer coaching, self-evaluation, sources of inspiration outdoors, and cultural authenticity. For example, Troussas, Virvou and Alepis (2014) contend that socialization is supported through mobile devices used as tools for collaboration. Long-term language practice is emphasized by Wong, Chai, Zhang and King (2015b) and by Berns, Isla-Montes, Palomo-Duarte and Doderio (2016). Hwang Shih, Ma, Shadiev and Chen (2016) highlight the application of new knowledge to real situations and student creation of meaningful learning material leading to more frequent practice. Andujar (2016) notes access to an authentic

“new hybrid of spoken, written and electronic chat discourse” (p. 64); while Wong and Hsu (2016) stress timely feedback from teachers.

Collaboration may be designed into a learning system or into a task by a skilful teacher. Chen (2013) shows that collaboration can be encouraged through creation of a suitable mobile platform, while Underwood, Luckin and Winters (2012) illustrate a handheld system which supports self-initiated personal and collaborative language inquiry. Ogunduyile (2013) highlights that learner-centred teaching requires “a highly creative and imaginative teacher” (p.1151), and Yang and Xie (2013) note that when technological hurdles are encountered, learners can engage in different forms of collaboration such that the activity is not entirely dependent on functioning technology.

Several studies report that diverse technologies and media have been used together to support collaboration, as a way to give learners choices (Ilic, 2015; Ogunduyile, 2013) and to increase authenticity through access to multiple popular media or the chance to create new media in different places (Fomani & Hedayayi, 2016; Tuttle, 2013; Viberg & Grönlund, 2013; Wong, Chai, Aw, & King, 2015a). Particular types of device are sometimes presented as having special affordances: e.g., “use of iPads enabled learners to engage in mobile and collaborative learning” (Yang & Xie, 2013); “the mobile device is an aid for creating more opportunities for communicative output, in addition to facilitating face-to-face interaction” (Tai, 2012); smartphones offer “anywhere, anytime communication and data gathering” (Ilic, 2015, p.17). Specific mobile apps are also singled out as being helpful for collaboration and discussion; one popular example is *WhatsApp* (Andujar, 2016; Hazaea & Alzubi, 2016). Hardware and software features are also noted, such as the automatic playback which created “a space for reflection” and helped learners prepare to share their texts with a wider audience (Kirsch, 2016).

General pedagogical approaches

Our analysis shows that the affordances of mobile technologies are particularly suited to promote *social constructivism*, which is sustained by various learning approaches. Wong and Hsu (2014, 2016), for example, present a learning design for Chinese character learning, which is supported by the foundations of collaborative *game-based learning* with a flexible grouping design. The game’s objective is to enhance orthographic awareness of Chinese characters through the guidance of the teacher, social learning and peer support. Berns et al. (2016) present and evaluate a hybrid game-based app, which combines opportunities for individual learning with a collaborative game for the purpose of real-life-like communication in the studied language. Likewise, Hwang et al. (2016) designed and evaluated game-based learning activities that facilitated listening and speaking skills; students could find clues outside of class to finish the game.

Authors of the reviewed articles also employ a *task-based approach* to learning. Lin (2014), for example, has investigated the effects of using tablets in an online extensive reading program. The instructor provided the control and test groups with in-class reading assignments and encouraged learners to read as much as possible outside the classroom, where the learners could decide on the tasks’ content and the pace by themselves. In Pellerin’s study (2014), such a task-based approach allowed young learners, through the use of iPods and tablets, to create their own learning environment, interactions and learning trajectories, and to self-assess and regulate their learning. The students offered scaffolding to each other in providing missing words. Troussas et al. (2014) propose a student-centred approach tailored to collaboration using mobile phones, with the aim to construct student models which promote misconception diagnosis. In their study, *problem-solving learning* was emphasized: the students after having worked on a problem individually were encouraged to collaborate in order to search for understanding, meaning and solutions. Tai (2012) offers a problem-solving task-

based learning design, where the mobile device is used as a communicative tool between the learners and between learners and the teacher.

Several authors ground their research within the foundations of *seamless learning*, which is often associated with *situated*, *authentic* and *contextual learning* opportunities. Seamless learning is generally understood in terms of a learning culture and experience which is not limited to a single context; “seamless learning practices should focus on fostering learners’ habit-of-mind and cognitive skills in carrying our seamless learning in a self-directed manner” (Wong et al., 2015a, p.132). Wong, Chen and Jan (2012) highlight that seamless learners can assume “greater agency in deciding what and how to learn, whether individually or collaboratively and across different learning contexts” (p. 422). Learner agency and contextual learning are key aspects in the work of Wong et al. (2015a) who provide a design framework for enacting long-term learning practices that are embedded into the formal curriculum and foster a cross-context learning process among learners of Chinese. Similarly, Chai, Wong and King (2016) concluded that engaging students in self-directed and CL practices through linguistics artefacts generated around life experiences creates opportunities for meaningful seamless learning. Furthermore, Fomani and Hedayati (2016) in their seamless learning design focused on contextualised student-created content and found it to be efficient for Iranian students’ English idiom learning. Seamless learning can be supported by ubiquitous technologies (that can include sensors embedded in objects and augmented reality), creating environments for collaborative ubiquitous learning (Wong et al., 2015a). In most of the studies various learning approaches are used in their different combinations, underpinned by CL foundations, which are largely based on sociocultural theories emphasising that learners’ construction of knowledge is viewed as the product of social interaction, interpretation and understanding (Vygotsky, 1962).

L2 (Second Language) Pedagogical Approaches

MALL studies with a focus on the use of sundry CL techniques apply various L2 pedagogical approaches which are closely associated with the corresponding language learning domain, and which often overlap with the general pedagogical approaches.

Some studies use a *task-based language learning approach*. Such an approach in the form of collaborative digital storytelling, in combination with exploratory talk and dialogical teaching, has been undertaken by Kirsch (2016). In Kirsch’s longitudinal study, use of the language learning app iTEO on iPads was examined among primary school children in Luxembourg. The findings indicate that the task of collaborative storytelling engaged the learners, guided them to interact with peers and the app, promoted exploratory talk and instruction, and invited them to listen and reflect on language. Tai (2012) undertook a task-based approach to design a contextualised MALL practice aimed at facilitating authentic language communication between learners, integrating reading, listening and speaking.

MALL researchers also apply a *situated language learning approach*. Hwang, Chen, Shadiey, Huang and Chen (2014), for example, focused on improving elementary school EFL learners’ writing skills through situated activities. The system’s design offered possibilities for situated peer comments, to enable learners to view peers’ writings and to comment on them through mobile devices. The results suggest that the more students were engaged in writing situational comments, the more effective learning results were achieved. In another study, Hwang et al. (2016) proposed learning activities to facilitate EFL learners’ listening and speaking skills. The Taiwanese students’ learning experiences were extended to a situational context, i.e., students created their own cards with content captured from the real-life environment. Such an approach has been shown to lead “to a more frequent practicing of speaking skills, learning with meaningful contextual material, producing comprehensive output, and surely to enhancing students’ speaking abilities” (p. 648). A personal and

collaborative language inquiry approach, presented by Underwood et al. (2012), enables students to initiate an inquiry into new language items directly in the settings in which items are encountered.

Several authors explore a *communicative approach* in their studies. Wong et al. (2015a) propose a sociocultural and communicative approach through artefact creation and a social interaction process. Development of communicative skills is emphasized by Ibáñez Moreno and Vermeulen (2015), who introduce and evaluate the Videos for Speaking app to promote oral practice in English among Spanish and Belgian students, and also by Hoven and Palalas (2013) whose learners interviewed each other and co-created artifacts in the process of developing listening skills. Wong, Hsu, Sun and Boticki (2013) likewise support communicative language learning, where communication between the study's participants took place in English, rather than in the target Chinese. Additionally, Ogunduyile (2013) explicitly employs the Communicative Language Teaching approach to teaching English in Nigerian secondary school settings, with the aim to prepare students to perform proficiently outside the language classroom. The communicative approach is also adopted by Lin (2014), with the aim to support mobile-assisted reading in natural settings among EFL learners. Finally, the communicative approach is often applied along with game-based learning design to promote students' communication in the target language and to increase their motivation (see e.g., Berns et al., 2016; Hwang et al., 2016; Wong & Hsu, 2014).

Several design-based research papers emphasise *raising students' orthographic awareness* (e.g., Wong et al., 2013; Wong & Hsu, 2014, 2016). This approach reinforces the application of orthographic rules and applies object teaching via graphics, embedding the fundamental orthographic theory and rules in hands-on practice through collaborative learning. It enables students to implicitly understand the concepts and rules of Chinese character structure through trial and error. Through the application of this pedagogical approach, with emphasis on active peer consultation and mutual learning, the students could successfully progress in their learning.

Authors of the reviewed articles often combine and encourage both individualised/autonomous and collaborative learning practices. Chai et al. (2016) outline facilitation of learners' collaborative construction of linguistics knowledge of Chinese as L2 through social interaction and encouragement of autonomous learning. Other scholars have taken a similar line (e.g., Chen, 2013; Fomani & Hedayayi, 2016; Hazaea & Alzubi, 2016; Lin, 2014; Wong et al., 2012). Ilic (2015), while investigating the use of smartphones for translation homework, asked students to upload their answers individually, before they could provide feedback to each other. Berns et al. (2016) combined opportunities for both individual and collaborative language learning (vocabulary, grammar, and communication practice to solve a murder mystery) through the use of a hybrid game-based app; such a combination is seen to "motivate learners, stimulate perceived usefulness and added value, and better meet the language learning needs of today's language learners" (p. 19).

SLA principles

The current review has identified such SLA core principles as *comprehensive input*, *comprehensive output*, *noticing* of a new language, and *negotiation of meaning* in interaction, with various degrees of *feedback* provided to the learners. The frequently employed social constructivist learning approach is frequently associated with the combination of all these principles, with a focus on the *negotiation of meaning* in interaction approach and the opportunities for *feedback* afforded both through the learners' use of mobile technologies and also offered by the teachers (i.e., both automated and human feedback).

In several studies, only peer feedback – as a facilitator of learners’ negotiation of meaning – is emphasized. For example, Hwang et al. (2014) illustrate how peer-comment activities were designed to enable EFL six-grade Taiwanese students to view peers’ writings and to comment on them through mobile devices. The peers were given instructions on how to give meaningful feedback. Ilic (2015) likewise accentuates peer feedback, while investigating if and how the use of smartphones for homework affects the relationship between Japanese university students, their mobile phones, and their homework.

Noticing and negotiation of meaning in interaction are central SLA principles in the study presented by Andujar (2016). Students explicitly focused on language use, questioning their language use and correcting themselves or others. This was defined as language-related episodes, in which “attention is drawn toward formal features of language, which leads to L2 acquisition” (p. 65). Students and the teacher corrected mistakes through their monitoring of activity in the app, presenting errors in a paraphrased form. Tarighat and Khodabakhsh (2016), in their learning design provided opportunities for both peer- and teacher *feedback*. The latter was offered only after the participants of the *WhatsApp* group posted their comments to each other through their mobile devices. Wong and Hsu (2014; 2016) apply the *negotiation of meaning* in interaction principle in the form of a “learning-by-doing-and-peer-help” approach in a game. In this game, peers offered reciprocal feedback through the app, while the teacher provided in-classroom feedback afterwards. Such negotiation of meaning through the principle of the comprehensive combined feedback is central to other studies (e.g., Wong et al., 2015 (a, b); Kirsch, 2016).

Automated feedback, afforded through the use of language learning apps and/or specially designed systems, has been also proven to be an efficient SLA design component. Lan, Sung and Chang (2013) present a mobile-supported cooperative English reading system, which automatically provides scores for correctly produced phonemes.

Affective design

A strong affective theme is reported increase in motivation; for example, Ibáñez Moreno & Vermeulen (2015) report that their project enhanced students’ motivation and curiosity. Pellerin (2014) claims higher levels of engagement and motivation, thanks to multimodal sensory touch screens and learner-created activities that benefitted young learners of French with attention disorders. Hwang et al. (2016) emphasize game elements as contributing to heightened motivation. According to Ilic (2015), the co-presence of entertainment and homework reduces the perceived distance and effort required to switch between them, thereby reducing the motivational barrier to starting a homework session. Tai (2012) has also shown that students’ “interest, effort, and willingness to learn English improved significantly” (p. 228).

Other claims being made concern positive effects in terms of learner attitudes, enthusiasm, engagement and mutual encouragement. In Lan et al.’s (2013) study, students displayed more positive attitudes towards English language learning. Ogunduyile (2013) states that students were engaged, while in Lin’s study (2014) multimedia functions attracted adolescent learners’ attention. Ibáñez Moreno and Vermeulen (2015) note differences in engagement between groups of students from two different cultural backgrounds. Chen (2013) reports that students encouraged one another to write in the target language, while Hazaea and Alzubi (2016) mention enthusiasm and encouragement in the context of using *WhatsApp* for language learning outside the classroom. Chen (2013) reflects on the need to create a supportive mobile learning environment that will encourage students who are less willing to express themselves in the target language.

Enjoyment and fun are mentioned as by-products of collaborative mobile language learning in several studies (e.g., Berns et al., 2016; Hwang et al., 2014; Tai, 2012, and Yang and Xie, 2013). Wong et al. (2013) observed students’ enjoyment of a collaborative

activity involving some competition and they identify “the novel spontaneous grouping feature, the mobility of both the smartphones and the students in the game, the joyfulness of game playing, and the individual students’ resulting self-esteem from both winning the game and assisting their peers” as some of the critical success factors in students’ performance (p.185).

Reduction in nervousness and embarrassment are notable themes in Ilic’s study (2015). In this study, collaborative mobile learning generated a sense of “belonging to a network of learning” (p. 29) with an improved sense of community. Learners could check their ideas with friends and others with whom they felt more comfortable, to reduce the risk of feeling embarrassed in a more public forum.

Some negative affective effects are also reported. Ogunduyile’s (2013) research highlights that although informal social learning can make students feel more comfortable, it is liable to involve distractions. Tuttle (2013) mentions safety concerns around communication via texting, while Ting, Tai and Chen (2016) note that the novelty of an activity created feelings of uncertainty among students about its effect on their learning. Finally, there are some reports of technical problems that might lead to frustration or non-engagement; for example, Yang and Xie (2013) note technical difficulties with picture uploading and copy-paste actions on iPads.

Discussion

Supporting mobile collaboration in educational settings is a challenging task (Reychav & Wu, 2015), which requires both practitioners and researchers to better understand in what ways mobile technologies have been used to support CL among second and foreign language learners and to what effect.

We found that a number of affordances of mobile technologies support CL language practices. They need to be carefully considered when developing and evaluating mobile collaborative language learning designs in education. However, this is a challenging task as it requires us to take into account the fact that both fluid learning contexts (e.g., formal, informal, in-class and out of class settings) and mobile technologies influence each other and continuously alter each other. This suggests that learners, who are in charge of their contexts and their technologies, need to be seen as co-designers of mobile collaborative language learning activities in education. However, it should not be assumed that learners know how to use their mobile devices effectively for educational purposes (Stockwell, 2014).

It has been suggested that affordances of mobile technologies enable linking between the local and the global, linking of the episodic and the extended, and linking of the personal and the social (Pegrum, 2014, 2015). However, in the papers reviewed for our study, these ‘linkings’ are not frequently considered. It may be that some links are implicit in the designs although they have not been mentioned when the studies were written up. The possibility of linking a local experience with the capacity to share and augment it collaboratively through access to global social networks could benefit more advanced language learners by exposing them to authentic intercultural discourse and its attendant challenges. However such initiatives are constrained by the costs and vagaries of mobile internet access, and by limitations imposed by teaching environments where risk aversion, safety concerns, lack of technical support and programme rigidity may sometimes thwart innovations.

The results of our study also indicate that while most of the reviewed studies take a social constructivist approach to learning, in many cases it is sustained by designs based on, for example, task-based language learning, situated language learning, seamless language learning and communicative language learning. All of them can underpin mobile collaborative language learning practices, which are seen as a process of sociotechnical construction, “where human action and social context reciprocally influence each other” (Viberg, 2015, p. 50). Such reciprocal influence will not be equal in different learning contexts: the roles of social context and human action will vary depending on the characteristics and skills of learners, specific

contexts involved, and technology used. Thus practitioners and scholars need a variety of pedagogical approaches to support diverse learners who use different technologies for collaboration in their acquisition of a new language. However, such approaches should be guided by firm instructional design principles, which will support both instructors and learners. Importantly, designing collaborative learning should mean designing for interdependent learning in which learners depend on one another for the overall completion of a task.

Finally, our repeated reading of the papers selected for our study has drawn our attention to the emphasis that their authors have frequently put on:

- learner agency and self-direction under the guidance of a teacher;
- learners' construction of knowledge;
- authentic communication and the integration of language skills;
- problem-solving and game-playing as popular approaches in task design;
- a desire to facilitate learning in and across multiple contexts and beyond the classroom.

Conclusions

Overall the reviewed studies present a convincing case for the benefits of collaboration in mobile language learning. However, even though much research on learning design in general has been conducted (see Dalziel et al., 2016), we still know little about the processes and steps that are essential for mobile learning design. This should be examined further, especially in terms of collaborative mobile learning. Additionally, SLA principles should be incorporated more systematically into language learning designs and discussed more extensively when reporting on empirical studies. Further research should also delve into how learners communicate and interact with each other through their everyday use of mobile technologies outside educational contexts and MALL researchers and practitioners should take this understanding into account when designing mobile CL activities for second and foreign language learners.

Authors of the reviewed studies have made some suggestions for future research, including development of MALL theories, incorporation of SLA theories, and the investigation of diverse designs and strategies in different circumstances of collaboration. Recent developments in animated agents and virtual tutors (e.g., Mohamad Ali, Segaran, & Wee Hoe, 2015) point to a near future in which 3-D talking heads or whole body avatars will join the ranks of participants available for assistance and collaboration. These developments will bring new challenges around the integration of technology to support learners and enhance collaborative learning which will need to be researched.

Conflict of interest

The authors confirm that there is no conflict of interest.

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