Guest Editorial – One-to-One Learning in the Mobile and Ubiquitous Computing Age

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Technological advancements in ubiquitous computing and wireless communication combined with the rapid adoption of sophisticated mobile multimedia devices and applications have created new software tools for people to connect and interact; therefore changing the ways we communicate and collaborate. Educators and researchers are becoming increasingly aware of how mobile and ubiquitous technologies used in our daily life can be utilized for developing new tools that may have a significant impact on learning. Since 2003, research into one-to-one learning (http://www.g1to1.org/) has focused on those aspects related to the design, implementation and evaluation of tools (such as digital pens or computing devices) used to support individual and collaborative learning. Students in a one-to-one (1:1) learning scenario use handheld devices fitted with wireless communication capabilities to support various learning activities. The usage of handheld devices contributes to the creation of new patterns of interaction and classroom dynamics that may support learning in many ways: they connect the classroom to the outside world (Liu et al., 2008; Vavoula et al., 2009), facilitate social learning process (Liu & Kao, 2007; Roschelle, 2003; Zurita & Nussbaum, 2004), and contextualize the learning experience (Hsi, 2003; Vogel et al., 2010).

One-to-one learning is based on the belief that people learn differently as a result of owning personal handheld computing devices (Chan et al., 2006). The attributes of these devices, including portability, connectivity and context sensitivity combined with sound pedagogical ideas can transform learning from being a merely productive knowledge acquisition process to an active social interaction activity. The argument that one-to-one computational environments may alter the way people learn is largely based on the ratio of students to computers and readiness for students to access the computers. The ready-at-hand personal devices might be able to change the teaching practices because teachers and students will probably no longer consider the computers irrelevant to learning and teaching (Soloway et al., 2001). Nowadays, after almost eight years since the notion of one-to-one learning was introduced, computational power is becoming available everywhere so that we can now have access to different services and the Internet from a wide variety of portable devices. The 1:1 ratio of students to computers in some educational settings has become reality. However, current technological and social environments in the classroom, compared to those that were present when the notion of one-to-one was proposed, have changed significantly. These changes need to be addressed in current research and practice of one-to-one learning.

Regarding technological changes in the environments, students are learning in more versatile settings than before. For instance, students have multiple choices of personal devices, such as smart phones, laptops and e-books which can be integrated with other ubiquitous computing devices to support their learning. Together with pervasively embedded sensors and peripheral equipments, these personal handheld devices provide us with novel ways to interact with our surrounding both, from an individually and collaboratively perspective. For instance, students can interact with each other by using a tabletop computing environment (Dillenbourg & Jermann, 2010) or shared displays (Liu & Kuo, 2007) through the use of their personal devices. In this type of emerging learning environments, students will more often need to use multiple technologies to accomplish a learning task according to the perceived affordances of the technologies in use (Bollen et al., 2008). To better support such learning tasks, it is necessary to further investigate how students interact with learning contents, peers, teachers and parents through a variety of technologies.

Regarding social changes, the accelerated pace of global adoption of smart phones provides a remarkable opportunity for making social mobile media an integral component of distributed learning environments (Multisilta & Milrad, 2009). As social web-based applications such as YouTube, Facebook, Wikipedia and Flickr have become an important element in our culture, they may contribute to broaden the educational impact of mobile technologies because these applications may enable new forms of interactions mediated by social mobile media that facilitate learning and teaching practices. Learners may, for instance, tap social networks and recommendations for learning in pursuit of their interests over informal and formal settings. Students could share experiences and learn from a broader universe of user-generated content, beyond “prescribed” content provided by teachers or textbooks as it
happens in traditional classroom settings. Therefore, a new line of research and practice, that highlights both the aforementioned social and technological changes in order to support and amalgamate contemporary social learning theories, will become more and more imperative than before.

The aim of this special issue is thus to expose the results of current research and emergent learning practices that address the aforementioned issues. The base of the articles described in this issue features a selection of the best research papers presented at the Conference on Classroom, Ubiquitous, and Mobile Technologies Enhanced Learning (CUMTEL) held in conjunction with the 17th International Conference on Computers in Education (ICCE 2009) that took place at the Hong Kong Institute of Education in December 2009. In the paper entitled “Learning Cultures on the Move: Where are we heading”, Kukulska-Hulme addresses the change of key competences in the lifelong learning culture and lists how mobile technologies can be helpful to satisfy the calls for these new competences in terms of language learning. It is argued that “mobile language learning is faced with many opportunities in terms of promoting a lifelong learning culture in society and aiding individuals in their efforts to have learning experiences that fit their needs”. This line of reasoning is consistent with the pedagogical design proposed by Wong, Chin, Tan and Liu where students learn language by making meaning on real-life contexts using smartphones. The results presented in this paper indicate that mobile technologies have the potential to transform passive language learning into an active and authentic learning experience.

This special issue includes also two studies which present new educational applications and interactions patterns enabled by mobile and ubiquitous technologies. Both of these studies address the integration of environmental objects that are used to enhance the interaction between learning contents, peers and teachers. The work carried out by El-Bishouty, Ogata, Rahman and Yano presents a social learning scenario in which a social network has been enhanced by wireless sensor technologies. By sensing and computing the learners’ surrounding environment, ubiquitous computing technologies and a software application are combined in order to recommend peer helpers who may be more likely to fit to the learners’ context and tasks. The results of their study demonstrate that the proposed mobile and ubiquitous computing environment is helpful to enhance social learning through increasing the awareness of learning contexts and peer helpers. In the second study that describes the work carried out by Chao, Chen and Chang, ubiquitous technologies were applied in an individual learning scenario. In their study, paper textbooks and computers were integrated by the use of digital pens to transform reading into a goal-directed learning activity. Their study addresses the integration of the affordances of paper and computers: paper supports an easy-to-read medium while computers provide questions to guide students to read. The results of this study suggest that the design of one-to-one learning activities and environments should take into consideration the affordances of different learning devices in order to maximize the effect of each individual device in the interactions that are part of the overall learning flow.

The descriptions of the two studies above, demonstrate that students need to deal with multiple learning devices and digital media, as well as different modes of interaction in order to complete a learning task. In order to achieve their learning goal, students may need to go through a cognitive process which is slightly different from the one performed without such many devices. It is therefore necessary to further investigate one-to-one learning approaches supported by mobile technologies looking at the human factors that influence the cognitive process using those learning devices. In the study presented by Shih, Chuang and Hwang, the authors explore how multiple sources of information, including the information in the surrounding environment and those provided by the PDAs, may influence the cognitive load of students who have different knowledge level. The results of this study suggest some initial pedagogical guidelines for implementing one-to-one learning with mobile and ubiquitous technologies. Such type of investigations may help us to re-think the principle of “Less is More” (Buxton, 2001) and to reflect upon what is really helpful or harmful in one-to-one learning environments.

References


