Chapter 12
Identifying the Potential of Mobile Phone Cameras in Science Teaching and Learning: A Case Study Undertaken in Sri Lanka

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ABSTRACT
This research was motivated by previous work using mobile phones to support science teaching and learning in a variety of ways. This paper explores in detail how mobile phone cameras can support science teaching and learning during the planning, implementing, and evaluation stages of a lesson. A case study of a science lesson carried out in a school in Sri Lanka is described. The methodological approach of this study is qualitative and data were collected using observations, informal interviews and field notes. The results show that mobile phone cameras support the teacher in a range of ways during lesson planning, lesson implementation, and evaluating learning. Furthermore, the camera function of mobile phones was reported by teachers and students as enhancing the effectiveness of student learning, providing more opportunities for students’ active participation, increasing interactions and collaborative learning opportunities.

INTRODUCTION
Studies have been carried out worldwide to investigate the use of mobile phones for a range of different teaching and learning processes. It is now recognised that the mobile phone can add new dimensions to the teaching and learning process because it possesses a wide range of attributes such as its spontaneous, personal, informal, contextual, portable, ubiquitous and pervasive nature and its functions that include talk, text, still camera, video, radio, and internet (Kukulska-Hulme, 2005).
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One of the most important features in the mobile learning environment (Parsons et al., 2007) is mobility itself which creates exciting opportunities for new forms of learning to emerge; these can change the nature of the physical relationship between teacher, learner and the object of learning (Laurillard, 2007). Mobility demolishes the need to tie particular learning activities to particular places or particular times (Traxler, 2010). The freedom of mobility offers opportunities for the learner to learn autonomously (MacCallum & Kinshuk, 2006). It also provides opportunities to obtain learning experiences outside the teacher-managed context (Naismith et al., 2004) by expanding learning beyond the four walls of the classroom, thus allowing interactions in the real world and bringing new interactions back into the classroom (van’t Hooft & Swan, 2007). In an increasingly fast-paced world where the ability to communicate electronically is increasing, the portability of mobile devices facilitates learning, irrespective of the time of day and the location of the learner (Cooney et al., 2007). Scanlon et al. (2005) note that the mobility and portability of the mobile phone have the potential for making positive changes for accessing information and enhancing interaction in science learning. In terms of the functions of mobile phones, Marriott (2005) considers present-day mobile phones to be complete multimedia centres that combine the capabilities of the still camera, video camera, personal organiser, and a web browser into one single device. These functions could further add a new dimension to science teaching and learning which contains content and scientific processes that are currently viewed as difficult to teach (Taber, 2005; Wellington, 2004; Barton, 2004) by enhancing communication and interactions between teacher and students and amongst students, and enabling collaboration in practical activities or field work. Students are known to be interested in the use of mobile phones for learning as they could assist with communication, create more collaboration and enable creativity (Botha et al., 2009). However, the success of adopting mobile phones in a lesson depends on the teacher’s preparedness to adopt the mobile technologies (Kukulska-Hulme et al., 2009). In this article we are focusing on the potential of using the mobile phone camera in science teaching and learning in school settings.

Theoretical Context

Webb and Cox (2004) claim that Shulman's (1987) model provides a useful description of the processes that teachers engage in when they are planning, teaching and evaluating their technology enhanced lessons. Shulman (1987) notes that, in general, teaching is initiated by some form of ‘text’: a textbook, a syllabus, or an actual piece of material that the teacher or students wish to understand. Then the teacher adds variety and nuances (examples, simulations, dialogues, demonstrations) into what is to be taught to students so as to develop and expand the subject content and a range of other attributes a student should possess for learning (Shulman, 1987). The process of changing the ‘text’ to the outcome (new comprehension by both the teacher and the student) goes through six processes, namely: comprehension, transformation, instruction, evaluation, reflection and new comprehensions. These processes impose a challenge to the teacher whereby his or her pedagogical reasoning and actions are tested throughout the planning, implementation and evaluation cycle and become vital.

Understanding of student learning is an important aspect of the pedagogy of teaching. There are a number of studies reported in the recent research literature suggesting theories underpinning mobile learning. For example, Naismith et al. (2004) categorise the learning activities associated with mobile technologies around seven main learning theories or areas of behaviourist, constructivist, situated, collaborative, informal and lifelong learning and learning and teaching support in their “Literature Review in Mobile Technologies and Learning” written for Futurelab,
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