

Chapter 11

Mobile, Inquiry–Based Learning and Geological Observation: An Exploratory Study

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ABSTRACT

This exploratory study examines the use of integrated and complementary technology systems including mobile devices to explore an instructional experience designed to provoke observational inquiry and geological reasoning with upper elementary and middle school students. Mobile devices combined with classroom-based computer technology loaded with Google Earth™ software provided enhanced and varying views of a geological phenomenon allowing students to identify and reason about visual evidence of erosion in their local environment. A socio-cultural frame was also employed to examine the data in relation to social structures, cultural practices and individual agency. Findings indicate that the incorporation of mobile devices into an overarching instructional intervention involving geological observational inquiry promoted enhanced geological observation and reasoning in the field as well as demonstrated some evidence of appropriation in shifts of agency, social structures and cultural practices for the students in this study.

INTRODUCTION

Research on mobile learning has been characterized as “the study of how the mobility of learners, augmented by personal and public technology can contribute to the process of gaining new

knowledge, skills and experience” (Kukulska-Hulme, Sharples, Milrad, Arnedillo-Sanchez, & Vavoula, 2009, p. 21). Mobile technology provides new possibilities for interconnections of formal, informal and integrative educational experiences capitalizing on portable software and hardware applications for learning. Identifying the specific

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affordances that may contribute to learning when mobile technology is integrated in the classroom presents a challenge for both research and instruction. The promise of mobile learning in flexibility, portability, connectedness and personalization cannot be overstated. However, identification and attention to what might emerge as the critical attributes for learning in a specific setting or context remains a significant concern in related research. As stated by Kukulska-Hulme et al. (2009), context is a central construct for mobile learning. Any investigation of mobile learning context may need to consider multiple levels of engagement and interaction including

1. Between learners and technological tools;
2. Among learners, technology and the setting;
3. Between learners themselves;
4. Between learners and instructors or teachers; and
5. Among learners, instructors or teachers, technology and setting.

Traxler (2009) suggests analyzing these unique learning experiences by attempting to categorize or define mobile learning in a specific pedagogical frame: “For situative activity, learners can take a mobile device out into an authentic context or use it while moving around a context aware environment ...” (p. 4). Current, existing mobile applications such as Google Earth™ on an iPhone or desktop could be considered an example of situated, authentic use in examining local landscapes and satellite imagery when used for geoscience learning. Although many applications are appearing daily for mobile technology, few have been empirically investigated in a learning context. To appropriately examine the pedagogical potential and use of mobile technologies in learning, Pachler, Cook, and Bachmair (2010) encourage researchers to consider a socio-cultural frame and give attention to the interrelationship of the following which they collectively describe as appropriation:

1. Process of meaning-making through communication/conversation across multiple contexts among people in a triangle of social structures, cultural practices and agency;
2. Augment inner, conceptual and outer semi-otic resources;
3. Meaning-making through signs situated in and distributed across learning.

According to these researchers, the cultural practices or informal contexts of learning often promoted by the integration of mobile devices may encourage individualization of content, consideration of context and perhaps different habits of learning than traditional education. Creating meaning or promoting learning then, with mobile devices, needs to consider the nexus of social, cultural and individual agency factors. Pachler, Cook, and Bachmair (2010) ascribe individual agency as manifesting itself through developing relationships, communication and attaching meaning to different sign systems such as images or representations of the world across different contexts. The “mobile complex” as defined by Pachler, Cook, and Bachmair (2010) broadly encompasses the socio-cultural, technological and infrastructural systems and what it means to come to know through interaction with others and technology across contexts. This study attempts to examine the “mobile complex” through a qualitative case study of using mobile learning in the context of classroom-based and field-based geological observation.

Geological Observation and Reasoning

Mobile devices may provide an important linkage between the classroom and the field for students by enhancing their understanding of landform change over time and visio-spatial capabilities augmented with technology. Recent work involving geotechnology in secondary education has included the use of mobile Geographical Information Systems

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