Improving critical thinking skills in mobile learning

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Abstract

The purpose of this study is to investigate the effect of mobile learning over the critical thinking skills. The volunteer sample in this experimental study consisted of 41 undergraduates enrolled in computer education classes at the Near East University in North Cyprus. The students’ critical thinking disposition was measured by California Critical Thinking Disposition Inventory Scale (CCTDI). Also, the usefulness of mobile learning systems (UMLS), a questionnaire adapted by Motiwalla (2007), was used to collect data. The data was analyzed using descriptive statistical analysis techniques; arithmetic mean and standard deviation. Overall, students’ attitudes toward the usefulness of a mobile learning system improved significantly at the end of the experimental study. It was found that after the study the students’ creativity improved significantly. Furthermore, researchers found that outdoor experiences influenced students’ attitudes positively. Additionally, results indicate that in this study, working collaboratively and sharing information were built into a group activity.

Keywords: M-learning; environmental awareness; collaborative learning; critical thinking; mobile technologies; SMS; MMS; Messenger; GPRS; WAP.

1. Introduction

Mobile learning or m-learning (ML) has increasingly attracted the interest of educators, researchers, and companies that develop learning systems and publish instructional materials. This technology provides the potential for collaborative interaction and learning opportunities for geographically dispersed persons and groups (Biström, 2005; Edwards et al., 2002). Although currently applied in small-scale projects, ML is potentially useful in more educational settings. Small and familiar to students, mobile telephones do not require technological training, do not intimidate users, and remain unobtrusive in classrooms (Nyiri, 2003). Also, within educational environments, students frequently move from place to place (Muhlhauser & Trompler, 2002), but the mobile telephones they carry are immediately accessible throughout the day (Cereijo-Roibas & Arnedillo-Sanchez, 2002). The use of wireless/handheld devices includes students and instructors using discretionary periods while traveling by bus or train to complete course assignments or prepare lessons (Virvou & Alepis, 2005).

Short Message Service (SMS) and Wireless Application Protocols (WAP), two types of wireless data communication, have gained increasing global popularity, although their use in online education has been limited (Motiwalla, 2007). The common use of telephones and messaging for facilitating friendships and socialization (Bauman, 2003; Taylor & Harper, 2002) has established a role for the mobile telephone as a means of collaborative learning. Few studies, however, have investigated educational outcomes of ML (Uzunboylu, Cavus & Ercag, 2009). BenMoussa (2003) identified several benefits of using mobile applications, which generally permit users to control or filter the flow of information and communication using individualized or personalized devices. The influence of constructivism has resulted in more self-directed and exploratory classroom activities (Karagiorgi & Symeou, 2005). Perhaps one of the most sophisticated uses of m-learning to date is the Mobile Author Project.

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(Virvou & Alepis, 2005), which allows instructors to create an intelligent tutoring system (ITS) for any subject. Also, the Mobile Learning Tool (MOLT) developed by Cavus and Ibrahim (2009) investigates the use of wireless technologies in education, particularly for learning technical English words using text messaging. They concluded that away from the regular classroom environment, students completed daily activities and learned new technical words. It is well known that one of the most important issues in education is critical thinking. Richard (1991) defines critical thinking as reaching consequences based on observation and knowledge. Norris (1985) describes critical thinking as students’ practice of all previous knowledge on a specific topic and the evaluation of their own thinking skills and the change of behaviors. According to Ennis (1985) is a reasonable, reflective, responsible and skilled thinking process which focuses on what to believe and what to do (Ivie, 2001). If students use critical thinking skills, they gain clear and bright views in depth, they are more interested in events, they approach in a more reasonable manner and they become fairer (Connerly, 2006). On the other hand, Rudd, Baker and Tracy (2000) state critical thinking is a reasoned, purposive, and introspective approach to solving problems or addressing questions with incomplete evidence and information and for which an incontrovertible solution is unlikely. Latterly, Moore and Parker (2007) underline critical thinking is “the careful and deliberate determination of whether to accept, reject, or suspend judgment about a claim”. Another outlook from Facione (2007) that suggested critical thinking is thinking that has a purpose (proving a point, interpreting what something means, solving a problem), but critical thinking can be a collaborative, noncompetitive endeavor. Today, another important role of education in understanding, protecting, and solving environmental problems has been universally recognized since 1970 (Shobeiri, Omidvar & Prahallada, 2006). Since 2000, researchers have considered the use of environmental education in schools, colleges, and universities (Iozi, 1989; Palmberg & Kuru, 2000; Shin, 2000). Researchers subsequently examined students’ knowledge and attitudes towards the environments (Ramsey & Hungerford, 1989; Thompson & Gasteiger, 1985; Weigel & Weigel, 1978) and methods for teaching environmental awareness (Attarian, 1996; Bryant & Hungerford, 1977; Howe & Disinger, 1988; Leeming et al., 1993; Shepard & Speelman, 1985).

2. The Purpose of the Study

The purpose of this study is to investigate the effect of mobile learning over the critical thinking skills. The study focuses on answering these questions:

Is there a significant difference in pre-experience test and post-experience test results of the usefulness of mobile learning systems (UMLS) questionnaire?

1. Is there a significant difference in pre-experience test and post-experience test results of the creativities of the participants?
3. Method

3.1. Participants

The volunteer sample in this study (N = 41) consisted of 20 males and 21 female undergraduates enrolled in computer education classes at the Near East University in North Cyprus. Thirteen students were second-year students (sophomore), 14 were third-year students (junior), and 14 were fourth-year (senior) students. The mean age of participants was 21.37 years, ranging from 19-24. Each participant completed pre-experience and post-experience questionnaires. Expenses for the study were paid by North Cyprus TURKCELL, a commercial provider of mobile services.

3.2. Instrument

The students’ critical thinking disposition was measured by California Critical Thinking Disposition Inventory Scale (CCTDI). California Critical Thinking Disposition Inventory Scale was developed by Facione, Facione and Giancarlo (1992) and was adapted into Turkish by Kökdemir (2003). It includes seven subscales which is determined theoretically and tested psychometrically. The CCTDI consists of 75 Likert-type questions that represent seven critical thinking constructs. The developers report an overall reliability Chronbach’s of .90 and scale reliability scores from .72 - .80. Total scores range for m 75-450. However, in order to determine the critical thinking disposition, a total point of these subscales is used Facione, Facione and Giancarlo (1992).

The usefulness of mobile learning systems (UMLS), a questionnaire adapted by Motiwalla (2007), was used to collect data. This 23-item questionnaire focuses on the usefulness of mobile telephones for increasing students’ awareness of environment concerns. Each participant completed the UMLS before the project began and after its completion. The questionnaire addresses three dimensions: Asynchronous communication, synchronous communication, and mobile communication. Respondents rate each item on a 1-5 Likert scale from “strongly agree” (5) to “strongly disagree” (1). The Cronbach’s alpha of the questionnaire is .93.

3.3. Procedure

Mobile technologies potentially promote, facilitate, and enhance student collaboration and interaction, processes that serve as a means for accessing, discovering, discussing, and sharing environmental concerns via multimedia messaging services (MMS), short message service (SMS), electronic mail, or MSN Messenger. Students can converse with each other, question each other, and share opinions about environmental concerns. Collaboration could also occur outside the classroom, unlimited by geography, space, or time, although traditional classroom instruction infrequently supports collaboration. Mobile telephones with cameras permit students to photograph environmental problems and serve as a means for sharing concerns with friends. Thus, students can pose questions related to the environment, collaborate with classmates, learn new knowledge, and formulate plans to solve environmental problems. ML potentially moves learning outside classrooms and into students’ environments, both real and virtual, thus re-conceptualizing learning as personal, situational, creativity, collaborative, and lifelong. All the activities during the study were organized so that students could use their critical thinking skills.

3.4. Data analysis

The data was analyzed using descriptive statistical analysis techniques; arithmetic mean and standard deviation.

4. Results and Discussion

Figure 1 presents the pre-experience test and post-experience test means and standard deviations for total point UMLS questionnaire. The pre-experience test mean on the UMLS was 45.20 (SD = 20.22); the corresponding post-experience test mean was 89.76 (SD = 9.79). The mean difference was 44.56. A paired-samples t-test compared the pre-experience test and post-experience test mean of the UMLS. The results differed significantly, t (40) = 12.47, p = .01. The pre-experience test mean was 1.97, and the post-experience test mean was 3.90. Overall, students’ attitude toward the usefulness of a mobile learning system improved significantly.
Figure 2 presents the pre-experience test and post-experience test means and standard deviations for CCTDI scale. The pre-experience test mean on the CCTDI was 211.39 ($SD = 37.91$); the corresponding post-experience test mean was 247.68 ($SD = 54.56$). The mean difference was 36.29. A paired-samples t-test compared the pre-experience test and post-experience test mean of the CCTDI. The results differed significantly, $t (40) = 3.49, p = .001$. The pre-experience test mean was 2.81, and the post-experience test mean was 3.30. After the study the students’ creativity improved significantly.

5. Conclusion

Overall, students’ attitudes toward the usefulness of a mobile learning system improved significantly at the end of the experimental study. It was found that after the study the students’ creativity improved significantly. This is other favorable result of the study for the researchers. Kökdemir (2003) states when critical thinking education is the part of the ongoing education, students are not only more successful academically but also they are more positive socially. Interestingly, the study of Ip et al., (2001) stated that in the majority of sub-scales of CCTDI, students showed a negative disposition towards critical thinking. On the other hand, researchers found that outdoor experiences influenced students’ attitudes (Driver & Johnson, 1984; Howe & Disinger, 1988; Knapp, 1996; Ramsey & Hungerford, 1989; Shepard & Speelman, 1985-86) exactly as in our study. Furthermore, using group discussions about environmental problems, Jaus (1984) investigated short-term and long-term effects of environmental instruction on the attitudes of third graders. Additionally, results indicate that in this study, working collaboratively and sharing information was built into a group activity to encourage undergraduates to create a virtual map by transmitting snapshots and text gathered while exploring a geographical area in North Cyprus.

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References


