*An Analysis of the Effect of Mobile Learning
on Lebanese Higher Education*

KHAYRAZAD KARI JABBOUR
Lebanese University, Lebanon
karijabbour@hotmail.com

Abstract

This research explores the effect of mobile technologies in Lebanese higher education. Four components were utilized to evaluate the impact, namely, student attitudes, student achievements, and educational process. The findings of this study showed that when mobile with 3G technologies is used in education, students take pleasure in attending classes, exhibit positive learning experience, and values the effectiveness of mobile technologies. Mobile technologies were also found to have positive influence on students learning outcomes. It also impacted positively the interactions between students and also the interactions between the instructor and students.

Keywords: Higher Education, Lebanese, Mobile, m-Education, 2013, Technology in education

1. Introduction

Over the past decade, developments in computer technology have significantly shaped our everyday life. These developments have potential to foster financial and social development. It also has the potential to reform our education system in the twenty-first century. Wireless technology, like smartphones, personal digital assistants (PDAs), laptops and other personalized tools, have been utilized by students for different reasons besides learning. Schieber in 1999, explained that the difficulties of "part-time" utilization of computer technology ceased when students with personalized wireless technology tools are able to use them the whole time, in class or at home (Schieber, 1999).

A review of the literature has revealed that none of the previous research evaluated the impact of using mobile technologies in higher education institutions classrooms in Lebanon. This research addressed this gap by studying the impact of mobile technologies on higher education students in Lebanese institutes from both a student and instructor perspective.

2. Literature Review

Many research studies illustrate the effect of technology in the classrooms. Some of these studies revealed that technology increased achievements and enhanced students' behaviors, (Carlson, 2002; Cianfrani, 2002; Doolen, Porter & Hoag, 2003; Kolar, Sabatini & Fink, 2002; Lowther, Ross & Morrions, 2001; Winsler & Manfra, 2002). On the other hand, some researchers reported that the impact of technology on student performance was not significant (Avers, 2004; Kinlaw, 2003). In this section we discuss some of these studies.

2.1. Students Attitudes Towards Education Technology

There are numerous previous studies that address student attitudes in relation to technology usage in the classrooms. Mitra and Steffensmeier (2000) demonstrated in their study that the use of technology in the classrooms was positively associated with student attitudes towards technology as it improved communication. The research also revealed that the attitudes of the students who did not use the computers in the classrooms were different from the learners who did have access to the technology. Another study done by Doolen, Porter, and Hoag in 2003, examined students' attitudes towards integrating PDAs in education. The result of the study revealed that students had positive attitudes towards PDAs when used in the traditional classroom setting.

2.2. Student Achievements

Several previous researches highlighted the effect of educational technology on student achievements. The majority of the researchers illustrated that technology has a positive impact on student achievements or that technology has no impact on student achievements at all. Only very few studies illustrated that technology has a negative impact on student achievements. (Waker, 2001). Kolar, Sabatini and Fink (2002) showed in their study that the use of technology in the university classrooms has a positive impact on students' performance; the results revealed that students who used laptop in the classroom performed better and had more positive learning experience than students who did not. Similarly, Lowther, Ross, and Morrison (2001) also showed in their study that students with laptops had significantly higher performance than those without laptops. Doolen, Porter, and Hoag (2003) also studied the association between student performance and the use of PDAs in a traditional classroom. The results showed that the introduction of PDAs in a traditional classroom improved student performance. Carlson (2002) investigated the relationship between the uses of the PDAs in class and student performance; the result showed that the use of PDAs had strong impact on the students' performance.

2.3. Educational Approach

Lowther, Ross and Morrison (2001) studied the affect of educational technology on the educational approach. The result showed that the integration of technology in the classrooms encourages student-centered approach. Teaching and learning were modified in ways that promoted active learning and technology application. Students who used technology were more active, self-directed, and collaborative in their classroom behaviors. Kolar, Sabatini and Fink (2002) also described in their study that using technology in the classrooms had dynamic effects, which was manifested in the much higher class participation grade. Similarly, Winsler and Manfra (2002) evaluated student perceptions of the usefulness of the technology in the classrooms; the results revealed that the majority of the students expressed that technology use is helpful in enhancing student learning, motivation, and communication. Bauer and Ulrich (2002) found that students with PDA access in the classrooms, when compared with those not having PDA, had better organizational skills, asked more questions about the coursework, and strengthened their collaboration on projects.

3. Research Study

This section outlines the research method that was used to examine the research questions; the research components, research questions, research participants and design, and research instruments.

3.1. Research Components

This research evaluated the impact of mobile technologies in the higher education classroom by focusing on six main components:

Component 1: Students attitudes towards the utilization of mobile technologies in learning;
Component 2: Student learning achievements;
Component 3: Impact of mobile technologies on instructional strategies;
Component 4: Impact of mobile technologies on student engagement and student activities;
Component 5: Issues with Mobile in Classroom;
Component 6: Impact of Mobile Devices with 3G on student interactions.

3.2. Research Questions

This research investigates the impact of mobile technology in Lebanese higher education classrooms. It also investigates some issues that are associated with mobile technology, and the impact of these issues on students' academic life. In this research study, the following research questions were addressed:

Research question 1: Does the introduction of mobile technologies in the classroom affect student attitudes towards mobile technologies and the usage of mobile technologies in learning?
Research question 2: Does the introduction of mobile technologies in the classroom affect student achievements?
Research question 3: Does the introduction of mobile technologies in the classroom affect educational approach, interactions between

instructor and students, or interactions between students?

Research question 4: What are some of the issues that education faces by using mobile technologies in the classroom?

3.3. Research Participants and Design

The participants in this study were Lebanese undergraduate education students taking classes at the Modern University for Business and Science in Lebanon during spring term in 2013. All participants were at least 18 years old. Two sections, A and B, of the same course cover the same concepts of educational technology. There were approximately 20 students enrolled in each section. The experimental group-section B and the control group-section A, were chosen so that they were as similar as possible on all variables. In the experimental group-section B, students were required to bring mobile devices with 3G service to class for the duration of the term; mobile phones with 3G service were used on a regular basis in section B. The educational technology courses were composed only of lectures. The topics covered in the educational technology course include:

- Educational technology effectiveness
- Architectures of educational technology
- Promise and pitfalls of educational technology
- Situations in which the contiguity principle is most applicable
- The human learning processes
- Modality Principle
- Redundancy Principle
- Using Simpler Visuals
- Coherence Principle 1-3
- Personalization Principle 1
- Pre-Training Principle
- Worked Example Principle 1-5
- Practice Multimedia Learning Principle 1-6
- Collaborative Learning: Criteria 1-3
- Learner Control Principle 1-5
- Thinking Skills Principle 1-4
- Games and Simulations Principle 1-6

3.4. Instruments and Protocols

Different techniques were used to evaluate the research questions and reflect the different ways of conceptualizing the impact. The research tools and protocols used are indicated in Table 1:

Table 1. Research Tools and Protocols

Component	Instruments	Protocols
Component 1: Students attitudes towards the utilization of mobile technologies in learning	• Pre Surveys • Post Surveys	
Component 2: student learning achievements,	• Students achievements scores	
Component 3: impact of mobile technologies on Instructional Strategies		• Classroom observations
Component 4: impact of mobile technologies on Student Engagement and Student Activities		• Classroom observations
Component 5: Issues with Mobile in Classroom		• Discussion group • Classroom observations
Component 6: Impact of Mobile Devices with 3G on Student Interactions		• Discussion group • Classroom observations

3.5. Surveys

The survey had two main components. The first component assessed student attitudes toward mobile technologies in education. The second survey component assessed student opinions of mobile technologies in education. Students were informed that participating in the surveys, or not, would have no effect to their class score. The participants were allowed to ask questions about the survey. Students who did not wish to participate in the survey were permitted to depart the classroom. The survey took around 10- 15 minutes to complete. Responses for all the surveys in this study were collected using paper and pencil.

3.5.1 Survey First Component- Attitudes

The attitude component of the survey used in this study was adapted from an investigation done by Doolen, Porter and Hoag (2003). The survey was modified to refer to mobile technologies and the use of mobile technologies in a traditional classroom. The survey was translated to Arabic language to match the Lebanese student population. The survey intended to assess attitudes towards

mobile devices with 3G capability in different areas -- confidence, liking, anxiety, usefulness in general, and usefulness in the classroom. Participants in the targeted section section B -- were asked to complete the survey. The surveys were administered early in the spring term and again at the end of the term. The instructor distributed these surveys during regularly scheduled class periods. Students were asked of their specific agreement or disagreement with each survey question. A five-point Likert scale (Strongly disagree, Disagree, Neutral, Agree, Strongly agree) was used for all survey items except for demographic information (gender, age). Pre- and post-surveys were employed in order to examine the changes in student attitudes before and after incorporating mobile technologies into the classroom. The pre-survey was administered for section B, in the beginning of spring term 2013.

Participants from section B, were requested to reveal their opinion on the use of mobile technology devices in the classroom. Participants were asked if they had any thoughts on the use of mobile technology devices in the classroom in both the pre- and post-surveys. The post survey was administered at the end of spring term 2013, to section B. The surveys from the beginning of the spring term were matched with end of the term surveys for each student to uncover individual attitude changes. Statistical techniques were used for student attitude analyses.

3.5.2. Survey Second Component - Opinion

The opinion survey was used to assess student opinions of mobile technologies for section B. Students were requested to specify their perceptions on how the mobile devices with 3G capability improved their learning, and how students employ mobile technologies in a traditional classroom. Students were first asked to specify how they used mobile technology devices in the classroom. Students were asked to estimate the rate of recurrence that they used mobile technology devices during class, (always, usually, about half of the time, seldom or never). Next, students were asked to specify the purpose of using mobile technology devices where they could select many answers. Students were also asked to evaluate mobile technology usage in the classroom in relation to overall student learning. Students were asked if they desire to utilize mobile technologies in other classes. Students were also asked to add any comments or suggestions related to the topic.

3.5.3. Discussion Group

The aim of the discussion group was to listen to observations of students in section B, about the usage and the role of mobile technologies in the classroom. The objective was to reveal unexpected or overlooked areas linked to student attitudes and learning using mobile technologies. The discussion group was also used to investigate student view on educational approach, interactions between the instructor and students, and interactions between students in the classroom. The duration of the discussion group was two hours. Students were informed

that their participation had no effect on their class scores. The students were permitted to ask questions. Students who did not wish to stay in the discussion group were allowed to depart. Five volunteer students from the experimental group-section B, attended the discussion group session. The discussion group was carried out at the end of spring term, 2013, after the completion of the course.

3.5.4. Students' Achievements Scores

Students' total achievements scores were used to investigate the effect of mobile technologies usage on student learning. Students' overall performance score grades from the control group (section A) and the experimental group (section B) were compared to determine if the presentation of mobile technologies enhanced student learning outcomes. Identical class manual, computer laboratory facilities, syllabus, assignments and parallel tests were used in these two sections. Both sections were taught by the same instructor. The instructor graded assignments and tests utilizing detailed score criteria. The same four assignments were handed out in both sections, with a total possible score of 40 achievable points. Each assignment was scored out of a total of 10 achievable score. Parallel midterm and final tests were administered in both sections, with a total possible achievable score of 60 points. The midterm was scored out of a total of 25 possible achievable score, and the final was scored out of a total of 35 possible achievable score. A total possible achievable score was 100 points.

3.5.5. Class Observation

The classroom observation was used to collect data on educational approach and interactions. The intention of the observations was to find out the degree to which a specific activity takes place. The most common usage of class observations is to study classroom behavior. In this study, the classroom observation was utilized to review: student interactions with the teacher and with the other students, mobile devices with 3G capability usage, student engagement in the classroom, and instructional activities.

4. Research Analysis

This study used both quantitative and qualitative methods to examine the research questions. Multiple data collection methods such as surveys, interviews, discussion group and observations were used. This section describes the results of the research components included in this study:

4.1. Demographics

Table 2 summarizes student demographics for section A and B. The data were taken from students' achievement scores. The student demographics for both sections were quite similar. All of the students were female. Their ages ranged between 19 to 23 years old. All of the students majored in undergraduate

Education program; and they all registered in spring 2013, for the same class, Educational Technology, section A and B.

Table 2. Profile of the subjects	
Section	Number of students
A	2 0
B	18

4.2. Student attitudes towards the utilization of mobile technologies in education

The student attitude surveys were designed to assess students' attitudes towards mobile devices with 3G capability, and the usage of mobile technology in the following different themes: confidence, liking, anxiety, usefulness in general, and usefulness in the classroom. A five-point Likert scale (Strongly disagree, Disagree, Neutral, Agree, Strongly agree) was used for all survey items. A score greater than 3.0 is a sign of positive attitude for all themes. For the anxiety themes, a high rating is used to indicate a low level of anxiety. The participant surveys from the beginning of the term 2013 were matched with end of term surveys for each participant to determine individual attitude changes by matching participant ID's on pre and post surveys.

Table 3 summarizes the descriptive statistics for the data collected. The minimum values, maximum values, medians, means, and standard deviations for each theme are shown. In general the answers were fairly positive; the median and the mean scores were greater than 3.0 for all themes for both the pre and post surveys, which indicate that learners had positive attitudes toward the use of mobile devices with 3G capability in classroom. The median and the mean scores of the usefulness in classroom scale (only available in the post-test survey data) were over 3.0, signifying that learners had positive attitudes concerning the effectiveness of the mobile devices with 3G capability as tool in the learning process.

In order to investigate any change in the pre and post attitude data, the nonparametric Wilcoxon signed-rank test was used to compare the pre and post scores that come from the same participants. The usefulness in classroom detail is only available in the post survey data therefore this item is not included in the test. P-values less than 0.05 designate a variation difference between the pre and post survey scores. The P-value for the confidence (0.041) and anxiety (0.020) are less than 0.05 which indicate that participants'' confidence increased, also the participants' anxiety decreased at the end of the term. Table 4 illustrates the descriptive statistics and results of the Wilcoxon Signed-Rank test.

Table 3 summary of descriptive statistics for attitude surveys

	Confidence		liking		Anxiety		usefulness in general		usefulness in classroom	
Survey	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
N	18	18	18	18	18	18	18	18	-	18
Min	1.90	2.65	2.15	2.15	2.10	2.30	2.57	2.00	-	2.20
Max	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	-	5.00
Median	3.70	4.00	3.85	4.25	4.00	4.00	4.00	3.84	-	4.00
Mean	3.76	4.02	3.95	3.77	3.91	4.10	4.06	3.80	-	3.71
SD	0.70	0.62	0.62	0.88	0.70	0.73	0.62	0.69	-	0.76

Table 4 Wilcoxon Signed-Rank test statistics for attitude surveys

	Confidence		liking		Anxiety		usefulness in general	
Survey	Pre	Post	Pre	Post	Pre	Post	Pre	Post
N	2	12	12	12	12	12	12	12
Min	2.15	2.90	2.90	2.40	2.70	2.90	2.60	2.00
Max	4.40	5.00	4.65	4.65	4.50	4.90	5.00	5.00
Median	4.00	4.00	4.00	4.25	4.00	4.40	4.17	4.00
Mean	3.70	4.13	3.91	4.10	3.86	4.26	4.06	3.80
SD	0.73	0.56	0.57	0.71	0.57	0.56	0.78	0.76
P-Value	0.041		0.182		0.020		0.058	

4.3. Student Learning Achievements

Grades of students from both Section A and Section B in the Educational Technology course were compared to find out if the integration of mobile devices with 3G capability in the classroom enhanced student learning achievements. These two sections, A & B, took the course in the same year and term, spring term of 2013. In order to determine the student's overall performance, the analysis was completed for their total points with a total possible score of 100. A t-test for two independent samples, sections A & B, was conducted to assess if a significant variation was witnessed between the scores of each section. The outcome of the t-test is illustrated in Table 5. The P-values for the test for section A and section B were less than 0.05. The result shows an adequate confirmation to deduce that the personal practice of mobile

technology in education with 3G capability positively impacted student learning achievements.

Table 5 Summary descriptive statistics for student learning outcomes and results of t-test

	Section	N	Min	Max	Mean	SD	P-Value
Total	A	20	45.5	95	78	10.5	0.017
Scores	B	18	52	100	84	9	

4.4 Impact of Mobile Devices with 3G on Instructional Strategies

In the classroom using mobile technologies, the lecturer's responsibility was transformed from presenter of knowledge to facilitator of learning. Planning for lessons was also altered in order to adapt to mobile technologies. Class structure and materials, such as questions or examples were altered to accommodate the integration of mobile technologies in traditional lecture. In both sections, the teacher used the traditional direct lectures strategy as the main instructional approach.

After giving information on the subject matter utilizing traditional lectures, the teacher handed out an in-class assignment in order to reinforce the concepts presented. The in-class assignment had varied purposes, namely, to respond to teacher questions, to collect data, collection, to analyze data. Other in-class assignments were on instructional lessons or class material reviews. Students in section A, completed the in-class assignment with the aid of their class manual and notes. Students in section B completed their in-class assignment with the help of their mobile devices with 3G capability. During the in-class assignment time, the teacher moved around to observe students' inquiries. Sometimes, the teacher requested students to work in teams. Instructors also used mobile devices with 3G capability to get continuing and timely feedback from students.

4.5 Impact of Mobile Devices With 3G on Student Engagement and Student Activities

Based on class observations, integrating mobile devices with 3G capability in the classroom encouraged students to be more active and involved in the educational process. This is in parallel with the participants' remarks from the students, surveys and the discussion group. Based on the classroom observations, students appeared to be more involved and focused in the classroom when engaged in the in-class assignment, team work, or debates than when the teacher was lecturing. It was also observed that there were more students seated in the front rows of the classroom in session (B) where mobile devices with 3G capability were used for education purpose than in the other session

(A) which did not use mobile technology in education. The teacher noted that the use of mobile devices with 3G capability in the classroom provided options for students to use their preferred learning style in the classroom.

4.6 Issues with Mobile in Classroom

One issue that was identified is the teacher's observation that there were some participants who chose to use the mobile technology for activities that are not related to the class activities, such as such as playing games or instant messaging. The teacher observed that students engaged in activities that are not related to class often toward the end of the session rather than at the beginning of the session. It was also observed that students seated in the back rows of the classroom use their mobile more often for activities that are not related to class. Sometimes the class was disturbed by some of the students who engaged in activities that are not related to class. Also, sometimes the teacher had to ask students to turn off their mobile in order to direct student attention back to her.

Another issue that was identified was that the physical classroom was a traditional lecture room; it did not accommodate group activities very well. Students from both session (A & B) remarked that they had difficulty when the teacher asked them to work in groups. Students had difficulties in re-arranging their seats for teamwork. The teacher also had difficulties walking between students due to limited spaces. In addition, students also complained that only a few power outlets were available in the classroom. Some students had problems of the mobile power outage and consequently they were unable to use their mobile in the classroom.

The university had a back-up arrangement for times when the mobile devices with 3G capabilities would not work quite right. The teacher worked collaboratively with the system manager to assure that the wireless system network is available in class.

4.7. Impact of Mobile Devices With 3G on Student Interactions

The use of mobile devices with 3G capabilities in education encouraged more communications between the teachers and students, also between students. The use of mobile devices altered the manner students related with each other. While students were working on the in-class assignments, the teacher walked around to assist students. Students also discussed with each other as they worked on the assignment. From student surveys and discussions group, students senses that mobile devices allow the teacher to evaluate student knowledge and improved the degree of student involvement in classrooms even when they do not speak out. From the discussion group, students felt that the use of mobile devices changed the way students interacted with each other. In addition to verbal communication, some students correspond with each other via instant messaging (IM) to discuss the course subject matter without disrupting the lecture. Students sensed that they were quieter. Students

consider IM an excellent idea for the reason that they did not have to disrupt the lecture.

4.8. Students Quotes

The aim of the discussion group was to listen to students in section B, on their observation about the usage and the role of mobile technologies in the classroom. The objective was to reveal unexpected or overlooked issues linked to student attitudes and learning using mobile technologies. The discussion group was also used to investigate student view on educational approach, interactions between the instructor and students, and interactions between students in the classroom. The duration of the discussion group was two hours. Five volunteer students from the experimental group-section B, attended the discussion group session. The discussion group was carried out at the end of spring term, 2013, after the completion of the course. The following quotes highlight student comments related to mobile technologies in the education:

Table 6. Direct Quotes from Students

Quotes that highlight students' positive comments
1. Using mobiles in class were a wonderful idea because it helped us understand material better,
2. I use my own mobile for other classes-I find on the internet allot of the information we learn,
3. I love to use my mobile; I think we should continue to learn with them,
4. It's a good idea to become as familiar with as much technology as possible,
5. Because technology today is amazing and extremely advanced, we should use it to improve the way we learn,
6. I wish there was more classes that involved the use of the mobile,
7. The 3G makes it a lot easier to access the net,
8. Using mobiles in the classroom enhanced instructor-student interactions,
9. Mobile made it easy to communicate with other students in class,
10. I like using my 3G, I hope we will use them more frequently; it helps me realize whether I comprehend the subject right,
11. It is convenient; having 3G in my mobile simplifies life,
12. Using my mobile in class made it easy to learn the class material,
13. Mobiles made it easy chat between colleagues.
14. using mobiles in the classroom made the class little more interactive,
15. Mobile brings the hands-on thing into the lectures,
16. Mobiles made it easy to receive class feedback,
17. Without doubt mobile made the class easier and more fun,

Quotes that highlight students' negative comments
• I enjoy using the mobile, sometime I use it to distract myself during class- I play games,
• I did not have mobile, I put yourself under financial strain to purchase the mobile,
• I had problem in the networks connection,
• It was easy to get distracted, If I got bored I used the 3G to surf the net, or IM [instant messaging] my friends,

5. Discussion and Conclusion

With the rapid increase of technology that makes doing everyday tasks more efficient, effective, and convenient, there is a growing desire and need to utilize new technology in education. This research investigates the impact of mobile technology in a Lebanese higher education classroom. The results of the research confirmed that the integration of mobile technology does impact student attitudes. In section B class, mobile technology was used on a regular basis in lectures; it was used as a learning tool. The use of mobile technology in the classroom was found to have effect on student attitudes towards mobile and student attitudes towards mobile usage in class. Use of mobile technology in education was found to encourage student confidence and reduce student anxiety on the use of technology. This finding is in parallel with the outcome of the preceding studies by Cianfrani (2002) and Dinnocenti (2001) which imply that the regular use of technology improved the level of student comfort and satisfaction in using technology. The use of mobile technology in classroom was found to have effect on students' motivation to learn. This outcome is in parallel with results of previous studies done by Buckley (2003) and Mitra & Steffensmeier (2000).

The results of the research confirmed that some issues associated with mobile technology does impact student attitudes. The outcome also showed that the usage of mobile reduce student's desire to use technology. The data from student survey and from the discussion group provided us with perspective for explaining this outcome. One explanation for this negative effect on student attitudes regarding technology seems to be associated with problems in accessing mobile network and 3G. Students experienced difficulty with network connection. When there were problems with the 3G connection, students could not use the net and this made it difficult for them to work on the in- class assignments. These findings are in parallel with the results of a preceding research by Kolar, Sabatini and Fink (2002) that once technology is utilized correctly in education and once class time is not wasted in solving technical difficulties, students will have positive learning experience and the average students scores were higher (more positive). On the contrary, when technical difficulties occur, the average score was lower (more negative) than the non-technology section.

The research confirmed that some mobile technology does effect students' achievements. The outcome of the study point out that the regular use of mobile technology with 3G capability in education have a positive effect on students' achievements. The outcome is in parallel with the outcome of preceding researches which demonstrate that the use of technology in education can enhance students achievements (Cianfrani, 2002; Doolen, Porter & Hoag, 2003; Kolar, Sabatini & Fink, 2002;Winsler & Manfra, 2002).

The research also confirmed that mobile technology does influence teaching strategy. Outcome from this study point out that, in mobile classroom, the teacher's task is altered from presenter of information to that of facilitator of learning – a task which requires a considerable time to prepare. The preparation for the lectures also altered. In addition, the teachers had to renovate the class structure to adapt the use of mobile technology, to prepare and construct collaborative assignments. The teacher was also compelled to prepare back-up plan for those times when the network connection would not support the intended classroom activities. This result is in parallel with the outcome of previous study by Dinnocenti (2001) where teachers expressed the necessity to arrange a back-up lecture in case technical difficulties take place. Lowther, Ross & Morrison(2001) showed that when technology is integrated in the classroom, the education pedagogy may be different. These results are important and should be taken into account when considering the use of mobile technology in the classroom.

The research also confirmed that mobile technology does influence students' engagement and activities. The research points out that with the use of mobile technology in education, students appeared to be more involved in classroom activities. When mobile technology was used, it assisted students to determine if they understand the class material right. Students were also able to raise questions and get quick response from the teacher using mobile. These outcome are in parallel with preceding researches (Bauer & Ulrich, 2002; Kolar, Sabatini & Fink, 2002; Lowther, Ross & Morrison, 2001). The results also showed that students' tasks in class are altered in the mobile classroom. The students do not only take in information that is presented by the teacher, but also investigate and contribute in the learning process. Students appear to be more involved in education and focused when doing in-class assignments, group work, or deliberations than when the teacher was lecturing. On the other hand, there were also students who decided stay out of focus by carrying out actions with their mobile that is not related class work. One problem that the class had to face was that the classroom was not suitable for technology or group activities. The result draws attention to the value of considering classroom design, and highlights that if these issues are not effectively tackled, potential advancement in education may not be accomplished.

Finally, the research confirmed that mobile technology does influence students interactions. The use of mobile for in-class assignment encourages more communication among students, as well as between instructor and students. The use of mobile technology in classroom altered the way students communicated with each other and with the teacher. Besides using spoken communication, students communicated through instant messaging-IM. Students utilized IM for class related discussion, as well as non-class related discussions. The use of mobile technology for in-class assignments encouraged interactions between students, plus between the teacher and students. During the time when students worked on the in-class assignment, the teacher moved between students to assist with their queries. These results are in parallel with the preceding researches demonstrating that the usage of mobile and technology improved interactions among students and among students and the teacher; improved students involvement, and collaborative learning (Bauer & Ulrich, 2002; Dinnocenti, 2001; Lowther, Ross & Morrison, 2001; Winsler & Manfra, 2002).

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