

# **AN ANALYSIS OF THE EFFECT OF MOBILE LEARNING ON LEBANESE HIGHER EDUCATION**

**Khayrazad Kari JABBOUR**

*Lebanese University, LEBANON*

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**Abstract.** This research explores the effect of mobile technologies in Lebanese higher education classrooms. Four components were utilized to evaluate the impact: student attitudes, student achievements, and educational process. The findings of this study showed that when Mobile with 3G technologies used in education, it affected students' attitudes such as take pleasure in class, positive learning experience, and student prospects of the common effectiveness of mobile technologies. Mobile technologies, was also found to have positive influenced on students learning outcomes. It was also positively impacted the interactions between students as well as between the instructor and students.

*Keywords:* higher education, Lebanese, mobile, m-education, technology in education

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## **Introduction**

Over the past decade, developments in computer technology have significantly shaped our everyday life. These developments have been known as

a potential to foster financial and social development. It is also has the potential to reform our education system in the twenty-first century into a new level. Wireless technology, ex. Smart phone, Personal digital assistants (PDA' s), laptops and other personalized tools, have been utilized by students at all levels of education with the aim of enhancing learning. Schieber (1999) explained that the difficulties of “part-time” utilize of computer technology have been put an end to it; pupils with personalized wireless technology tools are able to use them the whole time, in class or at home.

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 from both a student and instructor perspective in the Lebanese institutes.

### **Literature review**

Many research studies illustrate the effect of educational technology in the classrooms. Some of these studies revealed that technology had increased achievements and enhanced students' behaviors, (Carlson, 2002; Cianfrani, 2002; Doolen et al., 2003; Kolar et al., 2002; Lowther et al., 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.

#### *Student attitudes towards education technology*

There are numerous previous studies that address student attitudes in relation to technology used in the classrooms. Mitra & Steffensmeier (2000) demonstrated in their study that the use of technology in the classrooms was positively associated with student attitudes toward and it improve communication; the outcome of the research revealed that the attitudes of the students

who did not use the computers in the classrooms were different from the learner who did have access to technology in the classrooms. Another study done by Doolen et al. (2003) examined students' attitudes towards the integrating PDAs in education. The result of the data revealed that students had positive attitudes towards PDAs when used in the traditional classroom setting.

#### *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. Only very few studies illustrated that technology has a negative impact on student achievements (Waker, 2001). Kolar et al. (2002) showed in their study, that the use of technology in the university classrooms has a positive impact on students' performance; the result revealed that students who used laptops in the classroom performed better and had more positive learning experience than students who did not use laptops in class. Similarly, Lowther et al. (2001) also showed in their study that laptop students had significantly higher performance than non-laptop students. Doolen et al. (2003) also study 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 the use the PDAs tool had a strong impact on the students' performance.

#### *Educational approach*

Lowther et al. (2001) study the effect of educational technology on the educational approach. The result showed that the integration of technology in

the classrooms encourages a student centered approach. Teaching and learning were modified in ways that promoted active learning and technology application. Students who use technology were more active, self-directed, and collaborative in their classroom behaviors. Kolar et al. (2002) also described in their study that using technology in the classrooms had dynamics affects, which was manifested in the much higher class participation grade. Similarly, Winsler & Manfra (2002), evaluated student perceptions of the usefulness of the technology in the classrooms; the results revealed that the majority of the students alleged that net to be pretty helpful in enhancing student learning, motivation, and communication. Bauer & Ulrich (2002) found that students with PDA access in the classrooms, when compared with not having a PDA, had better organizational skills, asked more questions about the coursework, and strengthened their collaboration on projects.

### **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.

#### *Research components*

This research evaluated the impact of mobile technologies in the higher education classroom by focusing on three 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 students' activities; *Component 5*: Issues with mobile in classroom; *Component 6*: Impact of mobile devices with 3G on student interactions.

### *Research questions*

*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 education faces by using mobile technologies in the classroom?

### *Research participants and design*

The participants in this study were Lebanese undergraduate educational majors' students taking classes at the MUBS University in the spring term during the 2013 school years. 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 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 of only lectures, the topics that 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.

### *Instruments and protocols*

Different techniques were used to evaluate the research questions and reflect the different ways of conceptualizing the impact. The instruments tools used re as following: *Component 1*: Students attitudes towards the utilization of mobile technologies in learning (pre & post surveys); *Component 2*: Student learning achievements (students achievements score); *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).

### *Surveys*

The survey had two main components; the first component assesses student attitudes toward mobile technologies in education; the second survey component assesses 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 to all the surveys in this study were collected using paper and pencil.

### *Survey first component - attitudes*

The attitude component of the survey used in this study was adapted from an investigation done by Doolen et al. (2003). The survey was modified to refer to mobile technologies and the use of mobile technologies in the technology 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 six different areas confidence, liking, anxiety, usefulness in general, and usefulness in the classroom. Participants taking 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 a regularly scheduled class period. Students were requested to 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 & 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.

### *Survey second component - opinion*

The opinion survey used in this study was used to assess student opinions of mobile technologies for section *B*. Students were requested to specific 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 specific 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 specifically what they used mobile technology devices for; students could select many answers for this question. Students were also asked to evaluate mobile technology used in the classroom as it related 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.

### *Discussion group*

The aim of the discussion group was to listen to students, in section *B*, observation about the usage and the role of mobile technologies on in the classroom. The objective was to reveal unexpected or overlook spot linked to student attitudes and learning using mobile technologies. The discussion group also used to investigate the 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 participation or not had no effect to their class score. 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.

#### *Student achievement scores*

Students total achievement scores were used to investigate the effect of the mobile technology usage on student learning. Student total overall performance scores 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 lab facilities, syllabus, assignments and parallel tests were used in these two sections. Both courses 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 achievement score of 60 points. The midterm was scored out of a total 25 possible achievable score, and the final was scored out of a total 35 possible achievable score. A total possible achievable score was 100 points.

#### *Class observation*

The classroom observation was used to collect data on educational approach and interactions. The intention of the observations is to find out the degree to which a specific activity taking place. The most common usages of class observations are 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.

## Research analysis

### *Background*

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: *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.

### *Demographics*

Table 1 summarizes student demographics for section A and B. The data were taken from student achievement scores. The student demographics for both sections were quite similar. All of the students were female. Their age ranged between 19 to 23 years old. All of the students were majoring in undergraduate Education program; and they all registered in spring 2013, for the same class, educational technology class, section A and B.

**Table 2.** Profile of the subjects

Section	Number of students
<i>A</i>	20
<i>B</i>	18

*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 2 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, indicates that the learner had a positive attitude toward the use of mobile devices with 3G capability in the 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 a tool in the learning practice.

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 3 illustrates the descriptive statistics and results of the Wilcoxon Signed-Rank test.

**Table 2.** Summary of descriptive statistics for attitude surveys

Survey	Confidence		Liking		Anxiety		Usefulness in general		Usefulness in class-room	
	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 3.** The Wilcoxon Signed-Rank test statistics for attitude surveys

Survey	Confidence		Liking		Anxiety		Usefulness in general	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
N	12	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	

### *Student learning achievements*

Student total grades for the educational technology course, section A and section B 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, were held in the same years and terms, spring 2013 term. Student demographics for the two sections were very similar. All of the students were female, aged ranged between 18 to 23 years old. Identical class manual, computer lab facilities, syllabus, assignments and resemblance tests were used in these two sections. Both courses 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. Resemblance midterm and final were administered in both sections, with a total possible achievement 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. 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 drawn on to assess if a significant variation was witness between section A and section B total scores. The outcome of the t-test is illustrated in Table 4. The P-values for the test for section A and section B were less than 0.05. The result showed an adequate confirmation to deduce that the personal practice of mobile technology in education with 3G capability positively impacted student learning achievements.

**Table 4.** Summary descriptive statistics for student learning outcomes and results of t-test

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

### *Impact of mobile devices with 3G on instructional strategies*

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

After lecturing the information on the subject matter utilizing traditional lectures, the teacher hand in an in-class assignment in order to reinforce the concepts presented. The in-class assignment varied, to respond to teacher questions, data collection, data analysis, 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* complete their in-class assignment with the help of their mobile devices with 3G capability devices. During the in-class assignment time, the teacher moved around to observe student inquiries. Sometimes, the teacher requested from students to work on teamwork. Instructors also used mobile devices with 3G capability to get continuing and timely feedback from students.

### *Impact of mobile devices with 3G on student engagement and student activities*

Based on class observations, the integrating of the 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 devices were used for education purpose than in another session A who 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.

#### *Issues with mobile in classroom*

One issue that was identified by the teacher observations that there were some participants who chose to use the mobile for activities that is not related classes, 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 time rather than the beginning of the session; also it was observed that students seated toward the back rows of the classroom use their mobile more often for activities that is not related class. Sometime the class was disturbed by some of the students who engaged in activities that are not related to class. Also, sometime 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 sessions (A & B) remarked that they had difficulty when the teacher asked them to work in a group. Students had difficulties in rearrange their seats for teamwork. The teacher also had difficulties walking among students due to the not enough 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.

### *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 discussion group, students sense 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 to discuss the course subject matter without disrupting the lecture. Students' sense that they were quieter. Students consider IM was an excellent idea for the reason that they did not have to disrupt the lecture.

### *Student quotes*

The aim of the discussion group was to listen to students, in section B, observation about the usage and the role of mobile technologies on in the classroom. The objective was to reveal unexpected or overlook spot linked to student attitudes and learning using mobile technologies. The discussion group also used to investigate the 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 dis-



cussion 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 on in the education (Table 5).

**Table 5.** Quotes highlight student positive comments

<ol style="list-style-type: none"> <li>1. Using mobiles in class was a wonderful idea because it helped us understand the material better,</li> <li>2. I use my own mobile for other classes-I find on the internet allot of the information we learn,</li> <li>3. I love to use my mobile; I think we should continue to learn with them,</li> <li>4. It's a good idea to become as familiar with as much technology as possible,</li> <li>5. Because technology today is amazing and extremely advanced, we should use it to improve the way we learn,</li> <li>6. I wish there was more classes that involved the use of the mobile,</li> <li>7. The 3G makes it a lot easier to access the net,</li> <li>8. Using mobiles in the classroom enhanced instructor-student interactions,</li> <li>9. Mobile made it easy to communicate with other students in class,</li> <li>10. I like using my 3G, I hope we will use them more frequently; it helps me realize whether I comprehend the subject right,</li> <li>11. It is convenient; having 3G in my mobile simplifies life,</li> <li>12. Using my mobile in class made it easier to learn the class material,</li> <li>13. Mobiles made it easy chat between colleagues.</li> <li>14. using mobiles in the classroom made the class little more interactive,</li> <li>15. Mobile brings the hands-on thing into the lectures,</li> <li>16. Mobiles made it easy to receive class feedback,</li> <li>17. Without doubt mobile made the class easier and more fun,</li> </ol>
<p>Quotes highlight student negative comments</p>
<ul style="list-style-type: none"> <li>• I enjoy using the mobile, sometimes I use it to distract myself during class- I play games,</li> <li>• I did not have mobile, I put yourself under financial strain to purchase the mobile,</li> <li>• I had a problem with the network connection,</li> <li>• It was easy to get distracted, If I got bored I used the 3G to surf the net, or IM [instant messaging] my friends,</li> </ul>

## **Discussion and conclusion**

With the rapid increase of technology that make 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 the Lebanese higher education classroom. The results of the research confirmed that the integration of mobile technology does impact student attitudes. In section *B* 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 an effect on student attitudes towards mobile and student attitudes towards mobile usage in class. Mobile technology in education was found to encourage student confidence and reduce student anxiety. 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 the classroom was found to have an effect on students' motivation to learn; this outcome is in parallel with outcome 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 use of mobile reduce student liking, the data from student survey and from the discussion group provide us with perspective for explaining these outcomes. One explanation for this negative effect on student attitudes seems to be associated to troubles with network and 3G accesses. 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 class assignments. These findings are in parallel with the results of a preceding research by Kolar et al. (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 score was higher (more positive). On the contrary, when technical difficulties occur, the average score was lower (more negative) than the non-technology section.

The results of 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 et al., 2003; Kolar et al., 2002; Winsler & Manfra, 2002).

The results of the research confirmed that mobile technology does influence teaching strategy. The outcome from this study point out that in mobile classroom, the teacher's task altered from presenter of information to that of facilitator of learning, 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 a 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 a previous study by Dinnocenti (2001) where teachers uttered the necessity to arrange a back-up lecture in case technical difficulties take place. Lowther et al. (2001) showed that in when integrate technology in the classroom, the educational pedagogy may be different from traditional courses. These results are important and should be taken into account when considering the use of mobile technology in the classroom.

The results of the research confirmed that mobile technology does influence students' engagement and activities. The outcome of the research point out that with the use of mobile technology in education, students ap-

peared to be more involved in classroom activities. When mobile technology was used it assist students to identify if they grasp the class material right. Students were also able to raise inquiry and get a quick response from the teacher using mobile. These outcomes are in parallel with preceding researches (Bauer & Ulrich, 2002; Kolar et al., 2002; Lowther et al., 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 presented by the teacher, but also to investigate and contribute in the learning process. Students appear to be more involved in education and focused when involved in in-class assignments, group work, or deliberations than when the teacher was lecturing. On the other hand, there were also students who decide be unfocused by carrying out actions with their mobile that is not related class work. One problem that the class had to face that the classroom was not suitable for technology or group activities. The result draws attention to the value of considering classroom design and highlight that if these issues are not effectively tackled, potential advancement in education may not be accomplished.

The results of the research confirmed that mobile technology does influence students Interactions. The use of mobile for in class assignment encourages more communications among students, as well as between instructor and students. The use of mobile technology in classroom altered the way students' communication with each other and with the teacher. Besides using spoken communication, students communicated through instant messaging-IM. Students utilize IM for class related discussion, as well as non-class related. 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 between students and the

teacher; improved student involvement, and collaborative learning (Bauer & Ulrich, 2002; Dinnocenti, 2001; Lowther et al., 2001; Winsler & Manfra, 2002).

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✉ Dr. Khayrazad Kari Jabbour  
Lebanese University  
Hammana, LEBANON  
E-Mail: [karijabbour@hotmail.com](mailto:karijabbour@hotmail.com)

