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An analysis of the effect of mobile learning on Lebanese higher education

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Abstract

This research explores the effect of mobile technology in Lebanese higher education classrooms. Three components were utilized to evaluate the impact: student attitudes, student achievements, and educational process. This study used both quantitative and qualitative methods to examine the research questions. The main sources for data collection were surveyed, discussion group, achievement scores, and classroom observations. Thirty-eight volunteer students participated in this study in the spring 2013 term. The findings of this study showed that when Mobile with 3G technology 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 technology. Mobile technology, 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, 2013, Technology in education

Un análisis del efecto de aprendizaje con el teléfono móvil en la educación superior Libanesa

Resumen

Esta investigación analiza el efecto de la tecnología móvil en las aulas de educación superior libanesas. Tres elementos se utilizaron para evaluar el impacto: las actitudes de los estudiantes, los logros estudiantiles y el proceso educativo. Este estudio utilizó métodos cuantitativos y cualitativos para examinar las cuestiones de investigación. Las principales fuentes para la recolección de datos fueron encuestados, grupo de discusión, las puntuaciones de rendimiento y las observaciones en el aula. Treinta y ocho estudiantes voluntarios participaron en este estudio, en el semestre de la primavera de 2013. Los resultados de este estudio mostraron que cuando un móvil con tecnología 3G se utiliza en la educación, influye en actitudes de los estudiantes, tales como el placer de la clase, la experiencia positiva de aprendizaje, y las perspectivas de los estudiantes de la eficacia común de la tecnología móvil. También se apreció que la tecnología móvil tiene una influencia positiva en los resultados de aprendizaje de los estudiantes. Además se vieron afectadas positivamente las interacciones entre los estudiantes y entre el profesor y los estudiantes.

Palabras clave: Educación Superior, libaneses, móvil, m-Educación, 2013, tecnología en la educación.

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 in 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, (Schieber, 1999).

A review of the literature has revealed that none of the previous research evaluated the impact of using mobile technology in higher education institutions classrooms in Lebanon. This research addressed this gap by studying the impact of mobile technology 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, Porter & Hoag, 2003; Kolar, Sabatini & Fink, 2002; Lowther, Ross & Morrisons, 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.

Students Attitudes Towards Education Technology

There are numerous previous studies that address student attitudes in relation to technology used in the classrooms. Mitra and Steffensmeier in 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, Porter and Hoag in 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, 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 result revealed that students who used laptop in the classroom performed better and had more positive learning experience than students who did not use laptops in class. Similarly, Lowther, Ross and Morrison (2001) also showed in their study that laptop students had significantly higher performance than non-laptop students. Doolen, Porter and Hoag (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, Ross and Morrison (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, Sabatini and Fink (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 and 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 and 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 components; questions; participants; design; and research instruments.

Research Components

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

Component 1: Students attitudes towards the utilization of mobile technology in learning

Component 2: Student learning achievements,

Component 3: Impact of mobile technology on educational process including:

Component 3-A: Impact of mobile technology on instructional strategies

Component 3-B: Impact of mobile technology on student engagement and student activities

Component 3-C: Issues with mobile technology in classroom

Component 3-D: Impact of mobile technology with 3G on student interactions,

Research Questions

There are 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. 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: How does the introduction of mobile technology in the classroom affect student attitudes towards mobile technology and the use of mobile technology in learning?

Research question 2: How does the introduction of mobile technology in the classroom affect student achievements?

Research question 3: How does the introduction of mobile technology in the classroom affect instructional strategies including educational approach, interactions between instructor and students, interactions between students? And what are some of the issues education faces by using mobile technology 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 are as follows:

Component	Instruments	Protocols
Component 1: Students' attitudes towards the utilization of mobile technology in learning	<ul style="list-style-type: none"> • Pre Surveys • Post Surveys 	
Component 2: student learning achievements,	<ul style="list-style-type: none"> • Students achievements scores 	
Component 3-A: impact of mobile technology on instructional strategies		<ul style="list-style-type: none"> • Classroom observations
Component 3-B: impact of mobile technology on student engagement and student activities		<ul style="list-style-type: none"> • Classroom observations
Component 3-C: Issues with mobile technology in Classroom		<ul style="list-style-type: none"> • Discussion group • Classroom observations
Component 3-D: Impact of mobile technology with 3G on student interactions,		<ul style="list-style-type: none"> • Discussion group • Classroom observations

Surveys

The survey had two main components; the first component assesses student attitudes toward mobile technology in education; the second survey component assesses student opinions of mobile technology 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, Porter and Hoag (2003). The survey was modified to refer to mobile technology and the use of mobile technology in a traditional classroom. Participants taking section B- were asked to complete the survey. The surveys were administered early in the spring of the 2013 term- Pre survey; and again at the end of the term- post survey. 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 of the Pre & post surveys in order to examine the changes in student attitudes before and after incorporating mobile technology into the classroom.

Participants from section B were requested to reveal their opinion on the use of mobile technology devices in the classroom. The survey was in Arabic language to match the

Lebanese student population. The attitudes survey intended to assess attitudes towards mobile devices with 3G capability in five different factors including, confidence, liking, anxiety, usefulness in general, and usefulness in the classroom. The attitudes survey had the following questions:

First question, students were asked to specific their confidence in utilizing mobile technology devices in the classroom. Five-point Likert scale was used for this survey item ranging from 1 (no confident at all) to 5 (complete confidence).

Second question, students were asked for specific their liking of utilizing mobile technology devices in the classroom. Five-point Likert scale was used for this survey item ranging from 1 (do not like it at all) to 5 (complete like it).

Third question, students were asked to specifically the amount of their anxiety toward utilizing mobile technology devices in the classroom. Five-point Likert scale was used for this survey item ranging from 1 (complete anxieties) to 5 (not anxieties at all).

Fourth question, Students were requested to specific agreement or disagreement with the usefulness mobile technology devices in general, five-point Likert scale was used for this survey item (Strongly disagree, Disagree, Neutral, Agree, Strongly agree).

Fifth question, Students were requested to specific agreement or disagreement with the usefulness mobile technology devices in the classroom, five-point Likert scale was used for this survey item (Strongly disagree, Disagree, Neutral, Agree, Strongly agree).

The **last question** was open-ended response; students were asked if they had any thoughts on the use of mobile technology devices in the classroom in both the pre and post surveys.

Survey Second Component - Opinion

The opinion survey used in this study was used to assess student opinions of mobile technology 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 technology in a traditional classroom. The survey was in Arabic language to match the Lebanese student population. The opinion survey had the following questions:

The **first question** was open-ended response question; students were asked two specific how they used mobile technology devices in the classroom.

Second question, 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).

Third question, students were asked to specifically what they used mobile technology devices for; students could select many answers for this question.

Fourth question, students were asked to evaluate mobile technology used in the classroom as it related to overall student learning; (Strongly disagree, Disagree, Neutral, Agree, Strongly agree).

Fifth question, students were asked if they desire to utilize mobile technology in other classes; (Strongly disagree, Disagree, Neutral, Agree, Strongly agree).

The **sixth question** was open-ended response question, students were 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 technology on in the classroom. The objective was to reveal unexpected or overlook spot linked to student attitudes and learning using mobile technology. 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.

Students Achievements 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 technology 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

Introduction

This study used both quantitative and qualitative methods to examine the research questions. The main sources for data collection were surveyed, discussion group, achievement scores, and classroom observations. Thirty-eight volunteer students' undergraduate educational majors' students participated in this study in the spring 2013 term. This section describes the results of the research components included in this study:

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 I. Profile of the subjects	
Section	Number of students
A	20
B	18

Students' attitudes towards the utilization of mobile technology 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.

Table 2 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

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

Table 5. The Wilcoxon Signed-Rank test statistics for attitude surveys								
	Confidence		Liking		Anxiety		Usefulness in general	
Survey	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 5. 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 5. 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 technology on educational process

This research evaluated the impact of mobile technology on the educational process by focusing on four main aspects: Impact of mobile technology on instructional strategies; on student engagement; student activities; on student interactions; and issues with mobile technology in the classroom.

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 technology. Class structure and materials were altered to accommodate the integration of mobile technology 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 re-arrange 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.

Students Quotes

The aim of the discussion group was to listen to students, in section B, observation about the usage and the role of mobile technology on in the classroom. The objective was to reveal unexpected or overlook spot linked to student attitudes and learning using mobile technology. 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 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 technology on in the education:

Quotes highlight student positive comments
<ol style="list-style-type: none">1. Using mobiles in class was a wonderful idea because it helped us understand the 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 easier to learn the class material,13. Mobiles made it easy chat between colleagues.14. Using mobiles in the classroom made the class a 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 highlight student negative comments
<ul style="list-style-type: none">• I enjoy using the mobile, sometimes 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 a problem with the network 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,

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, 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 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, Porter & Hoag, 2003; Kolar, Sabatini & Fink, 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 the presentation 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, Ross & Morrison, 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 appeared 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, 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 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 results draw 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, Ross & Morrison, 2001; Winsler & Manfra, 2002).

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