

# **THE IMPACT OF WHATSAPP MOBILE SOCIAL LEARNING ON THE ACHIEVEMENT AND ATTITUDES OF FEMALE STUDENTS COMPARED WITH FACE TO FACE LEARNING IN THE CLASSROOM**

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## **Abstract**

The use of mobile learning activities in learning and teaching online course is an innovative educational technology in higher education. The study seeks to explore the impact of using WhatsApp mobile learning activities on the achievement and attitudes of online students using mobile devices at the university. Researcher conducted an experiment in the 2014 academic year. Specifically, this study compares an independent sample of students in an experimental group (15 students) with a control group (15 students) from a university class. The e-learning process of the experimental group is based on WhatsApp mobile learning activities. The e-learning process of the control group is without WhatsApp mobile learning activities and receives only face-to-face learning in the classroom. A learning unit of the same course educational media is experimented with the experimental and control group. The t-test was used to compare the differences between the experimental and control groups. The results of the experimentation show that there are real differences, at 0.05 alpha level, in the achievements and attitudes of the experimental group compared with the control group.

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**Keywords:** Mobile Learning, Mobile Teaching, WhatsApp, social interactions, Social constructivism

## **Introduction**

Social constructivist learning theory seeks to improve social interactions between students and to construct and share knowledge (Vygotsky, 1978). The access to learning resources anywhere, anytime, and in various formats has the potential to enhance deep student learning capabilities and to allow students to construct their own knowledge.

The Internet holds a vast array of information. The educational resources delivered on web pages are often very informative and useful for online students in nearly every topic of study. The Internet is useful in helping students both construct and share their knowledge (Richard & Haya, 2009). The use of Internet technology by online learning communities may provide mobile learning resources in synchronous or asynchronous modes (Zengin, Arikan & Dogan, 2011).

E-learning aims to deliver instruction to students not present in the classroom. It provides access to learning resources when the instructor and students are separated by time, distance or both (Honeyman & Miller, 1993).

E-learning is considered to be a new concept covering a variety of applications, learning processes and learning methods (Barhoumi & Rossi, 2013). It includes a variety of technological applications, processes, audio and video. The e-learning process designed and developed by online instructors is the node of the e-learning system (Tavangarian, Leypold, Nölting, Röser, 2004). A well-structured learning environment must facilitate the user in connecting different tools to build, share and improve his/her level of knowledge with a variety of learning models (Rossi, 2006, 2010).

Learning is the outcome of social interactions between students in collaborative learning activities. Activities can include sharing through mobile devices, such as discussion forums (Chan, 2005), which can be used for knowledge construction sharing (Gillingham & Topper, 1999). The construction of knowledge is based on social interactions between online students (Vygotsky, 1978). Learning can also be influenced by multiple variables, including the cognitive and psychological state of the learner, teacher professionalism and nature and complexity of the pedagogical approach.

The present article aims to explore the impact of Whatsapp mobile learning activities on the achievements and attitudes of online students and to compare those findings with students who are subjected only to face-to-face instruction in the classroom. Mobile learning technology is a new generation of remote learning. Researcher considers that the M-learning mode chosen by distance education teachers determines the instructive relation, which is linked to the learning approach used by online instructor.

To achieve the objectives of the present experimental study, a comparison was made between the e-learning process designed within WhatsApp mobile learning activities and another process where the students are solely present in the classroom face-to-face while learning a unit of the course Educational Media (EDCT 346).

## **Theoretical Framework**

### **Mobile learning**

Prensky (2001) suggests in his research titled, “Digital natives, digital immigrants” that “Our students today are all ‘native speakers’ of the digital language of computers, video games and the Internet.” University students frequently adopt new instructional technologies in learning and constructing knowledge. They use computers, video games, digital music players, video cams, cell phones, mobiles devices and a variety of other devices and tools of the digital age (Prensky, 2001). The transmission of general information through use of mobile technologies is more and more frequent at universities and all higher educational institutions. This information is related to event registration, dates of exams, messages sent by teachers or among students, and so on. For this reason, mobile learning, also called M-learning, is a new educational technology. It is a new generation of distance learning focusing on the use of mobile devices. Mobile learning is a learning technology that uses a variety of learning approaches and methods across multiple contexts and social interactions (Vygotsky, 1978) with personal electronic devices (Crompton, 2013). The mobile devices provide students with the opportunity to learn anywhere and at any time (Crescente & Lee, 2011).

Kukulska-Hulme and Traxler (2007) suggest that mobile devices used in distance learning are more suitable for informal learning than formal learning and are also suitable for situated, authentic and personalized mobile learning.

Mobile devices are used at universities and higher educational institutions to enhance online interactions through discussions and to share knowledge between students by synchronous or asynchronous mobile communication modes, such as instant messaging, Mobile Social networks and Web based learning (Echeverría, Nussbaum, Calderón, Bravo, & Infante, 2011). Mobile learning technologies use a variety of mobile devices, such as Mp3 players, notebooks, mobile phones, iPads, iPods, iPhones, tablets, and so on. The mobile devices provide mobility and interactivity for students. Mobile learning focuses on how society, universities and institutions can support an increasingly mobile population. Mobile learning gives online instructor more mobility and interactivity to online students. The use of mobile tools in M-learning is an important part of informal learning (Trentin & Repetto, 2013).

A smartphone is a mobile phone with advanced computing capabilities and connectivities (Andrew, 2009). Mobile learning uses smartphone platforms for mobile distance education. Early smartphones contain a variety of computing capabilities and connectivities, such as a personal digital assistant (PDA), a media player, a digital camera, a GPS navigation unit, a touch screen computer, a web browser, Wi-Fi, and 3rd-

party apps. Currently, approximately 90% of handset sales worldwide are for devices powered by Google's Android and Apple's iOS mobile operating systems (Charles, 2013).

Figure 1 shows a smartphone with computing capability and connectivity.



Fig 1. Smartphones are one of the platforms used for mobile learning.

### **WhatsApp Instant Messaging**

WhatsApp instant messaging is a cross-platform smartphone messenger that employs users' existing Internet data plan to help them network socially in real time (WhatsApp, 2010). WhatsApp provides online users with the ability to send and receive a variety of media, such as images, videos and audio media messages. Client software is available for Apple iOS, Google Android, Blackberry OS, Microsoft Windows Phone, among others. WhatsApp Inc. was created in 2009 (Albergotti, MacMillan & Rusli, Evelyn, 2014) by Jan Koum and Brian Acton, both formerly of Yahoo (Eric, 2012).

WhatsApp instant messaging handled ten billion messages per day in August 2012 (Olanof, 2012). During June 2013, WhatsApp Inc. announced that they handled 27 billion messages every 24 hours (Sushma, 2012).

WhatsApp had over 450 million monthly active users. Additionally, 700 million photos are shared daily, and 10 billion messages are also shared daily (Parmy, 2013).

The WhatsApp platform has the following collaborative features (WhatsApp, 2010).

- Provide online students with the ability to exchange text messages, images, videos, and voice notes to their social network or group and contacts.
- Provide students or instructors with the ability to create a group (social network group) that supports the social interactions of up to 11 group members. Members can engage in discussion forums.
- WhatsApp Messenger provides the ability for students to send messages without limits. The application uses a 3G/EDGE Internet

data plan or Wi-Fi to ensure continuous data transmissions across the WhatsApp mobile system.

- Students using WhatsApp through a variety of mobile devices, such as smartphones, Galaxy tablets, and so on can message one another through texts, images, videos, and so on.

### **Educational benefits of the WhatsApp platform**

Students at universities and major institutions of higher education use mobile communication based text messaging and instant messaging. Texting is based on short messages service (SMS) between students through mobile devices (Kasesniemi & Rautiainen, 2002). Instant messaging is based on sending brief, typed messages over the Internet between two work stations or computers. Students use both texting and instant messaging in higher education (Johnson 2007; Kennedy et al. 2008; Smith, Salaway, and Caruso 2009). Furthermore, the majority of the institutions of higher learning are willing to use both text and instant messaging for educational purposes (Jeong 2007; Kennedy et al. 2008).

Motiwalla (2007), in his research related to the use of instant messaging for educational purposes, suggests that popularity and support for mobile devices within the student population is great and that the majority of students at universities benefit from texting through mobile learning devices.

Other research in this field found that students in universities are oriented and positive about using mobile learning in educational fields, which argues for why researchers in this domain should investigate how mobile learning technology can be best utilized in education Litchfield et al. (2007).

Other studies in the field of principal factor influencing students' motivations to engage in social interactions. Cheung et al (2008) confirmed the principal role of online social presence in determining students' engagement through mobile technologies.

### **Benefits of online discussions in a collaborative learning approach**

Goodfellow and Hewling (2005) suggest that cultural issues in an online learning environment, such as an e-learning platform, mobile learning system, and so on, were related first to the development of inequities arising from dominant cultural values embodied in learning resources and methods (e.g., Gunawardena, Wilson, & Nolla, 2003) and second to the potential online social interactions arising from cultural difference (e.g., Wong & Trinidad, 2004).

Discussion forums exist in a variety of distance learning platforms, such as e-learning platforms (Moodle, Blackboard, e-tutor, etc.) or mobile platforms (WhatsApp, etc.). These forums provide online students

opportunities to collaborate and cooperate together to construct knowledge (Chan, 2005). Researchers in the field of collaborative and cooperative learning consider discussion forums to be effective tools for training (Gillingham & Topper, 1999).

Researchers in the field of online learning suggest that discussion forums promote the creation and development of learning communities and support the learning process (Bober & Paz Dennen, 2001; Browne, 2003; Bodzin & Park, 2002; Rich & Hibbert, 2004; Rogers, 2000). Synchronous and asynchronous communication between students promotes learning effectiveness (Zengin, Arikan & Dogan, 2011). The online discussion integrated in mobile devices provides opportunities for students to interact socially with their instructor to facilitate learning and solve learning difficulties.

### The model of the mobile learning process used in WhatsApp application

Figure 2 shows the model used by the online instructor to an experimental group taught with a mobile learning process based WhtasApp program and favoring the social interaction between female students of the experimental group. The female students of the control group are taught through a traditional method face-to-face in the classroom and without mobile learning.

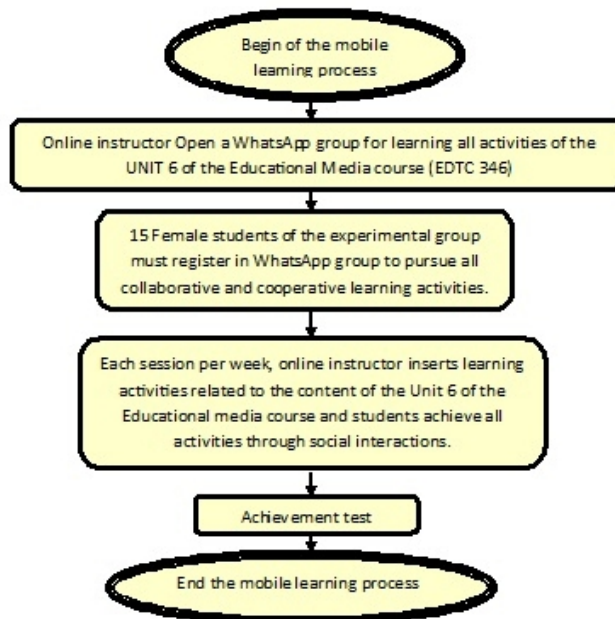


Fig 2. The model of the mobile learning process used in WhatsApp application

## **Research hypotheses and aims of study**

This study seeks to explore the impact of using WhatsApp social learning activities on the achievements and attitudes of online students and to compare them with face-to-face learning in the classroom. The mobile learning process using WhatsApp mobile learning activities is compared with another process based on the presence of students in the classroom for face-to-face learning of a unit in the course Educational Media (EDCT 346) taught in Taibah University for female students of the faculty of education. The course duration is one semester.

Three hypotheses guide the study:

**Hypothesis 1:** There is no difference in the arithmetical means of the experimental group using mobile learning and the control groups using face-to-face learning (at the 0.05 alpha level) in the achievement tests of online female students following the experimental period.

**Hypothesis 2:** There is no difference in the arithmetical means of the experimental and control groups (at the 0.05 alpha level) in their respective attitudes toward WhatsApp mobile learning and face-to-face learning in the classroom.

**Hypothesis 3:** The independent variable, "WhatsApp mobile social learning" has no positive impact on the dependent variables, "achievement" and "attitudes of female students " (based on the value of Eta squared ( $\eta^2$ )).

## **Method of research**

This study aims to understand the impact of WhatsApp mobile social learning on the achievements and attitudes of female students compared with face-to-face learning activities when students are in the classroom. WhatsApp mobile learning activities is administered to the experimental group, while the face-to-face learning approach is administered to the control group.

## **Population and sample**

Study participants are from faculty of female students of Taibah University and specialized in the study of special education, educational arts, etc.

During the 2014 academic year, the researchers completed experimentation with experimental and control groups. The experimental group was composed of 15 female students; 15 female students were also assigned to the control group. The researcher administered face-to-face learning to the control group and the WhatsApp mobile learning program for the experimental group.

Students of both groups were female students from the field of education and have approximately similar levels of training in computer

education, educational technology, educational media, and so on.

Table 1 shows the results of the achievement test prior to the experimental process. The results were used to divide the sample of students in control and experimental group. Half the students from each category ("excellent", "very good", "good", "average" and "poor") were placed in the control group, and the other half were placed in the experimental group. Placement of the individuals in the experimental and control groups was based on a random selection.

Table 1. The results of the achievement test 1 administered prior to the experiment.

	Frequency	Percent
Excellent	6	20
Very good	8	26.6
Good	4	13.3
Average	8	26.6
poor	4	13.3
Total	30	100.0

### Data gathering tools

The achievement test administered after the end of the experimental period was the first data gathering tool. Additionally, the questionnaire method was administered by the researcher to explore the students' attitudes toward the adoption of the WhatsApp mobile social learning and toward face-to-face learning activities in the classroom.

In the present study, the achievement tests were conceived and developed in a manner covering the maximum knowledge acquired through the learning content.

The questionnaire was conceived and developed to explore the attitudes of students in the experimental group toward the WhatsApp mobile social learning activities. Another questionnaire was used to evaluate the attitudes of students in the control group toward face-to-face learning activities in the classroom.

### Justification of measures

All students of the experimental group were familiarized with using WhatsApp mobile messaging for academic purposes. From the beginning of the experimental period, students used WhatsApp instant messaging.

The following criteria were used to evaluate the experimentation of this research.

- The acquisition of knowledge related to the learning unit of the course Educational Media (EDCT 346) through the WhatsApp mobile learning activities. The results of the achievement test are used to test hypothesis 1.



- The attitudes of students in the control and experimental groups toward face-to-face learning and the WhatsApp social mobile learning, respectively, are used to test hypothesis 2. The questionnaire used to interrogate the attitudes of students was distributed in face-to-face encounters. The researcher used the Likert scale (1932). In the present experimental research, the researcher used a three-level Likert scale: agree, neutral, disagree.

### Justification of the use of independent simple t-test and not another statistical test

In present study, the dependents variables are (Score of students and attitudes) and independent variables are (the WhatsApp mobile learning activities and the face-to-face learning activities in the classroom). The researcher choose to analyse data using independent simple t-test after making sure that the data passes all assumptions that are required for and independent t-test to give a valid result.

In present study, the researcher chooses independent simple t-test and not ANOVA test because a one-way ANOVA is used when we have three or more categorical, independent groups, but it can be used for just two groups (but an independent-samples t-test is more commonly used for two groups). For this reason, we choose the independent simple t-test and not ANOVA test.

### The WhatsApp mobile learning system

The experiment with the mobile learning process was conducted using the WhatsApp instant messaging system. On the first day of the experiment, an online instructor created a WhatsApp group. Then, students registered in this online mobile group to pursue the mobile learning process of the unit 6 of the course Educational Media.

Figure 3 shows WhatsApp instant messaging used by the group to pursue the Unit 6 of the course Educational media.



Fig 3. Print screen of WhatsApp mobile learning activities.

### Description of the online courses

The Educational Media course (EDCT 346) is a general course taught for a variety of specialties at the university. The course is mandatory for students at the faculty.

The course is composed of 6 units.

Unit 1: Introduction to instructional technology and its relation to educational media and information technology.

Unit 2: Teaching and learning through the 5 senses.

Unit 3: Components of Educational Media.

Unit 4: Instructional technology: theories and applications.

Unit 5: Examples of educational media.

Unit 6: Classification of educational media by senses and experiences (the cone of experience attributed to Edgar Dale).

Only unit 6 was tested with WhatsApp mobile social learning in the experimental group. The control group studied unit 6 using face-to-face learning in the classroom. This unit is very important for students in educational media. Unit 6 focuses on the cone of experience developed by Edgar Dale. He made several contributions to audio and visual instruction, including a methodology for analyzing the content of motion pictures.

### Results

#### Results of the achievement test after the experiment

Table 2 presents the means and standard deviations of student scores in the experimental group using the mobile learning process of unit 6 and the control group, which used face-to-face learning activities in the classroom.

Table 2. Means of control and experimental groups on the achievement test

Group Statistics					
	Group	N	Mean	Std. Deviation	Std. Error Mean
Test2	Control group	15	3.80	1.656	.428
	Experimental group	15	4.80	.414	.107

The results of the achievement test administered following the learning process based mobile learning activities and face-to-face learning in the classroom show that the mean of the experimental group using mobile learning is 4.80, while that of the control group is 3.80 (see table 2). The difference between the two means is clear ( $4.80 > 3.80$ ), but this difference must be explained by the t-test value of equality of means

Table 3 shows the value of t-test of equality of means.

Table 3. T-test for the equality of the means in the achievement test

		t-test for Equality of Means					
		T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Test 2	Equal variances assumed	<b>2.269</b>	28	.031	-1.000-	1.903	.097
	Equal variances not assumed	<b>2.269</b>	15.743	.038	-1.000-	1.936	.064

Figure 4 clearly shows the performance of students in the control group on the achievement test.

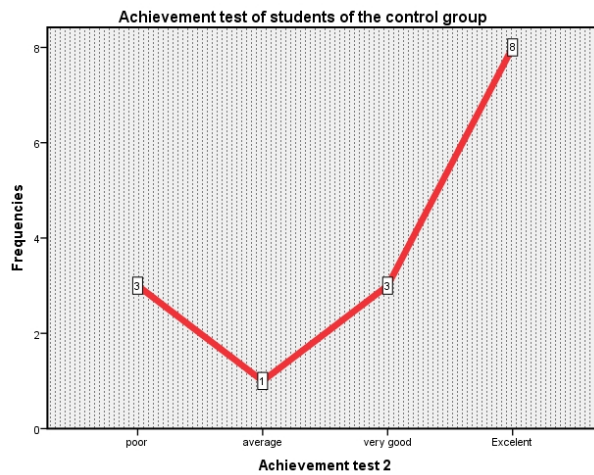


Fig 4. Result of the achievement test for the control group

Figure 5 indicates the performance of students in the experimental group on the achievement test.

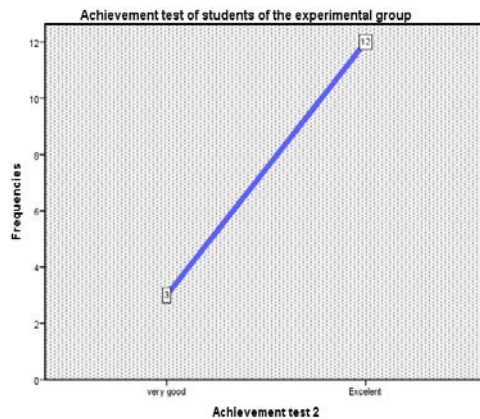


Fig 5. Result of the achievement test for the experimental group.

### Validation or rejection of the first hypothesis based on the results of the achievement test

Hypothesis 1: There is no difference in the arithmetical means of the experimental group using mobile learning activities and the control groups using face-to-face learning activities on the classroom (at the 0.05 the alpha level) in the achievement tests following the experimental period.

The results of the test administered after covering unit 6 of the Educational Media online course for the two groups of the independent samples clearly demonstrate that the mean of the control group is 3.80, while the mean of the experimental group is 4.80 (see table 2). The t-test value of equality of means is used to interpret the difference between the means of the control and the experimental groups.

The value of the t-statistic in the test of equality of means of the experimental and control groups is 2.269 (see table 3), while the critical value of the table is 2.048. The value of calculated t-statistic is higher than the t- value of the table. Thus, researcher rejects hypothesis 1 at the 0.05 alpha level and concludes that there is a difference in the arithmetical mean of the experimental group using mobile learning activities and the control group using face-to-face learning activities in the achievement tests of online students following the experimental period. The experimental group using mobile learning through WhatsApp mobile instant messaging performed better than the control group on the achievement test following the experimental period.

### Attitudes of students in the experimental and control groups

Table 4 describes the questionnaire used to explore the attitudes of the experimental group toward blended e-learning with continuity between individual and collaborative learning approaches.

Table 4: Structure of the questionnaire on the attitudes of students toward mobile learning activities through WhatsApp.

Variables	n= 15	
	Items	Attributed Value
The learning process used in unit 6 of the educational media course through WhatsApp learning activities makes learning easy.	I agree	3
	Neutral	2
	I disagree	1
The e-learning process used in unit 6 of the educational media course through WhatsApp learning activities favors problem solving.	I agree	3
	I agree	2
	Neutral	1
The e-learning process used in unit 6 of the educational media course through WhatsApp learning activities clarifies the	I agree	3
	Neural	2

learning resources.	I disagree	1
The e-learning process used in unit 6 of the educational media course through WhatsApp learning activities favors faster knowledge sharing.	I agree	3
	Neutral	2
The e-learning process used in unit 6 of the educational media course through WhatsApp learning activities favors the discovery of information useful for learning.	I disagree	1
	I agree	3
The time required for collaborative activities through WhatsApp is sufficient in unit 6 of the educational media course.	Neutral	2
	I disagree	1
	I agree	5
	Neutral	4
	I disagree	3

Table 5 describes the questionnaire administered to students in the control group

Table 5: the questionnaire used to explore attitudes of students of the control group toward face-to-face learning activities in the classroom.

Variables	N= 15	
	Items	Attributed Value
The e-learning process used in unit 6 of the educational media course through face-to-face learning activities in the classroom makes learning easy	I agree	3
	Neutral	2
The e-learning process used in unit 6 of the educational media course through face-to-face learning activities in the classroom favors problem solving.	I disagree	1
	I agree	3
The e-learning process used in unit 6 of the educational media course through face-to-face learning activities in the classroom clarifies learning resources.	Neutral	2
	I disagree	1
The e-learning process used in unit 6 of the educational media course through face-to-face learning activities in the classroom favors faster knowledge sharing.	I agree	3
	Neutral	2
The e-learning process used in unit 6 of the educational media course through face-to-face learning activities in the classroom favors the discovery of information useful for learning.	I disagree	1
	I agree	3
The time required for individual learning activities used in unit 6	Neutral	2
	I disagree	1
	I agree	3

of the educational media course through face-to-face learning in the classroom is sufficient.	Neutral	2
	I disagree	1

The attitudes of students in the experimental group toward mobile learning based WhatsApp social networking are recapitulated in table 6. The results of students’ attitudes show that the attitude of the experimental group toward mobile learning is 23.13, and the attitudes of students of the control group toward face-to-face learning in presence in the classroom are 18.07. The difference between the two means of the experimental and control groups must analyzed with the t-test.

Table 6. The mean of group statistics

Group Statistics					
	Group	N	Mean	Std. Deviation	Std. Error Mean
Attitude	group 1	15	<b>18.07</b>	4.415	1.140
	group 2	15	<b>23.13</b>	3.270	.844

Table 7 shows the values of t-statistics to interpret the difference between the means of the experimental and control groups. The difference between the means of the two groups is clear from table 7.

Table 7. t-test for equality between the means of students’ attitudes

		t-test for Equality of Means					
		t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Attitude	Equal variances assumed	<b>-3.571-</b>	28	.001	-5.067-	-7.973-	-2.161-
	Equal variances not assumed	<b>-3.571-</b>	25.807	.001	-5.067-	-7.984-	-2.149-

**Validation or rejection of the second hypothesis**

Hypothesis 2: There is no difference in the arithmetical means of the experimental and control groups (at the 0.05 alpha level) in their respective attitudes toward WhatsApp mobile learning activities and face-to-face learning activities in the classroom.

Table 7 shows the value of t-statistics calculated for the equality of means (3.571). The value of t-statistics of the table is (2.048). The calculated t-statistics is higher than the t-statistics of the table. Thus, hypothesis 2 is rejected. There is a difference in the arithmetical means of the experimental and control groups (at the 0.05 alpha level) in their respective attitudes toward WhatsApp mobile learning and face-to-face learning in the classroom in favor of the experimental group.

Fig 6 presents the attitudes of students in the control group.

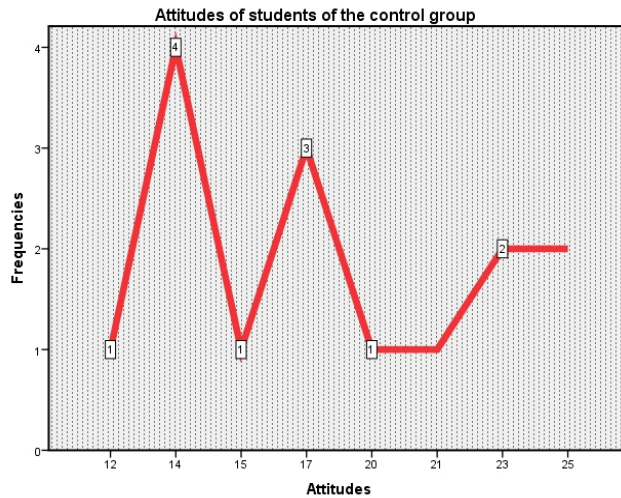


Fig 6 Attitudes of students in the control group

Fig 7 presents the attitudes of students in the experimental group

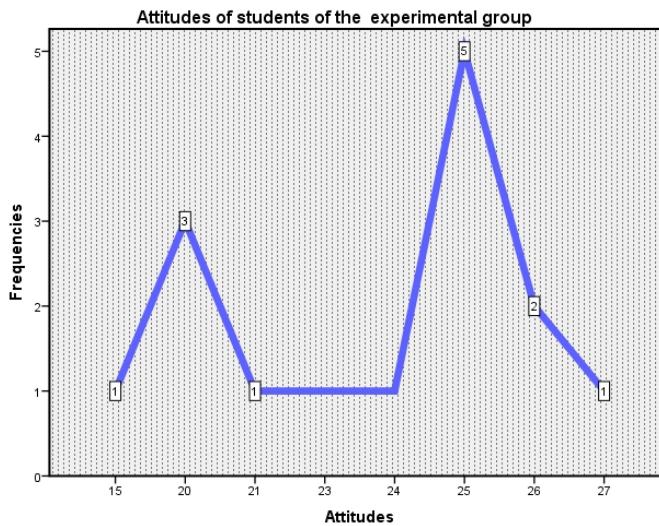


Fig 7 Attitudes of students in the experimental group

**The impact of the independent variable (WhatsApp mobile learning) on the dependent variables (achievement and attitudes of students)**

The impact of the independent variable (mobile learning based WhatsApp) on the dependent variables (achievement and attitudes of students) is measured through the value of Eta squared ( $\eta^2$ ).

$$\text{The value of Eta squared } (\eta^2) = \frac{t^2}{t^2 + df}$$

Table 8 shows the value of Eta squared ( $\eta^2$ ).

Table 8: The value of Eta squared ( $\eta^2$ ).

<b>Eta squared (<math>\eta^2</math>)</b>				
<i>Dependent variables</i>	<i>df</i>	<i>t value</i>	<i>Eta squared (<math>\eta^2</math>)</i>	<i>Impact</i>
Achievement test variable	14	3.571	<b>47.67%</b>	Very high positive impact
Attitudes variable	14	2.269	<b>26.88%</b>	Very high positive impact

Regarding the impact of mobile learning based WhatsApp social networking on the achievement test variable, the value of Eta squared is 47.67%. Thus, mobile learning activities improves students' scores on the achievement test. Regarding the impact of WhatsApp on the attitudes of students, we observe that the value of Eta squared ( $\eta^2$ ) is 26.88%. Thus, the mobile learning strongly and positively impacts the attitudes of students toward this new educational technology based mobile devices.

Fouad about Hatab and Amal Sadok (1997) indicate that if Eta squared ( $\eta^2$ ) is equal to 15%, the positive impact of the independent variable on the dependent variable is high (with 15% of the variance of the dependent variable explained by the independent variable). If the value of Eta squared,  $\eta^2$  is 20% or more, the positive impact of the dependent variable on the dependent variable is very high (with 20% of the variance of the dependent variable explained by the independent variable).

### **Validation or rejection of hypothesis 3 based on the value of Eta squared ( $\eta^2$ ).**

Hypothesis 3: The independent variable, "WhatsApp mobile social learning" has no positive impact on the dependent variables, "achievement" and "attitudes of students" (based on the value of Eta squared ( $\eta^2$ )).

Based on the results for Eta squared ( $\eta^2$ ) in table 8, we observe a very high positive impact of the independent variable, "mobile learning" on the dependent variables, "achievement" and "attitudes of students". Thus, hypothesis 3 is rejected and the independent variable, "WhatsApp mobile social learning" has a very high positive impact on the dependent variables, "achievement" and "attitudes of students" (based on the value of Eta squared ( $\eta^2$ )).

### **Discussion and theoretical implications**

The results of the present study show that mobile learning based WhatsApp social networking has a high positive impact on the achievement test of students. Students prefer this innovative educational technology based mobile learning. The results of the achievement test, which were realized after the end of the experimental period, show that arithmetic means of the



experimental group are higher than arithmetic means of the control group. Based on t-statistics values, the difference between the two arithmetic means is in favor of the experimental group using mobile learning activities based WhatsApp instant messaging.

The attitudes of students suggests that WhatsApp instant messaging makes learning easy, favors problem solving and resolves learning difficulties related to the learning process or to learning content distributed through WhatsApp, knowledge sharing, etc.

Social interactions improve the effectiveness of learning and teaching (Vygotsky, 1978). This advantage help students easily construct and share knowledge through WhatsApp social networking. This advantage is in accordance with the social development literature (Vygotsky, 1978). Gillingham and Topper (1999) suggest the positive impacts of collaborative learning through social networking (Facebook, WhatsApp, etc.) and its effects on the learning process.

Online synchronous or asynchronous discussion among students on social networks have a cognitive added value that provides them with the opportunity to construct and share knowledge and then attain good results on achievement tests. Online learning through discussion forums (Chan, 2005) improves the effectiveness of learning, solves learning difficulties and enables the faster construction and sharing of knowledge. They are considered effective tools for learning (Gillingham & Topper, 1999), both for developing an understanding of a concept and enhancing the cognitive performance of the students.

Goodfellow and Hewling (2005) suggest that cultural issues in online learning settings were related first to the development of inequities arising from dominant cultural values embodied in learning materials and methods (e.g., Gunawardena, Wilson, & Nolla, 2003) and second to the potential online collaboration between students based on social interactions arising from cultural differences (e.g., Wong & Trinidad, 2004).

Instant messaging through WhatsApp for academic purposes provides students with opportunities to interact together and to construct and share knowledge (Chan, 2005). Instant messaging is considered to be an effective tool for learning and teaching through social interactions (Gillingham & Topper, 1999).

Some researchers in this field indicate that social learning through discussion forums, mobile devices, and so on creates mobile learning communities (Bober & Paz Dennen, 2001; Browne, 2003; Bodzin & Park, 2002; Rich & Hibbert, 2004; Rogers, 2000). Online communication among students and their instructor create an affective learning and teaching environment (Zengin, Arikan & Dogan, 2011).

WhatsApp instant messaging is very easy to use. The majority of students use this mobile system for academic and other purposes. In this system, students are quickly informed of every update and any message inserted by a member of the group. An easy to use user interface is important in helping orientate their attitudes toward this technology. In this respect, the findings of this study confirm those of previous research projects that underscore the importance of having a user-friendly Web-based platform (e.g., Cheung et al., 2008).

Face-to-face learning in the classroom is a formal academic learning process and used mostly to disseminate information to individuals rather than improve social interaction between students. The social dimension is very important to constructing knowledge and to orientating students towards new educational technologies that use social networks.

The WhatsApp mobile learning is a good solution to improving community level interaction and social presence among students.

Cheung et al (2008) in their research related to social interactions between online communities in online learning through mobile devices, have found social presence to be a principal factor influencing students' motivations to engage in social interactions for constructing and sharing knowledge. The study confirmed the importance of an online social presence in helping students become more engaged.

### **Limitations**

Limitations of the present experimental study are as follows:

- This study was conducted in the context of only one learning unit (i.e., unit 6) of the course, Educational Media and must be used with a full course.
- The questionnaire used to explore the attitudes of students toward the two e-learning processes contained only 8 items.
- The sample size (i.e., 15 students for each group) is small.

### **Conclusion**

Through achievement tests and measuring the attitudes of students, the results of this research clearly demonstrate the effectiveness of WhatsApp social networking in comparison with face-to-face learning in the classroom. The mobile learning technology helps students to create a learning community, to easily construct knowledge and to share it with other members of a WhatsApp group through instant messaging.

In addition to the social interaction between students in the group, we should not discount the interactions of students with their online instructor. The presence of the online instructor in the WhatsApp group has

an added value in the learning process. The online instructor facilitates learning.

WhatsApp instant messaging is a free application, which is advantageous. Mobile system text messaging allows the user to send and receive messages synchronously and asynchronously. The WhatsApp instant messaging system is simplistic, intuitive, and very easy to use. Users have the chance to continue chatting with their buddies without slowing down the device. Another advantage of WhatsApp instant messaging is that it allows users to transfer all the names from the address book. Other similar applications ask users for their phone number without actually transferring the contacts.

Learning is becoming more personal and is becoming increasingly based on online social interactions that enable collaborative, networked and portable processes. Learning is becoming ubiquitous, durable and increasingly at odds with formal education. Increasingly, different types of learning happen outside of the classroom through social cooperation and collaboration between students to improve construction and knowledge sharing.

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