

# Mathematics Teachers' Knowledge and Usage of the Mobile Learning, A Case Study in Lebanon

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**Abstract:** *Through the sample of the study, this research aims to estimate the percent of mathematics teachers in Lebanon who know about the M-learning. In addition, among those who are aware of the M-learning, this study aims to estimate the percent of mathematics teachers who use it in their teaching. Moreover, this research aims to examine the effect of teachers' highest academic degree on their knowledge about the M-learning and its effect on usage of mobiles in teaching among those who are aware of it. Through the whole study, the researchers were only interested in determining the relations between the variables using an online survey of yes or no answers. The sample of the study was formed by 467 mathematics teachers who lived and taught in Beirut, Bekaa, North, south and Mount Lebanon. This research, through its primary quantitative approach, have explored the possible relations between mathematics teachers' knowledge of the mobile learning and their academic degrees, and their usage of the M-learning in their teaching. For statistics, the researchers have used the frequencies, the percent and the bar diagrams to represent the data of the study, and the chi-squares test for analysis. Results of the study have revealed that math teachers' knowledge and usage of the mobile learning is extremely weak in Lebanon. In addition, results have also showed that teachers' academic degree has a significant effect of their knowledge of the M-learning but not on its usage. The researchers recommend the math teachers to search online for the mobile learning or be assigned to future workshops dedicated about its advantages. Further, through experiments, the researchers recommend other researchers to examine enhancing students' learning of mathematics through the social media platforms that support learning through mobiles and teachers to embrace this technique in teaching mathematics.*

**Keywords:** Mobile learning, mathematics, math teachers, teaching, learning, social media platforms

## 1. Introduction

### 1.1 Background of the study

Learning through mobiles has always been surrounded with huge arguments since the introduction of the mobile phones to the public. Many researchers emphasized on using mobiles in education. Internationally, Sharples, Arnedillo-Sánchez, Milrad and Vavoula (2009) unveiled that mobile learning has been able to gain the interest of many researchers since the beginning of the new millennium. Mobile learning is capable of extending students' learning experience from inside the classes, beyond the old fashion traditional teaching method, to anywhere in the world at any time. They confirmed that the ubiquitous technology provided by the mobile phones, through effective conversation, can support students' learning (Sharples, Arnedillo-Sánchez, Milrad, & Vavoula, 2009).

Moreover, Sarrab, Elgamel and Aldabbas (2012) indicated that the mobile learning, otherwise known as the M-learning, can change the old fashion educational field. They stated that, if given the opportunity, it can evolve education and take it to the next level. In addition, they assured that the M-learning can enhance the learning of the students as well as the teaching of the teachers; though, it still has many future challenges in the educational system to overcome (Sarrab, Elgamel, & Aldabbas, 2012).

Regionally, mobile learning also became an interesting point to researchers who indicated that usage of the M-learning is still limited in the educational process and its usage is blocked by many obstacles. Rajasingham (2011), in her report, questioned the possibility of learning through mobiles. She wondered if mobiles can bring a paradigm shift in education. More importantly, even-though mobiles are widely spread among students and teachers all over the world, she asked what teachers expect their students to

learning through the M-learning. Rajasingham (2011) assured that the M-learning will present a new model for teaching and because the way we live, work, play and learn is deeply influenced by the speedy changes in our society, it is up to the researchers and those of high intellectual abilities to meet the continuous changing needs of the pupils and audiences (Rajasingham, 2011).

Moreover, SALEEM (2017), through his study, examined usage of mobiles in teaching in Jordanian public high schools. He found out that usage of mobiles by students in learning is medium because they use them mostly for games and amusement. In addition, he found that the M-learning is not taken into consideration as a teaching technique. Many schools have no regulations to use them in the educational process. Due to that, the researcher called for more studies to empower the role of the M-learning in education (SALEEM, 2017).

Locally, Mohammad (2018) revealed that, in an era where digital learning has become a must, Lebanon is still way behind in using technology in education (Mohammad, 2018). In a reality like this, we find ourselves asking if the mobile learning can be given a real chance in the educational process. In addition, we may ask if the math teachers in Lebanon know the M-learning and use it to support students' learning or they are weakening its potential role by ignoring it. The antecedent studies and articles showed that many believe that the M-learning has high potential in education; however, due to different reasons and circumstances, it still has a long road full of obstacles to vanquish.

### 1.2 Purpose of the Study

Through the literature, this study has aimed at enlightening on the advantages of the mobile learning in education as well as the barriers it is still facing. In addition, through its online survey, it has aimed at determining the knowledge of

the mathematics teachers in the secondary and intermediate levels, in Lebanon, about the mobile learning. Moreover, this study has attempted to determine if the M-learning is used by those who acknowledged it. Finally, this study has seek to determine if there was any difference between math teachers' knowledge and usage of the mobile learning in their teaching and their highest academic degree.

### 1.3 Significance of the Study

This research will add to the literature through its findings about the knowledge and usage of the mobile learning by a sample formed of intermediate and secondary math teachers who lived and taught in diverse regions in Lebanon from Beirut to Mount Lebanon, Bekaa, South and North. In addition, through this research study, those who are not aware of the benefits of the mobile learning will be introduced to it and they will learn about its benefits and advantages in teaching, which might encourage them to use it.

### 1.4 Research Questions

- 1) What percent of mathematics teachers in Lebanon know about the M-learning?
- 2) Among those who are aware of the M-learning, what percent of mathematics teachers use it in their teaching?
- 3) Does the highest academic degree held by a mathematics teacher in Lebanon affect his knowledge about the M-learning?
- 4) Among those who are aware of the M-learning, does their highest academic degree affect their usage of mobiles in their teaching?

### 1.5 Limitations of the Study

This study had one limitation to deal with. The researchers were unable to deliver the survey by hand to many math teachers because many of them were living at a distance. For that, the researchers had to come up with an alternative. The alternative turned out to be an online survey that enabled the researchers to reach 467 teachers who formed the sample.

### 1.6 Delimitations of the Study

Many math teachers have cooperated with the researchers. They have not only filled the online survey, but they have volunteered sending the link of the survey to their colleagues to fill it. This act have enabled the researchers to reach 467 math teachers in diverse Lebanese regions like Bekaa, South, Beirut, North and Mount Lebanon. Moreover, this act has positively influenced the accuracy of the results at the end of the study.

## 2. Literature Review

In any field in life, such as the educational field, training is the process that transfers wisdom, information, knowledge and abilities from one generation to the next one. For anyone, education, which existed in the ancient time and remained existing because of the development in the process of human culture, is a life long journey that begins at early

stages of life and should not be ceased because of aging through time (KEEGAN, 2005).

By time, many societies started building their own schools of education and universities by which the educational process continued without stopping. However, the necessity to transfer the knowledge acquired by experience from one teacher to another, to keep the ongoing educational process, imposed the need of training centers through which teachers may develop new skills and attain more knowledge (KEEGAN, 2005).

Thus, people were educated through the conventional face-to-face method through-which the instructor and the learners met at a precise time in a predetermined place where the learning or the training process occurred (KEEGAN, 2005).

In the 21<sup>st</sup> century, things are not exactly the same. The conventional education did in fact remain the same in some schools, universities and training centers, while distance education, also known as electronic learning, mobile learning and distance learning, emerged because of the prosperous technology that was not available in the preceding centuries (KEEGAN, 2005).

Theories and ideas about education from Plato, in the old ages, to Aristotle to Dewey in the last century, were nothing more than a conventional education method based on the face-to-face interaction. Students were assembled into groups to collaborate in the presence of a well-qualified person, with teaching abilities, who led them through conversations that enabled him of transferring his knowledge to them (KEEGAN, 2005).

In the last century, schools and universities expanded widely and gave students a chance to pick what suits them. Unfortunately, many students had to travel for a long distance to reach their aim in education because the academic institutions in the 20<sup>th</sup> century, just like those in previous centuries, were built on joining students with teachers in exact places during the day or at night, whether it was in classrooms or laboratories, where the teaching and learning process would take place through lectures or experiments, and knowledge and skills would be acquired (KEEGAN, 2005).

For students, upcoming learning tasks usually depend on their skills, brilliancy, intellectual accuracy, previously acquired learning outcomes, learning difficulties and of course their laziness. Conventional learning through face-to-face lectures does not answer to those with different needs and skills because basically students are grouped in lecture rooms without acknowledging their brilliancy or their learning disabilities, if any, like those who are slow learners or suffer from dyslexia and need more care to learn properly (KEEGAN, 2005).

Enter distance education which feels different, not because of its ability to transform passive students to active ones but because it treats this modern era generation of students who are familiar with the internet and the digital technologies as individuals, and not students, who can be taught through online connection (KEEGAN, 2005).

The marvelous development and revolution of technology in the last decade paved the way for distance education. Through distance education, learning acts are no longer necessarily attached to time and place. Learners and teachers are not interchanging theories, concepts, rules and thoughts through face-to-face interaction because of the availability of digital mediators(KEEGAN, 2005).

Distance education can provide the learners or those who are willing to train at a distance with materials of excellent content and a diversity of teaching strategies that maintain the validity of the educational process. In the 21<sup>st</sup> century, most people have many commitments in life, many students are unable to study during the day because of their work and because of their inability to travel to learn, and many teachers are unable to attend regular training sessions that enable them developing new skills. Distance education allows them of doing so at any time and place through the wondrous technology that revolutionized connection among humans (KEEGAN, 2005).

In the last century, for those who were at a far distance from their university, distance learning was their only way to learn by watching professors proceeding in their lectures through internet connection that was slow at times from different locations (KEEGAN, 2005).

Distance learning did not easily bring great benefits to many societies because of its lack of credits and criticism by many educators. However, things changed in the late nineties when an open university, that supported the distance learning, overcame other well respected universities. It was ranked in the list of the top ten universities in Great Britain, such as Oxford and Cambridge, by the agency that detects the quality assurance in higher education because of its excellence in academic achievements through its ability to provide its students the needed knowledge and skills, and its capability to not only adapt to change but also to contribute to it (KEEGAN, 2005).

At that time, some considered it as a fluke, but the repetition in the results through the years validated distance learning as a force to be recognized with in education (KEEGAN, 2005).

As time passed, the innovative technology provided many effective telecommunication devices that allowed students to access diversified educational content outside the wall of the class through the worldwide web to learn from and opened the way in front of them to receive academic authentic degrees through online courses(KEEGAN, 2005).

Moving forward, at the end of the second millennium, mobile juggernauts, like Nokia and Ericson, revealed that near one billion humans, among 6 billions, would be using mobile phones by the year 2002. This overwhelming usage, because of its strong wireless telecommunication system, allowed the mobiles to find their ways into the business field and change their methods of sealing deals and commercials through their wireless applications like the 3G service that provides wireless internet connection and phone calls (KEEGAN, 2005).

Moving back to the educational system, it is no secret that the world-wide-web is a very effective in teaching, when the teachers decide to use it, through its podcasts, educational videos, distance learning, online training and e-learning. Mobile phones, through its wireless networking, are capable of providing teachers and employees who seek training, and students who intend learning at a distance from their universities, with online courses and training sessions, podcasts, interaction and collaboration at any time and any place they want (KEEGAN, 2005).

Mobile learning, also known as the M-learning, stands for using the unmatched technology of these devices for the benefit of teaching and learning. These mobiles are designed in a way that humans can benefit from in education in general and in mathematics specifically. Their internet connection can be used to participate in a math game, answer math questions posted online, while riding a bus, or collaborate with others who are at a near or far distance to solve a math problem (KEEGAN, 2005).

In a bigger picture, mobile phones could be integrated in the learning environment. Learning could be built around online collaboration. However, for it to be a reality, it depends on the teachers and their will to change, especially with using a networking technology that is familiar to a generation of students more than the teachers themselves(KEEGAN, 2005).

Though, because of the massive expansion of the mobile phones among students all over the world and in all classes, some education departments in large governments started taking the mobile learning more seriously and became interested in finding ways to prepare real training workshops for teachers to enlighten them on modern teaching methods through the mobile technology (KEEGAN, 2005).

In the year 2003, a project denoted as MOBIlearn was launched with the association of Tamper, Birmingham, Zurich, Stanford, Southern queen-island, Nottingham, Liverpool and Genoa universities, and telecommunication enterprises, like Nokia, to introduce the instructors to the mobile learning environment in order for them to become more adaptive to using, integrating and properly managing it in their lectures (KEEGAN, 2005).

Unfortunately, the project was ceased in early 2005 with not so many continuous implementations by instructors in higher education or in schools. What is real unfortunate, is that not so many people realize that the M-learning is an extension of the E-learning by nature because it has the ability to provide education with high quality through online interaction between the learners themselves or between the lecturers and the learners who are at a distance from each other (KEEGAN, 2005).

However, due to the grand presence of the mobiles among people, it is expected that the mobile learning will flourish someday in an unmatched way and will bring new meaning to education (KEEGAN, 2005).

Mobile learning is about using these devices in teaching. When teachers use the mobiles for the first time in their

teaching, it is very important for them to know that it is a valid way for reinventing education for what is best for learners and themselves (KEEGAN, 2005).

Even-though many teachers might see the M-learning at first as a supportive and not a primary mode of education, time will prove if it can take a front seat in the educational field or not through not only the development of its technology but also the trust of the teachers in integrating it in their teaching by focusing on communicating and interacting to deliver the content in the smoothest way possible (KEEGAN, 2005).

Now similar to the E-learning, the M-learning has its advantages through its online interaction as well as disadvantages. It has the ability to distract its user's mind; however, it is up to the learner to empower its pros on its cons, which, in turn, can help his learning through its technology (KEEGAN, 2005).

What is so weird is that it is no secret that billions of people walk around the world every day holding a small but powerful computer, the mobile phone in other words, in their hands or keeping it nearby without realizing that instead of using these devices for calling and texting, they can utilize them for what is best for their learning whenever and wherever they want (KEEGAN, 2005).

Some might say that the old generation is accustomed to using the mobile devices for messaging and calling only. However, this cannot be applied to the "*Digital Naïve Generation*" whose youngsters are flexible with using technology more than those in previous generations; so it not acceptable for them to use these tech tools for their entertainment and not their education (KEEGAN, 2005).

Over 6 decades ago, Marshall McLuhan (1956) indicated that, in the educational field, teachers must realize that teaching and learning are no longer hostages of the classroom's monopoly. It is the completely opposite. Students are able to learn outside the walls of the classrooms as much as inside it, and even better, because of massive amount of information conveyed by the media institutions that exist outside schools that grow rapidly and surpass the information provided inside the classes. Thus, teachers must understand that, in the future, teaching and learning are going to leave the classes and they are going to break through their walls (Richmond, 2015).

Moving forward, in 1977, John Dewey indicated that communication is an educative experience which results in people sharing knowledge and possessing it, and that the possibility of providing information outside the classes through communication cracks its walls and overcomes the books' monopoly (Nyíri, 2002).

In addition, it is not a secret that the availability of the internet connection paved the way for the mobile learning, where some say that because of it the E-learning will completely transfer to the M-learning as time progresses with the same quality of education provided and even better, because of the ability to communicate and collaborate online (Nyíri, 2002).

Even-more, the mobile learning transcends humans' discipline because it requires a high level of collaboration and integration of ideas concerning the problem situation on hand, and it organizes principles and classifies values through its practical assignments when students find themselves teaming up for what is good for their learning, which in turn allows them to reconsider their standards for learning and maybe in life because of the positive vibes transferred by that online collaboration (Nyíri, 2002).

Thus, those who are under the impression that mobile learning is only about transmitting information are totally mistaken because online communication between one person and the other does not only convey information; on the contrary, it permits them building knowledge through the context of the sent and received information and thoughts (Nyíri, 2002).

So instead of questioning the spatial of the mobile phones in education and instead of viewing them and their technology as a threat to the educational system, educators may attempt merging it within the curriculum to transform the learning environment and change their teaching methods, even to the minimum, for what is best for students (Sharples, Taylor, & Vavoula, 2007).

At the beginning, many educational institutions, in schools and universities, who might be willing to use the mobile learning perspective in their educational system, may encounter some challenges. Most teachers/instructors are not aware of using their mobiles in learning, so it is up to the administrations to figure out how to train them (KEEGAN, 2005).

However, it is always fundamental for those who are associated with education to remember that, in the history of technology, there has never been one so widespread and used by humans such as the technology provided by the phone phones. So everyone, from administrations to teachers and even students, have to believe that the M-learning is the next generation in the digital learning environment that provides quality of learning as the E-learning but with mobility and interaction that could very well enrich their learning in many subject materials (KEEGAN, 2005).

### 3. Methodology

#### 3.1 Selection of the Subject

Even though mobiles are very effective for learning when the laptops and desktop computers are unavailable, mobile learning is still relatively new in the educational process (MCCONATHA, PRAUL, & LYNCH, 2008). In April 2000, Sharples (2000) elaborated about the potentials of the mobile learning (Sharples, 2000). Five years later, Wagner (2005) indicated that regardless of the worldwide expansion of mobiles among teachers and students mobile learning has yet to take a front seat in teaching and learning despite its potential advantageous in education (Wagner, 2005). Four years later, Vavoula and Sharples (2009) indicated that, through mobile learning, people can interact socially and exchange meanings, information and knowledge. However, they stated that meaningful results can be achieved only if

the mobile learning was properly used (Vavoula & Sharples, 2009). In 2013, Mehdipour and Zerehkafi (2013) pointed out that mobile learning can happen at all places. It enables people to learn while walking, eating, sitting or riding a bus/car. Mobile learning can inspire everyone to learn more, especially those who are not comfortable with the traditional teaching (Mehdipour & Zerehkafi, 2013). Finally, Singh Gure (2015) assured in his paper that the proper usage of the mobile learning can provide quality education and make a difference in teaching and learning (Singh Gure, 2015). For that, the researchers picked the mobile learning as the subject of this research study.

**3.2 Design of the Research**

A quantitative research of descriptive design does not start with hypotheses. They are developed after the collection and analysis of the data (CIRT, 2015). This research, through its quantitative approach, has sought at determining the knowledge of mathematics teachers in the intermediate and secondary levels about the mobile learning, and it has tackled teachers' usage of mobiles in their teaching. Moreover, this research has explored the effect of the

academic degree on usage of mobiles in teaching mathematics by a sample of 467 math teachers in Lebanon.

The mathematics teachers who formed the sample were randomly selected by the researchers because, according to Bhat (2019), the simple random sampling technique is more suitable when the population is large (Bhat, Adi, 2019).

**3.3 Research Instruments**

To reach math teachers at a distance, the researchers have formed their own online survey. Three items were designed. In the first two items, the respondents had to answer by yes or no. The first item was related to math teachers' knowledge about the mobile learning. The second item concerned only those who knew about mobile learning. They were asked if they are using the M-learning in their teaching. Finally, the third item was about math teachers' academic degree: Bachelor degree/Diploma in mathematics, Masters in mathematics, Masters in education/didactics of mathematics, PhD in mathematics or PhD in education/didactics of mathematics.

Survey about Mobile Learning	
Questions	
Do you know what the mobile learning is?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Only for those who know, do you use mobiles in teaching mathematics?	Yes <input type="checkbox"/> No <input type="checkbox"/>
What is your highest academic degree?	Bachelor degree/Diploma in mathematics <input type="checkbox"/> Masters in mathematics <input type="checkbox"/> Masters in education/didactics of mathematics <input type="checkbox"/> PhD in mathematics <input type="checkbox"/> PhD in education/didactics of mathematics <input type="checkbox"/>

**Data Collection Procedure**

The online survey, through the link sent by the WhatsApp platform, has enabled the researchers to reach mathematics teachers in the secondary and intermediate level across Lebanon. Due to that, the researchers were able to collect data from 467 math teachers who lived at the south, north, Bekaa, in Beirut and Mount Lebanon. At the end, the researchers organized the data and imported it for analysis.

**4. Data Analysis**

Through the online survey, the data was collected. The researchers imported the data from the Excel Spread Sheet into the Statistical Package for the Social Sciences (SPSS) and analyzed it.



**Chart 1:** Bar Diagram for the First Question of the Survey

The above diagram shows that mobile learning has yet to be known by math teachers in Lebanon.

**Table 1:** Descriptive Statistics for the First Research Question (Frequency and Percent)

Do you know what the mobile learning is?		
	Frequency	Percent
Yes	80	17.10%
No	387	82.90%
<b>Total</b>	<b>467</b>	<b>100%</b>

The table above revealed that 387 teachers (82.9%) out of the 467 participants do not know what mobile learning is, while only 80 teachers (17.1%) knew about it. These results clearly show that mobile learning has yet to be widely recognized as a teaching method in schools by mathematics teachers in Lebanon.

The number of teachers who do not know about the mobile learning is almost five times that of those who know about it.

**Table 2:** Descriptive Statistics for the Second Research Question (Frequency and Percent)

Only for those who know, do you use it in teaching mathematics?		
	Frequency	Percent
They do not know about the mobile learning, thus they did not answer the question as requested	387	82.9%
Yes	21	4.5%
No	59	12.6%
<b>Total</b>	<b>467</b>	<b>100%</b>

387 math teachers did not know about the mobile learning. Thus, they did not answer the second question as requested by the researchers. Among the 80 teachers who knew about it, only 21 teachers (26.25%) admitted that they use it in their teaching, while 59 teachers (73.75%) do not.



Chart 2: Bar Diagram for the Second Question of the Survey

The above diagram clearly shows that usage of the mobile learning in teaching is extremely weak in Lebanon. Only 80 teachers know about the mobile learning, 21 out of them use it while the remainder 59 don't. This means that, out of these 80, only 26.25% use the M-learning in their teaching, while 73.75% don't.

Eventually, a very small part of the teachers who know about mobile learning use it in their teaching of mathematics.

Table 3: Descriptive Statistics for the Third Research Question (Frequency and Percent)

What is your highest academic degree?	Frequency	Percent
Bachelor degree/Diploma in mathematics	300	64.2%
Masters in mathematics	98	21%
Masters in education/didactics of mathematics	61	13.1%
PhD in mathematics	3	0.6%
PhD in education/didactics of mathematics	5	1.1%
<b>Total</b>	<b>467</b>	<b>100%</b>

The table above shows that most math teachers, 300 out of 467, hold a Bachelor degree/Diploma in mathematics. In addition, it shows that the higher the degree, the lower the number of teachers.

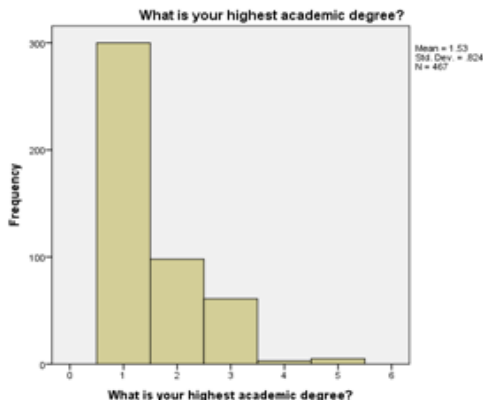


Chart 3: Bar Diagram for the Third Question of the Survey

The above diagram shows that most of the math teachers of the sample of the study did not work on achieving a higher academic degree in mathematics and, most importantly, in teaching mathematics.

Table 4: Descriptive Statistics for the First and Third Research Questions (Frequency and Percent)

		Do you know what the mobile learning is?	
		Yes	No
What is your highest academic degree?	Bachelor degree/Diploma in mathematics	30	270
	Masters in mathematics	13	85
	Masters in education/didactics of mathematics	33	28
	PhD in mathematics	1	2
	PhD in education/didactics of mathematics	3	2

The table above shows that 270 teachers (90%), out of the 300 who hold a bachelor degree/diploma in mathematics, do not know what is the mobile learning. Concerning those holding a masters degree in mathematics, 85 teachers (86.734%) out of 98 do not know about the mobile learning. Concerning those holding a masters in education/ didactics of mathematics, 33 teachers (56.89%) out of 58 know about the mobile learning. Among those holding a PhD in mathematics, only one (33.33%) out of three knows about the mobile learning, while 3 (60%), out of 5 teachers holding a PhD in education/didactics of mathematics, know about it. These results show that teachers with a masters or a PhD degree in education/didactics of mathematics are aware of the mobile learning way more than their colleagues who hold other academic degrees.

Table 5: Results of the Pearson's Chi Square Test on the Effect of teachers' Highest Academic Degree on their Knowledge of the Mobile Learning

Teachers' Knowledge of the Mobile Learning and Academic Degree	Pearson Chi-Square Alfa Value
Do you know what the mobile learning is?	0.0000

According to Morrissette (2014), the Chi-square is used to analyze the data collected by a yes or no survey (Morrissette, 2014).

A Chi-square test of independence was calculated to check possible association (if any) between teachers' knowledge of the mobile learning and their highest academic degree. Results showed that there is a significance association between math teachers' knowledge of the mobile learning and their highest academic degree at the p-level < 0.05. Results of the Chi-square test show that the highest academic degree held by a math teacher has a significant effect on his knowledge of the mobile learning.

**Table 6:** Descriptive Statistics for the Second and Third Research Questions (Frequency and Percent)

		Only for those who know, do you use it in teaching mathematics?		
		They do not know about the mobile learning, thus they did not answer the question as requested	Yes	No
What is your highest academic degree?	Bachelor degree/Diploma in mathematics	270	11	19
	Masters in mathematics	85	2	11
	Masters in education/didactics of mathematics	28	6	27
	PhD in mathematics	2	1	0
	PhD in education/didactics of mathematics	2	1	2

The table above shows that, among the 30 teachers who hold a bachelor degree/diploma in mathematics and know about mobile learning, only 11 use it in their mathematics teaching. Among the 13 teachers who hold a masters in mathematics and know about mobile learning, only 2 use it in their mathematics teaching. Among the 33 teachers who hold a masters in mathematics and know about mobile learning, only 6 use it in their mathematics teaching. The teacher holding a PhD degree in mathematics use the mobile learning in his teaching, while only 1 teacher, among the 3 teachers who hold a PhD degree in education/didactics of mathematics, use the mobile learning in his teaching of mathematics. In general, only 21 teachers (4.49%), among the 467 participants, use the mobile learning in their mathematics teaching, which in turn reflects the weak usage of the M-learning among the mathematics teachers in Lebanon.

**Table 7:** Results of the Pearson’s Chi Square Test on the Effect of teachers’ Academic Degree on their Usage of the Mobile Learning

Teachers’ Usage of the Mobile Learning and Academic Degree	Pearson Chi-Square Alfa Value
What is your highest academic degree?	
Only for those who know, do you use it in teaching mathematics?	0.148

A Chi-square test of independence was calculated to check possible association (if any) between teachers’ usage of the mobile learning and their academic degree. Results showed that there is no significant association between math teachers’ usage of the mobile learning and their highest academic degree at the p-level < 0.05. Results of the Chi-square test show that the highest academic degree held by a math teacher has no significant effect on his usage of the mobile learning.

## 5. Conclusion, Hypotheses and Recommendation

### 5.1 Conclusion and Hypotheses

Results of the study have showed that mathematics teachers’ knowledge of the mobile learning is too meager in Lebanon. 82.9% of the participants do not know about the M-learning. Many reasons could play a factor in this. Teachers’ reliance on the traditional teaching method and their comfort using it could be one of the reasons that forbid them from looking for new found alternatives and changing their techniques in teaching mathematics.

Moreover, only 21 teachers (4.449%) out of the 467 participants use the mobile learning in teaching mathematics. Among the 80 teachers who know about it, only 26.25% use the M-learning in their teaching, while 73.75% don’t. These percent reflect the weak and limited usage of the M-learning in teaching mathematics in Lebanon.

On the other hand, it seems that not so many math teachers are interested in achieving a masters or a PhD degree in education/teaching mathematics since the majority of the teachers of the sample hold a bachelor degree/diploma in mathematics. Results of the Chi-Square Test showed that the highest academic degree has a significant effect of teachers’ knowledge of the M-learning and the highest percent of teachers who know about it hold a masters degree in education/didactics of mathematics.

Due to that, the researcher can hypothesize that the highest academic degree held by a mathematics teacher in Lebanon affect his knowledge about the M-learning.

Finally, based on the results of the Chi-Square Test, the researcher can hypothesize that the highest academic degree does not affect teachers’ usage of mobiles in their teaching.

### 5.2 Recommendations

#### 5.2.1 For teachers

- 1) Mobile learning still has many barriers to overcome in education. According to the results of this study, teachers’ knowledge of the M-learning is very weak. For that, teachers could be assigned to future workshops dedicated to enlightening them about the mobile learning and its advantages in teaching mathematics. If this is not possible, teachers can use the richness of the web, look up for the mobile learning and learn about it on their own.
- 2) Usage of the M-learning in teaching mathematics is extremely weak in Lebanon. Many schools might be against it. However, the presence of the social media platforms, like WhatsApp, enforces learning through mobiles. Teachers can take advantage of that and interact with their students outside the classes. They can enforce students’ learning through this never before seen technology from any place at any time.
- 3) Math teachers should not settle down with the bachelor/diploma in mathematics. On the contrary, a masters in education/didactics of mathematics can

provide them with new teaching techniques they were not aware of. Through courses, they can be presented to new techniques that can support students' learning of mathematics.

### 5.2.2 For the researchers

- 1) Results of this study revealed that 21 teachers (4.49%) out of the 467 participants use the mobile learning in teaching mathematics. Through the criterion sampling technique, future researches could be dedicated to determining and explicating the methods of usage of the mobile learning in Lebanon to enlighten others about its benefits.
- 2) The mobiles themselves are one of the biggest obstacles that faces the M-learning because they were not initially developed for teaching and learning. They were built from the start to reach high ranks in the lists of entertainment devices. So, it is up to researchers in education to figure ways to employ them in the educational system. It would be a shame to shorten this technology for entertainment and not use it in education. Through experiments, future researches could also be dedicated to empowering the mobile learning by supporting students' mathematical performance by the social media platforms.
- 3) Future researches should be assigned to determine the disuse of the mobile learning by many mathematics teachers even those who hold a masters degree in education or didactics of mathematics. Reasons for that should be determined. Researchers can determine if the teacher himself or the school was the reason behind disusing the M-learning in teaching.
- 4) 21 teachers (4.49%), among the 467 participants, use the mobile learning in their mathematics teaching. Future researches should be assigned to determine how mobile learning is used by some of these teachers to enlighten others about it.

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