Classroom-Based Integration of Text-Messaging in Mathematics Teaching-Learning Process

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ABSTRACT

A lot of teachers are complaining that students are "texting" inside the classroom even during class hours. With this, this research study ***on students' perception before the integration and the students' attitude after the integration of text-messaging inside the classroom during the mathematics teaching-learning process*** was conducted. With 35-sample accountancy students at University of San Carlos, preliminary survey showed: 1) all of them have their own cellphone; 2) twenty-four out of 35 (68.57%) have airtime load everyday; and 3) all of them haven't experienced the integration of text-messaging in their teaching-learning process. Additionally, the students: 1) have a ***positive attitude*** towards mathematics; 2) ***agreed*** if the integration of text-messaging will be implemented; 3) ***still agreed*** after the implementation; and 4) evaluated the integration as ***effective***.

Furthermore, there is: 1) ***no significant difference*** between the before and after responses of the students on integration; 2) a ***significant relationship*** between the students' attitude towards mathematics and the students' perception on integration; 3) ***no significant relationship*** between the students' attitude towards mathematics and the students' attitude on integration; and 4) ***no significant relationship*** between the students' assessment on the effectiveness indicator of the integration and the students' attitude on integration.

Keywords: Text-Messaging, SMS (short messaging service), Mobile Phone, Mathematics Teaching-Learning Process, Student's Perception, Student's Attitude, University of San Carlos

I. Introduction

In the advent of the mobile communication devices, a lot of students are seen using cellphone even inside the classroom. In fact, estimate 83% of 17 year olds across the country have a cell phone today by an April Pew Internet and American Life Project (Paul, 2011). These mobile technologies, especially cellular phones, are intriguing to educators because these technologies are small, relatively inexpensive, and ubiquitous—almost every student has a cell phone (Kovalik, 2010). They are the new addition to the Information and Communication Technologies for learning.

Indeed, this technology can be used to for learning and to help motivate students (Jones, 2009). Rather than obtaining another technology to receive learning materials, people all over the world will want to access learning materials on their current mobile phones. As a result, educators and trainers must plan learning materials for delivery on different types of mobile devices (Ally, 2009).

Mobile devices integrate a series of features used in various learning environments. In some mobile learning applications currently available, mobile features are being utilized for various educational practices include the use of Short Message Services (SMS) (Mtega, Bernard, Msungu, and Sanare, 2012). The SMS (Short Messaging Services) provided by the mobile phones could be used effectively as a supporting tool for teaching-learning process. And since text-messaging provides a means of contacting students about the course and takes advantage of the ubiquity of cell phones on today's college (Kovalik and Hosler, 2010), then, this research study on the classroom-based integration of text-messaging in mathematics teaching-learning process is conducted. This is the third sequel of the research on *Text-Messaging in Mathematics Teaching-Learning Process.*

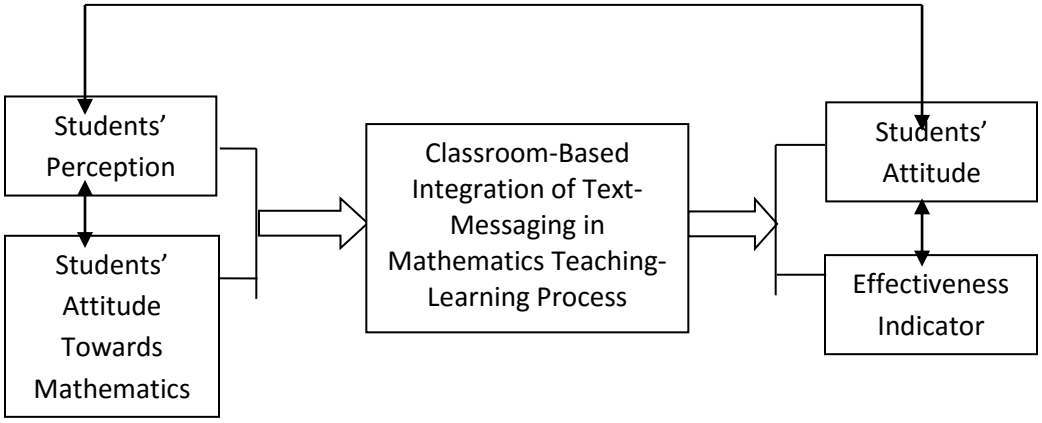
II. Theoretical Framework

Educational research and theory suggest that students learn better when they are actively engaged in learning rather than passive recipients of information. With this, several efforts were on place to integrate technology in education (Kafyulilo, et.al., 2011).

In the advent of mobile technology, specifically the mobile phone, inappropriate usage of surpassed in the learning environment such as disrupting the classroom, students are using their mobile phone during class hours, constant texting in the class (Paul, 2011). With this, Kafyulilo (2011) recommended that teachers also exposed to the multitude of learning opportunities provided through the learning flexibility offered by the mobile phone. This will empower educators since they can use the mobile technology to communicate with learners from anywhere and at anytime (Ally, 2009).

Mobile technology can be used to deliver instruction and information (Ally, 2009), educators support the idea of exploring educational uses of cell phones (Kolb, 2007). With all of these, the researcher implemented the classroom-based integration of text-messaging in mathematics teaching-learning process. In the process, the researcher conducted this study which determined the students' perception and attitude on classroom-based integration of text-messaging in mathematics teaching-learning process.

III. Conceptual Framework



The figure above shows the schematic flow of the research study. As shown in the diagram, the following were assessed at the start of the research study: 1) Students' Attitude Towards Mathematics; and 2) Students' Perception on Classroom-Based Integration of Text-Messaging in Mathematics Teaching-Learning Process. The integration of text-messaging inside the classroom during the teaching-learning process followed thereafter. At the end of the integration, the following were assessed: 1) Students' Attitude on Classroom-Based Integration of Text-Messaging in Mathematics Teaching-Learning Process; and 2) Effectiveness Indicator of Classroom-Based Integration of Text-Messaging in Mathematics Teaching-Learning Process, as evaluated by the students.

Through statistical manipulations, the following were analyzed: 1) relationship between students' attitude towards mathematics and students' perception on classroom-based integration of text-messaging in mathematics teaching-learning process; 2) difference between students' perception and attitude on classroom-based integration of text-messaging in mathematics teaching-learning process; 3) relationship between students' attitude on classroom-based integration of text-messaging in mathematics teaching-learning process and students' assessment on the effectiveness indicator of classroom-based integration of text-messaging in mathematics teaching-learning process.

IV. Methodology

The methodology employed in this research is discussed in the subsections below

A. Research Design

This study investigated students' perception and attitude on the classroom-based integration of text-messaging in mathematics teaching-learning process. A quantitative approach was employed from a descriptive perspective. This study was conducted using survey methodology. Questionnaires and surveys are often used in educational research for collecting information that is not always directly observable (Gall, Borg, & Gall, 1996). A

survey on the student profile on the use of text messaging, and the student-respondents' perception and attitude on the classroom-based integration of text-messaging in mathematics teaching-learning process was conducted.

B. Research Environment and Respondents

This study was conducted at University of San Carlos, a privately owned University located in Cebu City, during 2nd semester of school year 2013 - 2014.

There were two sets of respondents in this research study: 1) Math35 students – these are students enrolled in Business Statistics class who are asked to answer the first wave of the questionnaire. This was to test the readability of the survey questionnaire; and 2) BA100 Students – There were thirty-five (35) accountancy students used as a research sample who belong in a single class. They were in their first year when the study was conducted.

C. Research Instrument

The instrument was composed of the following parts: 1) Part I-A presented the demographic data of the student respondents; 2) Part I- B established the students' profile on the use of cellular phone; 3) Part II evaluated the students' attitude towards mathematics, which was adapted with permission from a thesis output; 4) Part III established the students' perception on the classroom-based integration of text-messaging in mathematics teaching-learning process; 5) Part IV established the students' attitude on the classroom-based integration of text-messaging in mathematics teaching-learning process; and 6) Part V revealed the students' assessment on the effectiveness indicator of the classroom-based integration of text-messaging in mathematics teaching-learning process.

D. Data-Gathering Procedure

This research study underwent the following data-gathering procedures:

1) Dry-Run – This was conducted to test the readability of the different parts of the research instrument. Revisions of certain parts of the questionnaire were made based on the questions raised by the students.
2) Pre-Assessment – At this stage, the students' attitude towards mathematics was evaluated by using the instrument adapted with permission from a thesis output. In addition, the students' opinion about the implementation of the classroom-based integration in mathematics teaching-learning process.
3) Implementation of the Classroom-based Integration of Text Messaging in Mathematics Teaching-Learning Process – During the duration of the research study, the teacher-researcher sent the following pre-saved text-messages to the students inside the classroom: 1) concepts that need to be super-emphasized because of constant use; 2) trivia questions worth certain points, which answer will sent by student to the teacher-researcher while they are doing their seatwork inside the classroom; and 3) challenging problems related to the day's discussion which answer will be sent by student to the teacher-researcher while they are doing their seatwork inside the classroom.

   In addition the following were also sent by the teacher-researcher to the students after the class: 1) updates on exam schedules/results, new topics and class standing; 2) enrichment items especially to those students who performed low in the quiz and those who are shy during seat work; 3) congratulatory remarks to those who scored high in the exams and those who did a nice participation in the discussion; 4) follow-ups on activities that were not yet submitted; 5) "catch-up" items for students who were absent; 6) advance topic organization for the new lessons, like set of examples, and concepts; 7) trivia questions worth certain points, which answer will sent by student to the teacher-researcher; and 8) challenging problems related to the day's discussion which answer will be sent by student to the teacher-researcher.
4) Post-Assessment – At this stage, the student were evaluated on their feelings after experiencing the classroom-based integration of text-messaging in mathematics teaching-learning process. In addition, the students were asked to evaluate the effectiveness indicator of the classroom-based integration of text-messaging in mathematics teaching-learning process
5) Analyzing the Data – The researcher quantified the students' responses on research instrument. The researcher got the percentages/frequencies of responses and was subjected to tabulation and analysis with the other parts of the instrument.

V. Results and Discussions

The following findings were based on the result of the statistical and analytical analysis of various data:

A. Demographic Profile

1. All of the respondents were teenagers. The 17 years old composed the highest number of respondents (65.71%). It is followed by 16 years old (28.57%) and 18 years old (5.71%).
2. All of the respondents are in their first year of the accountancy course.
3. Eighty-six percent (83%) of the respondents are living within the city proper, while others (17%) live outside the city proper.
4. All of them are first-time takers of the BA100 subject.

B. Profile on the Use of Cellphone

1. All of the respondents have cellphone during the research study.
2. Most of them (65.71%) have airtime load everyday, while others have airtime load once a week, twice a week, and once a month.
3. All of the respondents have not experienced the integration of the text messaging in mathematics learning with their previous teachers.

C. Students' Attitude Towards Mathematics

Table 1: Students' Attitude Towards Mathematics

Statements	SA	A	U	D	SD	Total	Wx	Verbal Description
1	2	14	15	3	1	35	3.37	Undecided
2	7	14	11	2	1	35	3.69	Agree
3	9	17	9	0	0	35	4.00	Agree
4	9	11	11	4	0	35	3.71	Agree
5	4	14	11	6	0	35	3.46	Agree
6	7	16	12	0	0	35	3.86	Agree
7	6	15	13	1	0	35	3.74	Agree
8	5	13	9	7	1	35	3.40	Undecided
9	6	16	13	0	0	35	3.80	Agree
10	1	2	17	10	5	35	2.54	Disagree
11	4	19	10	1	1	35	3.69	Agree
12	4	13	15	2	1	35	3.49	Agree
13	3	5	20	6	1	35	3.09	Undecided
14	19	11	5	0	0	35	4.40	Strongly Agree
15	5	11	18	1	0	35	3.57	Agree
TOTAL	**91**	**191**	**189**	**43**	**11**	**525**	**3.59**	**Agree**

Table 1 shows the students' attitude towards mathematics. The over-all weighted mean is 3.59, which means that the students ***agree*** on the statements about mathematics. This implies that they have a ***positive attitude*** towards mathematics.

There is one statement which receive a ***strongly agree*** responses by the students. This means that the students have a ***strong positive*** attitude towards mathematics based on this statement: Question 14 – *Mathematics is as important as any subject in school*.

The table also reflects that there is one statement which receives a ***disagree*** response by the students. It is on the statement: Question No. 10 – *I do not mind being dismissed late in my mathematics class*. This response was validated when the students commented that, "*we are not used to come late in our classes"*. This is the reason why they are time-conscious on their classes and that they have to proceed to their next class on time. During this research the students have a class in other subject after their mathematics class. A certain student commented, *"I feel awkward coming to our class late".*

As shown in the table, the following students were ***undecided*** with the following statements: a) Question 1 – *I enjoy how rapid and accurate I can work out mathematics problems*; b) Question 8 – *Solving problems in*

mathematics makes me feel like an adventurer who is willing to take a risk; and c) Question 13 – *I feel at ease in mathematics class*.

D. Students' Perception on Classroom-Based Integration of Text-Messaging in Mathematics Teaching-Learning Process

Table 2: Students' Perception on Classroom-Based Integration of Text-Messaging in Mathematics Teaching-Learning Process

Statements	SA	A	U	D	SD	Total	Wx	Verbal Description
1	11	18	6	0	0	35	4.14	Agree
2	2	10	23	0	0	35	3.40	Undecided
3	2	12	21	0	0	35	3.46	Agree
4	1	9	25	0	0	35	3.31	Undecided
5	7	19	9	0	0	35	3.94	Agree
6	2	11	22	0	0	35	3.43	Agree
7	4	17	14	0	0	35	3.71	Agree
8	7	21	7	0	0	35	4.00	Agree
9	13	16	6	0	0	35	4.20	Agree
10	5	14	16	0	0	35	3.69	Agree
11	3	16	16	0	0	35	3.63	Agree
TOTAL	**57**	**163**	**165**	**0**	**0**	**385**	**3.72**	**Agree**

Table 2 shows the students' perception on classroom-based integration of text-messaging in mathematics teaching-learning process. This revealed their opinion before they actually experienced the integration of text-messaging during the teaching and learning process inside the classroom.

As shown in the table, the over-all weighted mean in 3.72, which means that they ***agreed***, if integration of text-messaging during the teaching-learning process inside the classroom will be implemented.

The table reflects that the students were ***undecided*** on the following statements: a) Question No. 2 – *I will learn more if classroom-based integration of text-messaging is used in our BA100 teaching-learning process*; and b) Question No. 4 – *I prefer to take a course from a math instructor who is using classroom-based integration of text-messaging in their mathematics teaching-learning process.*

Since (SMS) is widely used, some schools include them in their lesson plans. Some teachers use the quick writing style to spark the students' learning. They allow children to use SMS language in their first draft to get thoughts and ideas into paper more quickly (Mahmoud, 2013). University teaching has focused on interactivity in lectures and practical classes, and teachers in several fields have set up systems in which students can interact with the lecturer using mobile-phone based SMS text messaging (Reimers, 2015). Indeed, SMS text messaging has been used in the behavioral sciences in the past, to prompt people at random times to sample their environment (Hogarth, Portell, & Cuxart, 2007)

E. Students' Attitude on Classroom-Based Integration of Text-Messaging in Mathematics Teaching-Learning Process

Table 3: Students' Attitude on Classroom-Based Integration of Text-Messaging in Mathematics Teaching-Learning Process

Statements	SA	A	U	D	SD	Total	Wx	Verbal Description
1	8	18	5	2	0	33	3.97	Agree
2	6	14	8	5	0	33	3.64	Agree
3	7	7	16	3	0	33	3.55	Agree
4	6	6	17	3	1	33	3.39	Undecided
5	11	15	5	2	0	33	4.06	Agree
6	7	10	13	2	1	33	3.61	Agree
7	8	12	8	4	1	33	3.67	Agree
8	7	18	6	2	0	33	3.91	Agree
9	12	14	4	3	0	33	4.06	Agree
10	6	9	13	4	1	33	3.45	Agree
11	6	13	10	3	1	33	3.61	Agree
TOTAL	**84**	**136**	**105**	**33**	**5**	**363**	**3.72**	**Agree**

Table 3 shows the students' attitude on the classroom-based integration of text-messaging in mathematics teaching-learning process. This revealed their feelings after they actually experienced the integration of text-messaging during the teaching and learning process inside the classroom.

As shown in the table, the over-all weighted mean in 3.72, which means that they ***still agreed*** on the integration of text-messaging during the teaching-learning process inside the classroom.

The table reflects that the students are still ***undecided*** on Question No. 4 – *I prefer to take a course from a math instructor who is using classroom-based integration of text-messaging in their mathematics teaching-learning process*. But, during the this time, the ***already agreed*** on Question No. 2 – *I will learn more if classroom-based integration of text-messaging is used in our BA100 teaching-learning process*. This shows that the students had a change of idea on learning process as influenced by their experience on the integration of text-messaging in mathematics teaching-learning process inside the classroom.

The latest generation of undergraduates have grown up in a world of pervasive digital technology where widespread ownership of mobile devices has provided an infrastructure that these students rely on for building extensive social communication networks (Reid and Reid 2005). As young undergraduate students enter HE, bringing with them personal mobile devices and expertise in mobile communication, arguably there will be increasing demands for more mobile communication on campus. The social contexts surrounding students' mobile communication practices may help us understand these demands (Jones, 2009).

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F. Effectiveness Indicator of the Classroom-Based Integration, as Assessed by the Students

Table 4: Effectiveness Indicator of the Classroom-Based Integration as Assessed by the Students

Statements	SA	A	U	D	SD	Total	Wx	Verbal Indicator
1	10	16	5	1	1	33	4.00	Agree
2	2	11	15	3	2	33	3.24	Undecided
3	8	21	2	2	0	33	4.06	Agree
4	6	19	6	2	0	33	3.88	Agree
TOTAL	**26**	**67**	**28**	**8**	**3**	**132**	3.80	Agree

Table 4 shows the effectiveness indicator of the classroom-based integration as assessed by the students. This established the students' evaluation on the integration of text-messaging after having personally experience it inside the classroom during the teaching-learning process.

As shown in the table, the over-all weighted mean is 3.80, this mean that the students ***agreed*** on the effectiveness of the integration of text-messaging during the teaching-learning process inside the classroom. This implies that they evaluated the integration of text-messaging during the teaching-learning process inside the classroom as ***effective***.

Many pupils are more skillful than their teachers in using a variety of technologies to obtain and transmit knowledge (Kirschner & Selinger, 2003). These pupils are often prolific and fearless users of technology and can assimilate new software and hardware as if it were second nature (Jonassen, 2000). Studies targeted disengaged youth and found that these devices were helpful in building teacher-student relationships; this in turn facilitated improved learner engagement (Ferry, 2009).

In a study by Riley, Obermayer, and Jean-Mary (2008), student smokers were aided in a smoking cessation intervention through the use of a combination of text messages and web-based resources. The outcome indicated positive results in the number of study participants who quit smoking, and those participants who continued to smoke reported reduced smoking rates.

G. Difference Between the Students' Perception and the Students' Attitude on the Classroom-Based Integration of Text-Messaging in Mathematics Teaching-Learning Process

Table 5: Difference Between the Students' Perception and the Students' Attitude on the Classroom-Based Integration of Text-Messaging in Mathematics Teaching-Learning Process

	Wx	Mean Difference	std. dev.	n	df	Paired t-test	Tabular Value	p-value (2-tailed)	Remark
Perc on TxtM	3.72	0.000472255	0.151416	11	10	0.010344	2.2281	0.991950068	Not Significant
Att on TxtM	3.72								

Table 5 shows the difference between the students' perception and the students' attitude on the classroom-based integration of text-messaging in mathematics teaching-learning process. This established the before and after responses of the students on the statements about the classroom-based integration of text-messaging has changed.

As shown in the table, the p-value (0.991950068) is less than 0.05 alpha-level. This means that there is ***no significant difference*** between the before and after responses of the students on the statements about the classroom-based integration of text-messaging. This is substantiated by the computed paired t-test value of 0.010344 which is less than the tabular value of 2.2281. This also leads to the acceptance of the null hypothesis, which also reveals an insignificant difference.

Furthermore, the table shows that the students' perception on the classroom-based integration of text-messaging has a weighted mean of 3.72, which means that the students agreed if the text-messaging inside the classroom will be implemented during the teaching-learning process in mathematics. Then, after the implementation, the students still agreed with a weighted mean of 3.72 (Attitude on Txtm) which is also shown in the table.

Since technology has become more available in classrooms, it plays a very important role in student's learning in their subject area. Moreover, students have become more comfortable of using technology in classrooms such as computers, iPads, and iPhones. Therefore, teachers should update themselves by learning and practicing new technological tools to be able to communicate and motivate students in their e-learning area (Abousalham, 2013). Indeed, study on text-messaging in online course indicated that students reacted positively to receiving text messages (Kovalik and Hosler, 2010).

H. Relationship Between the Students' Attitude Towards Mathematics and the Students' Perception on the Classroom-based Integration of Text-Messaging in Mathematics Teaching-Learning Process

Table 6: Test for Independence Between the Students' Attitude Towards Mathematics and the Students' Perception on the Classroom-based Integration of Text-Messaging in Mathematics Teaching-Learning Process

	SA	A	U	D	SD	Wx	Verbal Description	x^2	Tabular Value	p-value	Remark
Att Towards Math	91	191	189	43	11	3.59	Agree	45.18	9.488	3.64E-09	Significant
Perc on TxtM	57	163	165	0	0	3.72	Agree				

Table 6 shows the test for independence between the students' attitude towards mathematics and the students' perception on the classroom-based integration of text-messaging in mathematics teaching-learning process. This established the relationship between students' attitude towards mathematics and the students' perception on the classroom-based integration of text-messaging in mathematics teaching-learning process.

As shown in the table, the p-value (3.64E-09) is less than 0.05 alpha-level. This means that there is ***significant relationship*** between the students' attitude towards mathematics and the students' perception on the classroom-based integration of text-messaging in mathematics teaching-learning process. This is substantiated by the computed chi-square value of 45.18 which is greater than the tabular value of 9.488. This also leads to the rejection of the null hypothesis, which also reveals a significant relationship.

Furthermore, this shows that the students' perception on the classroom-based integration of text-messaging in mathematics teaching-learning process (3.72, agree) ***is related*** to the students' attitude towards mathematics (3.59, agree).

Emerging technologies have changed the way our students communicate and learn. Though skeptics find it difficult to acknowledge or adapt to the changing scene, pervasive technologies may proffer exciting options for learning environments. Not only do we have to keep up with the evolving content specialty but also keep abreast of the proliferation of technology acronyms and systems (Anchan, 2013). In study, Thornton and Houser (2005) found Japanese students learned significantly more vocabulary when they received vocabulary lessons via text messages on their phones compared to students who received the same information in a paper format.

Al-Fahad (2009) cited the study of Habitzel, et.al. (2006) who quoted that mobile learning can provide good support to micro-learning, a new and effective way of learning. Habitzel, et.al. (2006) revealed that people can learn more effectively if "information" is broken down into smaller, more easy-to-comprehend units. There they suggested that mobile learning is an ideal medium simply because it supports this "new way" of learning via the use of SMS (short messaging service).

I. Relationship Between the Students' Attitude Towards Mathematics and the Students' Attitude on the Classroom-based Integration of Text-Messaging in Mathematics Teaching-Learning Process

Table 7: Test for Independence Between the Students' Attitude Towards Mathematics and the Students' Attitude on the Classroom-based Integration of Text-Messaging in Mathematics Teaching-Learning Process

	SA	A	U	D	SD	Wx	Verbal Description	x^2	Tabular Value	p-value	Remark
Att Towards Math	91	191	189	43	11	525	3.59	7.8	9.488	9.91E-02	Not Significant
Att on TxtM	84	136	105	33	5	363	3.72				

Table 7 shows the test for independence between the students' attitude towards mathematics and the students' attitude on the classroom-based integration of text-messaging in mathematics teaching-learning process.

This established the relationship between the students' attitude towards mathematics and the students' attitude on the classroom-based integration of text-messaging in mathematics teaching-learning process.

As shown in the table, the p-value (9.91E-02) is greater than 0.05 alpha-level. This means that there is ***no significant relationship*** between the students' attitude towards mathematics and the students' attitude on the classroom-based integration of text-messaging in mathematics teaching-learning process. This is substantiated by the computed chi-square value of 7.8 which is less than the tabular value of 9.488. This also leads to the acceptance of the null hypothesis, which also reveals a no significant relationship.

Furthermore, this shows that the students' attitude on the classroom-based integration of text-messaging in mathematics teaching-learning process (3.72, agree) ***is not related*** to the students' attitude towards mathematics (3.59, agree).

Lauderdale and Partin (2013) cited the finding of their previous research that, students enjoy incorporating mobile devices into classroom activities, and learning outcomes are increased as a result.

Kovalik and Hosler (2010) in their study also cited that, in a review of 14 studies of text messages used to support changes in health behavior, Fjeldsoe, Marshall, and Miller (2009) found 13 of those studies showed positive behavior changes, especially when messages were tailored to a specific situation.

Kamat and Shah (2009) cited a study which made a conclusion that SMS text-messaging provided the most appropriate technology to address issues to support students in distant displacements and reduce the feeling of isolation while on practice. In addition, SMS for answering "short words-answers types of questions and evaluating them using simple matching process, providing enough feedback. The results proved that SMA can be used as an aid for answering short-answered type of questions (Kamat and Shah 2009).

J. Relationship Between the Effectiveness Indicator of the Classroom-based Integration of Text-Messaging and the Students' Students' Attitude on the Classroom-based Integration of Text-Messaging

Table 8: Test for Independence Between the Effectiveness Indicator of the Classroom-based Integration of Text-Messaging and the Students' Students' Attitude on the Classroom-based Integration of Text-Messaging

	SA	A	U	D	SD	Wx	x^2	Tabular Value	p-value (2-tailed)	Remark
Effectiveness Indicator	26	67	28	8	3	3.80	8.383641	9.488	7.85E-02	Not Significant
Att onTxtM3	84	136	105	33	5	3.72				

Table 8 shows the test for independence between the students' assessment on the effectiveness indicator of classroom-based integration of text-messaging and the students' attitude on the classroom-based integration of text-messaging. This established the relationship between the students' assessment on the effectiveness indicator of the classroom-based integration of text-messaging and the students' attitude on the classroom-based integration of text-messaging.

As shown in the table, the p-value (7.85E-02) is greater than 0.05 alpha-level. This means that there is ***no significant relationship*** between the students' assessment on the effectiveness indicator

of classroom-based integration of text-messaging and the students' attitude on the classroom-based integration of text-messaging. This is substantiated by the computed chi-square value of 8.38 which is less than the tabular value of 9.488. This also leads to the acceptance of the null hypothesis, which also reveals a ***no significant relationship***.

Furthermore, this shows that the students' attitude on the classroom-based integration of text-messaging (3.72, agree) ***is not related*** to the students' assessment on the effectiveness indicator of the classroom-based integration of text-messaging (3.80, agree).

In the study of Sundararajan, Sheehan, Gilbert, and Gauthier (2013), survey data indicates support for the idea of using ***texting*** to discuss course material, communicate better with teammates, help to focus on tasks, acquire knowledge, build relationships, collaborate effectively, and overcome language barriers.

Habitzel, et. al. (2006) study revealed that 23.57% students strongly agree that mobile learning can be an effective method of learning as it can give immediate support. Then, 39.2% of the students felt that mobile learning will be more flexible method of learning as it can be done anytime anywhere.

The result of Al-Fahad's (2009) study revealed that majority of the students supported the idea that the wireless networks increase flexibility of access to resources of learning independently in any place. Therefore, students can save their time, effort and even money. Al-Fahad (2009) also cited "students favored using mobile devices in the process of learning". With this, it was recommended to extensively study methods and techniques of providing knowledge via modern technological tools.

Furthermore, in the study conducted by DuVall, et.al. (2007) which aimed at evaluating the effectiveness of text messaging in an online environment, they found out that students enjoyed using text-messaging in the learning process. They quoted the following statements of the students who experienced text-messaging in the learning process: interesting, cool, nice, exciting, fun, and challenging.

VI. Conclusions

Based on the findings of this study, the following conclusions are derived:

1. The first year accountancy students-respondents who are first-taker in BA100 were not exposed to the integration of text-messaging in mathematics-teaching learning process.
2. The student-respondents have a positive attitude towards mathematics.
3. The student-respondents agreed if the integration of text-messaging was implemented inside the classroom.
4. The student-respondents still agreed the on classroom-based integration of text-messaging in mathematics teaching-learning process after its implementation during the duration of the research study.
5. There is no significant difference between the students' perception and students' attitude on the classroom-based integration of text-messaging in mathematics teaching-learning process.
6. There is no significant relationship between the students' attitude towards mathematics and the students' perception on classroom-based integration of text-messaging in mathematics teaching-learning process.
7. There is no significant relationship between the students' attitude towards mathematics and the students' attitude on classroom-based integration of text-messaging in mathematics teaching-learning process.
8. There is no significant relationship between the students' assessment on the effectiveness indicator of the integration and the students' attitude on classroom-based integration of text-messaging in mathematics teaching-learning process.

VII. Recommendations

Based on the findings and conclusions, the researcher provides the following recommendations.

A. To the Mathematics Teachers

1. Integrate text-messaging in mathematics teaching-learning process.
2. Use text messaging as an "enrichment" tool only in the learning process of the students. Thus, depending too much on text messaging has to be avoided.
3. Through text messaging, send the students the following:
    a. updates on exam schedules and results;
    b. updates on class standing;
    c. concepts that need to be super-emphasized because of constant use;
    d. enrichment items especially those who performed low in the quiz and those who are shy during seat work;
    e. congratulatory remarks to those who scored high in the exams and those who did a nice participation in the discussion;
    f. follow-ups on projects that are not yet submitted;
    g. updates on new topics;
    h. critical thinking problems related to the day's discussion which will be voluntarily shown by the students during the next meeting;
    i. "catch-up" items for students who will be absent; and
    j. advance organizers for the new topics, like set of examples, and concepts.
4. Allot few minutes before the days lessons in explaining the answers to text messages where many students failed to arrive the correct answer.

5. Encourage active participation in text messaging by replying boost-enhancing statements to the students
6. Keep updated with the students if they receive the text-messages.

B. To the School Administrators and/or Curriculum Planners

1. Create a strategic plan for mathematics instruction where text-messaging is integrated in the teaching-learning process.
2. Include the following goals in developing the strategic plan:
    a. Program Development Plan
    b. Governance Strengthening Plan
    c. Subscription and Development Program
    d. Physical Development Plan

C. To the Book Authors and/or Publishing Companies

1. Integrate text-messaging in designing the contents of the book.
2. Create link with the cellphone network stakeholders for the integration of text-messaging in textbook production.

D. To the Cellphone Network Stakeholders

1. Create links with publishing companies where text-messaging can be integrated in textbook production.
2. Develop a text promotion where mathematics learning of the students will be enhanced.

E. To the Researchers

1. Develop a research study that covers the impact of on the classroom-based integration of text-messaging in mathematics teaching-learning process.
2. Create a strategic plan for research purpose that will serve as a springboard of the school administrators in their implementation of the classroom-based integration of text-messaging in mathematics teaching-learning process.

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References

Abousalham, F. (2013). The positive impact of using technology in today's classrooms. *Proceedings of The 2013 International Higher Education Teaching and Learning Association Conference: Exploring Spaces forLearning* (p. 17). New York: Higher Education Teaching and Learning. Retrieved June 10, 2015

Al-Fahad, F. N. (2009). Students' Attitudes and Perceptions towards the Effectiveness of Mobile Learning in King Saud University, Saudi Arabia. *TOJET: The Turkish Online Journal of Educational Technology*, 8 (2), Article 10.

Ally, Mohamed (2009). Mobile Learning: Transforming the Delivery of Education and Training. http://www.slideshare.net/mlearningtadel/2009-mobile-learning

Anchan, J. P. (2013). Pedagogy and emeging technologies - learning a new language. *Proceedings of the 2013 International Higher Education Teaching and Learning Association Conference: Exploring Spaces for Learning* (p. 18). New York: Higher Education for Teaching and Learning. Retrieved June 10, 2015

Duvall, J., et.al. (2007). "Text Messaging to Improve Social Presence in Online Learning. http://net.educause.edu/ir/library/pdf/eqm0733.pdf

Ferry, B. (2009). *Using mobile phones to enhance teacher learning in environmental education.* University of Wollongong, Social Sciences, Wollongong. Retrieved June 10, 2015

Fjeldsoe, B. S., Marshall, A. L., & Miller, Y. D. (2009). Behavior change interventions delivered by mobile telephone short-message service. *American Journal of Preventive Medicine, 36*(2), 165-173.

Gall, M. D., Borg, W. R., & Gall, J. P. (1996). Educational research: An introduction (6th ed.). New York: Longman.

Habitzel, K., Mark, T.D, Stehno, B., & Prock, S. (2006). Microlearning; Emerging concepts, practices and technologies after e-learning. Proceeding of Micro learning 2005 Learning & Working in New Media, Inconference Series: Innsbruck University press: Retrieved June 6, 2007 from http:// www.microlearning.org/micropapers/ microlearning 2005- proceedings – digit aversion. Pdf.

Hogarth, R. M., Portell, M., & Cuxart, A. (2007) What risks do people perceive in everyday life? A perspective gained from the experience sampling method (ESM). *Risk Analysis, 27,* 1427-1439.

Jonassen, D. H. (2000). *Computers as mindtools for schools*. Merrill: NJ.

Jones, G. E. (2009, November). How mobile SMS communication support and enhance a first year undergraduate learning environment? *ALT-J, Research in Learning Technology, 17*(3), 201 - 218. Retrieved June 10, 2015

Kafyulilo, Ayoub C, and Fisser, Petra (2011). Teachers' and students' perceptions towards the use of mobile phones as a tool for teaching and learning in Tanzania. http://www.slideshare.net/Vangidunda/teachers-and-students-attitude-towards-the-use-of-mobile-phones-as-a-tool-for-teaching-and-learning?utm_source=slideshow02&utm_medium=ssemail&utm_campaign=share_slideshow_loggedout

Kamat, V., and Shah, A. (2009). Effectiveness of using text message/SMS to support the teaching learning process in distance education. India.

Kovalik, C. and Hosler, A. (2010, June). Text Messaging and the Community of Inquiry in Online Course. *MERLOT Journal of Online Learning and Teaching, 6*(2), 38 - 46. Retrieved June 10, 2015

Kirschner, P. & Selinger, M. (2003). The state of affairs of teacher education with respect to information and communications technology. *Technology, Pedagogy and Education 12* (1), 5-17

Kolb, L. (2007). Should cell phones be banned from classrooms? No. *Learning & Leading with Technology, 35*(4), p. 8-9.

Lauderdale, S., and Partin, C. (2013). Texting without borders: using mobile technologies to overcome confines of online courses. *Proceedings of The 2013 International Higher Education Teaching and Learning Association Conference: Exploring Spaces forLearning* (p. 35). New York: Higher Education Teaching and Learning. Retrieved June 10, 2015

Mahmoud, S. (2013, March). The Effect of Using English SMS on KAU Foundation Year Students' Speaking and Writing Performance. *American International Journal of Social Science, 2*(2), 13 - 25. Retrieved June 10, 2015

Mtega, W. Bernard, R, Msungu, A., and Sanare, R. (2012). Using Mobile Phones for Teaching and Learning Purposes in Higher Learning Institutions: the Case of Sokoine University of Agriculture in Tanzania. *Proceedings and report of the th UbuntuNet Alliance annual conference*, (pp. 118 - 129). Retrieved June 10, 2015

Paul, S., (2011). Mobile Learning: Using Cell Phones as an Instructional Device. http://www.slideshare.net/spaul6414/mobile-learning-using-cell-phones-as-an-instructional-device

Reid, D.J., and F.J.M. Reid. 2005. Textmates and text circles: Insights into the social ecology of SMS text messaging. In *Mobile world: Past, present and future*, ed. L. Hamill and A. Lasen, 105–18. Berlin: Springer-Verlag.

Reimers, S. (2015). *Using SMS messaging for teaching and data collection in the behavioral sciences.* University College London, Department of Psychology, London. Retrieved June 10, 2015

Riley, W., Obermayer, J., & Jean-Mary, J. (2008). Internet and mobile phone text messaging intervention for college smokers. *Journal of American College Health, 57* (2), 245-248.

Sundararajan, B. S. (2013). Mediated discourse in higher ed classrooms using text messaging. *Proceedings of the 2013 International Higher Education Teaching and Learning Association Conference: Exploring Spaces for Learning* (p. 21). New York: Higher Education for Teaching and Learning. Retrieved June 10, 2015, from 2015

Thornton, P., & Houser, C. (2005). Using mobile phones in English education in Japan. *Journal of Computer Assisted Learning, 21*, 217-228.