THE USE OF SMS SUPPORT IN PROGRAMMING EDUCATION

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ABSTRACT
The rapid developments in the communication technologies today render possible the use of new technological support tools in learning processes. Wireless, or mobile wireless, technologies are the tools whose potential contributions to education are investigated. The potential effects of these technologies on learning are explored through studies where either the entire learning process is carried out via mobile learning practices or the mobile tools are used as support tools in a mixed learning environment. In this study, the possible uses of mobile phones, which have a large user potential among mobile technologies, as support tools in the programming language education process have been analyzed. During the study that has been carried out via the Short Message Services (SMS) of mobile phones, lists of the messages sent to the students have been recorded and it was observed at the end of the application process that the SMS support had influenced the students' academic achievements significantly.
Keywords: Communications technology, Short Message Services (SMS)

INTRODUCTION

It is observed that most definitions of the mobile technologies are synonymous to the wireless systems. However, there exist important points that these two concepts differ from each other. Malladi and Agraval (2002) have defined those systems that enable users to connect to a network structure in all environments as mobile systems. On the other hand, Dubendorf (2003) has defined wireless systems as the devices that enable text, audio, video or image contents to be sent through radio waves, infrared radiation or microwaves without any wiring. The distinction between two system structures can be seen through the characteristics in the above definitions. Al-Fahad (2009) referred to mobile phones as mobile wireless systems by combining the above two definitions and defined mobile wireless systems as the devices that use radio waves in order to facilitate the transfer of any kind of data from mobile services to mobile devices, freely from the environment.

The use of mobile wireless systems and especially mobile phones today is very common. According to the data of International Telecommunication Union, the number of mobile cellular network subscribers has increased between the end of 2006 and the end of 2009 by 1.6 billion (ITU, 2010). Especially the mobility in the daily life supports and facilitates the transition to mobile technologies. As for Turkey, a significant change and transformation in years is notable in the characteristics of the use of communication media. This change can be seen in the data of Turkish Information and Communication Technologies Authority (ICTA) (Figure 1).

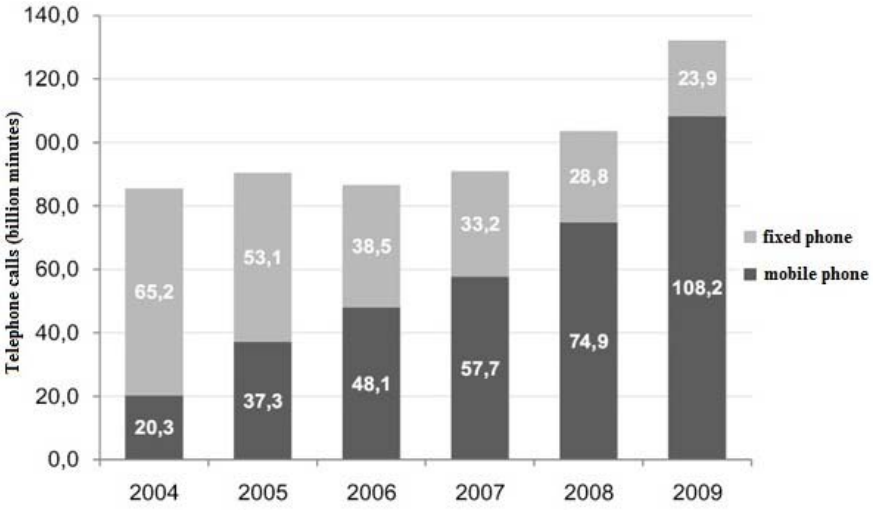

Figure 1: The Annual Telephone Call Traffics in Turkey
(Source: ICTA, 2010)

According to Figure 1, while a significant difference is notable between the hours of fixed phone calls and mobile phone calls in 2004 in the favor of fixed calls, this difference has become reversed in 2009 and mobile phone traffic has increased significantly. According to the 2010 data of ICTA, there exist a total of 61,5 million mobile phone subscribers (ICTA, 2010). Along with this common use of mobile phones, it can be argued that the general way of communication that global mobile phone users prefer is Short Message Services (SMS). SMS is an international messaging system. Asynchronous communication can be established up to 160 characters via SMS that has been used since 1992 (Kert, 2009). Although image and visual communication types are supported via mobile media, SMS communication is used intensely even in the developed countries of the world. For example, according to the data of Ofcom (2010) in England, while the monthly number of SMSs per a mobile phone call is 99, the number of visual communications (MMS) per a phone calls is only 0,56. The increase in the use of mobile communication media renders inevitable the examination of the potential effects of these devices on not only the everyday life but also the educational processes.

Numerous researchers have been conducted to investigate the effects of mobile technologies on educational process (Seppala & Alamaki, 2003; Mcconatha, Praul & Lynch, 2008; Aubusson, Schuck & Burden, 2009; Chang, 2008; Al-Fahad, 2009 ; Gaskell, 2010 ; Jones, Edwards & Reid, 2010; Kukulska-Hulme & Sharples, 2010; Martines-Torres, Toral, Barrero & Gallardo, 2010, Basoglu & Akdemir, 2010). It can be inferred from these researches' findings that positive effects of these systems are dominant. The mobile learning process can be defined as a new application area, which started to be pedagogically used recently and in which mobile wireless systems are used as supporters of students and teachers in distant learning processes (Mcconatha, Praul & Lynch, 2008), and it can be said that this application area attracts mostly young users (Attewel, 2003). The use of portable, flexible and distributable systems in learning processes has significantly positive effects to individualize the learning (Traxler, 2008). Along with these use advantages, it can be stated that mobile learning systems influence students' motivations and learning levels more positively than the conventional learning methods (Liu, Chu, Tang & Chang, 2007).

The reason of the use of SMS in mobile learning environments can be attributed to the facts that technological requirements are at the minimum level in the use of these environments and it provides easiness in practical application environments. Vavaula and Sharples (2009) have grouped the sharp evaluation of mobile learning process under three headings:

1. Availability of technology
2. Education/Learning level
3. Practical applicability

According to these three headings, the SMS infrastructure differentiates from other mobile systems in terms of accessibility to large masses and ease of use. To what extent these services can contribute to education and learning levels is an application area that needs to be researched according to different course contents.

In this context, the effects of the SMS support, provided to university students' programming education process, on their academic achievements have been investigated and the findings have been analyzed in this study.

METHOD

Context

In this study, the effect of the SMS support in programming education on students' learning levels has been investigated and, within the framework of this main problem, answers to the following sub-questions were sought:

- Are there significant differences between the pretest and posttest scores of those students who received SMS support during the process of programming languages education?
- Is there a significant difference between the posttest scores of the students who received SMS support and who did not, during the process of programming languages education?

During the study, a process analysis has also been conducted in order to analyze the practical use and the rate of reading the SMSs sent was also recorded.

Participants

The working group of the study consisted of 40 students, who were attending to the Department of Computer Education and Instructional Technologies at Yildiz Technical University in the 2009-2010 Academic Year and taking the course Programming Languages II for the first time. The students were divided into two groups through random sampling, 20 each for the experimental and control groups.

Data Collection Tool

At the beginning of the research process, a pretest prepared by the researcher was administered in order to determine the experimental and control groups' academic achievements. Through this pretest administered to both of the groups, quantitative data were obtained about the academic achievements of both groups. While the experimental and control groups were continuing their standard education, the experimental group was provided with SMS support in this process. The achievement test, which had been administered to both groups as pretest at the beginning of the research, was administered again as posttest. This way, quantitative data were obtained both about the groups' individual achievement scores and about the difference between their posttest achievement scores.

Pre-Application Preparation

Forty participants who took the Programming Languages II course for the first time were divided into two groups through random sampling, 20 each for the experimental and control groups. In order to control the balance between the groups, the academic achievement test was administered to both groups as pretest and if there existed a significant difference between the groups' academic achievement scores was tested. In order to control the difference between the academic achievement scores, t-test analysis was carried out and the analysis results are given in Table 1.

Table 1: Independent Groups T-Test According to the Pretests of the Experimental and Control Groups

Groups	N	Mean(X)	Standard Deviation	df	t	P
Experimental Group	20	8,10	4,29075	38	-,037	,971
Control Group	20	8,15	4,20870			

Table 1 demonstrates that there is not any significant difference between the pretest achievement scores of the experimental and control groups (t:-,037; p>,05). It can thus be concluded that the balance between the academic achievements of the groups was ensured before the application.

Application Process

During the application process of a total of seven weeks, information messages through SMS were sent to the experimental group in parallel with the course content of Programming Languages II. In this process, a total of 27 SMS messages were sent throughout seven weeks. All sent messages were approved through the mobile service that they were delivered to the experimental group. Moreover, randomly produced special code words were placed at the ends of each SMS messages in order to discover if the students read the sent SMS messages entirely or not, and the students were asked to send these code words back to the telephone number from which the message had been sent. The record of students' sending the code words back during the process is listed in Table 2.

Table 2: The SMS Messages Sent to the Participants throughout the Application Process and the Read Receipts Returned

SMS Nr	Participant Nr																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	√	√	√	√	√	√	√	√	√	√	√	√	√			√	√	√	√	
2	√	√	√	√	√	√		√	√		√	√	√	√	√	√	√		√	√
3	√		√	√	√	√	√	√			√	√	√	√		√	√	√	√	√
4	√		√	√	√	√	√				√	√	√	√	√		√	√	√	√
5	√		√	√	√	√	√	√				√	√	√	√	√	√	√		√
6		√	√	√	√	√	√	√	√	√	√		√	√		√	√	√	√	√
7	√	√	√	√	√	√	√	√		√	√	√	√	√		√	√	√	√	√
8	√	√	√		√	√	√	√		√		√	√	√		√	√	√		√
9	√		√	√	√	√	√	√		√	√	√	√	√		√	√		√	√
10	√	√	√	√	√	√		√		√	√	√	√	√			√	√	√	√
11	√	√	√	√	√	√		√		√	√	√	√		√		√	√	√	√
12	√	√	√	√	√	√	√	√	√		√	√	√		√		√	√	√	√
13	√	√	√	√	√	√		√	√	√	√	√	√		√	√	√	√		
14	√		√	√		√	√	√	√	√	√	√	√		√		√		√	
15	√	√	√	√		√	√	√	√	√		√	√		√		√		√	
16	√	√	√			√	√	√	√	√		√	√	√	√	√	√		√	√
17	√	√	√			√		√	√	√	√			√	√	√	√			√
18	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		√	√	√	√
19	√	√		√	√	√	√	√	√	√			√	√	√		√	√	√	
20		√	√	√	√	√	√	√		√	√	√	√	√		√	√	√	√	√
21	√	√	√	√		√				√	√	√	√	√		√	√	√	√	
22	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
23	√			√	√	√	√	√	√			√	√		√	√	√	√	√	
24	√		√	√	√	√	√	√	√		√	√	√			√	√	√	√	√
25	√		√	√	√	√	√	√	√		√	√	√			√	√	√	√	√
26	√	√	√	√	√	√		√	√	√	√	√	√				√	√	√	√
27	√	√	√	√	√	√	√	√		√	√	√	√		√	√	√	√	√	√

Table 2 indicates that some students did not respond to some messages. Students pointed out that they did not have enough time to respond to the messages sent. Code words were later received via e-mail from those students who had not sent the code words via SMS. Through these code words, it was attempted to control whether the students really read the messages they received. Messages were sent at different hours of weekdays in order to ensure that the time difference during the day would not affect the research findings. In order to maintain the group balance, all information messages sent to the experimental group via SMS were given to the students in the control group as a written document in the final week of the application process.

FINDINGS

After the application process, the academic achievement test, which had been administered to the experimental and control groups as pretest, was administered to both groups again as posttest. Independent groups t-test was conducted to compare the groups' posttest scores, and the paired-samples t-test was conducted to examine the difference between both groups' in-group pretest and posttest scores. The data were analyzed through the SPSS software.

Firstly, if there existed a significant difference between the pretest and posttest academic achievement scores of the students in the experimental group was tested, and analysis results are presented in Table 3.

Table 3: Paired-Samples T-Test Results for the Experimental Group's Pretest and Posttest Scores

Control Group	N	Mean (X)	Standard Deviation	df	t	P
Pretest	20	8,10	4,29075	19	-17,889	,000
Posttest	20	23,30	2,31926			

Table 3 demonstrates that the posttest achievement scores of the experimental group are significantly higher that its pretest achievement scores (t:-17,889; p<,05). Then, if there existed a significant difference between the pretest and posttest academic achievement scores of the students in the control group was tested, and analysis results are presented in Table 4.

Table 4: Paired-Samples T-Test for the Pretest and Posttest of the Control Group

Control Group	N	Mean	Standard Deviation	df	t	P
Pretest	20	8,15	4,20870	19	-11,880	,000
Posttest	20	19,85	4,50614			

Table 4 demonstrates that the posttest achievement scores of the control group are significantly higher than its pretest achievement scores (t:-11,880; p<0,05). At the end of the research process, the difference between the posttest academic achievement scores administered to the experimental and control groups was tested through independent groups t-test and the results are presented in Table 5.

Table 5: Independent Groups T-Test for the Posttests of Experimental and Control Groups

Groups	N	Mean(X)	Standard Deviation	df	t	P
Experimental Group	20	23,30	2,31926	38	3,067	,005
Control Group	20	19,85	4,46360			

Table 5 indicates that there exists a significant difference between the posttest academic achievement mean scores of the experimental and control groups (t:3,067; p<,05). In this respect, it can be stated that the SMS support provided to the students in the experimental group has improved their learning performances positively.

CONCLUSION

Wireless mobile technologies are the tools whose uses are becoming widespread day by day within the mobility of the daily life. It is considered to be necessary to consider the use of mobile phone separately among these technological tools due to its vast popularity and its flexible characteristics of use. In this study, an example was attempted to be presented about the ways the content of a technical course can be supported through SMS that is notable with its important use features among mobile phone applications, and the findings were analyzed. Although there exist new generation mobile phones with much more developed multimedia features, it was determined and approved during the research that SMS messages can be used by all users and for all mobile phones without technological limitations. Firstly, the in-group pretest-posttest results of the two groups that had received SMS support and not were analyzed, and it was observed that there existed significant differences in favor of both groups' posttest achievement scores. This finding indicates that the learning process had been useful for both of the groups.

Following the in-group controls, the posttest academic achievement scores of the group that had received SMS support and the group that had not were compared in order to be able to make comparisons between groups, and it was determined that the posttest academic achievement scores differentiated in the favor of the group that had received SMS support. This finding suggests that SMS support can be used as a support tool in learning process, given the fact that all the content given to the experimental group via SMS was also presented to the control group as a written document. This finding supports the findings of the studies conducted by Martines-Torres, Toral, Barrero & Gallardo (2010) and Echeverria, Nussbaum, Calderon, Bravo, Infante and Vasquez (2009). Besides, Jones, Edward and Reid (2010) obtained similar findings regarding the use of SMS in the role of a support tool for university students.

In light of the findings obtained as a result of the study, it is believed that further studies that will focus on the contributions of wireless technologies and mobile phones to learning processes can test the multimedia features of especially mobile phones such as Podcast, Vodcast etc., and investigate the effects of these media on different course contents.

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