

Examining Technology Perception of Social Studies Teachers with Rogers' Diffusion Model

Özkan Akman¹ & Erol Koçoğlu²

¹ Nizip Faculty of Education, Gaziantep University, Turkey

² Faculty of Education, İnönü University, Turkey

Correspondence: Özkan Akman, Nizip Faculty of Education, Gaziantep, Turkey. E-mail: akmanozkan@hotmail.com

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Abstract

Mobile learning has started to take place in education literature with the developing technology, and this technology started to have an increasing spread along with its advantages. This study examines the responses of social studies teachers to the innovations in the field of mobile learning. The study was designed within the framework of theory of diffusion of innovations by Rogers and 161 social studies teachers have participated in it. Data was collected by m-Learning Adoption Scale (MLAS) which is developed by Celik and analyzed in SPSS 18.0 package program. According to the results of this study, approximately 65% of social science teachers are within the groups that give the most positive response to diffusion of innovations theory on mobile learning (innovators, early adopters, and early majority). Also, the characteristics of mobile learning have a descriptive impact on the teachers' ability to embrace the innovations about mobile learning and to give positive decisions on using it. The study has suggested to develop new reactions for innovations and to develop the mobile learning content through collaborative approach by all the stakeholders in education.

Keywords: mobile learning, diffusion of innovations, social studies teacher, education

1. Introduction

Since the first human beings detected on earth, it is seen that humanity has searched for and discovered all types of opportunities and inventions and this helped knowledge to grow up. This development has created the human civilization and anything that humanity pursued, researched and invented has become a part of the history as an item of technology during its time period. Since the second half of 20th Century; usage of computer and Internet has become an obligation for individuals in parallel with the development of technology and it has gained a new level with mobile technologies. The usability and indispensability of computer and Internet in every part of human life has become a matter of argumentation. Within this context, the development of computer and related technologies has improved the nature of learning and teaching; providing new sources for these fields (Hill & Hannafin, 2001). With the development of wireless and mobile telephone technologies, mobile technologies have become a part of agenda and spread widely. These technologies have started to be used in educational field and they are becoming more dominant. With the characteristic of mobile technologies' easy accessibility and carriage; activities of exercises and implementations of learning can be carried out of the classroom (Saran, Seferoğlu, & Çağiltay, 2009). With the help of mobile technologies, access to information became very easy with no time and place limitations. This easiness increases the utilization of mobile technologies and dependency every day.

Literature and studies on educational technology have been increasing in the recent years. (Dyrli & Kinnaman, 1994; Martins, Steil, & Todesco, 2004; Sherry, Billig, Tavalin, & Gibson, 2000; Van Den Akker, Keursten, & Plomp, 1992; Wilson, Sheery, Dobrovolny, Batty, & Ryder, 2001). As there are argumentations on the definition of technology and the aspects to be classified as technology; we can consider technology as "the aspects that make something easy in any field". When we consider the educational technology within this context; although some experts consider teaching with blackboard and white chalk as educational technology, we can see that educational technology covers a different area with many rich items. According to the results of studies conducted by the relevant scientific branches, the educational technology within this purpose does not direct the technology according to own purposes and research results; but it seems that the initiative in this field is

completely under the control of technology. In other words, “education” sets the goals in accordance with technological developments. Although teachers invest on technological tools in order to enhance the quality and feature of education; lecturers are still not able to use such tools in their educational activities and academic works efficiently. Technology usage remains limited with word processors and electronic e-mails (Surry, 2000).

1.1 Mobile Learning

Mobile learning can be defined as a form of learning that can be reached via portable processing tools (Quin, 2000). In other words, mobile learning is the ease of access for students to educational materials at wireless environments via mobile devices and learns easily (Litchfield et al., 2007). Georgieva et al. (2005) suggest that mobile learning is not a new concept for e-learning or remote learning; but it is a new form of these implementations. Laptops, tablet computers, mobile computers with lines pocket computers, portable media players, MP3 players and smartphones are among the mobile learning devices (Mutlu, 2006). When we consider the benefits of mobile learning; we can say that its contribution to lifelong learning, its readiness, its ability to make learning possible without being aware of it, its independence from time and space and adjustment according to the conditions are some advantages (Bulun, Gulnar, & Guran, 2004).

It is known that the integration of technology on education in general and on the process and learning and teaching in private is a very popular issue in the academic field. With technological devices, new methods and techniques were used in the learning process and several innovations and arrangements were made in order to arrange the learning environments. Many researchers emphasize that efficiently used learning technologies have the potential to enhance the education system (Jonassen et al., 1997; Means, 1994; Çağiltay et al., 2001). When we consider the fact that the number of studies conducted on the factors affecting teachers’ adapting of technology in learning are very limited; it is considered that determining the perceptions of prospective teachers on the inclusion of technology to learning programs will be useful to develop strategies for integrating technology to education, to empower the teacher education problems and to improve their attitudes toward the occupation of teaching (Usta & Korkmaz, 2010).

As studies, literature and other works in the field of educational technologies have increased; the theoretical studies on this field did too. Innovative change has a particular importance especially in parallel with the improvement of technology. Innovative change includes everything that increase the technological value or functionality of an organization in order to achieve its duty or aim (Porter, 2005, p. 1063). Within this context, the diffusion model suggested by Rogers is placed in his book named diffusion of innovation and the most interesting model for the last 35 years (Sherry & Gibson, 2002). The main reason of this interest is the convincing impact of this theory in its field and its applicability in different fields of education (Woodel & Garafoli, 2002). Most of the researchers have adopted this model of Rogers (Medlin, 2001; Parisot, 1995; Sahin, 2006). Rogers (2003) has used the concepts of technology and innovation as two interrelated concepts.

He has presented the entire factor impacting the diffusion in his book named Diffusion of Innovations Theory (Rogers, 2003).

When we look at diffusion of innovations theory, we see that it is based on adaptation of an innovation, its mechanism and the assumption whether this innovation will be helpful or not. It is seen how an innovation is used by the individual and the aspects of utilization. Rogers defines innovation as “any ideas, applications or things defined as new by an individual or any other entity in social life”. Communicating with different members of society via this innovation is named as diffusion (Rogers, 1995). These communication channels familiarize the individual with the innovation and increase the adaptation skills. The knowledge obtained about this innovation is also realized due to such communication channels.

We see that this theory was built on four aspects with several sub steps;

- 1) The Determinant Features of Innovation include relative advantage, suitability, complexity, trialability and visibility. According to this theory, these are the main characteristics that determine an innovation.
- 2) Decision Types for Innovation examines whether the innovation decision was given by the relevant person with his own will or in other ways.
- 3) Innovation Acceptance level contains the rating of individuals according to their rate of accepting and using the innovations. A sorting was made between that person who accepted innovation rapidly and that person who did it very slow: Laggards are typically focused on tradition with a strong aversion to change (Orr, 2003), Late majority members adopt an innovation after the average member of a system (Rogers, 2003), Early majority members tend to be slower with the adoption process than the early adopters (Rogers, 2003), Early adopters use the data provided by the innovators to make their own adoption decisions (Rogers, 2003), and they are usually

respected social leaders, visionaries in their field, often considered as key decision makers (Rogers, 2003), Innovators are Venturesome types who are typically well educated, more likely to take risks, enjoy being on the cutting edge, and are motivated by the idea of being a change agent (Rogers, 2003), The depth to which the innovators implement and confirm a new innovation will particularly influence subsequent decisions of other potential adopters (Orr, 2003; Scollin et al., 2007).

4) Innovation Decision Steps consist of information, convincing, deciding, application and approval; and it explains what kind of decision the individual has given to use the innovation. This theory has formulated the phases of noticing an innovation by an individual and utilization of it. This theory was used in this study in order to reveal the mobile learning characteristics of social sciences teachers.

2. Methods

The purpose of this study was to analyze characteristics of m-learning. Data collected using the m-Learning Adoption Scale (MLAS) were used to explore the relationship between m-learning decision stage, m-learning decision type, attributes of m-learning and m-learning innovativeness level.

2.1 Participants

The study participants are the social studies teachers. A total of 161 teachers participated in the present study. Of the participants, 68% were male ($n = 109$) and 32% female ($n = 52$).

2.2 Research Instrument

The data collection instrument of this study was a survey that is originally developed by Celik et al. (2014). The MLAS includes four sections based on the Diffusion of Innovations Theory (Rogers, 2003):

- M-learning Decision Stage: This section shows the participants' decision stage concerning the adoption of m-learning.
- M-learning Learning Decision Type: This section shows the participants' type of decision regarding the adoption of m-learning,
- M-learning Innovativeness Level: This section helps to determine the five adopter behavior categories (based on innovativeness), including innovators, early adopters, early majority, late majority, and laggards in the adoption of m-learning.
- Attributes of M-learning: This section consists of the five characteristics of m-learning as an innovation: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability.

2.3 Data Analysis

In the present study, descriptive statistics and correlation analysis are used. In multiple linear regression analysis, the relationship between the dependent variable and the predictor variable is tested. In the current study, Data are analyzed using SPSS 18.0 (Statistical Package for Social Sciences) software.

3. Findings

The majority of teachers (91.9%) reported that they had their own smart phones; only 8.1% did not. Participant respondents were distributed across the following mobile technology experience in years: 1 year ($n = 9$), 2 years ($n = 28$), 3 years ($n = 55$), and over 4 years ($n = 69$). The most frequently occurring amount of teaching experience in higher education was 4-6 years ($n = 59$), followed by 1-3 years ($n = 50$), over 9 years ($n = 29$), and 7-9 years ($n = 23$).

As shown in Figure 1, the data gathered from teachers suggest that the MLAS shows a normal distribution for the features of innovativeness in the adoption of m-learning. This finding confirms the Diffusion of Innovations Theory (Rogers, 2003) that the individuals' innovativeness levels follow a normal distribution.



Figure 2. Distribution of innovativeness levels

Innovators, early adopters, early majority, late majority, and laggards, respectively, had the following frequency percentages: 8.7%, 13.7%, 44.1%, 24.8%, and 8.7%. Early majority was the most common group among the adopter categories.

Findings from the linear regression analysis regarding the relationship between m-learning decision stage and characteristics of m-learning are summarized in Table 1. The results of the regression analysis show that m-learning decision stage was significantly and positively related to characteristics of m-learning. Using the regression method, the overall model explains 4% of the variance in m-learning decision stage.

Table 1. Model summary for regression analysis

Model ^a	R	R Square	Adj. R Square	Std. Err.	F	p
1	0.200 ^b	0.040	0.034	1.722	6.599	0.011

^a: Dependent variable: m-learning decision stage.

^b: Predictors: (Constant), Attributes of m-learning.

This finding suggests that characteristics of m-learning are a strong predictor of m-learning decision stage. This finding indicates that teachers who encounter more with characteristics of m-learning tend to decide to use mobile learning devices.

Findings from the linear regression analysis regarding the relationship between m-learning decision type and characteristics of m-learning are summarized in Table 2. The results of the regression analysis show that m-learning decision type was significantly and positively related to characteristics of m-learning. Using the regression method, the overall model explains 28% of the variance in m-learning decision type.

Table 2. Model summary for regression analysis

Model ^a	R	R Square	Adj. R Square	Std. Err.	F	p
1	0.532 ^b	0.283	0.279	0.559	62.863	<0.001

^a: Dependent variable: m-learning decision type.

^b: Predictors: (Constant), Attributes of m-learning.

This finding suggests that characteristics of m-learning are a strong predictor of m-learning decision type. This finding indicates that teachers who encounter more with characteristics of m-learning tend to decide to use mobile learning devices personally and willingly. In fact, personal and optional innovations are usually adopted faster than the innovations involving an organizational or collective innovation-decision (Rogers, 2003). Hence, characteristics of m-learning are still a key factor in m-learning decision type.

Findings from the linear regression analysis regarding the relationship between m-learning innovativeness level and characteristics of m-learning are summarized in Table 3.

The results of the regression analysis show that learning innovativeness level was significantly and positively related to characteristics of m-learning. Using the regression method, the overall model explains 28% of the variance in m-learning innovativeness level.

Table 3. Model summary for regression analysis

Model ^a	R	R Square	Adj. R Square	Std. Err.	F	p
1	0.533 ^b	0.284	0.279	0.880	62.978	<0.001

^a: Dependent variable: m-learning innovativeness level.

^b: Predictors: (Constant), Attributes of m-learning.

This finding suggests that characteristics of m-learning are a strong predictor of m-learning innovativeness level. This finding indicates that teachers who encounter more with characteristics of m-learning tend to become more innovative to use m-learning tools.

4. Result, Discussion and Suggestions

This study has aimed to examine the characteristics of social sciences teachers in relation with mobile learning according to Roger's theory of diffusion of innovations. Within the context of this purpose, results listed below were reached:

- 1) It has been seen that majority of teachers (65%) are within the groups of Innovators, Early Adopters, Early Majority as indicated by Rogers in his theory. Such upper groups can be evaluated as pioneer and fast adaptive groups in terms of innovation. Therefore, it has been determined that social sciences teachers have a normal distribution in terms of adopting and using innovations according to diffusion of innovations theory and that they have positive qualities.
- 2) Characteristics of mobile learning tools or technologies are the strongest determinant on the decisions of teachers about mobile learning. Aspects such as content, form, harmony, and circulation are among the characteristics of mobile learning.
- 3) When teachers are left to decide whether to use the devices related with mobile learning or not, they adopt it faster. Whenever it is dictated by a person or by an institution, the adaptation rate is low.
- 4) Teachers who know and involve in technology more have higher rate of adapting mobile learning and they are more progressive.

Change in education is a continuous and indispensable aspect (Law, 2007, p. 315). Teachers should not only be a follower of change, but they should also implement or reinterpret it, and have a role in change (Bruce, 1997). Among the teachers who are employed as social sciences teachers in this study group, 65% have aimed to develop the innovations, to implement and adopt those are important in terms of applicability and spread of innovations in education. These skills are currently at the level of mobile learning and they will be reflected upon the innovations of future. Therefore, all the stakeholders in education have to develop new ways of thinking and methods about innovation, making the changes and developments adopted in a healthy way. Other stakeholders in the system and the education system itself must be adaptive and open for innovations.

Rogers, in his study relying on the previously established theory, has found that one third of society if in early majority group in terms of adaptation grading for diffusion of innovation. This study has 44% in early majority group. This is almost half of the group. The reason of increase in this study can be indicated as the facts that the majority of teachers are young and new graduates, that they are very active about the innovations, and that they follow technology more than the rest of society.

The change or development in the field of education is not a process that could be carried out only by the

teachers. The study conducted by Timucin (2009) has considered the reactions of language teachers to the innovations in the field of technology. In this study, author has indicated that the administrators and leaders should also take responsibility along with teachers, and that they should ease and support change and development. This study has examined the adaptations of teachers to innovations in mobile learning but it did not focus on the other stakeholders of education.

In his study, Motiwalla (2007) has indicated that mobile learning technologies can be utilized in accordance with constructivism and other education and training theories. Within this context, the important thing is to know the strong and weak points of the technology to be used and to provide the learning goals with the proper pedagogical arrangement. Because of this; necessary research, arrangement and applications should be implemented in order to use the mobile learning technology properly in education.

Each development in the field of technology also provides opportunities to educators in developing new models (Johnson & Maltz, 1996; Lin & Liu, 1999; Chen & Nahrstedt, 2000; Chen & Lai, 2001). Mobile learning should be evaluated within this scope and the require research and applications have to be implemented in order to utilize those proper and efficient in education process. Mobile learning devices are almost indispensable to use today, and they should be re-evaluated by searching new opportunities, methods and techniques to use in education.

According to the results of this study, while deciding on the usage of innovations in mobile learning, and at the level of usage and adaptation, the features of mobile learning technology is very important. As it is known, mobile learning is relatively a new area and technology. In order to use this learning type better in the field of education, content arrangements to respond the questions of “what will be taught to whom and in which way” in addition to increase the quality of material named hardware.

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