

Design, Practice and Research: the Effects of Mobile and Web-Based Learning Systems

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Abstract

Modern technological developments lead a change not only in the social and economic lives of the countries but also in the education policies along with the techniques using in the teaching-learning environments. Distance education, which is carried out apart from the school building concept, is the umbrella term for the techniques used in technological methods in education. Mobile learning and web-based learning Technologies are the two of them which is most commonly used and applied in education (Ally, 2009). In this study it was aimed to design, research the effect of mobile and web-based learning systems into practice and compare the success levels of the participants before and after the applications. The results showed that there is a difference between the pre and post scores of the two groups. It is also seen that web-based group has higher scores than mobile learning groups when the final scores were compared.

Keywords: distance education, mobile learning, web-based education

Introduction

A distance education program which was used as a support to the education program at first, has become a favorable program recently. Many education institutions, colleges, universities, small or big companies, education agencies, military forces and many others, mostly use and prefer "Distance Education" program in their education program. Because it is easy to reach vast numbers of people in a short time and in a very effective way. It also does not have to have a current building to carry the education process. Mobile devices such as cell phones, pocket computers, laptops have become common in education because they are independent from the time and place and they can connect to web smoothly. Mobile devices have also been used in the mobile learning field at an important level because of their advantages. The advantages are to be mentioned in the following parts.

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Web-based learning the learning environment that carried out by using web tools. Not only mobile devices, but also the web is a common way to reach the information needed at any time the target population, in this case the students, supposed to get and learn. Web-based tools perceived by students as a way of effective learning tools (Su, Bonk, Magjuka, Liu, & Lee, 2005). In this study web based and mobile based learning subjects are examined. The study was carried through cell phone and web based education to support the learning process.

Theoretical Basis and Literature

In this section the terms “education, distance education, web-based education and mobile learning” is to be discussed in detail in the lights of the literature review.

Education

Education is defined in the Oxford dictionary as the systematic process of receiving or giving instruction, via formal or informal institutions. (Oxford Dictionary, 2017). Education is also defined as guiding the behaviors and act of teaching to gain terminal behavior. It took long years of studies and expertise to have a profession beforehand, but it is crucial now to get and reach the education from the shortest and most effective way which is possible. Here it outcomes the term distance education, web-based learning and e-learning technics to get and acquire the knowledge required or demanded

Distance Education

“Distance education” term was first used in 1906 by William Lighty who is also the founder of the Wisconsin University. Distance education can be said as the result of the push and pull factors as to be called. It means the more the demand of the users from the technology the more the developments of the technology (Prasolova-Forland, 2017). It can be said that there are four periods in distance education. The first period is the employment of the printed materials as well as radio and tv in learning and teaching environment. The second period is the usage of the fax, tv, video and audio-cassettes in education. The third period can be defined as the usage of the CD_ROMs, computer based trainings, internet and web-based cassettes fort he final period, it can be said that the real-time video and audio materials, desktop conferences and interactive materials along with the internet employment. Distance education is classified into two groups mainly (IDE, 1998) : asynchronous and synchronous. Asynchronous education is an education where the communication and collaboration takes place across time and space while in synchronous education the communication takes place at the same time.

Asynchronous distance courses uses HTTP as a communication tool, HTML and also web browsers as document viewers (Harvey, Palmer, & Speier, 1997); while for the synchronous courses electronic boards/ screen sharing, Microsoft NetMeeting, DataBoard and Smart 2000 Conference systems can be used (Prasolova-Forland, 2017).

Distance education is preferred by many countries for small or large group education programs in long or short terms. When the enrollments in the developing countries for the distance education programs are evaluated, it is seen that at the universities in Turkey, China, Indonesia, India, Thailand and Korea rank among the six most preferred ones in the world (Daniel, 1999).

The advantages of distance education can be listed as high rank of students, no need for large spaces for large groups, available for all ages in an instant time while the limitations can be mentioned as the cost of the system for distance education, isolation from the teacher-student interaction and the problem of evaluation (Hellman, 2003)

Web-based Education

Web-based education (WBE) is the employment of the World Wide Web and supporting systems to the education process as a communication and collaboration tool. It has been popular since the 1900s at many worldwide leading universities. There are many other terms for WBE such as; online education, internet-based education or virtual education. The characteristics of WBE can be listed as follows;

- The communication between the student and teacher is no more face-to-face.
- It can hardly be said that there is an influence from an educational organization or authority
- The fundamental aim of the web Technologies is to deliver the education context
- Even-if there is no face-to-face communication, there is a two-way communication between not only student to teacher, but also student to student (Vladan, 2006).

According to the Baker et al. (2006, s. 3-21) there is the nine types of web-based learning experiences and these are:

1. Formal courses: the lessons delivered by using a network distribution, but the content and the material are traditional,
2. Blended courses: the instructions are shared by live teachers and the classroom environment, but the content is supported by computers,

3. Technology-supported courses: the instruction is given by the live teacher but the samples and practices is delivered by web tools. The balance is mostly on live equipments,
4. Technology-enriched environments: most of the practions are given live, but for subtasks of the content is generally given by web tools.
5. Discretionary Web activity: the tasks or the content is generally the ones supporting the computer literacy skills,
6. Tool-use learning is closely related with the spreadsheets, documents and content prepared using web tools and the content is closely related to the collaborotaive work between the live and web tools.
7. Focused games and simulations: related to the strategies of using the web tools
8. Exploratory games and simulations: the goal is to emerge unpredictory learnings, investigate the relationships between the content and procedures
9. Domain specific incidental learning: relevant usage of the commercial usage, learning the rules and interpret the related contents.

WBE have been commonly used and preffered by the teacher and students for many reasons. It can enable fast and clear communication between the subjects of the education process. It can save time and there is a slight chance to miss the announcements or important points when one log into the web environment. As for the teacher it enables them to deliver assignments or course content cheaper than printed materials and for students WBE is the fast and again a cheaper way to get the information (Lynch & Lynch, 2003). It is also easy to adapt into changes in syllabus or students' levels.

There are also some cons when to consider using WBE in education. One of them is that some practitioners, they are teachers in this situation, are not fully aware the principles of WBE. They may be not fully trained, not competent enough on using WBE in education context. Barriers in accessing to web can be said another problem along with the slow connection to net sources.

WBE has been on the practice at many universities and there is even a virtual university which has been accredited by the North Central Association of Colleges and Schools. This and many changes in the preference of the system has led a question about why to choose a web-based education. At this point Collis (Collis, 1998) listed four main reasons. One of them is the need for active engagement of the learner into learning process, thus there is a need of re-assign new Technologies. The second reason is the variety of the student demographics. This means there is a need in adjusting the materials into these diversities and it can be done using web-based systems. The most important reason is the flexibility of the web-based technics.

The amount, time, place and the material barriers are no longer important and a problem needs to be solved. The final reason is in WBE it is easy to have and get academic and professional leadership. It is not only these advantages, also the new target population of students demands new ways and technics in getting the knowledge as fast as possible besides being time and cost effective (Valcke, 2001). Being flexible, easy to adapt to new environments are also temptations for both schools and organizations in choosing web-based education systems.

Mobile Learning

Mobile learning is used for the devices such as cell phones. Cell phones, smart phones and PDAs are accepted as mobile devices. There is not any agreed definition on the mobile learning because the area is a new one and it is still developing (Vavoula, Pachler, & Kukulska-Hulme, 2009). Mobile learning is a result of the combination of the mobile information and e-learning evaluation. It has no strict place to use and has the advantage to reach the e-content dynamically and efficiently. It can be used for both supporting traditional learning and distance education (Tarımer & Okumuş, 2010).

Mobile learning applications have been widely used in European context with many projects such as: HandLer, MOBILearn, M-Learning and some other projects under the Leonardo Da Vinci Program. These projects aimed to show the value, advantages and defined limitations in the practice of using the mobile learning in the education process (Kukulska-Hulme, Sharples, Milrad, Arnedillo-Sanchez, & Vavoula, 2009). Mobile learning generally closely related with the terms distant education and web-based learning as mentioned above, but there is a clear distinction between them and mobile learning itself. To the Mehdipour and Zerehkafi (2013, s. 93-101) mobile learning is mainly offered to the student being mobile via interacting with the portable technologies. It is also an advantage that mobile learning makes learning process more personalized and customized than web-based learning and distance education.

Mobile learning is found to be most commonly used and having the most student access according to the data from Project Tomorrow (West, 2013). It shows that %18 of the students of kindergarten, %45 students from grades three to five, %65 students from grade six to eight and %80 students from grade nine to twelve have the access a mobile device in their learning. The situation of owning a mobile phone is not one hundred percentage for every teenager or student by the usage of the mobile devices along with the mobile phones has been dramatically increased.

Behera (2013, s. 65-78) list the advantages of mobile learning as follows:

- It increases the mobility: the learning can take place at any time and anywhere,
- It can help people to save money and time because they can commit the learning process even when they were travelling,
- It caters for the interests of people at any age and at any physical condition such as disabled people easily and cost-effectively,
- The immediate feedback and one-to-one interaction are greater than a classroom environment offer,
- It can be customized to the needs of the learners, also helps them to be stimulated in learning.
- It can enhance the communication web of the students not only with the teacher but also other components from all around the world including totally outsiders of the teaching-learning process.

Another point of view related to the advantage of the mobile learning is mentioned by Vishwakarma (2015, s. 24-36) that: mobile learning offers the chance to a spontaneous, personal, not formal and a learning environment free from the geographical boundaries. It puts students into real context and real environments and maximize the potential of the students.

There have been studies related to the technics, perceptions of students and teachers towards mobile learning since its first implementation in the education process as a tool of learning- teaching. One of them is carrying by Mcconatha et al. (2009, s. 15-21) in order to assess mobile learning in higher education as a new education tool in an empirical aspect of view. They carried a study among one hundred college students in an introductory survey course in sociology. They designed and carried the course in Mobile learning environment. The practice, related questions to the subject are done via smart phones, web enabled phones, PDAs and other mobile devices using Learning Mobile Author interface. The results of the practice were compared to those who use software programs throughout this process. It is resulted that mobile learning group had higher values than the others who use the internet or not any mobile tools at all.

There are many other studies that are carried on the distance learning, mobile and web based learning subjects for the development of the technology, there will be many others also. Along with these studies; in this study, the attitudes towards two different learning methods (web based and mobile learning) were trying to examine. Before and after one month of application period the students were applied to attitude tests and the results are analyzed. Within this study it has been trying to find answers to the following questions;

1. Is there a difference between the success of mobile learning group before and after the application of the method?
2. Is there a difference between the success web based education group before and after the application of the method
3. Is there a difference between the mobile and web based education groups after the application?

Method

In this study, 89 students were selected via basic random sampling technique and they were divided into two groups. The learning situations of the both groups were compared with each other. Before the application of the both methods two groups were taken an exam in order to measure their knowledge on the subject. The scores were evaluated at 100 points. Then the web based and mobile based method has been applied to the groups for one month. The groups were randomly selected as it was selected at the beginning. One group has studied via web based pages and the other group have used mobile learning method. The analysis was done as pre and post tests in groups and between groups. The difference between and in the groups were statistically evaluated using SPSS18.0 program.

The scales using in the study are Web Based Education Attitude Scale and Mobile Learning Attitude Scale (Gündüz and Sökmen). The Cronbach Alpha value of the Web Based Education Attitude Scale was found 0,79 before the application of the method and after the application the same value found as 0.61. The Cronbach Alpha value of the Mobile Learning Attitude Scale was found 0,74 before the application of the method and after the application the same value found as 0.80. The total item number of the scales are 26 for each.

Designing web-based education pages

ASP programming languages, javascript and html codes are used while planning the web-based pages codes. Active server pages (ASP) are a technology developed by Microsoft and it uses server-side scripting to generate the content to be sent. It is a result demanding not only the demanded pages but also the need in receiving the data. ASP programming language is chosen because it is easy to calculate the time that students have been online in the system and the database is Ms-Sql which is also working in harmony with the ASP language program. The Picture in the pages are adapted via Photoshop Cs program. The shapes are changed in order to be adjusted to the page. Students use their username and their own passwords to sign in the system as seen in Picture 1.

Picture 1. The Welcoming Page



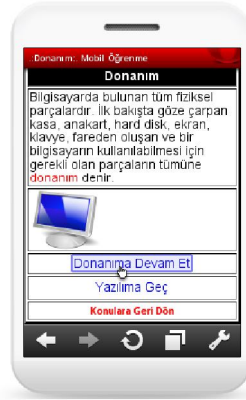
The system has also been evaluated by 11 experts from 7 of whom computer branch and 4 of whom from other branches. While designing the pages Dreamweaver Cs program is used. This program enables students to surf around the pages more easily and the programming language can be related with each other more easily.

Designing the mobile learning system pages

The most important factor while designing the mobile pages is the page size and the kilobyte values of the pages. This is important because the price in connecting to internet via mobile phones is higher than the connection price of connecting via computer. The price has a direct proportion with the data used when connected via mobile devices. It is because the design of the pages should be meticulously done. The shapes of the mobile learning pages are between 2-4 kilobytes. The pages do not contain pictures densely. The pictures which are used has transferred into formats like gif or png in order not to occupy the majority of the data. It also enables students to have a fast and fruitful usage between the pages. Html programming language is used while designing the mobile learning pages. This programming language is chosen because it serves smooth usage while using the pages via mobile pages. Mobile learning pages are designed using Dreamweaver Cs web design program while considering the screen sizes. The pages are generally designed at 240 pixel to 260 pixel. This also helps students to reach the pages even at small mobile phones. An entrance page is designed for mobile learning pages as seen in Picture 2.

Picture 2. The Mobile Entrance Page

After signing into the system the links on the subjects appear in the mobile screen. Students can choose any subject they want from these links and can study the related subject step by step as given in Picture 3.

Picture 3. Sample Screen of Mobile System

Findings and Comments

In this part result of the analysis is discussed in detail. The first research question is; "Is there any difference between the level of the mobile learning group on the subject of computer hardware units before and after the application?" .

Table 1 Results Related to the First Research Question

	Mean	Std.deviation	Standard error mean	t	p
Pre-Test	52,53	19,54	2,98	-1,770	0,084
Post-Test	57,56	21,98	3,35		

As it can be seen from the Table 1 the post-scores of the students are higher than the pre-scores of the students. The mean of the scores after the application ($x=57,56\pm3,35$) is also higher than the mean score of the before the application ($x=52,53\pm2,98$). The p value between the pre and post tests are not statistically significant ($t=-1,770$; $p=0,084>0,05$). It can be concluded that there is not any difference in the mobile group in learning computer hardware unit in before and after the application. The second research question was; "Is there any difference between the level of web based learning group on the subject of computer hardware units before and after the application?"

Table2 Results Related to the Second Research Question

	Mean	Std.deviation	Standard error mean	t	p
Pre-Test	48,41	19,24	2,84	-2,724	0,009
Post-Test	56,93	24,17	3,56		

As it can be seen from the Table 2 the post-scores of the students are higher than the pre-scores of the students. The mean of the scores after the application ($x=56,93\pm3,56$) are also higher than the mean score of the before the application ($x=48,41\pm2,84$). The p value between the pre and post tests are statistically significant ($t=-2,724$; $p=0,009<0,05$). The third research question is; "Is there a difference between the post-scores of the web based and mobile based education?" The results related to this question was given in Table 3.

Table3 Results Related to the Third Research Question

	Groups	N	Mean	Std.deviation	Standard error mean	t	p
Pre-Test	Mobile	43	52,53	19,54	2,98	1,002	0,319
	Web	46	48,41	19,24	2,84		
Post-Test	Mobile	43	57,56	21,98	3,35	0,127	0,899
	Web	46	56,93	24,17	3,56		

As it can be seen from the Table..., the pre-test scores are not statistically significant ($t=1,002$; $p=0,319>0,05$); when compared the mean scores of the students in mobile learning group ($x=52,53\pm2,98$) and the mean scores of the web based group ($x=48,41\pm2,84$). Similarly when the post scores of the both groups are compared, it can be seen that the mean scores of the mobile learning group ($x=57,56\pm3,35$) and the mean scores of the web based learning group ($x=56,93\pm3,56$) are not statistically significant ($t=0,127$; $p=0,899>0,05$).

Results and Discussion

This study which was aimed to support the education via mobile and web-based education was successfully carried on the 89 students. As a result of the study carried on the Sinop University Gerze Vocational School students, it can be said that both of the methods were found statistically important on empowering the success of the students. One of the distance education methods; Web based education method applied on the students increased the success of the students. As a result of the tests applied on the students it has been reached that the success is statistically important. The other distance education method was mobile learning method. The reason behind the increase of this group is random. The increase between the pre-scores and post-scores of the students in mobile group is not statistically important.

The main research question of the study was to define whether there is a significant difference between mobile learning and web based learning group. With this aim, the final scores both of the methods were compared and it has been found that there is a difference between the final scores but this difference is not statistically significant. Web based education can be said more successful according to the final scores.

Supporting the lessons using distance education materials has increased the success of the students especially supporting the verbal parts. The videos and pictures which cannot be shown during the lesson can enrich the learning process for the students when they reach these contexts via web based and mobile learning devices. Web based and mobile learning methods can reach more senses and makes it easier for students to focus. Students are more enthusiastic and focused on different learning situations. The pre-conditions which are necessary for learning such as attention, motivation and readiness can form via these methods.

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