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Development and evaluation of educational android application

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Abstract

In this study, a mobile application was developed for courses at undergraduate level. The application has not only been developed and used, but has also been used practically for 8 weeks. In other words, the findings are based on a practical experience rather than a theoretical basis. This study aimed to determine the opinions of students who participated in the development and application process of an Android application named NEU-CEIT about the mobile learning environment, educational and sharing structure of the developed application. A total of 27 students participated and students were asked to upload the developed application and examine the content. Following the application, students were administered an environment evaluation questionnaire. Data of the research were collected with survey method. Data obtained in the research were analyzed through the views of experts. According to the results, it was revealed that outcomes related with the usage structure of the developed application were positive, educational structure of the application is appropriate to follow the curriculum, it is rich in terms of materials and it might be one of the applications that students can use for communication. The results also showed that mobile applications will support education and increase motivation. This study supports that mobile applications improve academic achievement.

Keywords: Mobile learning, android application, application development.

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1. Introduction

Designing mobile environments appropriate for education based on rapid development of technology facilitated the development and diversification of teaching contents developed in these fields. Mobile devices such as mobile phones, laptops and personal digital assistants have become learning tools with excellent potential both outdoors and in classrooms (Sung, Chang & Liu, 2016). In this study, Android-based learning environment was developed and students were asked to evaluate this mobile learning environment. Unlike other studies, the application was not only developed and used but also practically used for 8 weeks. The findings of this study are based on a practical experience of the developed application rather than a theoretical basis.

The focus of research on mobile learning is based on the fact that the learning content on mobile devices, meaning learning mobility, can be reached "anywhere" as students move between space, time and social interaction. Among students in the classroom, mobile technologies can support a new method of cooperation. In a broader sense, students with intelligent devices can initiate self-learning experiences at home or abroad with structured education (Sharples & Spikol, 2017). Individuals have the opportunity of making research, sharing knowledge and accessing information at any time. Approximately 8 out of 10 people check out their social media or messages (instant messaging, email, and SMS) before the news (Deloitte, 2016).

For this reason, as the use of mobile devices becomes more widespread, it is thought that these devices will provide countless opportunities that can be useful in the teaching and learning process, support learning outside the classroom (Eppard, Nasser & Reddy, 2016; Khaddage, Muller & Flintoff, 2016). The use of mobile technology in education will alter the teaching and learning of educators (Heflin, Shewmaker & Nguyen, 2017).

According to a five-year (2016-2020) forecast released by International Data Corporation (IDC) an analyst firm for the smartphone market, the smartphone market, which was 1.44 billion in 2015, was 1.48 billion at the end of 2016; in 2020, smartphone market share is forecasted to reach 1.84 billion (IDC, 2016a).

Deloitte Global Mobile User Survey 2015 (GMCS) was conducted in 6 continents, 30 countries and with 49,000 participants. When the dependence of countries on smartphones is compared to each other, the country with the highest average and over dependency level was determined to be Turkey. It is predicted that dependency will increase with the increase of smartphone ownership in the future. In Turkey, users control cell phones 70 times a day on average. This corresponds to approximately 1 every 15 minutes during the awake time (Deloitte, 2016). Hall (2013) also believes that young people are obsessed with smartphones. Adoption of technology will often affect users (Azuddin, Malik & Mahmud, 2017). Therefore, appropriate applications are developed in order to use these mobile devices for the aims as mentioned.

In this study, Android operating system was preferred since it enables free software and it is frequently used. According to IDC (2015), Android and IOS mobile operating systems account for 96.3% of all smartphone shipments. IDC data also clearly shows that the Android mobile operating system is the most common operating system in the world (Android 32%, IOS 27%). Android has an 86.8% share of the smartphone market and IOS has a market share of 12.5% with 45.5 million shipments (IDC, 2016b). One of the most important reasons of this is that Android devices have a wide range of prices that everyone can buy (IDC, 2015).

According to the report published by We Are Social in 2015, it was revealed that the 37.7% of the total number of 76.7 million people in our country are internet users. Nevertheless, there are 69.6 million active mobile user subscriptions (Kemp, 2015). We Are Social and Hootsuite's 2017 Global Overview report reveals that more than half of the new Digital world population is using the Internet. The general effect of many people around the world on the use of these tools and on the social life has been documented empirically at many levels (Greenwood, Perrin & Duggan, 2016; We Are Social & Hootsuite, 2017).

Mobile technologies, which inevitably become a part of everyday social and academic life, have dramatically changed the ways in which students communicate, access information, become active and organize their own learning. Educational policy makers are aware of this change and should look for ways to make the most of pedagogically effective new mobile technologies (Yokus, 2016). It

should be viewed as an opportunity which provides high phone use and rapid adaptation of young users to different applications (Deloitte, 2016).

In this context, use of mobile devices in learning environments can be seen as a component which can increase efficiency in learning-teaching process. In this process, it is essential to evaluate mobile learning environments and determine the existing opportunities in order to achieve the integration of mobile learning technologies and mobile applications into education in a successful manner. However, the development of mobile application software is rather weak and there are few accepted methodologies for the progress of such mobile applications. There is still a shortage of research methods and at the same time there is a lack of understanding and analysis of the concerns and difficulties that may arise in the mobile application development process (Kumar, Krishna & Manjula, 2016).

This study is important in terms of producing practical results for faculty and practitioners. However, if the programming classes continue to become more interdisciplinary, it may be possible for the trainees to use NEU-CEIT mobile application software to get all levels of the students and take an active role in classroom training to further implement the learned basic programming concepts. The feature of being comprehensive and being open to improvement and application makes this research more important. Are students ready for mobile learning environments? In this context, use of Android mobile learning application, evaluation of learning environment and identifying the opinions of students towards this environment constitute the problem of this research.

2. Aim of the Research

The general aim of this study was to determine the opinions of the students about the use of NEU-CEIT Android application and the educational structure of mobile learning environment. The findings of this study are based on a practical basis rather than a theoretical one. Sub-aims of the study in order to reach this general aim are as follows:

What are the opinions of the students about;

a. Educational usage structure,

b. Sharing structure,

c. Educational environment of NEU-CEIT Android application?

3. Method

3.1. Participants

Students from the department of Computer Education and Instructional Technology who have Android operating system constituted the study group of this research. Study group included students enrolled in Ataturk's Principles and History of Turkish Revolution 101-102 course and Turkish Language 102 and elective field course CEIT-340 (Flash). There are 27 students in the group. The students voluntarily participated in the research and stated that they would show sincere and genuine considerations during the interviews.

3.2. Data Collection Tool

While the data collection tool was being developed, the opinions of the subject experts were consulted firstly and whether the measurement tool was suitable for the purpose to be used was taken into consideration. In accordance with the opinions of the experts, necessary arrangements were made in the interview questions. Questionnaire was used to collect the data of this study. The

questionnaire was developed based on the guidance of expert views and recommendations in order to receive the opinions of the students towards NEU-CEIT Android application. The data collection tool consists of 17 questions about educational usage, 10 questions about sharing structure, 32 questions about the evaluation of the training environment of the application and 59 questions in total. Cronbach Alpha value of the environment evaluation questionnaire employed was .985

3.3. Data Analysis

The data were collected using the data collection tool developed by the researchers. Data obtained from the study were analyzed with SPSS 16 program. Data are provided with percentage (%), mean ( ) and standard deviation (SD) values.

3.4. Preparation and Implementation of Educational Environment

In this study, an information system was prepared for use on Android devices for Near East University Computer Education and Instructional Technology. The first set of software development tools to improve the application is the Java SE Development Kit (JDK). Later, the Android SDK and Eclipse were installed from the most commonly used tools in Java programming. NEU-CEIT Android application's page contents are prepared with WordPress. When preparing the training environment, videos, course contents are added weekly in Wordpress page structures, and these pages are integrated with the code system into the Java Eclipse program. The training of the Flash courses that the students want to learn is also included in this system. This application has been developed not only for Computer Education and Instructional Technology students but also for students who use Android to follow the developments related to Atatürk Principles and Revolution History 101 -102 and Turkish Language 102 Courses given in Distance Education at Near East University.

In the context of the application, in general, the development of the university from 1988 to today, detailed information about the department, updated academic calendar, student information system, courses and contents given in distance education with NEU-UZEM, exam schedule and current curriculum, there are also screens with information such as contact information, the undergraduate program, the graduate program and the doctoral program, the CEIT announcements and the CEIT graduates and the personal communication information of the applicant preparing the application. Figure 1 shows the screen views of the application.

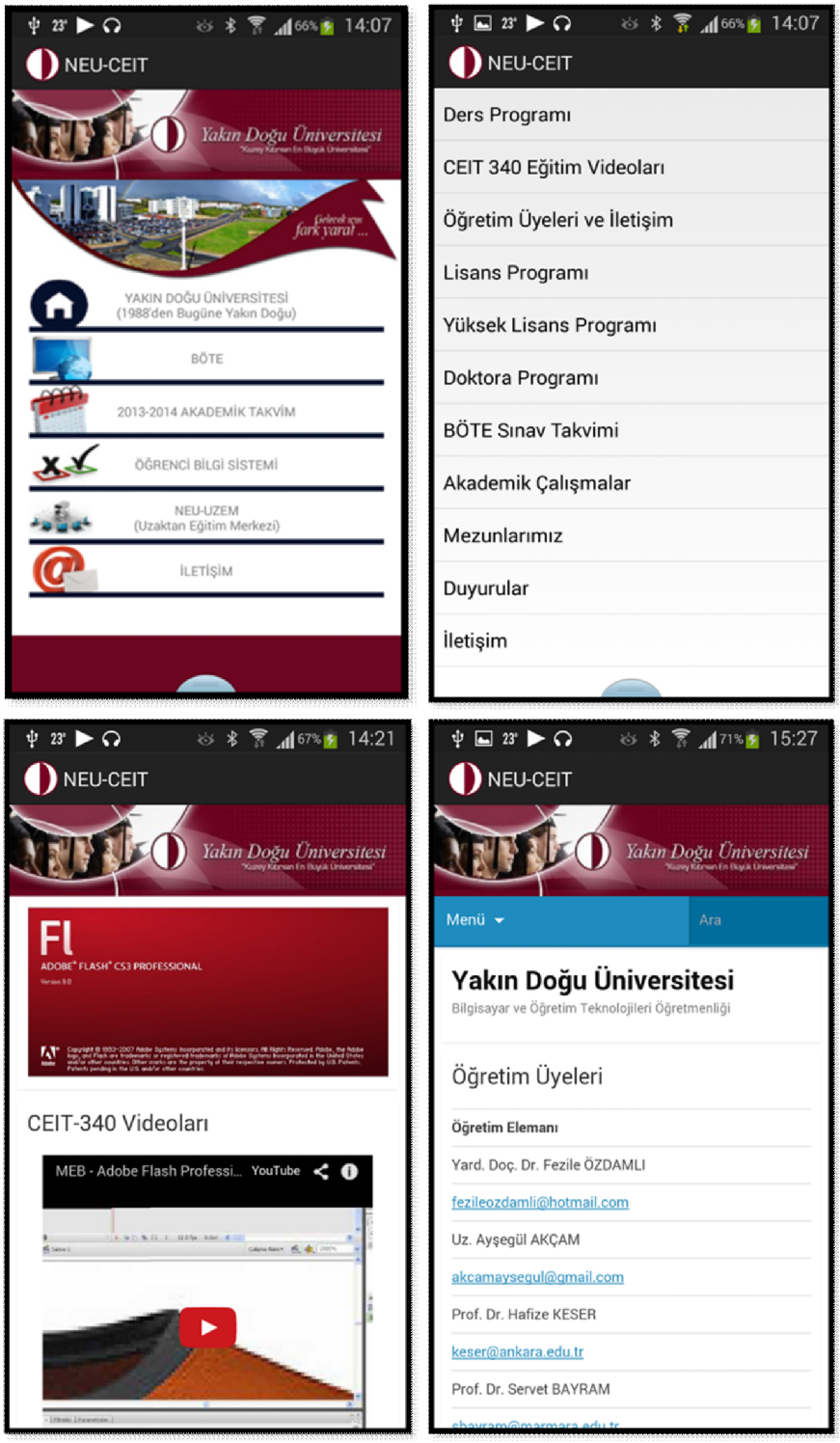

Figure 1. NEU-CEIT Screen Views

After the application has been used by the students for some time, it was requested to fill questionnaire aiming at evaluating the educational environment of the mobile application by the students during the final evaluation stage.

4. Results and Discussion

4.1. Results on the Educational Structure of the Android Mobile Application

When results on the educational structure of NEU-CEIT Android mobile application are examined, it was revealed that students in the group indicated that they do not agree with the statement of "following the lectures do not motivate me". The reason for this situation is that mobile applications will motivate students to follow the lectures. In a similar study, the researchers observed that using technology in the learning environment has increased the students' (Yaman, Donmez, Avci & Yurdakul, 2016).

Furthermore, students indicated that the application is appropriate for them to follow the lecture, they can reach the course materials when they need, it is easy to watch the video materials, they can learn independently from time and place, it will facilitate the learning of lecture contents, they can share the course contents, it will increase the quality of education, it will enable the communication between student and teacher, it will increase the interest of students towards lectures, they find the design of the application appropriate for education, flicking through the pages is easy through the application, it is a good alternative for interaction and they would like to use such applications in the future lectures.

Table 1. Results on the Educational Structure of the Mobile Application

No	Educational Structure	*M*	SD
1	The application is appropriate for me to follow the lecture.	4.44	.64
2	Following the lectures do not motivate me.	2.30	1.03
3	I can reach the course materials when I need.	4.44	.69
4	The application is rich in terms of materials.	4.07	.87
5	It is easy to watch the video materials.	4.44	.80
6	I can learn through the application independently of time and place.	4.44	.64
7	The application facilitates the learning of lecture contents.	4.30	.86
8	It is a suitable method for me to share the course contents.	4.26	.90
9	It can be used in traditional education as a support for students.	4.41	.69
10	The application increases the quality of education.	4.15	1.02
11	The application enables the communication between student-teacher.	4.33	.96
12	The application increased my interest towards lectures.	3.96	1.01
13	Design of the application is appropriate for education.	4.22	.97
14	Flicking through the pages is easy.	4.67	.62
15	The application is a good alternative for interaction.	4.52	.58
16	I would like to use such applications in the future lectures.	4.15	1.06
17	The application is appropriate for self-development.	3.85	1.13

It is seen that these results are consistent with the results of other studies in the literature. Karaaslan and Budak (2012) stated that mobile phones and mobile phone users are affected by each other. Mobile devices have become a learning tool with great potential both in class and outdoors (Sung, Chang & Liu, 2016).

Chen, Seilhamer, Bennett and Bauer (2015), have received student feedback on the benefits of using mobile applications and devices for academic purposes. As a result of the survey, 72% of the students stated that mobile applications / devices facilitate access to classroom work, 65% claim that it increases communication with other students, 60% claimed that it increases communication with teachers, 48% believed that it increases their knowledge about the field, 43% claimed that it increases the quality of the research and that 42% of them are motivated to complete their class work. In addition, by enabling mobile learning students to work in groups, the teacher ensures that their students have a successful learning experience (Powell & Wimmer, 2016).

4.2. Results on the Sharing Structure of the Android Mobile Application

When results on the sharing structure of NEU-CEIT Android mobile application are examined, students revealed that the use of application is easy and screen design is understandable, sharing the announcements page is easy, they can follow the audio and video lectures, they can communicate with their teachers, they can open and examine office documents, it is easy to open PDF documents, video sharing and sharing videos in social network are easy and it is easy to follow the lectures.

Table 2. Results on the Sharing Structure of the Mobile Application

No	Sharing Structure	*M*	SD
1	The use of application is easy.	4.63	.49
2	Screen design is understandable.	4.63	.49
3	It is easy to share the announcements page.	4.37	.83
4	It is easy to follow audio and video lectures.	4.56	.69
5	It is easy to communicate with teachers.	4.56	.50
6	It is easy to open and examine office documents.	4.07	.95
7	It is easy to open PDF documents.	4.19	.87
8	Video sharing is easy.	4.26	.71
9	Sharing videos in social network is easy.	4.33	.67
10	It is easy to follow the lectures.	4.44	.84

It was revealed that students mostly agree with the statements of “the use of application is easy” and “screen design is understandable”. Besides, students did not agree with the statement of “it is easy to open and examine office documents”. Gikas and Grant (2013) pointed out that mobile devices are effective tools for reaching content and communicating with classmates and teachers wherever they are. Compared to other countries, Turkish consumers have consumed visual media content (such as videos and photos) more frequently. Due to the high demand for video content and the sharing of photos on social media, Turkey's market stands out as a market open to opportunities for mobile operators (Deloitte, 2016).

For ease of use, small screens, drafts and user collaboration styles are of great importance in creating and designing an application. Several application creators have neglected this fact. Mobile developers have to spend some time on the graph and concentrate on user convenience by doing some research on effective text, so they have to use some frameworks to provide user convenience, so that the application can be easily changed and easily reconfigured. Design, instinctive buttons, and if content can be loaded quickly, it should be easy and straightforward to implement and apply, helping users feel comfortable (Kumar, Krishna & Manjula, 2016). The ease and convenience of the application in this study indicates that attention is paid to the content of application creation and design.

4.3. Results on the Evaluation of the Educational Environment of the Application

When results on the evaluation of the educational environment of NEU-CEIT Android mobile application are examined, it was figured out that students indicated that pages are useful and the trainings are beneficial. It was also revealed that the homepage, Wordpress pages, pages related with the department of Computer Education and Instructional Technology are useful. Students who participated in the application and uploaded this application to their phones and examined it indicated that the pages are useful. Similar to these findings, it was also figured out that training in the Ataturk's Principles and History of Turkish Revolution (101-102) and Turkish Language II courses provided through Distance Learning Center (NEU-DLC) was beneficial. Besides, it was revealed that pages on the internet http://neuhakkinda.wordpress.com/ and http://neuceit.wordpress.com/ are useful.

Table 3. Results on the Evaluation of Educational Environment of the Android Mobile Application

No	Evaluation of educational environment of the Android mobile application	*M*	SD
1	Homepage of the application is useful.	4.67	.48
2	Wordpress pages of the application are useful.	4.37	.83
3	NEU page of the application is useful.	4.41	.93
4	CEIT page of the application is useful.	4.56	.93
5	2013-2014 Academic Calendar page is useful.	4.41	.97
6	Student Information System Page is useful.	4.41	.93
7	NEU-UZEM page is useful.	4.48	.64
8	Communication page is useful.	4.63	.49
9	CEIT Academic Program Page is useful.	4.59	.74
10	CEIT 340 Education Videos Page is useful.	4.59	.74
11	CEIT Lecturers and Communication page is useful.	4.52	.89
12	CEIT Undergraduate Program Page is useful.	4.44	.80
13	CEIT Undergraduate Exam Timetable Page is useful.	4.48	.75
14	CEIT Master Degree Program Page is useful.	4.44	.69
15	CEIT PhD Degree Program Page is useful.	4.44	.75
16	CEIT Exam Timetable page is useful.	4.56	.64
17	CEIT Academic Studies page is useful.	4.44	.80
18	CEIT Graduates page is useful.	4.48	.75
19	CEIT Announcements page is useful.	4.41	.88
20	CEIT Communication page is useful.	4.52	.64
21	Training in the NEU-UZEM AIT 101 course was beneficial.	4.15	1.09
22	Training in the NEU-UZEM AIT 102 course was beneficial.	4.19	1.11
23	Training in the NEU-UZEM Turkish Language II course was beneficial.	4.19	1.07
24	NEU-UZEM Announcements page is useful.	4.30	1.03
25	NEU-UZEM Communication page is useful.	4.56	.64
26	http://neuhakkinda.wordpress.com/ website is useful.	4.26	.81
27	http://neuceit.wordpress.com/ website is useful.	4.19	.87
28	http://neuuzem.wordpress.com/ website is useful.	4.22	.89
29	Wordpress is useful as an educational tool.	4.15	.86
30	NEU-CEIT application is useful as an educational tool.	4.33	.92
31	Educational page structure of Wordpress is useful.	4.07	.95
32	Use of Wordpress with Android Applications is useful.	4.33	.87

Similarly, Tsai, Wang and Lu (2011) showed that participants of technology acceptance model adopted the environment developed for application and the developed educational mobile environment led participants to learn the topic easier. Especially with the emergence of web browsers such as Safari, it was revealed that readability in the mobile web pages has increased based on the development of web designs suitable with different screen dimensions through mobile devices.

In a study to evaluate the application developed using mobile learning student feedback in kindergarten, it was determined how students integrating mobile devices into pre-kindergarten curriculum would impact the academic achievement of students using informal feedback. The study was carried out with a semi-experimental design consisting of two groups of 28 students from K-12. It is determined that integrating mobile learning in areas providing student feedback increases the academic success of early childhood education students (Reeves, Gunter & Lacey, 2017). In a study systematically studying the use of mobile learning in PK-12 training, 40% of researchers have demonstrated that they design mobile learning activities that are compatible with the learning behavioral approach (Crompton, Burke & Gregory, 2017).

An application developer should create a simple design for mobile applications that is modest, scalable, and mobile, without too many resources to offer the best solutions. Flexible parts for each stage should be constructed where similar business rules and application logic must be kept (Kumar, Krishna & Manjula, 2016). With these processes in mind, the pages were prepared and the students were provided with the use of the pages, which finally came to a conclusion.

5. Conclusion

It is revealed that in the field of summer school students easily adapt to mobile learning. Therefore, within this study, a mobile lesson application was developed to meet the needs of undergraduate students. The application has not only been developed and used, but has also been used practically for 8 weeks. The findings of this study are based on a practical basis rather than theoretical grounds. The evaluation of the students' views also provided an in-depth analysis. Underneath the emergence of NEU-CEIT practice is the lack of educational learning environments among the existing mobile applications, especially the students at the undergraduate level at Near East University, who are desperate for mobile environments. The results also showed that the students were positive. The results of this study are consistent with the results of similar studies.

6. Recommendations

The following recommendations are provided for further research which will examine the use of mobile applications for educational purposes.

6.1 Recommendations Related with the Educational Structure of the Application

- Applications should be designed in a way to be more interactive.
- Materials should be enriched and they should be designed appropriate for the full screen property of phones.
- Teachers should support their lectures with such applications in the future terms.
- Mobile applications should be developed to support students in traditional education.
- Educational structure of the mobile applications should be organized well in order to increase the quality of education.
- In order to increase the interest towards lectures, educational dimension of the application should be structured well.

6.2 Recommendations Related with the Sharing Structure of the Application

- Information about which essential programs must be uploaded to open office documents should be provided.
- Appropriate links might be provided for students to upload essential applications to their phones in order to open PDF documents.
- How video sharing will be achieved should be explained in the application.

6.3 Recommendations Related with the Evaluation of the Educational Environment of the Application

- Students and teachers should be informed about the educational page structures of Wordpress.
- Lecturers should explain that Wordpress can be used as an educational tool.
- Teachers and students should become aware about the advantages of the android applications when designed with Wordpress pages.
- Students and teachers should be informed that materials of the courses which can be provided with distance education can be integrated into this application.
- It should also be explained to teachers that all pages can be updated from computer by the teachers and students can reach these new information without updating the application.

This study is limited to the volunteer students from the department of Computer Education and Instructional Technology at Near East University. It would be beneficial to make this application applicable for other lectures and even other departments. Further research might be conducted to examine if the use of these kinds of applications to support the lectures have an effect on student achievement or not. In addition, this study did not analyze whether group size influenced students' responses. For this reason, the importance of group size is unknown. Additional research should be conducted in a variety of computer lab environments with a larger sample size than various hands-on lessons with various mobile application development tools for long periods of time.

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