Hakemli - Süreli - Bilimsel Dergi
İNTERNET UYGULAMALARI ve YÖNETİMİ
Journal of
INTERNET APPLICATIONS and MANAGEMENT
2016 / 7(2)

The Power of Mobile Web: Kırklareli University Case

Mobil webin gücü: Kırklareli Üniversitesi örneği

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doi: *10.5505/iuyd.2016.42104*

The usage rates of mobile devices have increased day by day in worldwide. One of the main factors which direct people to use this technology is that these devices allow to reach intended content at anytime without depending on any place. This ability also helps the applications developed by designers make more interaction with the target users. The websites which are already one of the most used technology product at reaching information since the past, can be transmitted to more user groups than before on mobile devices through one of the popular trends "Responsive Web Design (RWD)". This concept has began to have an important place at designing the mobil compatible websites. The purpose of this study is to determine how successful the current website of Kırklareli University designed with RWD as mobile compatible is at interacting with users relative to the former web site which was not mobile compatible. In accordance with this purpose, a comparative analysis has been made between the former website and the current website by using Google Analytics (GA) reports on the bases of user visitation. In order to support this analysis, the periodical change of students amount was used. As the result of this study which searches the success difference between the current website and the former website in terms of visitors' choice, it is determined that the current website which is developed with RWD is 3,7 times precede in terms of amount of visitors, 3,2 times precede in terms of the rate of visitor interaction and aproximately 2,7 times precede in terms of the rate of page demonstration. This result reveals that the current website which is designed as mobile competible, is more succesful at interacting with users.

Keywords: *Mobile Web, Responsive Web Design, Google Analytics*

Jel Codes: *C88, L86, O33.*

Dünya genelinde mobil cihazların kullanım oranları her geçen gün artmaktadır. İnsanları bu teknolojiye yönlendiren temel faktörlerden biri, bu cihazların, ortamdan bağımsız bir şekilde istenilen içeriğe istenilen zamanda ulaşabilmeye olanak sağlamasıdır. Bu, tasarımcıların geliştirdikleri uygulamaların hedef kullanıcılarla daha fazla etkileşim kurmasına yardımcı olmaktadır. Bilgiye erişme noktasında en çok kullanılan teknoloji ürünlerinden biri olan web siteleri, günümüz trendlerinden "Esnek Web Tasarımı (EWT)" sayesinde mobil cihazlar üzerinde artık daha fazla kullanıcı kitlesine ulaştırılabilmektedir. EWT, mobil uyumlu web sitelerinin tasarlanmasında oldukça önemli bir yer edinmeye başlamıştır. Bu çalışmanın amacı, Kırklareli Üniversitesinin EWT ile tasarlanmış olan mobil uyumlu güncel web sitesinin, mobil uyumlu olmayan önceki web sitesine oranla kullanıcılarla etkileşim kurmada ne kadar başarılı olduğunun belirlenmesidir. Bu amaç doğrultusunda, önceki web sitesi ile güncel web sitesinin, Google Analytics (GA) raporlarıyla kullanıcı ziyareti bazında karşılaştırmalı analizi yapılmıştır. Bu analizlere destek olması amacıyla üniversitenin öğrenci miktarındaki dönemlik değişimden de yararlanılmıştır. Kullanıcı tercihleri bakımından güncel web sitesiyle önceki web sitesi arasındaki başarı farklılığının araştırıldığı bu çalışma sonucunda, EWT ile geliştirilen güncel web sitesinin, ziyaretçi miktarı bakımından 3,7, ziyaretçilerin etkileşim oranları bakımından 3,2 ve sayfa gösterim oranı bakımından da yaklaşık 2,7 kat üstün geldiği belirlenmiştir. Bu sonuç, mobil uyumlu web sitesinin kullanıcılarla daha fazla etkileşim kurmada başarılı olduğunu gözler önüne sermektedir.

Anahtar Kelimeler: *Mobil Web, Esnek Web Tasarımı, Google Analitik*

Jel Kodları: *C88, L86, O33.*

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1. INTRODUCTION

The tendency on mobile device usage has been increasing in recent years. Twitter which is used by millions of people actively in the world shows this situation on its reports, as well. Twitter indicates that its number of monthly average active user has increased 9% in comparison with last year and become 320 billion, and it has anounced that the number of mobile device usage constitutes 80% of this amount (Twitter, 2016). On the other hand, the other populer social website Facebook which has above 1,5 billion users (Statista, 2016) has anounced how high is the mobile device usage rate, on its reports. When the monthly average number of users who enter either Facebook application or Facebook mobile web site around the world was 945 million on December 31, 2013, this number increased 26% and became 1.19 billion on December 31, 2014 (Facebook, 2015). These statistics which are acquired from each of the websites which have many users around the world show how much the mobile devices were prefered by users clearly enough.

Using mobile devices intensely make designers consider this situation for the products they will improve. Because this tendency directly affects the lifetime of these applications. Fisch, from Google Mobile Ads Marketing (2012), indicates that the experience of mobile web site becomes important more and more, in addition to this, not having a mobile-friendly web site helps competitors. Turkey Statistical Institute (TSI), on the research about the rate of information technologies ownage by keeping smartphones and mobile phones together states that the rate of device ownage which was 90,5% in 2010 increased 96,8% in 2015 (TSI, 2015). The variance of mobile-cellular telephone subscription according to years around the world by International Telecommunication Union is given on Table 1.

Table 1. Mobile-cellular telephone subscriptions in the world (ITU, 2016).

Year	2010	2011	2012	2013	2014	2015
Amount (Billion)	5.290	5.863	6.232	6.666	6.954	7.085

According to Table 1, it is seen that the rates of mobile-cellular telephone subscripiton has increased about 2 billions from 2010 to 2015. Altough these statistics were made about subscription, they inform us about how high the potential mobile device usage rates are.

According to this information, it can be said that the applications which will be developed based upon the İnternet are quite important in terms of serving as mobile-friendly. Moreover, İnternet based applications which are developed in order to reach users via mobile devices can differ from each others, either. The way of their working type lays on the base of these varieties.

1.1. Definition of Mobile Web

Applications based on İnternet which have an important role on the point of reaching many more user groups can be found as 2 different types generally. Altough these applications type classified as "Mobile Applications" and "Mobile Web Applications" are close to one another, they have a lot of differences in terms of working process. "Mobile applications" which are situated on the device and are reached by the icon on the device home screen. They are installed via application stores such as; Google Play or Apple Store, are the

applications which are developed especially for a certain device (Badiu, 2013). Thus, it is able to be made use of the features of device such as camera, compass, contacts etc. On the other hand Mobile Web Applications which are felt and seen smilar to mobile applications in many aspects, but can not be implemented as Mobile Applicaitons (Budiu, 2013). Moreover, they are run via a browser and written in HTML5 (Budiu, 2013).

Mobile web applications are on the focus of this study.

Web, which was born in Tim Berners Lee's lead (Veen, 2000) in 1989, still can be defined as a technological product which users benefit the most on reaching information nowadays. This technology which is at the age of twenty-seven continues its development process. At the present time, this growth can be seen more clearly thanks to the number of websites (Figure 1).

Figure 1. The statistic of total number of websites (Netcraft, 2016).

"Hostnames" on Figure 1 represents total number of websites and *"Active sites"* represents uniqe websites in hostnames. According to this graphic, on October, in 2010 when there were 94.5 million active websites and about 233 million hostnames in total, this number on October, in 2013 became 189 million active websites and 767 million hostnames in total, lastly on January, 2016 it has become 170.2 million active websites and about 906.6 million hostnames in total. This significant increase proves us how much İnternet and websites by extention web have been used. Mobile website which is the topic of this research represents a part of all websites namely, websites which are developed as compatible with mobile devices.

As a basis, websites and mobile websites are the same applications according to designing and the way of running. The way of accessing to these applications was generally on desktops in the early years putting websites into service. The increase of mobile device usage numbers in time, in order to provide better user performance and satisfaction caused to design properly displayed websites on many platforms. Because websites developed for only desktops were quite insufficient in terms of usage and they revealed this need. The other disadventageous side of this stuation is the dependency to environment. However, in parallel with the technological developments, users' needs have increased and helped this dependency situation to become free.

Mobile web is a technological concept which information can be shared, which lets and helps us reach every kind of content wherever, whenever and however we want in interactive ways and which takes us out of the environment in which before we reach information only via desktops and makes us free about reaching information anyways. The information acquired from traditional websites is quite complex and users can encounter with restrictions (Hung & ChanLin, 2015). Users are able to overcome these difficulties via websites developed for mobile devices. Hung and ChanLin (2015) says "Mobile web helps overcome difficulties in reseaching for needed information and makes information more accessible".

Mobile web enables applications wherever, whenever and on any device to be more useful (Desruelle & Gielen, 2013). In order to respond human needs more quickly, many applications are being made compatible with mobile devices. That's why making websites on the focus of mobile web compatible to mobile devices is highly important.

1.2. The Relationship between Mobile Web and Responsive Web Design

Mobile devices have developed differently through human needs day by day from the first time they entered our lives. This development has been actualized thanks to the change of some features such as size, slimness, screen width, touch, performance, durability, design, functionality, etc. Naturally, the main reason of this development, for the producer company, is related to being used more thereby overselling and for users it is related to ease of use as developmental motivation. In parallel with this development, applications which are developed and put into service for mobile devices are started to be designed for certain devices, as well. While the websites were being used as applications which were reached by desktops mostly, the fact that mobile devices has been gained İnternet access feature and their increased user group number reveals the need of considering the devices used, on the design of websites.

When mobile devices used at the present time such as smartphones, tablets, game consoles, etc. are considered, it can be seen that every single one is different from one another in terms of equipments, physical and functional features. This fact caused the design of websites become different. This difference is the main reason of revealing the need of change of former websites, compared to websites in the center of mobile web in terms of design (Budak, 2016). The design made and the work done in order to response to this need have varied for sure.

At the first stage of this change, there is the İnternet access of mobile devices and also the situation of websites already exist which is not able to be used practically. The situation of bad performance of user which is occured because of not being practical stimulated the change at this stage. Afterwards, at the second stage, the performance problem which websites weren't able to be displayed properly, cause the new websites which designed for a certain screen width and had adresses as "m.", come up. At this stage, if users were using mobile phone they generally were directed to the mobile version of website automatically. On the other hand users can reach website by clicking a link or generally by using a different URL (Uniform Resource Locator) which use "m" as subdomain. This situation has led to characterize websites as "m-dot" websites (Peterson, 2014). Altough this way of solving the problem decreases some disadvantages, as it is seen it increases the work load of developers. In different meaning, both designing for the devices have wide screen width and differently

designing for a certain mobile device has small screen width which can display very well increases the work-load twice in terms of design and upgrade thinking that both websites need to be upgraded (Budak, 2016).

For developers, it is a disadvantage to make design for different devices. Because designing websites in order to be able to get a smooth visuality on each different device is quite difficult and tiresome process. At this point, the relation between mobile web and responsive web design (RWD) shows up and that situation creates the third stage (Budak, 2016). In fact, altough it is not possible to create a certain proper design for all devices on the market, at least according to the screen width of most devices creating a generic design assists to close this deficit. Maybe the act of designing an application which is competible with all devices will be able to be possible in the forthcoming days and that can be qualified as the fourth stage. However, it can easily be said that we are at the third stage at the moment (Figure 2).

Figure 2. The development stages of web site design on mobile devices.

Technically RWD can be carried out by using HTML and CSS3 media inquiry by hiding the content elements on a website according to device size which was presented, by resizing them or by moving them on a different point, thus, a content element seen on a device differs from the adjustments made on a different device (Budak & Gezer, 2016). Content elements mentioned here are article, picture, video, interface structures etc., and the fact is that each content element attitudes are how much responsive or stable, can change according to developers' imagination and willingness. The feature of RWD which is getting a smooth visuality on multiple platforms with only one design can be seen more obviously on Figure 3.

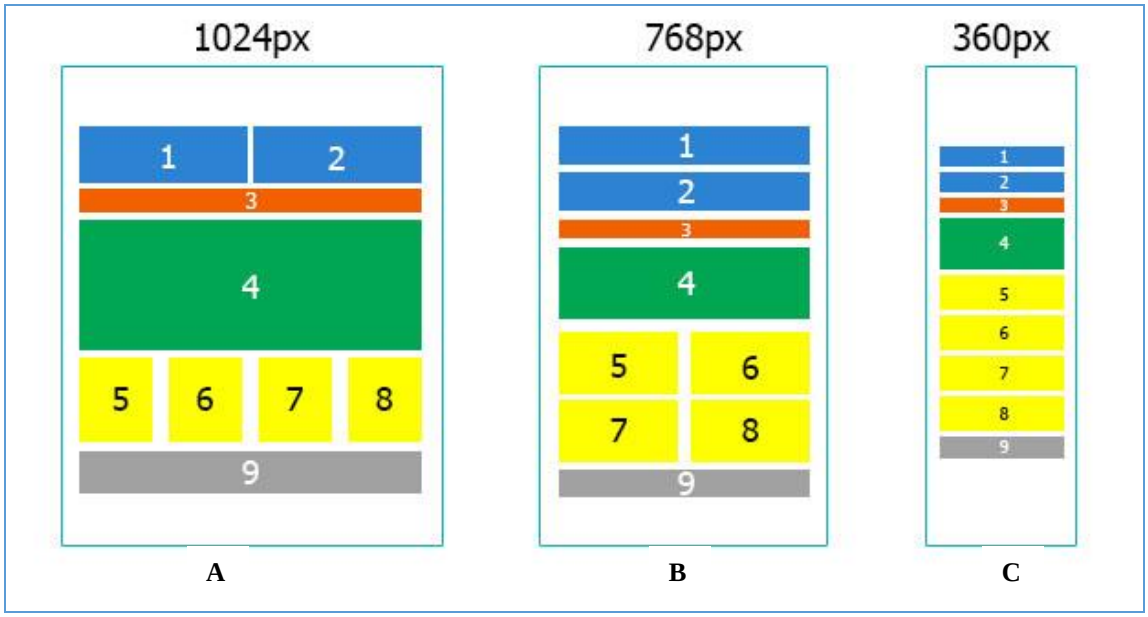

Figure 3. The basic working mechanism of responsive web design.

When it is assumed to develop only one application for three different device width, the first diagram on the left (A) is for wide screens on Figure 3, the middle diagram (B) is for smaller devices such as tablets etc., and the last diagram (C) is for devices which have little screen width such as mobile phones, show how the change occurs on application interface. Developers, thanks to RWD serving us this flexiblity, are able to edit how visual elements change such as each part on the page smilar to the one on Figure 3 and which element such as picture, article, video, etc. will be replaced to these parts of the page.

The feature of making generic design of RWD concept which was mentioned by Ethan Marcotte (2010) first, caused it to become one of the most important option which has been referred while making a design related to mobile web. In short, designing mobile device types in every aspect newly encourage developing applications competible with these devices directly and as a result of this incentive, RWD occured due to the need.

The aim of this study is to reveal how the mobile friendy current website of Kırklareli University (KLU) which is designed with RWD is succesful at interacting with users compared to the former non-mobile-friendly website. In order to support this fact, Google Analytic (GA) reports which are belong to the website of KLU, were used. GA (Google Inc.,2009) which is served to use freely by Google Inc., is not only a traffic analysis tool but also is an application which has share above 80% among traffic analysis tools which are used in websites around the world (W3Techs, 2016). In this study, the GA reports of the mobile-friendly current website and non-mobile-friendly former website are compared and response to questions below are searched.

- How did the visitor data of websites change?
- How is the relationship between the change on the number of university students and the change on the number of the users who visit the web site?
- On which rate did the new and the returning visitors change?
- How is the rate between the devices used while reaching the websites?
- How did the visitor interaction on the website pages change?

2. MATERIAL AND METHOD

2.1. The Compared Websites

Within the scope of the study, the former web site of KLU which was active between 2011 and 2014 however was not developed as mobile-friendly was compared with the current website of KLU which is designed as mobile-friendly in 2014. In terms of content, the former website and the current one is identical. On the other side, the difference between them is that the current one is designed to serve more mobile-friendly view than the former one. The users' attention on the two websites was able to be observed easily with the update of the design whose content wasn't changed.

2.2. Google Analytic Reports

While using the GA reports, the websites are assessed generally instead of observing each page of the university website. The GA account which the former website used is continued to be used with the current one. Thus, over the same account the two different web designes were evaluated. On the purpose of comparing, the data of the former website obtained

between September 1, 2013 and August 31, 2014, and the data of the current one obtained between September 1, 2014 and August 31, 2015.

2.3. Performance Indicators

On the GA reports, it is showed the sessions, visitors, new and returned visitors, page visitors, unique page views, average time on page, page/session rate, bounce rate, new session and exit percentage as performance indicators (Table 2).

Table 2. GA performance indicators used in this study (Google Inc., 2009).

Key performance indicators	Description
Sessions	Total number of Sessions within the date range. A session is the period time a user is actively engaged with your website, app, etc.
Users	Users that have had at least one session within the selected date range. Includes both new and returning users.
New Visitor	A user who has not visited your website, app, etc. before.
Returning Visitor	A visitor who has an experience on your website, app, etc. from a previous visit.
Page Views	Pageviews is the total number of pages viewed. Repeated views of a single page are counted.
Unique Page Views	Unique Pageviews is the number of sessions during which the specified page was viewed at least once. A unique pageview is counted for each page URL + page Title combination.
Avg. Time on Page	The average amount of time users spent viewing a specified page or screen, or set of pages or screens.
Pages/Session	Pages/Session (Average Page Depth) is the average number of pages viewed during a session. Repeated views of a single page are counted.
Avg. Session Duration	The average length of a Session.
Bounce Rate	Bounce Rate is the percentage of single-page visits (i.e. visits in which the person left your site from the entrance page without interacting with the page).
% New Sessions	An estimate of the percentage of first time visits.
% Exit	%Exit is (number of exits) / (number of pageviews) for the page or set of pages. It indicates how often users exit from that page or set of pages when they view the page(s).

2.4. Data Analysis

In the study, the date range which the former and the current website were actively used in GA reports was chosen in order to compare these two websites. Thus, the data of the two websites was be able to be observed on a single screen at the same time. While analyzing the data, the reports on the menus of GA which were given on Figure 4 were used.

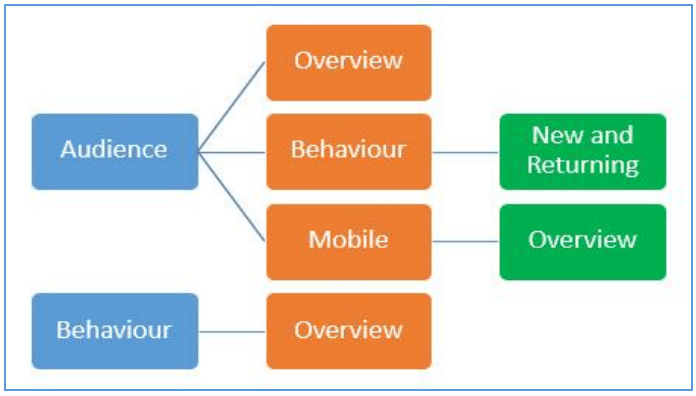

Figure 4. The menus which belong to the GA reports were used.

Thanks to GA, serving the opportunity to compare the two date ranges, the change degree of the basic performance data on the indicated menus was observed both graphically and numerically.

3. FINDINGS AND DISCUSSIONS

The findings show that the mobile-friendly current website is far superior than the former one in terms of the number of users, view, sessions and new sessions. Moreover, it is observed that the mobile-friendly website is not useful enough in terms of Page/Session, average session time and bounce rate. As a reason for that it could be shown as the situation in which the users are able to find what they need on the mobile-friendly website easily and leave the site as soon as they finish their actions.

3.1. How Did the Visitor Data of the Websites Change?

In terms of the visitors of the website the general statistic data is given on Table 3.

Table 3. General statistics of the visitors.

Indicators	Former Web Site	Current Web Site	% Change
Sessions	819.970	2.673.028	225,99
Users	342.079	1.278.300	273,69
Page Views	1.922.298	5.328.432	177,19
Pages/Session	2,34	1,99	-14,97
Avg. Session Duration	00:12:54	00:01:57	-84,88
Exit	%61,10	%61,66	-0,92
% New Sessions	%40,33	%47,62	18,07

Table 3 shows that the change on the number of sessions of the current website have increased 3,26 times and have developed %225,99, the number of users have incresed 3,73 times and have developed %273,69, the number of page views have increased 2,77 times and have developed %177,19. When Page/Session, Average Session Duration and Bounce Rate were observed, some decrease could be seen however, these rates show that users are able to find the information they need more easily, as well. (Table 3). In different meaning, altough the current website had the low rates, it can be claimed that the current website affected users positively.

3.2. How Is the Relationship between the Change on the Number of University Students and the Change on the Number of the Users Who Visit the Web Site?

The monthly change on the numbers of users in one year process between September 1, 2013 and August 31, 2014 for the former website and between September 1, 2014 and August 31, 2015 for the current website is given on the Table 4.

Table 4. The quantity of visitors monthly.

Months	Former Web Site	Current Web Site	% Change
September	43.697	140.420	221,35
October	22.966	136.094	492,59
November	26.356	98.452	273,55
December	23.808	83.994	252,80
January	37.895	121.618	220,93
Fabruary	31.592	117.823	272,95
March	22.362	108.828	386,66
April	22.093	90.503	309,65
May	22.908	99.244	333,23
June	37.063	128.909	247,81
July	49.632	192.341	287,53
August	58.499	177.082	202,71

While observing Table 4, it can be seen that the change on the number of users increased on mobile-friendly website much more each month. In order to make this data more meaningful, knowing the number of the termly students will show us how high the change on Table 4 is. As the number of students of the university for 2013-2014 period was 18.283, for 2014-2015 period this number increased 2% and came about 18.667 (YÖK, 2016). While thinking the increase rate on monthly visitors on Table 4 has never been under the 200%, the success of the mobile-friendly website becomes much more apparent.

3.3. On Which Rate Did the New and the Returning Visitors Change?

The change rate of the users who visit both websites is given on Table 5.

Table 5. The new and returning visitors.

User Type	Term	Session	% Change
Returning Visitors			
Current Web Site	01 Sep 2014 – 31 Aug 2015	1.398.494	186,69
Former Web Site	01 Sep 2013 – 31 Aug 2014	487.803	
New Visitors			
Current Web Site	01 Sep 2014 – 31 Aug 2015	1.274.534	283,70
Former Web Site	01 Sep 2013 – 31 Aug 2014	332.167	

While observing user behavior, it can easily be seen that the current website interacts with more users than the former one, in comparison.

3.4. How Is the Rate between the Devices Used While Reaching the Websites?

The devices which visitors used while interacting with the websites, proves how important the mobile web is (Table 6).

Table 6. The types of device which were used on visits.

The Type of Device	Term	Session	% Change
Desktop			
Current Web Site	01 Sep 2014 – 31 Aug 2015	1.699.962	159,67
Former Web Site	01 Sep 2013 – 31 Aug 2014	654.663	
Mobile			
Current Web Site	01 Sep 2014 – 31 Aug 2015	922.287	511,17
Former Web Site	01 Sep 2013 – 31 Aug 2014	150.905	
Tablet			
Current Web Site	01 Sep 2014 – 31 Aug 2015	50.779	252,58
Former Web Site	01 Sep 2013 – 31 Aug 2014	14.402	

Table 6 shows that the mobile-friendly website has interacted with users far more than the former one. However, the point that one shoud be careful about is that the most significant increase is on mobile category. A change rate which is 511,17% clearly proves how much user attention the current website takes. The other acquired data is the approach between the numbers of reaching the current website from mobile device and reaching it from computer. While the computer / mobile rate for the devices used for reaching the former website is 4,33, this rate on the current website not only decreased to 1,84 and also shows that the usage rate of mobile device reaches to computer usage more and more.

3.5. How Did the Visitor Interaction on the Website Pages Change?

The other acquired data thanks to GA is Table 7 which shows how the user interaction occured on pages.

Table 7. The user interactions on the pages.

Indicators	Former Web Site	Current Web Site	% Change
Unique Page Views	982.055	3.957.359	302,97
Avg. Time on Page	00:09:36	00:01:58	-79,54
% Exit	42,66%	50,16%	17,60

Altough the average time when a user stays interacted on a page was more on the former website, the rate has decreased on the current website (Table 7). Altough acuiring lower rate, this statistics on the other hand, can be inferred that a visitor finds needed information more easily on the website. Thus, the exit rate of the interacted visitor who finds needed information right after leaving has increased as on table 7. This data can be defined as visitors stay less on the website however, if it is considered as increasing rates of unique page view is around 4 times, due to users' reaching more contents, it can be indicated that interaction has been increasing.

4. CONCLUSION

It is stated that the university website evaluated in this study from the period when it has been presented as mobile-friendly, has been in interaction with the users more. When considering the increasing rates of usage of mobile devices, it can be said that making a mobile website in order to interact with more users on this platform is quite important. The data which is acquired from GA reports indicates a change which is able to prove that the mobile-friendly website is far superior in every sense. Therefore, it can not be ignored that mobile websites are more advantageous on reaching on the users in every environment.

REFERENCES

Budak, V. Ö., & Gezer, M. (2016). Farklı Ekran Çözünürlükleri İçin Esnek Web Arayüz Yapıları Tasarlanması. *Uluslararası Elektronik Meslek Yüksek Okulları Dergisi*, *6(1)*, 10-24.

Budak, V. Ö. (2016). *Kurumsal Bir Mobil Web Sitesinin Kullanılabilirliğinin Değerlendirilmesi: Kırklareli Üniversitesi Örneği*. Published Master Thesis, İstanbul Üniversitesi, İstanbul.

Budiu, R. (2013, Eylül 14). Mobile: Native Apps, Web Apps, and Hybrid Apps. https://www.nngroup.com/articles/mobile-native-apps. Erişim tarihi: 24.02.2016.

Desruelle, H., & Gielen, F. (2013). Architectural Modifiability Considerations for Designing A Multi-Device Web Application Platform. *Procedia Computer Science*, *19*, 895-900.

Facebook (2015). 2014 Annual Report. California: Facebook. İndirilme tarihi: 24.01.2016.

Fisch, M. (2012, Eylül 25). Mobile-Friendly Sites Turn Visitors into Customers. http://googlemobileads.blogspot.com.tr/2012/09/mobile-friendly-sites-turn-visitors.html. Erişim tarihi: 10.02.2016.

Google Inc. (2009). *Google Analitik*. http://www.google.com/analytics. İndirilme tarihi: 10.01.2016.

Hung, W.-H., & ChanLin, L.-J. (2015). Development of Mobile Web for the Library. *Social and Behavioral Sciences*, *197*, 259-264.

ITU (2016). *Mobile-cellular telephone subscriptions*. Geneva: International Telecommunications Union.

KLU (2014). Kırklareli Üniversitesi. http://www.klu.edu.tr. Erişim tarihi: 20.02.2016.

Marcotte, E. (2010, Mayıs 25). Responsive Web Design. http://alistapart.com/article/responsive-web-design. Erişim tarihi: 24.02.2016.

Netcraft (2016, Ocak 26). January 2016 Web Server Survey. http://news.netcraft.com/archives/2016/01/26/january-2016-web-server-survey.html. Erişim tarihi: 20.02.2016.

Peterson, C. (2014). *Learning Responsive Web Design*. Sebastopol: O'Reilly Media.

Statista (2016*). Number of Monthly Active Facebook Users Worldwide As of 4th Quarter 2015 (in millions)*. http://www.statista.com/statistics/264810/number-of-monthly-active-facebook-users-worldwide. Erişim tarihi: 24.02.2016.

TSI (2015). Availability of Devices in Households. Ankara: Turkey Statistical Institute.

Twitter (2016, Şubat 10). *Twitter Q4 and Fiscal Year 2015 Shareholder Letter*. http://files.shareholder.com/downloads/AMDA-2F526X/0x0x874459/8A4D1A1D-D184-4AFE-9AC1-F880C5EA06F1/Q415_Shareholder_Letter.pdf. Erişim tarihi: 25.11.2016.

Veen, J. (2000). *The Art & Science of Web Design*. San Francisco: New Riders.

W3Techs (2016). *Usage of traffic analysis tools for websites*. http://w3techs.com/technologies/overview/traffic_analysis/all. Erişim tarihi: 12.02.2016.

YÖK (2016). *Öğrenci İstatistikleri*. Ankara: Yüksek Öğretim Kurulu. https://istatistik.yok.gov.tr/