

**İSTANBUL TECHNICAL UNIVERSITY ★ INSTITUTE OF SCIENCE AND
TECHNOLOGY**

**THE EFFECT OF SOCIOCULTURAL FACTORS ON DESIGN:
A CASE STUDY ON PRODUCT EXPERIENCE**

**THESIS OF MASTER OF SCIENCE
SEYEDEH ELHAM MIRSAEIDGHAZY**

DEPARTMENT OF INDUSTRIAL PRODUCT DESIGN

THESIS ADVISOR: Assoc. Prof. Hümanur BAĞLI

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İSTANBUL TEKNİK ÜNİVERSİTESİ ★ FEN BİLİMLERİ ENSTİTÜSÜ

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To my mother, father and husband,

FOREWORD

I would like to acknowledge the contributions of the following individuals to the development of my research:

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(Master of Industrial Design)

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ABBREVIATIONS

UX	: User Experience
UI	: User Interface
HCI	: Human Computer Interaction
HCD	: Human –Centered Design
MC	: Manufacturer Company
PC	: Personal Computer

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THE EFFECT OF SOCIOCULTURAL FACTORS ON DESIGN:

A CASE STUDY ON PRODUCT EXPERIENCE

SUMMARY

Everybody wants to experience every aspect of life to fulfill their wishes and dreams; everybody wants his life to be filled with many beautiful things and moments. Now this world is full of devices and equipment by which everybody seeks to experience his/her life much better, these devices provide more possibilities for new experiences that may bring better feelings and more comfort in developing a task by bringing new technologies to the people. Therefore, designers are trying to bring these experiences with new ideas everyday. They design new devices with the help of new technologies, but there is a question here: How design may bring ease of use at the same time together with experiences?

The goal of this thesis is about finding experiences of people interacting new technologies and the problems they face, accordingly their resistance or tendency of use toward new products with new technologies. So LG smart phones as newly launched mobile phones in the last decade is selected as the subject of the study, since these devices are used by a wide range of people from children to elderly people, female to male, they also brought the idea of the importance of studying the developing smart technology and their influential factors on people's experience which may be led to resistance or tendency of use.

In this study, a usability test with an interview of users and a survey were conducted with a sample of smart phone suggested by a manufacturer company. In this research the roles as an academic master student and as a user have been taken during this empirical work. This gives an intuition into the personal background and also valences of the author. Therefore, from the user-centered design point of view and its emphasis on users, this promotion in this thesis was considered so that a pace could be taken to have portion in current design practice. Thus, the motivation to do this research project and the specific approach chosen is highly connected.

The aspiration of this study is to gain knowledge about the user experience and its influence on product usage and to take this knowledge as a source of application in design practice. Here, it is essential to find compatibility of this knowledge with the design practice that is currently used. Moreover, what is gained as a result of this thesis could be accepted as a theoretical framework and also as a guideline in use for practitioners and designers.

Despite the distribution of user-centered design point of view in practice, recently it is seen that many products could not match with people's lives. Especially, many old and

young people are seen to have problem in using, so they result in not using these newly technological products. It is often seen that many men or women, educated people and not educated ones, young and old people that are incapable to interact with the new smart devices .

User-centered design method brought some opportunities to these types of products. What should companies put their focus on is to consider users in their real natural bases and also take into account the users' experiences at the very first phase of product development process to the last steps of product creation in order to have better product that could match with people's lives.

The explanation that has mentioned above may give an intuition of what this research approach is and also this research holds both theoretical and practical aspects at the same time.

At the first phase, the aim of the study and the methodology are given in details. Then, in the next part, the thesis is assigned to investigate the basic meaning of experience and the meaning of the word experience, specifically. In this section the people and what they experience through products are investigated. So, their role and importance in the process of making experience are described with examples and then the relation of the situation of usage to the user's experience is defined in details.

In the next section, the experience and what is related to this issue are investigated. Therefore, the peoples' experiences in their first encounter with the product has been taken a look on. Then, their first experience in new technology of HCI, what they really need to experience in this field and the importance of it for designers are explained by examples. In the following, the history of HCI, the steps of its organization in the last decade and the integration of users in this field are explained.

In the last part, a case study is done with the help of a focus group that is held from 8 local design students in Turkey and then the ideas and specific functions(such as what kind of functionality a smart product could bring to the user by its applications) reextracted from the session made by this focus group. So, the case study, which is followed by using the usability method with a test, includes observation by taking videos and also the surveys from the 40 participants with a newly launched smart phone mobile introduced by the company itself. This device is introduced since the manufacturer company assumed that there could be possible usability problems of this product and this issue is also the company's main intention.

The participants are videotaped and observed when they are completing the two tasks of adding a song to the music application and adding a contact name with its phone number to list of favorites in contact application and the time of completing the two tasks from each participant are recorded. So, the case study continues with the data collecting from videos which include the time of errors, number of errors and type of errors that each participant made during task fulfillment, then by these data the qualitative analysis is made in which quantitative values are not considered.

TASARIM ÜZERİNDE SOSYO-KÜLTÜREL FAKTÖRLERİN ETKİLERİ ÜRÜN DENEME İNCELEMESİ

ÖZET

Bu dünyada bir kere yaşadığımız için, herkes tüm yönlerini tecrübe etmek istemektedir. Bu nedenle insanlar teknoloji aracılığıyla arzularını ve rüyalarını gerçekleştiriyorlar. Bu dünya “Denemek” içindir. Bugün dünyamız sayısız ürünlerle ve ekipmanlarla doludur ve onlarla insanlar daha iyi bir hayatı tecrübe etmektedirler. Bu ürünler yeni teknolojileri insanlara sunup, yeni deneyim olanakları sağlamaktadırlar. Bu deneyimler insanlarda geçmişe göre günlük çalışmalarında onlara kolaylık sağlamaktadır. Bu yüzden günümüzde tasarımcılar yeni fikirleri, yeni deneyimlerde kullanılmaktadırlar. Onlar yeni ürünleri, yeni teknolojiler aracıyla tasarlıyorlar, fakat tam burada bir soru akla gelmektedir: “ Diğer kullanıcılar için nasıl yeni bir tasarım yapılsın ki aynı zamanda kullanım aşamasında kolaylık sağlasın.

Bu araştırmanın amacı kullanıcıların deneyimlerini yeni teknolojiler kullanarak bulmak ve onların bu ürünleri denediklerinde karşılaştığı problemleri ortaya çıkarmaktır. Bu problemler sonucunda kullanıcıların yeni cihaz ve teknolojiyi kullanmak isteyip/istemediklerini sunmaktır. Bu incelemede LG’nin cep telefonu ki geçen on yıl içinde yeni cep telefon pazarına girmiştir; konu edilip, araştırılmıştır. Bu ürün seçim nedeni, onu büyük bir kitle tarafından, değişik yaş guruplarından, gençlerden yaşlılara kadar aynı zamanda kadın/erkek tarafından kullanılmasıdır. Böylece bu araştırmanın önemi, insanların deneyimlerini etkileyen faktörlerin akıllı cep telefonu üzerine etkilerini ve onu seçip/seçmeme isteklerini ortaya koymaktadır.

Bu araştırmanın metodu bir kullanılabilirlik testi, kullanıcılarla anket/görüşme ve bir akıllı cep telefonu numunesi ile beraber üretici firması LG ile görüşmekten oluşmaktadır. Bu araştırma iki bakış açısı kapsamaktadır.

İlk olarak araştırmacının bir öğrencisinin bakış açısını, diğeri ise bir araştırmacı-kullanıcının bakışından oluşmaktadır. Bu bölüm yazarın şahsi görüş ve tecrübelerini anlatmaktadır. Bu nedenle bu araştırma, kullanıcı odaklı tasarıma ve onun kullanıma verdiği önemi taşımaktadır.

Bu nedenle bu konuyu ele almaya ve araştırmaya teşvik ve aynı zamanda araştırmayı yönlendiren en önemli delildir.

Bu araştırmanın en önemli noktası, kullanıcının deneyimleri hakkında bilgi edinmek ve o bilgiyi, ürünü kullanmayı etkileyen faktörleri bulmak ve yeni tasarımlarda göz önünde bulunmaktadır. Burada en önemli nokta bu bilgilerin yeni tasarım çalışmalarıyla uyumlu olmasıdır.

Bu tezde çok belirgin bir şekilde önem verilen nokta buluşların ortaya çıkması ve onların somut bir şekilde sonuçlanmasıdır. İlâveten, sonuç olarak bu tezdin elde edilen bilgiler bir teorik çerçeve olarak kabul edilip kullanıcı ve tasarımcılara yön vermek içindir.

Kullanıcıyı önemseyen bakış açısına rağmen piyasada bulunan ürünlerin insanların hayatıyla uyumlu olmadıkları gözlemlenmiştir.

Özellikle yaşlı ve genç kitlelerde yeni ürün teknolojileri kullanmak zorlaşmakta, onların bu ürünleri kullanmaktan vazgeçtikleri görülmektedir. Genelde görülüyor ki, çoğu kadın/erkek, okumuş/okumamış, genç/yaşlı kişiler bu akıllı ürünlerle iletişim kuramamaktadırlar. Çoğu kişi bu akıllı ürünleri kullanmakta zorluk çekmektedir ve bu nedenle kolay bir tecrübe elde edememektedirler.

Deneyim metodunu önemsemek ürünlere bir takım önerileri sunmaktadır. Böylece ürünlerde önemli ve etkileyen kabiliyetler varsa, öncelikle onu tanıtarak, daha sonra kullanıcının ihtiyacı ve istekleriyle irtibat korunmaktadır. Üretici fabrikaların dikkat etmesi gereken konu, müşterilerini oldukları gibi görmek ve ayrıca kullanıcıların tecrübelerini ürün geliştirme sürecinde, ilk aşamasından sonuna kadar göz önünde bulundurmaktır. Bu da, kullanıcılara uyumlu ürünler sunulmasını sağlar. Kullanıcı odaklı tasarım metodları ile geliştirilecek ürünler, genellikle kullanıcıların ürünü kullanma isteklerini yükselmektedir; fakat bu metodlar yeterli olmamaktadır. Kullanıcıların deneyleri üzerine elde edilen daha çok bilgi ve beceri(kullanıcı odaklı tasarım) daha başarılı yönle yönlendirilmektedir. Örnek olarak ” kullanılabiliyor kabiliyet deneyi” başka metodlarla birleştirebilir. Bu vesileyle, üretici firmalara, müşteriye önemseyen metodların bulgularına, tasarım aşamasında yer vermenin önemi anlatılmalıdır.. Bu metodun en etkin yönü teoriyi uygulamaya yakınlaştırmasıdır.

Yukarıdaki açıklamalarından bu tezin konusunun içeriği ve aynı zamanda teori ve uygulama yönleri gösterilmektedir. İlk aşamada, bu çalışmanın amacı ve yönü detaylar ile birlikte anlatılmıştır, sonraki bölümde ise, deneyimin ne olduğu ve anlamı araştırılmıştır.

Özellikle bu bölümde kişilerin ve onların bir ürünü denediklerinde elde ettikleri duygu araştırılmıştır. Böylece onların rollerini ve önemini bir ürün denemesinde verilen örnekleri ile açıklıyor, sonra, kullanma konusu ve kullanan kişi tanımlarındaki ilişkiyi bir şekilde açıklıyor. İlâveten kullanıcıların önemi, tasarım aşamasında “ kullanıcı odaklı tasarım” tarafından savunulmaktadır.

Bir sonraki bölümde, deneyim ve onunla ilgi konular inceleniyor. Neticede kişilerin ilk deneyimi gözlem altına alınmakta, sonra onların ilk deneyimi HCI’ın yeni teknolojisinde ve onların bu konuda neye ihtiyac duyduklarını ve tasarımcılara bu konunun önemini örneklerle açıklamaktadır.

Devamında HCI’ın tarihçesi ve geçen on yıl içinde attığı adımlar ve kullanıcıların bu noktada birleştiği konular anlatılmaktadır. Böylece HCD’nin, HCI konumundaki önemi detaylı şekilde anlatılmıştır. Son bölümde ise, kullanıcı deneyimi ve onu etkileyen faktörlerden bahis edilmektedir. Kullanıcının kullanma isteğini içeren kullanma kabiliyeti, ürünü denedikleri zaman ve bu deneyimler üzerine, tasarımcıların kişisel deneyimini nasıl etkilediği anlatılmaktadır.

Sonra konu daha derin inceleme bakımından, “Grup Odak” adı ile, sekiz kişilik Türk tasarım öğrencisi tarafından yardım alındı; sonra elde edilen bilgiler bu grup tarafından toplanarak not alındı. Böylece gözlemler video filmler ve 40 kişiye verilen akıllı cep telefonları LG firması tarafından ürün değerlendirilmesi için incelemiştir. Üretici firma (LG firması) kullanıcı tarafından problem yaşayabilme ihtimalini göz önüne alarak ve bunun önemini bildiği için, bu ürünü tanıttı. Katılımcılardan yapılması gereken iki şey istenildi; ilki, bir şarkıyı (yukarıda belirtilen üretici firmaya ait) telefonun müzik bölümüne ilave etmeleri, diğeri ise bir isim ve telefon numarasını favori listesine kayıt edilmesi istenildi ve bu gözlemden video kaydı yapıldı; böylece araştırma için, elde edilen video kayıtlarından yardım alarak, hata süreci, hata sayısı ve her kullanıcı tarafından hata biçimi nitel analizleri yapıldı; fakat nicel analiz ve değerlendirme araştırma konusunun sınırlarından dolayı yapılmamıştır.

Sonuç olarak, katılımcılar üç yönden ele alınmıştır. Bunlarda kullanıcıların yaş ve okuma seviyeleri ve cinsiyetleri ele alınarak değerlendirilmiştir.

Sonuçta, bütün bu aşamalardan elde edilen bilgiler ile aşağıda sunulan özete varılmaktadır: Kullanıcıların, yaş, eğitim seviyesi ve cinsiyeti gibi sosyo-kültürel faktörlerin akıllı telefon kullanım deneyiminde etkileri açıklanmaktadır.

Aynı zamanda bu faktörler tasarımcıların ürün tasarımı aşamasında önemli bir yer almakta, kullanıcıların yeni ürün tasarımına eğilimlerini etkilemektedir.

Bunlara ilaveten, bu tez kapsamında uygulanmış tüm araştırmalar ve deneyimler sonucunda kullanıcıların yeni ürün teknolojisini beğenip / beğenmeme durumları, farklı testler ve görüşmeler kapsamında incelenmiştir. Aynı zamanda, bu araştırmada kullanılan metod ile, gelecekte kullanıcıların beğenme gerekçeleri ve onların bir ürün ile etkileşim miktarını ölçmek mümkün olmaktadır. Bu da tasarım boyutundan öte ve ürünün üretimi ile kalmayıp, pazarlamada da büyük bir önem taşımaktadır.

1. INTRODUCTION

Take a glance at the moment when one has experienced taking picture by a mobile phone, was the action done comfortably? Was it interesting or stressful? How was the feeling? Was it a motivation for a person to do it again? Was the usage of the new technology easy?

Experience is not plain and it is so complicated. From the user-centered design point of view, many available products do not fulfill people's needs and do not match the people's lives. This world is disturbed by the many products available nowadays that do not fit the everyday lives of people. Specifically, new technologies that are launched in new products can be suffering in people's lives (Sleeswijk Visser, 2009).

In this thesis, the personal experience people have in interacting with the new technology is investigated and the detailed information about the influential parameters on their experience and their choices believed to become a significant source of data from the UCD point of view(that emphasizes more on the importance of user and user research than other issues) that help designers to create products that could match the complex lives of people better. In this case the integration of this kind of information in the process of design is becoming a stir and has much of importance.

Despite the individuation of the experience and the difficulties in designing it, it is being done over and over. The main aim of creating such a design (design for experience) is to create positive experience (Arhipainen, 2009). Specifically, the main goal of designing products with the ability of computing is to penetrate into people's beliefs and the way of their lives (Fogg, 2003). For instance, Facebook the most hortative technology in 2007, (Fogg, 2007) is a good example of a new technology as a solution to an easier way of communication. Another example of that is a smart technology that started with mobile phones and soon will be expanded to nearly every computed product. By the integration of the products launched with computing technology and its implementation into the peoples' way of communication, and the increasing distribution of mobile phones and the newly

primed smart technology in them there is more need for companies and developers to pay attention on how people experience such a device (Arhippainen, 2009). These products are becoming more and more in number in use of people but there is a question that if they really match people's lives and needs. Are people really satisfied with using them? What do they need to experience and what they really experience? This incident as a user experience has a meaning and the meaning is emphasized as below:

Like Mike Kuniavsky (2003) believes : *“The user experience researcher has the broadest job of all”*.

Although the user experience may not guarantee a product success, a bad user experience definitely bring failure for a product (Kuniavsky, 2003). There is a general description that says a usable product could bring ease of use, efficiency and good functionality, so it will conclude to a positive user experience which leads to product success.

As Buchenau & Fulton Suri (2000) state about user experience and they say that an experience gets its shape in relation with people and objects. Forlizzi and Ford (2000) were among the first ones that have studies on the three types of user experience which are experience, an experience and co-experience. Although user experience has been changed and developed in last 5 years , there are still some conferences such as NordiCHI2008, PERSUASIVE2008 , IUE2008 held in this case which shows the shortage of this issue in product development. And despite of all the progress and development in user experience, this issue still lacks empirical studies so this thesis provides the research world a bit with practical tools and studies that are needed in user experience issue.

1.1 Background and Motivation

Products that have the ability of computing have been created to affect the experience of users. However there is a question if it could warrantee the gained experience as the required one. There has been a simulation by Buchenau and Fulton (2000) by which they tried to catch the desired experience. This technique was called experience Prototyping. Also the main elements of the user experience, both from designers and user's point of view, have been introduced by Hassenzahl (2003). He says that the property of the product are considered only by designers and *“there is*

no guarantee that user will actually perceive and appreciate the product the way designers wanted it to be perceived and appreciated” (Hassenzahl , 2003).

Although many references claim that designing for user experience is difficult and may not be possible all the time and there is a need for them to express it as “Design for Experiencing” (Sanders 2001, Roto 2006a, Roto 2006b, Hassenzahl, 2003), by the growth of the technology and its affection on user experience, there is fear about the failure of the products delight in this case. The more researches on user experience develop, the more this fear grows. For instance, by the growth of using mobile devices and its users, the researches on the mobile phone applications have been increased. In the studies on user experience on mobile browsing that made by Virpi Roto various traits that have an influence on it have been investigated. In this study, it is claimed that there are some main aspects that should be considered in a design of a mobile browser that will be concluded to a good experience in relation with user, device itself and context (Roto, 2006b). Moreover, one main point for a product as a user delight is user experience to be taken into account and it is accepted as a keyword for product’s success (Pine & Gilmore 1998, Jordan 2000). In an environment where there is no coordination with technology there is no space for a technological product to be successful. Adversely for some users technology is a part of their life and this event adds to the importance of user experience.

There are sets of active user experience teams both in industry and in research; also there have been many conferences and workshops on this topic. Moreover, there are some theses on user experience topic in doctorate program which are a good contribution of this issue (Kankainen 2002, Battarbee 2004, Kaasinen 2005, Arhippainen 2009, Sleeswijk Visser, 2009). In addition, there has been a change on the interest on studying user experience during previous years in business and product development and marketing and there are some books that hold the definitions of the user experience (Forlizzi & Battarbee 2004, Sanders 2001, Mahlke 2005, Hassenzahl 2008, Roto 2006b). In the book of Thüning (2007) the emotional experience and its influential aspects are discussed. In a conference in 2008 Kristina Höök’s gave a note on influential loop experience by which he proved that it was possible to influence on users, purposely and also by an emotional way (Höök 2008b). Despite many studies on user experience, this subject lacks empirically (Roto 2006b). Therefore, there are also some studies need to be done for

development in this topic. This dissertation not even includes study on user experience on smart mobile phone users but it also replies to the questions that may be a doubt for other researchers.

In this case, to get the information for such a reason in this thesis some tools and techniques have been taken in use to theoretically develop a framework and here it is emphasized on describing what is the exact definition of experience, what affects the people's experience and then finding of the effective parameters on that, then it investigates the importance of experience for designers and in design process and how it can be studied and why it should be studied. At the end, the formulated questions of the research are answered which deal with the part of influential aspects of experience.

1.2 Focus and Scope of The Thesis and The Case Study

This thesis brings a feasible view to the studies of user experience; this dissertation not only suggests answers to what may influences user experience in product usage, but also it gives suggestion for usability studies and tools for practical studies. In all steps, the focus is on how users experience a new smart phone that has not been experienced before and what usability problems users may face. Maybe, it would be better to test the users with their own mobile device but in this case there would have not been homogenous sets of condition for all users and the gained information and results would not be suitable accordingly. The condition of use was taken the same for all participants in order to see in real what usability problems people have right after the product is purchased. Here, users' permanent and also non-changing factors as influential parameters on their experience are considered and compared so that at the end is seen what factors may have deep affection on their experience that may lead to their resistance of use that could be taken into account in the process of designing for them. Gathering data on experience consists of stories, observation, videos, photos, drawings, etc. of people in reality. Considering experience as a comprehensive issue, new forms and models are needed in order to support the process of design to result in a successful product. Smart phones, as a new generation of mobile phones and also the people's intention toward experiencing such a technology, by which people's usage is affected, are the main interests that are focused on in this thesis.

Problem definition

It is not known well how experience can be successfully applied in practice of design, and the way designers can exactly get it in use in the process of designing is not well recognized, also companies still may not know the significant role of these kinds of data for a success of their products in the market; of course the way of applying these information in design that may conclude in a successful product is rather vague for design companies. Furthermore, there is a lack of knowledge, tools, and methods in practical guidelines that could be conveyed from theoretical studies to practical phase which is design.

Aims

This dissertation has two aims; one is theoretical and the other is practical.

- The theoretical aim

This knowledge is useful in studies related to user-centered design approaches. The outcomes are shaped as theoretical framework where the components and tools are determinate.

- The practical aim

In practical aim, the main goal is to create some techniques and tools to aid in applying theoretical part into the practical phase, by these, companies are supported in integrating theory into practice and take the advantage of using these methods in user-centered design methods. Because by this, now they will have theoretical data changed to be used practically and the written guidelines now are well developed that can be directly used in design.

Research questions

The focus of this research is to find parameters that may influence the design of new technological products that consequently affect the disposition of users toward that product that is the main point in product success. This results in 3 research questions as below:

1. How does product experience influence the tendency of the potential users to smart phones? What are the main influential parameters?

2. Is it possible to define some categories such as gender differences, educational level and age differences of mobile phone potential users according to the reasons of their tendency or resistance towards smart phones?
3. How do the results of this study can be extended to the design process of mobile devices?

2. EXPERIENCE

During last decades experience has become an important field in research and industry and also in the field of product design the user experience term started as an ambiguous word but developed (Forlizzi & Ford, 2000; Hassenzahl & Tractinsky, 2006).

Experience has over 100 definitions among books but recently the standard (ISO DIS 9241-210: 2008) has its own definition as below:

(Jokela, 2008):

“A person's perceptions and responses that are resulted from the use or anticipated use of a product, system or service. NOTE 1 User experience includes all the users' emotions, beliefs, preferences, and perceptions, physical and psychological responses, behaviors and Accomplishments. NOTE 2 User experience is a consequence of the Presentation, functionality, system performance, interactive behavior, and Assistive capabilities of the interactive system. It is also a consequence of the user's prior experiences, attitudes, skills and personality. NOTE 3 Usability, when interpreted from the perspective of the users' personal goals, can include the kind of perceptual and emotional aspects typically associated with user experience. Therefore, usability criteria can be established so as to assess aspects user experience.”

In the above literature there are some definitions of experience and user experience that define the meaning of experience. Now in coming literature, the discussion of experience and its related issues such as user experience, product experience and usability are going to be made in order to describe the experience field in its real domain of product.

2.1 A Comprehensive Look Through Experience

For the definition of 'experience' there is no common idea, most believe that experience is constructed, holistic and situated (Dewey, 1934). It means that it is

multi- layered and related to the specific situation and also directly related to the person that having the experience.

The word experience is translated into two words in German language ‘Erlebnis’ and ‘Erfahrung’. ‘Erlebnis’ relates to the memorable events (Hekkert and Schifferstein, 2008). For instance, an accident or an event that kept in mind like last week a meeting with a friend is related to Erlebnis definition. This model of experience starts from one point and lasts in another point. ‘Erfahrung’ related to the experiences of everyday experiences of life. This type of experience does not have any start and end point. The type of definition of experience that is referred to in this thesis is the definition related to ‘Erfahrung’. This relates to experiences people have in every second of their life and every fragment of it is considered as a part of it. The ‘everyday experiences’ referred here is close to the ‘product experience’ as defined by Schifferstein and Hekkert (2008).

It is believed that user experience is all-inclusive. This concept brings uncertainty with itself. When something is called all-inclusive we may doubt that it is an issue that is hardly described and immeasurable. Indeed, user experience is a comprehensive issue and captured nearly all aspects of our life since in every moment we experience things. We cannot see or touch experience; it is something that is not visible and also we don’t have an exact awareness of the time or the condition we are experiencing things. We recognize it when we strongly impressed by something, for example, when we get happy or sad or anxious. We may use technology even if we are not conscious or thoughtful of its usage (McCarthy & Wright, 2004).

Even if the user experience is a comprehensive issue we need to understand and have information about it; we need to have it tangible such as saving product design aspects not only interaction design properties in order to develop the technology and to make a useful technology for people to use. In this part the user experience and its various facets that belong to it or have an influence on it are defined.

In literature of user experience there are various terms in studying this issue. There are many related terms such as evaluation on user experience, assessing the user experience and measuring the user experience. So, it is understood that this issue could be measured. For instance, the information on quantitative issues is measurable

(Arhippainen, 2009) also; the term of evaluation is applied for user experience in the book of Studying User Experience (Arhippainen, 2009). Yet, it is doubted if the user experience as a subjective issue could be evaluated or not. In addition, it is chosen to use the term catch and collection rather other words like capture, so here by this it can be better envisaged the character of the user experience. In this case, for collecting such information a deep probe from the users is needed in order to catch user experience.

2.2 Users and Experience

In the Human Computer Interaction (HCI) field the user experience is abbreviated as UX (Kankainen, 2002), so in this thesis it is also used the current used abbreviation.

The definition of UX of Kuniavsky is that:

In a nutshell, the user experience of a product is everything that's not Human-computer interaction. It's everything that affects how someone interacts with a tool--whether it's software, hardware, a service, or whatever. To me, this meant that I had to deal with all of the squishy, abstract things that good cognitive psychology and computer science-trained designers like me try not to deal with: business goals, emotions, relationships, branding, etc.” (Kuniavsky, 2006.)

The term user experience is hardly defined; there has been a lot of attempts to define an exact definition for it. In many cases it is said that the term user experience is all-inclusive. Below are some descriptions to a more narrow and understandable definitions researchers came up with during years:

As Jesse Garrett has stressed (2003):

“Every product that is used by someone has a user experience: newspapers, ketchup bottles, reclining armchairs, cardigan sweaters.”(Arhippainen, 2008, p46).

UPA defines :

“Every aspect of the user’s interaction with a product, service, or company that make up the user’s perceptions of the whole. User experience design as a discipline is concerned with all the elements that together make up that interface, including layout, visual design, text, brand, sound, and interaction. UX works to coordinate these elements to allow for the best possible

interaction by users” (Arhippainen, 2008, p46).

UX has a wider definition as below (Pabini Gabriel-Petit, 2008):

*“Encompasses all aspects of a digital product that users experience directly—
And perceive, learn and use—including its form, behavior, and content.
Learn ability, usability, usefulness, and aesthetic appeals are key factors in
Users’ experience of a product”.*

For its more narrow definition, experience is a subjective issue that is totally related to the person who is experiencing and it defers from person to person (Sanders, 2001). People experience events from past to future and that experienced things from before shapes their memories and in future is held as their dreams (Sanders, 2001).

2.2.1 Users’ needs

When designing for people, what designers first should take into account are the people. When a product is being designed for the people, the importance is that designers should gain an intuition about whom they are designing for. In the last decades, there has been a significant attention to product development (Sleeswijk Visser, 2008) and this influenced on the merging of the terms human-centered design (Jorge, 2002), people-centered design (Wakeford, 2004), costumer-centered design (Chandler and Hyatt, 2002, Beyer and Holtzblatt, 998) . In these approaches they believe that since this is people who are designing for, the people should get involved in the process of design in order to have a good intuition from them to make a better design. Thus, this could result better as a product in order to fulfill the people needs; so, the probability of losing that product in the market will become less (Laurel, 2003). Also in the book of (Baxter et al., 2005, p3) the importance of understanding users for companies is mentioned as below:

“Effectively gathering and applying user requirements are one of the most critical areas of focus in today's companies. This invaluable resource provides comprehensive and practical guidance on a variety of methods-including strategies, tactics, tips, and templates enabling readers to more efficiently apply techniques in their own organizations”.(Janice Rohn, Vice President, User Experience, World Savings Bank)

Here, it is understood what has to be firstly given significance to by companies is user's need.

2.2.2 Existing problems

Human-centered design emphasizes on users' needs in the process of design development rather than the products or the technology (Frascara, 2005). The main aim of Human-centered design is to find or create the suitable technology in order to solve the existing problems of products which are in use of users (Jorge, 2002) to create products that was created from the deep recognition of users and their needs. This knowledge in human-beings recognition is what may bring more opportunities for new product developments. From the better searching on users' own problems, the problems could be extracted from them themselves. It means that from focusing on users' habits, their way of living, their condition, background, many other factors related to them, a better recognition of their needs could be gained. As Jorge, 2002 says the process of design is a connection that fills between the domain of the users' need and the domain of the actual expression (Jorge, 2002).

In order to make a right design for a product it should be understood for whom it is made for and not only what it is. In user-centered design approach the main concentration is on the thing that is being designed for, this thing could be space, communication, interface, service, product as an object ,etc. and at the end the main aim is to make sure that the needs of the users have been fulfilled comprehensively (Frascara, 2009)

3. PRODUCT EXPERIENCE

When we interact with a product we manage to experience all aspects of a product such as instrumental and non-instrumental characteristics . Also, experience is a term that gets its shape from the user's characteristic such as user's skills, background, characteristics, cultural background and also from the product such as product's texture, color, form and behavior (Desmet et, al, 2007). Product experience is considered as a multi-dimensional issue that could be manifested through subjective feelings and behavioral, expressive and physiological reactions (Desmet et, al, 2007). All actions happen during product interaction such as exploring, finding, understanding, remembering, will contribute the user to a related experience (Dewey, 1980). So, experience is considered as a subjective issue .The subjective interaction between humans and both real and virtual products are the basis of a multidisciplinary field which is called product experience.

According to Hekkert and Schifferstein:

“Product experience is “the awareness of the psychological effects elicited by the interaction with a product, including the degree to which all our senses are stimulated, the meanings and values we attach to the product, and the feelings and emotions that are elicited”. (Schifferstein & Hekkert, 2008)

What it means by usability and product experience is the concept that designers and researchers put in mind when products are getting in used by which a specific goal could be obtained. The ease of use can be a definition for usability in product experience. As Desmet and Hekkert say, in interacting with a product, if a user achieves a specific goal, it is totally related to the properties of the product and the user's capability and skill. In many cases, this type of achievement is not obtained at once but during product interaction. Sometimes, the user faces difficulties interacting with the product, for example ,all of us have experienced products such as our DVD player, mobile phones , laptops , TV remote control , etc. that they hardly interact with or not satisfied by interacting them . The word' product' here in this thesis covers the durable long lasting products in use.

Various definitions could be suggested for the term 'product' and 'user', in many cases users are considered when they have a product, in other cases they may have the products but not using them and in other cases they may use a product but not having it, here we consider the users that handle the product in order to use it. In this thesis what it is referred to as the term 'user' is the people that may get served through a product. It is added here that these people are considered as users who get served through a product are complex human beings that may affect the way of designing for themselves. Thus, the designers should regard all the dimensions related to the so called peoples' experiences. Relatively, there is a question held by Desmet and Hekkert "what is the use of functionalities that are too complex for an average user to understand and operate?" This question is specifically related to the products that need complex interfaces in order to get functionally operated, like mobile phones and computers.

3.1 Product Experience and HCI

In the previous ten years in HCI, there have been many studies about functionality and usability of this field and a multidisciplinary field has been elicited in this field. HCI is a mandatory science that interfered in the field of computing and should be considered in every step of its related education with the computing field. All the professionals in this field make technologies including software, hardware and etc., so there are users that are able to use them efficiently. According to Carroll, in the book of *Human Computer Interaction in the New Millennium*, HCI was primarily found in the 1960's and 1970's along with four main threads in the progress of technology which today's driving forces have been extracted from (Evelyn. P & Anne .R, 2003). HCI first was born in 1950 when 'functionality 'was the main objective issue. (Helander&Prabhu, 1997). In 1960 with the development of technology majority of the problems were found in the ergonomics field (knobs and dials) (Ronald M. Baecker, 2000). According to Diaper (2005) the history of HCI initiates from 1959 with the article of Shaker's on "The ergonomics of Computers" and this was the first step in addressing into issues like this. (Hinze-Hoare, 2007). Moreover, with this development and the adhesion of computers into the people's life, there were more attention on users (Jacko&Sears, 2003). It was after 1990 that the 'I' of HCI changed its root from the word interface to interaction and showed the fast development of computing technologies. It was in this decade that the issue

of usability came into the HCI field. Before this HCI have had five issues in progress, those were safety, utility, effectiveness, efficiency in which usability has been cultivated to provide everything. As Diaper (2005) says, “The study of HCI became the study of Usability” . (Hinze-Hoare, 2007,p 1) . After years passed by the so called emotion” and “experience” which are 3rd wave of HCI (Bødker, S. 2006) is facing new contexts such as “value”, “context” which are subjective and not measurable.

This subjective Interaction that takes place by humans with the products in real and virtual ways is what makes a novel issue as a multidisciplinary field that is called ‘product experience’. In initial steps of this field, functionality had much of importance; however with more focus on users in the current field of HCI, subjective issues became more significant and this brings the engagement of the current HCI field and this new issue.

With the growing of technology the way users experience has been changed during the last decade, this is obvious from McCarthy and Wright's point of view that say:

This is from McCarthy and Wright's words:

“Today we don’t just use technology, we live with it.” (Shneiderman, 2005)

The way users have been interfered to the world of internet and web has been developed, people do not bring big and heavy books to libraries, they have forgotten paper letters in order to contact. They connect with each other via internet, they have blogs to share their ideas, they study together via web without their physical presence and this is how social networking is in progress in people’s lives, so as social networks became an important part of people’s lives, users experience has been changed totally with its growth.

Below is an example of Sharp (2007):

“The outside case of a cell phone can be designed to be smooth, silky, and fit in the palm of a hand that when held, touched, looked at, and interacted with can provoke a sensual and satisfying user experience. Consequently, if it is designed to be heavy and awkward to hold, it is much more likely to end up provoking a poor user experience that is uncomfortable and unpleasant”.

3.1.1 HCI and subjective experience

During the evaluation of product design, there were different points of concentration in this discipline. Providing functionality, fulfilment of consumer needs, business advantages and aesthetics are among these points. With advancements of technology and decades of experience in different industries, it seems that today's designers have a wide range of trustable solutions for many of those problems, which were considered as critical issues for the designers of past generations.

Offering perfect functionality or understanding the objective needs of users can be a routine in many companies, however there are still many unsuccessful designs (Cagan & Vogel, 2002). In most cases users prefer a product to another because of subjective reasons, while both products have the same functionality and satisfy the same needs. A similar trend can be seen in the field of Human Computer Interaction (HCI). While functionality was the main concern in the early days of this field, current HCI is more and more engaged with subjective issues. HCI was born in 1950s. At that time computers were not a part of everyday life of ordinary people and functionality was the main objective of HCI research. Therefore HCI experts were trying to understand the capabilities of both humans and computers (Helander & Prabhu, 1997). With progress in technology there were more advanced tools for interaction between computers and operators in 1960s. Therefore finding solutions for the problems of this interaction was the core area of HCI research. Majority of these problems were seen from ergonomics point of view, therefore this era is called as "knobs and dials" research (Baecker et al., 1995). With graduate integration of computers in the everyday life, there was more focus on users (Jacko & Sears, 2003). In the first phase, some scholars tried to develop methods for modelling users and study users on laboratory settings.

In the next phase, scholars worked on methods for studying users in real context and tried to do various case studies. The emergence of user centred design and methods like participatory design and co-design gave this opportunity to users to get involved into the design process (Jacko & Stephanidis, 2003). Although HCI had a great progress during its relatively short life as a scientific field, there are some challenging issues at the moment. Mobile computing and ubiquitous computing made computers to be presented in all times and spaces of humans' life (Harper et al., 2008).

Computers are not distinct object for professional means. They can affect every aspect of our life such as having fun and socializing. In the current era, solving the usability problems and providing the best features are not the only requirements for successful designs. There is an importance of experience issue in the field of HCI. The ‘user experience ‘is abbreviated as UX and became famous in HCI when designing for websites been started. So interface design extracted the importance UX in HCI that included all facets of a product that a user may perceive while using a product or service. The UX in HCI field goes around the product and its main focus is on task related concepts, the ease of use, absorbing points and also suitability a product has such as a website (Norman, 2005)

3.1.2 Usability issue

When a product is usable? Usability is when an application could be learned easily, easy to connect with, easy to use, and interesting for the user who is dealing with.

Usability may be defined by three definitions, effectiveness, efficiency and ease of use (Desmet and Hekkert, 2007) .In this case, a usable product should have three characteristics. One is effectiveness that is the degree an specific goal could be obtained, efficiency that is the time it takes that an specific goal be obtained and ease of use that is the amount of endeavor it needs to obtain an specific goal (Desmet and Hekkert, 2007).So, the idea of “usability” brought by the researchers and designers is an important issue when a user employs a product in order to obtain an specific goal (Norman, 2002). Thus, usability is a term that could be considered as a source of product experience .Usability involves goal achievement, which is one of the main dimensions by which the elicited emotions can be, assessed (Scherer, 2001).

The Organization of International Standards (ISO) has published some standards for usability (Guidance on Usability, ISO 9241–11, 1998) as below:

A usable product should be effective, efficient and satisfying for users who interact with. An effective product is a product that does well at what it is supposed to do and as an example: If a website provides all the information we need in order to reserve a hotel for our holiday an example for efficiency is whether a mobile application

(menu structure) provides users in order to fulfill their needs in relation with an appropriate task?

And for satisfaction it relates to people anticipation of a product and how much easy it is for using and taking all the desired feelings after product's use. As Maguire believes (2001a), in order to have a usable product we need to adopt the human-centered design approach for the development of the system. As ISO Standard 13407 (Human-Centered Design Processes for Interactive Systems, 1999) describes usability there are some main points by which we may have a good plan for human centered design process:

1. Recognizing context of use specifically
2. Recognizing the user's needs
3. Creating prototypes
4. Assessing users specifically

TI

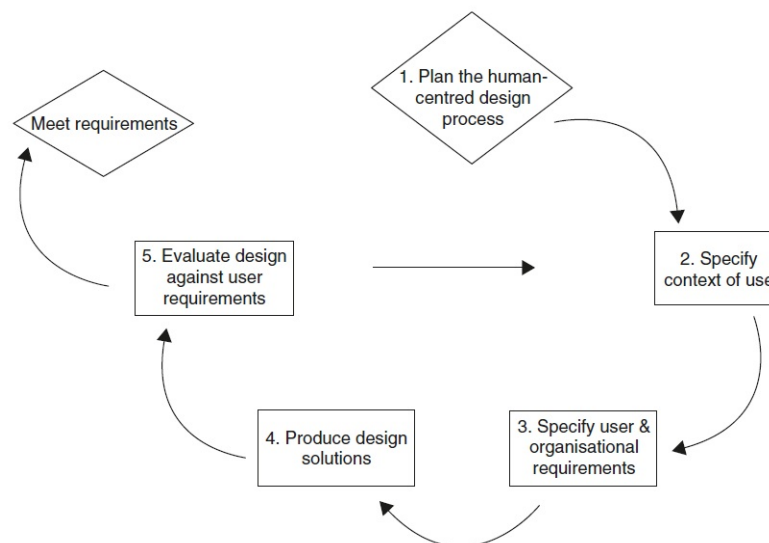


Figure 3.1: Model of human-Centered Design activities adopted from (ISO 13407).

3.1.2.1 Usability in HCI

HCI is considered as assessing the connection between people and computer systems and applications (love, 2005). In product design users experience is more than just the functional options a product suggests for use. What it means by user experience while using a product is a relationship the user gets in with the product. What users

experience by any products. This experience is not considered as a vacuum but it exists in relationship with other objects, places and also people. (Buchenau and ulton Suri, 2000).A product in use may give the user the opportunity for a pleasurable experience and sometimes oppositely it may bring bad experience for the user. In interacting with a product pleasure may be gained which this could help experiencing the use of that product in a positive way (Jordan, 2000).For instance, what that can be experienced as a positive one or pleasurable experience is the playing music option in the mobile Phones of apple, which gives the opportunity to play a guitar with the phone with nearly the same experience as the guitar is played by us in reality. It gives the feeling of having a real musical instrument people everywhere they go. Now a day, products are competed with each other rather than only on their functional values but they compete on their added values they bring to the users (McDonagh, inprint). Norman (2004) divides the user product experience into three levels: a visceral (the first impact of the product), a behavioral (the whole experience while using a product) and a reflective (the affection after using the product in relation of the taste and feeling of the user) (Visser , 2009).

Some authors believe that there should be a redefinition for design when it comes to user experience. There is also a suggestion for redefining the context of ‘the product’ into ‘the context of experience’ (Hummels et al., 2001)

On the above all the authors believe in common that the experience is an issue that should be taken to account while designing a product. Giving the importance to the ‘user experience’ issue in design literature is because users are considered as complex human beings and not only users with tasks to be accomplished.

In this case, there is a thought created by designers that they should start designing for ‘user experience ‘and not the’ products’. The user experience is not something that could be designed for; experience is something that individually related to any person and it’s not controllable, it is also a subjective issue. As Bate and Robert says ‘Experiencing ‘is an activity that could be constructed and it belongs to individual people (Bate and Robert, 2007). When designing the experience comes to the mind there is a statement created at the same time ‘the affection of a design is not controllable but what designers should be aware of is how users may experience and get affected by a product. Designers cannot control the subjective term(temper,

mood) of a user experience while a product is in use but they can have a control on the influence on a part of the user experience that deals with the qualities of products that could be interpreted through different aspects of social, personal and cultural meaning of the user(Suri, 2003).

Designers cannot give guarantee to an experience, for instance, by a user in experiencing talking on the phone, designers cannot fulfill all the good feeling one may experience during using the phone but they can design a phone that could fit the aspects (rather than functional aspects) that may influence the experience of talking on the phone.

What Designers should do is to design for experience by understanding users in a delicate way (Wright et al., 2003).What requires in the process of design is a profound cognition of users' personal, social, emotional, sensorial, cultural and environmental aspects that could influence the talking on the phone experience and illustrate the new role of the new product that is going to be created. However, designers have to take into account many aspects of it into the process of their design such as function, ergonomics, form, material, production, usability, marketing, target group, the existing product, etc. Regarding the function of the product and how it could be experienced in real condition and also understanding the user, one significant source for better understanding of this is the real experience people have in their everyday lives. This type of information brings some kind of consciousness about people and their basis where the upcoming products are going to be used. As Alan Cooper says:

“‘Interaction design’ means much more than just ‘interface design’. Interaction design incorporates the end user and the objectives of the end user (and the organization) into the design process, whereas interface design, a subset of interaction design, refers to the look of the software and is not concerned with the users overall experience and satisfaction.” Rozanski& Haake, 2003 ,p182)

Thus, the mandatory need of understanding the influence of experience both theoretically and practically on designing the HCI technology is recognized (Kaye & Taylor 2006, McCarthy & Wright, 2004.)

3.1.2.2 Usability and product success

Designers use their own experiences as a source of users' experience. Designers emphasize on their needs, their likes and dislikes, and their ability in order to get information for users' experience. But the problem is that designers are not the users that have been targeted for use, while the designer experiencing the same issue designer's experience might be different with the user's experience. Thus, designing a product with the designers own criteria is not designing for other people. People are different in various aspects which are their background, culture, age, gender, education, abilities so they may get the product in usage in different ways. (Sleeswijk Visser, 2009). For the designers, In order to have a successful product, a deep understanding of the users according to their values, ideas, and feelings and differences in background, age, culture and etc, is needed. Moreover, designers should build a connection to people in order to have a subjective recognition of users' daily experiences rather than themselves. As Christian Rohrer says in the book of understanding your users (2005, p 3):

“This is a detailed, step-by-step guide to user requirements gathering, one of the most critical, yet often overlooked stages in product development research. Courage and Baxter effectively draw on real-world experience as well as tried-and-true methods”.

Christian Rohrer, *Director, User Experience Research, Yahoo!*

Gronhaug and Haukehal (1997) define a construction in the process of knowledge, by which designers may have a better sense in understanding their world. To have a better sense in user's cognition, the designer understands the data by which he may take his attention and revise his reality construction. (Visser, 2009).

Here is the new gained information about user experience beside the consumer research and market research that are the traditional sources of information gained by the designers. Thus, when they have limitation in information they are not capable of understanding users' daily experiences.

4. INFLUENTIAL PARAMETERS ON HCI EXPERIENCE

In this study, it is assumed that there is a difference of usability by the changing parameters such as gender, education or age on product experience. Thus, these three parameters could be considered by designers in the process of design as relations with the contexts such as psychology, marketing and sociology. In this part there is a short theory about the factors of gender, educational level and age and their effects in product experience . Furthermore, the discussion goes over the essential reasons that influence the possible differences between gender, educational level and age in product experience specifically.

4.1 Users Socio-Cultural Factors

Computers and other forms of technology are used in various forms and in different settings. One way that people experience this technology is through a product that is in the access of nearly every person with any condition. Moreover, people have differences in every aspect such as psychological aspects, social aspects and cultural aspects which affect the way one may experience a digital product. Thus, the way people experience a new technology through a product such as mobile phone is affected firstly by their own factor such as people socio-cultural or demographic factors, as Parson (1994) says, people socio cultural factors are significant to be considered when technology is going to be designed. Moreover, Parson (1994) and his colleagues conducted a study in which they gave an example in designing a remote control for a specified group of people the users' socio cultural factors should be considered specifically. For example, in another study, it has been proved that people have different opportunities in working and performing tasks according to their demographic factor such as age (Fossum, 1976). Given the vast distribution of the so-called technology of HCI in a form of products it is significant to understand and recognize the factors and the importance of them on influencing the experience people have in this context.

4.1.1 Gender

The studies on women in Encyclopedia give the description on gender as, “*a cultural construct, the distinction in roles, behaviors, and mental and emotional characteristics between females and males developed by the society*” (Tierney, 1999 p 563). Also the society differentiates it to the terms feminine and masculine. With growing up babies from the very first stage of their life they are given values according to their sex (Basow, 1992). This difference is obvious when they are about to be dressed up by colors, the blue color usually goes to boys and the pink one goes to girls or when they are buying playing toys girls are bought dolls and boys are bought cars. The given heterogeneous responsibilities are good examples of this discrimination. Thus, a baby at the very first stage of his life will grow up by the gender roles that are given to him or her and this is also attributed to the objects that belong to him (Yavas, 2006). In general, males and females are given attributes oppositely. The given role of females is as sensitive, expressive, and cooperative and oppositely the masculine one is aggressive, dominant and active (Basow, 1992).

The term 'sex' is used instead of gender, but sex is used when it is needed to be referred biologically around men and women. However, the term gender is referred to its sociological meaning. There are two different points of view on sex and gender; one discusses the biological side which is related to physical aspects of human beings like hormones, shape, chromosomes, etc. This view mentions these differences as an origination of the behavioral differences and also differences by roles in society of men and women (Garret, 1987). However, according to Kimmel (2000) and Wood (2003) as long as the term gender is dynamic, it could be changed when time, culture, and society come to discussion, but the term 'sex' is unchangeable and the varieties of sex have no or little influence on the gender performance in society. As Tierney (1999) says as “*the term that encompasses the morphological and physiological differences which humans (and other life forms) are categorized*” Tierney (1999, p 564). So, the term 'sex' is used when behaviors originate from the biological distinction of male and female. Kimmel (2000) gives four verities by which the meaning of being a man or woman could be defined. Firstly, in different cultures the meaning of gender may change. For instance, in Norwegians Yukon Territories the behavior of aboriginal people toward men is different from their attitudes toward women. Secondly, the time is the next factor (Kimmel, 2000). The

third factor that may bring differences in people's anticipation of being man or woman is the person's (education, experience, vocation and characteristic). At last, also in one culture there may be a difference at the stage of being men or woman in different groups of people.

As the above discussion, a child understands the existing gender difference from the very first stage of his or her life. Since the society has a contribution in influencing norms and values, the person would be grown up by predetermined roles for different gender (Willis, 1991).

Additionally, in one discussion it is approved that men in comparison with women have more tendency to be focused on the salient characterizing of a product or an environment (Meyers-Levy, 1989; Meyers-Levy and Maheswaran, 1991). The above discussion approves the prediction that women and men may be different in their attitudes toward experiencing a product.

4.1.2 Education

As its wide and general definition education is "*the moderate mean through which the aims and habits of a group of people lives on from one generation to the next*" (Dewey, 1916/1944, p 1-14). In general, it has an evidence in any experience and also it influences the way one feels, behave and think. In its detail description, it's a conventional process, by which skills, knowledge, values and habits of a society will be conveyed intentionally from one generation to another (Dewey, 1916).

In a society people with higher educational level may have more abilities in conducting more complex services or products. For instance, in virtual world higher educated people are more frequent users (cyberatlas.com, 2000). Moreover, higher education equips people with more abilities and skills about future possibilities in products' performance (Keaveney et al., 2001). Since products are getting more complex and visualized, they are needed to be more imaginative for users to anticipate how a product or service can be used. This is getting real when there is a sophisticated product in use. Many users complain about the product sophistication of use after product evaluation (Murray et al., 1991)

Adversely, people with less education may have difficulties while using products or services, finding themselves unable to get help from their own experiences, finding their anticipation of a product performance vague (Hoch and Deighton, 1989).

For instance, the elder users of internet are not well confidence in using their skills (Cyber atlas.com, 2000). Moreover, less educated and elder users of computers in comparison with higher educated and younger ones feel that they lack the knowledge in computer proficiency skills. That's why less educated users may have not the proper skills in order to use or conduct a performance well in a new sophisticated product with virtual options.

4.1.3 Age

From looking for definition for age it is extracted that aging is a process of change in psychology, physic and social related things of a human being. Over time, some facets of aging become extended and many others become reduced, for instance the time of reaction on an action becomes more, when the one's knowledge and wisdom become extended (Wikipedia.com, 2012).

In using technology there is a notion that older people are less capable when they face new technology in a product and they show more resistance in comparison with younger people. In this view elder people are not accepted as potential users and designers do not take them into account in the process of designing a new technology (Parson et al., 1994). Recently there have been some studies that show only one percent of the people over 65 year old have computers (Schwartz, 1988). In addition, some other studies on old people approved that elder people are less interested in using technology such as ATM machines or VCR (Rogers et al., 1987). Zeithaml and Gilly (1987) also proved that the people with the age upper than 65 do not have the tendency to have ATM cards than the people younger than 65 years of age do. With the reviewing literature on this subject it is understand that age may affect the way users experience the technological products. Thus, by the dispersion of the technology and its integration into every person's life it is important to know if the age factor may or may not affect the tendency and probability of use of technology, so some strategies can be integrated to the design process of companies to increase the interactions of such a technology in new products with its users.

5. METHODOLOGY

The main question of this study is to show how product experience influences the tendency/resistance of the potential users to new mobile devices as smart phones. An empirical study was conducted in order to substantiate the planned discussion. This chapter explains the applied method in details and it includes the conducted usability test, interviews, results and analysis implemented and then followed by findings and related discussion.

5.1 Literature About The Methodology

In years the pressure of the market has led to the consciousness of many product teams about usability, by this they can more realize the significance of recognizing users and the outcome of users' disability in using products. So the importance of user requirement became very obvious now.

From the users point of view user requirements advert to the aspects and features a product should have and also the product performance in use. This part gives the idea behind the user requirements and the ways of collecting them. The importance of user rudiments collection is become vaster from User-centered Design approach, the UCD is an approach in the developing process of a product and its main concentrations is on end users of the product (Courage et al, .2005). Its concept is that the product should fit to the user's needs not the user that fits himself to the product and this is possible by applying different methods and techniques during the product development process that concentrate on users. Indeed, the usability test method which is a suitable method has been suggested as a method for accomplishing such an aim (Courage et al,.2005). In literature there are many resources that could refer to the usability method that contributes us in selecting this method as the most suitable one for studying experience issue undoubtedly. Below is a quick view on literature of the methods on studying user experience and HCI.

User experience has been evaluated by traditional methods such as observation, interviews, diaries; cognitive walk throughs and story boarding (Rohn et al., 2002). In addition, Isomursu et al. (2004) introduce a method by which they have collected data from mobile users' emotional responses in a space stimulated like a real environment. This method avoids the affection of researcher on user experience and emotion collection. This experience with various methods (Publication I, Tähti and Arhippainen 2004, Tähti et al., 2004) lack the useful knowledge as an easy method for data collection in experience. This method is specified to users of smart phones. This method has been fertilized a lot by various tests on user experience.

Collecting data on Emotion and analyzing it is hard by observation and interviews (Publication I, Tähti and Arhippainen 2004, Tähti et al., 2004). The non-verbal experiment methods, Emocards (Desmet 2001) and SAM (Lang 1980), shows the method by which the evaluation of emotions can be extracted quickly by mobile users in a space like real environment (Tähti et al., 2004a, Tähti et al., 2004b), its benefit is that no especial material is needed and the result can be easily analyzed. Yet, it is not easy for user to understand the related figures of Emocard and SAM (Tähti et al., 2004a, Tähti et al., 2004b).

According to the user experience in the related book (Tähti et al. 2004a, Tähti et al., 2004b) it is understood that the user experience may hardly be evaluated. It is not feasible to test users several times by giving them questionnaires in order to assess their experiences at the time their experiencing through their mobile phones. So this is the reason why we manage to select a mixture of methods in order to find appropriate data on users experiencing mobile application in real time (at the time of experience).

There is another method called MF method which based on the Experience Sampling Methodology) (Csikszentmihalyi, 1987) and that is a mixture of techniques as interviews, diaries, questionnaires. The ESM method is famous in researches in psychology since 1970s. This method seemingly originated by Flügel's (1925) in the book of 30-day study of mood.

In their book (Scollon *et al.*, 2003.) Scollon *et al.* (2003) there is a discussion about sampling experience and some points about how much it is weak or strong, also, the way ESM was conducted has been studied since 1970s. However, all these methods

were not feasible in studying a holistic subject as user experience. In this case, Love (2005) in his book 'understanding mobile human computer interaction' introduces different methods that are applicable in studying user experience in HCI field. As he says in his book there are various methods for taking into the research of a mobile HCI. One important thing that he mentions to be applied in this kind of research study is using multiple methods in order to get a better recognition of users' way of use (Love, 2005). This method is called 'triangulation' (Love, 2005) for doing this a mixture of different objective and subjective techniques are needed for collecting data. For example, a combination of different methods like taking task completion, questionnaire, and observation could be taken when we are interested to look at the model of users using an application as GPS guide in the city. In addition, in studying a Human-Centered Design (HCD) approach to mobile application development, usability is introduced as a significant agent in order to have a successfully designed product (Love, 2005). So, in order to get ideas for designing a way it is better to get feedback from users and to have developed stimulated products or prototypes. These kinds of techniques have benefits with them that can be a useful way in gaining fast and inexpensive feedbacks on applications usability at the very primary phase.

According to Preece *et al.* (1994) the above points are the principal reasons why usability assessment should be taken:

1. To recognize how technology is being used by users
2. To have a comparison between different design of products
3. To evaluate if the products provide usability needs
4. To make sure that if the product is designed according to standards that is defined in industry

Moreover, in the handbook of "Understanding Your Users" Catherine and Kathy (2005) give usability practitioners some techniques in order to conduct a good qualified and reliable Study in studying user research. (Courage *et al.*, 2005).

The usability test suggested in this book was the main leader to conduct such a study in this thesis.

Usability tests are applied to choose a concept of design in a product and to investigate if the usability requirements are provided by that concept. Usability

testing of product is applied while designing a product is in progress. In general, product usability test is operated with a sample of users through a real product, a prototype, or a software simulated product and the results taken from this test is analyzed to evaluate product usability and to recognize issues of design.

5.2 Implementation of This Study

The aim of this thesis is to investigate problems and issues in studying user experiences of mobile phones and to find out in which conditions the study of user experience is possible and meaningful. Therefore the settings of this part of the study are affected by the conditions of the case study. These settings will be described briefly in the next subsections.

In the process of the usability test the scenario-based requirements were also applied. Indeed, for a better understanding of the tasks a scenario of use about the past and future of use were used (Carroll, 2002). These scenarios included the past story of use of the existing systems and also the usage in the future of potential systems. In this research as a problematic area basis, the way of use of similar products were considered for designing the usability test, the three steps of the analysis which one of them is a qualitative analysis is related to the research method. In addition, all these are the connections between the constructive grounded theory and the scenario based task analysis.

5.2.1 Usability test and settings

Recently, there are many critiques by users on device interfaces and it is complained that these interfaces need UI expertise to be armed technically. (James R. et al., 2001). So, user interface specialists studied the interfaces of devices from experience view so this action led them to usability problems. They hold their studies on usability testing on interfaces and these tests were carried out under real world conditions when users were experiencing an interface in time. By these tests UI specialists could gather the information and the device problem from the users while the interface was in use by them (Uyeda et al., 2001). By these tests specialist are given a great opportunity by which they understand how an interface of a device may support a user's work surrounding, while observing the users (Wharton, 1999). Thus,

this method is selected as an effective one while there is a proper situation. Thus, for such a test some materials are needed as below.

5.2.1.1 Observations and surveys

Images and videos are strong resources in order to extract meaning from, especially extracting experiences and emotional values (Bruseberg and McDonagh, 2002). As experience holds intangible facets, visual materials such as videos, photos, are significant ones in order to transcribe this kind of information for designers. Visualizing for designers is a way by which people mental and intangible world get narrated and this is a way to make an easier recognition of them rather than words that only helps to get through their thoughts and what they think of (Fulton Suri, 2003). One important skill of designers is that they have the ability to visualize their concepts (Muller, 1989). Thus, by visual materials the multi-dimensional information of experience can be transcribed and taken for use.

As far as experience is a subjective issue, in order to understand users' experience comprehensively we need to conduct different methods. This is possible by listening to people, observing them, see what they do, what they like, what they use. By listening to them we may understand what they verbally express; this is called explicit knowledge (Arhippainen, 2009). For understanding what people do, we can have an observation on them, this let us understand what people may perceive about experience. We can have an empathy with people when we understand how people feel, this kind of knowledge is a tacit knowledge that could be extracted verbally (Arhippainen, 2009).

Thus, from the above literature it is understood that a mixture of different methods is useful in order to capture a comprehensive understanding of user experience.

In the HCI field there have been various methods on studying users. The all-inclusive character of the user experience brought us a question to our mind if only the senior HCI methods such as observations, interviews, and questionnaires are enough resources to catch up a good assessment on subjective issues like users' experiences? Or there should be a mix methods involved with new ones in order to reach a good data?

Many new methods have been in progress on the ‘user experience’ issue such as the ones in the book of Tuuli Mattelmäki (2006) a book that is called “Design Probes”, and in the book of Mike Kuniavsky 2003, that is called “Observing the User Experience – A Practitioner’s guide to user research”, another important reference for studying mobile users is a book written by Isomursu et al., (2004) which gives a method by which users give emotional responses while using a mobile phone in a setting stimulated like an end-user environment. Also, in the book of Kuniavsky (2003) there are different methods of user experience and their advantages. In a study on Usability Testing Multimedia of Mobile, Belt (2010) used think-aloud usability test of a mobile multimedia application were suggested as method in order to study such an issue.

5.2.1.2 Focus group

Focus group is a group that is interviewed in order to catch specific information on a specific topic. This fast and not expensive method helps to understand and catch the demands, requisites, experiences, and preferences of the target users. Focus groups are led by a main leader which is trained in this way. What may be asked from the focus group and how the answers and results are being analyzed may make a focus group a good conductor for discovering peoples’ thoughts and ideas in a given topic. (Dumas & Redish, 1999, Kuniavsky, 2003). For example, from a focus group discussion it could be extracted the aspects below (Jordan, 2000):

- Experiences users have while using a product
- The users notion toward a product both functionally and aesthetically
- Collecting data about their feelings and emotion and the pleasure and displeasure they experience while users experiencing the product
- The users notion toward the appearance and design of the product

The focus group method in research was firstly called as a “Focused interview” and developed in 1930 as a method of research in sociology (Arhippainen, 2009). In World War II the focus group method was used in order to improve the soldiers’ life style. In 1950, it entered into the field of marketing. This method is one of the ancient methods used in user experience research (Kuniavsky, 2003). It was also being used when the initial steps of websites development and software were in progress. Indeed, by this it is possible to extract ideas and recognize the needs and

demands of the potential users. In research, focus group method is considered as a competitive method by which the participants are discovered by their avail on competing products and the products that may fail. They have also the ability to discover the new competitors and also brand new applications for the product (Kuniavsky, 2003).

Catching data in a limited time from an experience that have never held before is another potency of the focus group. Here is the focus group that makes it possible for designers to understand users' demands for a new coming product. In addition, focus group is a method which is tangible, easily observable and also free of jargon, by which the group of designers who do not have the possibility to interfere in user research is undertaken (Kuniavsky, 2003.)

In a typical group as focus group there were 8 to 12 members as participants. Every session held by focus group lasted for 2 hours. These participants were selected in order to make potential user stimulation possible so they were selected charily. These sessions could be divided rather than being once. And the discussion of the users and focus group should be with both experienced and inexperienced users. In order to be successful in a study held by focus group the people were invited as users and asked by the questions that were planned to discover what was needed to be understand, and also there was an expert leader who knew the aim of the session. (Dumas & Redish, 1999.)

One the benefits gained from the focus group method is that it is usable at any level in the process of design. The product that is discussed by the participants could be a prototype or a product that is finished and lunched in the market and is in use (Jordan, 2000).

The focus group has an informal structure so that many issues could be raised that never been guessed that it has such a value for investigation. "The groups' dynamics can be particularly beneficial here as issues rose by one user by which it may stimulate ideas from others." (Jordan, 2000). Yet, group dynamic may be a disadvantageous, too. Jordan (2000) says, for instance, there is fear that may be one participant behave dominantly. This means that one's idea may affect the opinion of others in a group. This problem should be controlled by the moderator so that the questions from users could be asked in private or an individual text messaging. So it is helpful in order to successfully work as a focus group in this case (Jordan, 2000).

Despite the focus group advantage as a fabulous method by which the users' beliefs, points of views, demands could be elicited, it is not possible to have the understanding of what users may do with the products and how they may experience it. Dumas and Redish (1999) put his emphasis on this fact that a focus group is not a way that the usability of a product could be investigated or evaluated by.

5.2.1.3 Participants

In order to find some clues about the marketing situation of the smart phones, LG Company was selected since it was a company that helps university students when they attempt to have their studies on technological products regarding the products of this company. LG Company is a manufacturer company of mobile phones also the smart phones who was a source of information that was helpful in this study. This company found that in its free market some kind of resistance is seen in buying their smart phones. Thus, after all of these interviews and meetings with the original manufacturer of the LG Company in Turkey, Istanbul and its marketing team, the information was gained which led the team toward a special way to have the study on a special group of users. Then it was decided to have the tests on a group of users which included 40 people in total and was divided to 20 male and 20 female between the ages of 14 to 53. Yet, the applied study by the focus group was designed according to users' characteristics and the essence of the studies by the focus group.



Figure 5.1 : The marketing manager of the LG Company in Turkey.

The focus group study was constructed by 8 users with characteristics below:

- Between the ages 20 and 25 years old
- Not smart phones users before
- Design Students
- Concerned in new technology and electronic materials



Figure 5.2: Sessions held with the focus group.

In order to develop the hypotheses some intuitions were needed about the mobile usage. As previously it was explained it was preferred to look at the country of Turkey condition and not utilizing the existing model to reach the study goal. So, the focus group method was applied first. Since, there was a shortage of time and other limitations the sessions with the focus group was a mixture of a free listening study (Goebert & Rosenthal, 2002) rather than a diary study. The participants were asked to narrate their one day from morning until night and name their electronic devices and all kinds of activities they had with their mobile phones, MP3 players and their PCs. Participant explanations were shortened at the same time as a list of a task for every user. After all these free listening study and participants explanations all users commonly decided about the making a list of tasks which was mostly repeated. This list was helpful in selecting the two tasks to be tested in the usability test

Lists made by the focus group group toward the usage of their technological devices.

Table 5.1 : List made by focus group 1.

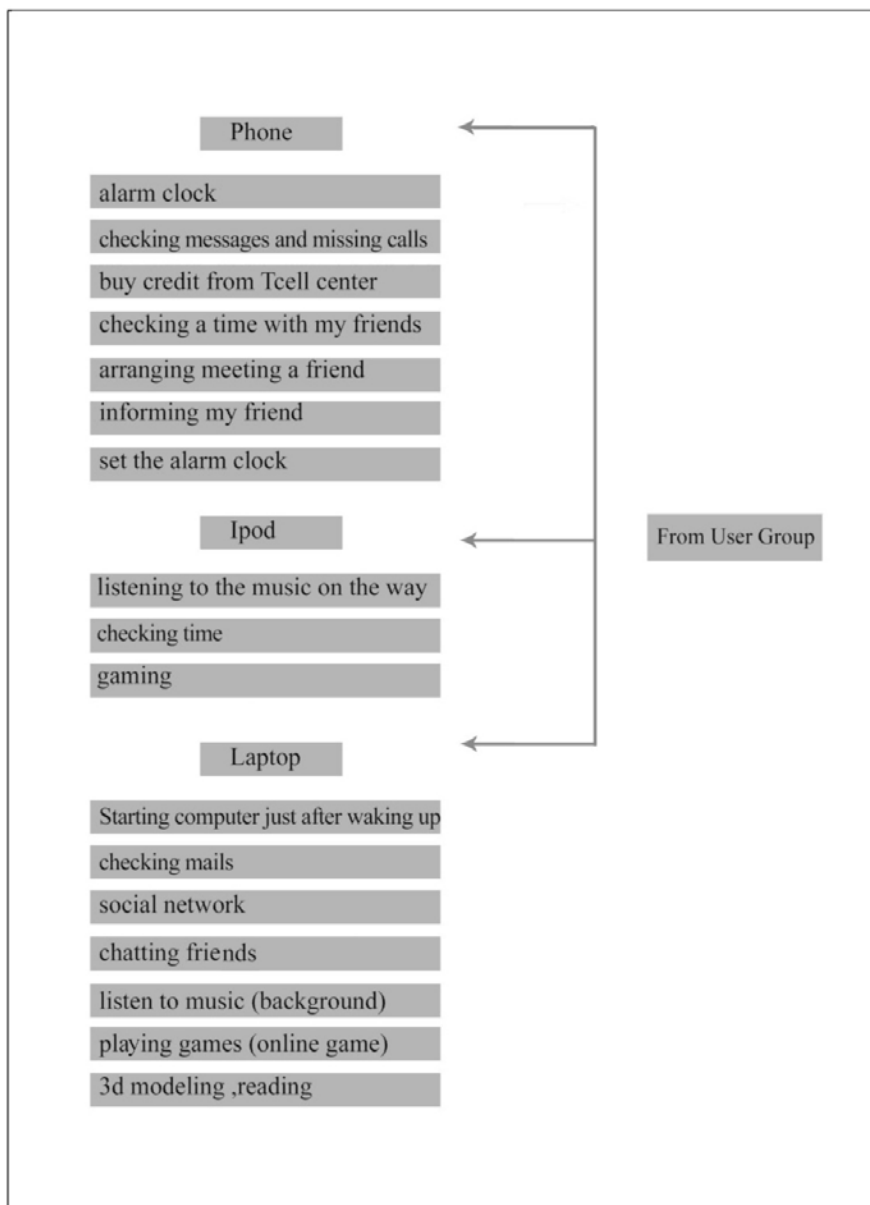


Table 5.2: List made by focus group 2.

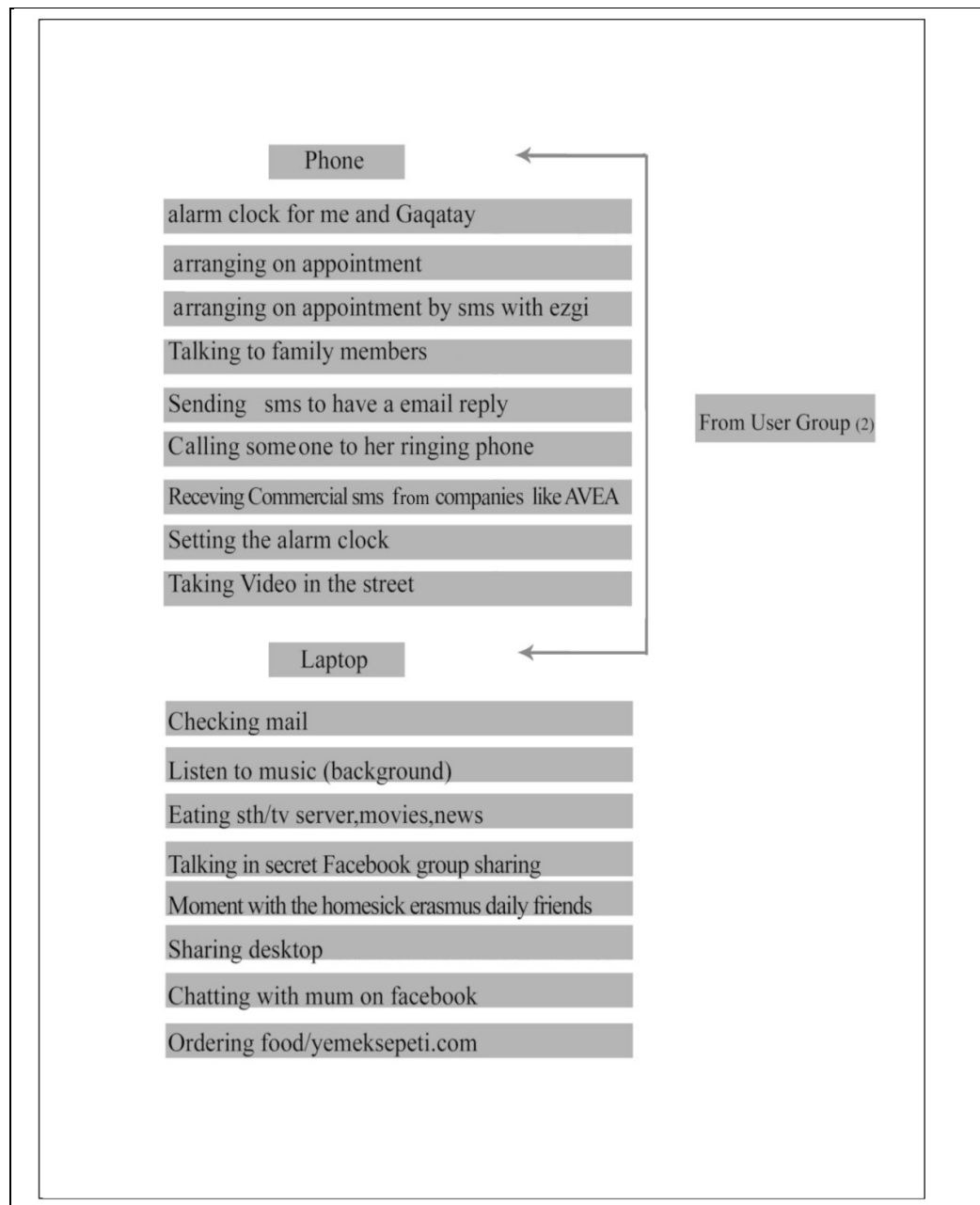


Table 5.3: List made by focus group 3.

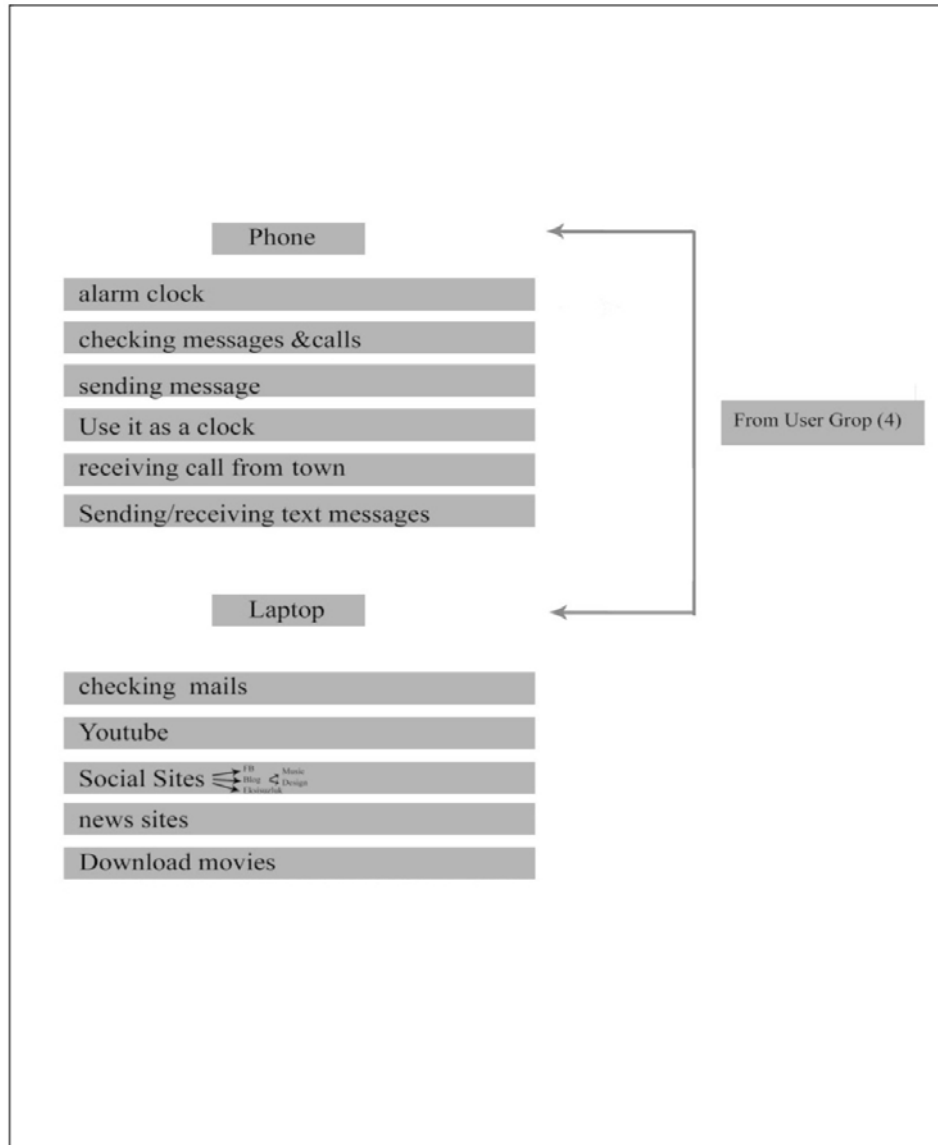
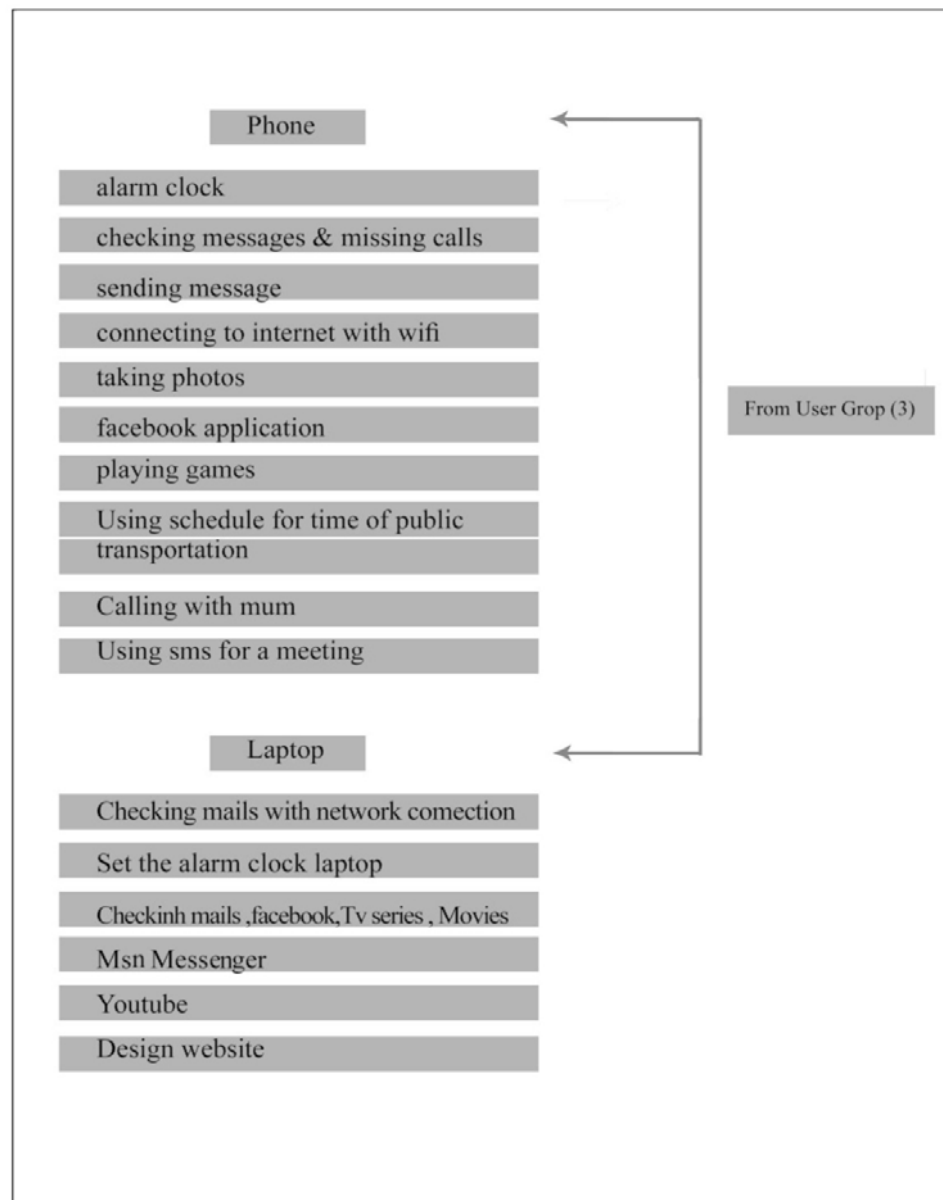


Table 5.4: List made by focus group 4.



5.2.2 Developing the problem areas

In many studies such as this one the primary assumptions about the influence of user experiences were made by gathering information by means of finding tools and techniques in order to explore the reflection and expression of one's experience. However, for some reasons, here in this thesis no statistical knowledge was applied in order to gain subjective issues about user experience. It was preferred to look at the experience to be considered as a dynamical model, rather than to be considered as a set of statistical properties. It was also tried to look at the users and study them in real circumstances instead of considering them as a model. Because it was not feasible to apply a qualitative research for large scale of users, before applying the usability test, a group was selected as focus groups in order to gain basic information about users and also for the problem areas to get developed.

Since there were some lacks of the facts in industry and marketing in many other academic researches on user experience and HCI. Thus, the setting of usability test like achieving users and the testing device were simulated in real condition of its producer. So, the problem areas in the selected device were developed as below in the selected device.

5.2.2.1 Problem area 1

Classifying and finding songs through the application of music:

Since the music player and contact list applications were the most common and repeated ones in usage among the focus group, it was decided to select this application in order to develop the problem areas. Since there were no games installed by the manufacturer company, it was not possible to get through game applications so the second choice that was the contact list application was selected for the study.

As the users of focus group were looked as their way of using mobile devices, it was found that the standard application of device let users find songs through media album, genre and artists. Yet, users were using another way of sorting songs and that was selecting by relying on their own mood. In selecting a song through the existing

application user have usability problems on the mobile device. Thus, it was managed to develop the below problem areas:

Problem area 1: In selecting and finding songs, users have problems by music application existing in devices.

5.2.2.2 Problem area 2

Making a new contact and adding to favorite list of the existing list

All the users commonly stated that they had frequent calls or message with their families specially their parents. With more discussions it was understood that all users were eager to have different levels of privacy in their contact list. This type of frequent family communication with its members and a fine line between different types of the contacts let the focus group team contemplate about the existing application of contact list's usability. Thus, the below problem areas were developed:

Problem area 2: With the existing contact list application, users have problems when they want to assort and create contacts according to their preferences.

5.2.3 Applying the usability test

One important fact about the tests is that the operating system and the device are connected. The device is considered as a package .It is obvious that same usability problems would be found in other devices with the same operating system; however, a comparison was made before conducting the test between the considered device and another device. The same operating system with the version of both devices was the same, but the company of manufacture of the devices was different. So, what could be understood was that, there could be many different options that may be customized in the operating system and standard applications related to user interfaces. Thus, it means that every manufacturer has its own customizations on applications and operating systems, and this is totally different from what is seen in operating systems on PCs. In the next section the procedure of the test is shown.

A device that the marketing manager of the LG Company suggested for the test was considered and it was a smart phone, it was assigned by the original manufacturer for the users in Turkey that previously did not have the experience of use of this device.

Accordingly, two types of tasks were designed for each problematic area and before the real test a pretest was conducted in order to clarify the feasibility of the tasks. The tests were done by sampling users of 20 women and 20 men between the ages of 14 to 53 in a store of electronic devices at the center of Istanbul, totally 40 users attended the test. Moreover, three conductors conducted the tests, and the tests were held in a public place. One conductor had the responsibility to record the video, and the other for the guiding the users. The last two conductors were native in speaking Turkish.

The task that was designed for music application and the users were observed during the process of assorting and finding the songs as below:

1. Finding the music folder or application.
2. Deciding which “mood” of music is going to be listened.
3. Finding a song related to that mood (the focus group added some songs from 30 of the most famous and popular singers in turkey in Rock, R&B, POP, traditional style for different tastes that could be fulfilled
4. Adding it to a preset play list but not playing it after finding the song
5. Having the song to play
6. Adding the song to the preset playlist Again
7. Going back to the homepage (home).



Figure 5.3: User doing task 1.



Figure 5.4: User doing task 1.

Another task that was designed for the application of contact list and that was for the feature to be observed while users were making and creating a contact and differentiating among contacts by this feature. The job of this feature was to add a selected contact to favorites. The task steps are as below:

1. Finding the contact list folder or application .
2. Making a new contact with a name.
3. Adding the so called contact to the contact list.
4. Going back to the main page of the contact application.
5. Finding the same contact again.
6. Adding the so called contact to the option of “Favorites “.



Figure 5.5: User doing task 2.

The reason why this method was selected

Usability testing itself is not User-centered Design (UCD) but it is a method among many other techniques that helps to make sure in fulfilling scopes of the User Centered Design approach (Rubin & Chisnell, 2008). By observing the related studies on mobile HCI, User-Experience and User-Centered Design there have been more various methods and materials in order to study; however, as a common point among the studies the usability method plus a mixture of other techniques are suggested as a good method for user research study.

5.2.4 The three type of demographic comparison (gender, education, age)

The primary question of this study is to find the influential parameters on product experience which was led to the resistance or tendency toward using a product as a smart phone.

An empirical study was conducted in order to give validation to the proposed discussion. This chapter gives in details about the method used in this study including the usability test and results, the survey and results, the analysis performed and then discuss the findings.

Comparison on gender

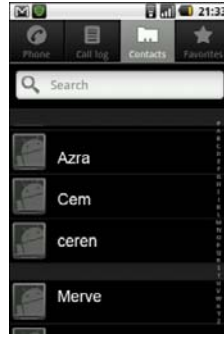
In order to find possible differences between male and female an observation was conducted on a product which was introduced by the manufacturer company on participants. Here mobile phones were a good selection to be tested in such a study since this product was designed to be directed to both genders and was in use of the majority of the people (Bakalis et al. 1998). By this product finding the possible differences in product experience was feasible.

An observation held after the videos taken by the members of the focus group from the participants explained above. The aim of this was to look at the videos to see whether there were any differences between male and female on their navigation through completing the so-called tasks. The videos were divided to the ones that men were taking part in and the ones that women were taking part in, and then each group was observed separately. By videos, the way that every man and woman chose in order to navigate through and also the application for completing the so-called tasks were observed in details. So the scenario that users were used in their task completion could be recognized in two groups of men and women and also the differences or similarities could be identified in this way. There were two different models of scenario that were used frequently by every group of male and female as below:

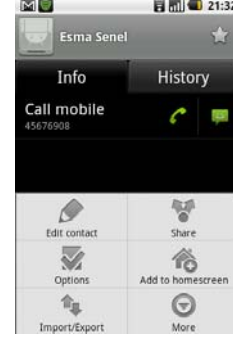
Male group:

- In order to find a name from list of contacts, first clicking on the rectangle part of the part in order to activate that to type a name in it.
- Clicking on rectangle part in searching a name for music song or the name of the singer.

- Finding the search button from the buttons of the hardware part of the device and searching in the screen to find the search option in searching for contacts.
- Finding the button of option form the hardware part of the device in order to add a song to a specified list.



Clicking on the rectangle



Finding the button from the device

Figure 5.6: The rectangle space for searching name and option from the device.

Female group:

- In order to find a name from list of contacts, not clicking on the rectangle part of the part in order to activate that to type a name in it, directly goes to find the alphabetical icons to type before any click.
- Not clicking on rectangle part in searching a name for music song or the name of the singer, (directly scrolling the list to search the name).
- Not finding the search button from the hardware part of the device and searching in the screen to find the search option in searching for contacts.
- Not finding the button of option form the hardware part of the device in order to add a song to a specified list.

Table 5.5: Comparison according to gender differences.

	Task completion time(music) Average	Task completion time(contact lists)average	Average of errors(music)	Average of errors(contact list)	Standard Deviation Music	Standard Deviation contact application
Men	131.38	188.48	7.37	8.2	46.549	89.705
Women	130.57	193.52	7.33	9.06	67.721	96.563

Results

In whole, the above points show the process used by most of the men was not used by women and the way of the process that used by most of the women were not used by men. The information above shows that the way that majority of men were choosing in completing a task was totally different with the ones that women were choosing. For instance, nearly no woman behaved such an action to click on the rectangle part before typing on the alphabetical icons while 16 out of 20 of men did such an action, and also 18 of 20 women did not attempt to find the option button from the hardware part of the device. This is when nearly 19 out 20 men could find this button from the device itself and not the software part. Moreover, the mentioned four different points in task scenario chosen by males and females show the inordinate discrimination between male and female in experiencing applications in a Smartphone. Moreover, from the error made by users in two genders of male and female, the team calculated an average error made by them in the figure above and a noticeable result was extracted from that and that is the distinct difference in the number of errors in music task and contact list application task. In music task female group and the male group do not have a distinct number of difference with each other but in the contact list application about 10 number differences are seen between the average times of errors. In addition, in female group this time of errors is more in number than in male group. So it can be concluded that users are not that comfortable in using contact application in comparison with the music application, and females are more in difficulty in using such an application rather than males. Thus, it shows that in contact application the efficiency and feasibility and conformability of use are very low. So the usability of this application in such a mobile phone is not well developed, by this we can find the possible difference which may bring different kinds of experience for the users experiencing such a newly technological device.

Comparison on education

In order to find possible differences of users according to their educational level an observation was conducted on the same product that explained above. Since this product is designed to be directed to every person with any educational level and also is in use of the majority of the people (Bakalis et al., 1998), so it is possible to find

possible differences of people with two educational levels of educated and uneducated(educated means university students and above,uneducated students means below university level and diploma of high school)in experiencing such a new technological device.

Method

The videos were divided into the ones that educated users were taking part in and the ones that uneducated users were taking part in, and then they were observed separately for each group. What extracted from the users completing a task in videos brought us some remarkable points as differences between these two groups which are listed below.

An observation held after the videos taken by the focus group from the participants as explained above .The aim of this was to look at the videos to see whether any differences between educated and uneducated user is seen on how they are using that device and completing the so called tasks in it.

Uneducated group were:

- Using the “Shuffle” icon by mistake when they attempt to add a song to a list.
- Using the “Repeat” icon by mistake when they attempt to add a song to a list.
- Not understanding the star icon (*) that stand for favorite when they attempt to add a contact in FAV list.
- Not using the option icon instead of using star (*) icon.
- Opening the existing favorite list instead of the adding to favorite option.

Educated group were:

- Not using the “Shuffle” icon by mistake when they attempt to add a song to a list.
- Not using the “Repeat” icon by mistake when they attempt to add a song to a list.
- Understanding the star icon (*) that stand for favorite when they attempt to add a contact in FAV list.
- Using the option icon instead of using star (*) icon.
- Opening the existing favorite list instead of the adding to favorite option.

Table 5.6: Time of errors according to users' educational level .

	Average time of errors in music task	Average time of errors in contact application task	Standard deviation In music app	Standard deviation In contact list app	Number of errors average in music	Number of errors average in contact
Educated	130.75	195.85	53.5	78.4	4.75	8.55
not educated	135.25	194.45	56.3	102.8	6.9	9.2

Result

It was understood from this comparison of uneducated group that at least 10-13 participant could not extract any meanings by the graphic signs designed for the the “REPEAT” and” SHUFFLE” modes of the interface of the applications, while this behavior did not happen by none of the participants in the educated group. It means that these symbols were more recognizable by this group ,and also,in understanding the star(*)icon the educated group were more successful in recognizing this sign as an option for adding a contact to favoirite list but in the group of uneducated users the people who could use this icon for adding a contact to favorite were less than in educated group. The educated participants that could not extract any meaning from the star(*)icon were 3 to 5 out of 20 participants and also none of the educated participants have used the “shuffle”and “repeat” icon by mistake when they were attempting to add a song to a playlist . Thus,it means that educated group could extract a meaning for a designed icon in contact application. Moreover,from the figure above there were nearly 21 numbers of difference which were more in non-educated group than in the educated one in the time of errors in music task. This could be accepted as a significant difference between these two groups.

Comparison on age

In order to find possible differences of users according to their age status an observation on the videos plus a survey were conducted on the same product that explained above since this product was designed to be directed to every person with different ages from 14 to 53 and also was in use of the majority of the people (Bakalis et al. 1998). Therefore, it was possible to find possible differences of people with different ages in experiencing such a new technological device.

Method

The surveys were given to participants before the videos were taken by the focus group. The aim of this was to evaluate the participants according to their age differences and to see whether any differences could be seen in any groups (youth, and elderly) on the way they were experiencing that device and completing the so called tasks in it. In the analysis process the participants which were between the 14 - 53 years of age were not equal according to their age and the dispersion of young and old users were not set equally, so here a number of mode was made from their age which was 33.5 of age and then it was tried to compare the users who have the upper age than the mode number of 33.5 and the users who have the lower age than 33.5, in this step the most frequently made errors by these two groups were written down as the list below.

Age group of upper than 33.5 year -old:

- Not easily finding the music application from the application menu
- Trying to add a song but playing it at the same time
- Not distinguishing the option button from the device itself
- Not capable of saving a contact after filling the fields
- Not capable of finding a saved contact and creating a new one by mistake

Age group of lower than 33.5 year-old: (is also the same with the age group of upper 33.5 year-old):

Not easily finding the music application from the application menu

- Trying to add a song but playing it at the same time
- Not distinguishing the option button from the device itself
- Not capable of saving a contact after filling the fields
- Not capable of finding a saved contact and creating a new one by mistake

Result

1. In both age groups (young and older) there are some errors that are made the same in each group. Of course there are some more errors made by each group that are not

listed here but these are the most frequent ones in common with both groups and also the number of other errors that were made were not that much that could be specified for each age group differently, So, the errors that were made by most of the users were chosen. Consequently, these evaluations show that there are no significant differences in experiencing the smart phone between the two age groups of young and elder users. However, from the time of errors in the figure below we may see that the average time of errors made by the age group upper than 33.5 is more in number and could be considered as a significant difference between these groups. This shows that in the older group of user the efficiency and usability in using an smart phone change by age growth and gets lower in older users rather than in younger ones. Thus, this is a significant difference that could be attended in future.

Table 5.7: Comparison according to age differences.

	Average time of errors in music task	Average time of errors in contact application task	Standard deviation in Music task	Standard deviation In contact list application	Number of errors in music App	Number of errors in contact list app
Age upper than 33.5 year old	147.73	202.6	60.81	88.22	6.4	9.8
Age lower than 33.5 year old	105.4	125.33	41.23	27.067	7.06	7.9

Table 5.8: Table of number of users, number of errors made, and time of errors in contact list application.

Number of Users	Number of errors	Task completion time of contact list task(s)	Having s.ph	Like s.p
User1	16	244	No	No
User2	14	313	No	No
User3	7	156	Yes	yes
User 4	6	153	Yes	yes
User5	7	56	Yes	yes
User6	9	141	No	yes
User7	0	64	No	yes
User8	13	192	No	yes
User9	10	111	No	No
User10	6	121	No	No
User11	8	112	No	No
User12	13	260	Yes	yes
User13	11	114	Yes	yes
User14	9	160	No	No
User 15	5	116	No	yes
User16	8	113	No	yes
User17	4	65	Yes	yes
User18	6	106	Yes	No
User19	7	95	Yes	yes
User20	13	181	No	No
User21	9	108	Yes	yes
User22	9	131	No	No
User23	10	130	No	No
User24	8	210	Yes	yes
User25	11	143	Yes	yes
User26	11	253	No	yes
User27	6	256	No	yes
User28	11	293	No	No
User29	11	330	No	No
User30	3	146	No	No
User31	7	313	No	No
User32	11	263	No	No
User33	12	290	No	No
User34	8	194	No	Yes
User35	6	155	No	Yes
User36	5	218	No	No
User37	11	263	No	Yes
User38	14	350	No	No
User39	11	331	No	No
User40	10	420	No	Yes
Total	8.54	136.025		

Table 5.9: Table of number of users, number of errors made, and time of errors.

	Number of errors	Task completion time of music task(s)		
User1	4	139		
User2	0	108		
User3	6	227		
User 4	4	165		
User5	0	100		
User6	5	202		
User7	7	222		
User8	5	138		
User9	3	85		
User10	2	93		
User11	5	202		
User12	4	146		
User13	7	192		
User14	2	125		
User 15	4	175		
User16	8	197		
User17	5	112		
User18	7	171		
User19	2	50		
User20	5	88		
User21	8	171		
User22	0	36		
User23	8	156		
User24	9	105		
User25	14	145		
User26	11	123		
User27	10	162		
User28	7	65		
User29	15	307		
User30	13	142		
User31	6	86		
User32	7	166		
User33	4	52		
User34	8	94		
User35	4	73		
User36	10	117		
User37	1	68		
User38	9	138		
User39	7	88		
User40	6	102		
Total	7.35	121.188		

Table 5.10: The example of the asked question in the questionnaire.

This questionnaire is conducted with the help of Assoc. Prof. Dr. Hümanur Bağlı from Istanbul Technical University for the master thesis of Industrial Design and will be used for study purpose.

Preparation: Seyede Elham Mirsaeid Ghazy-, Istanbul Technical University ,Department of Industrial Design

Student of master

Thank you for your use

Name ,Family name:

Age:

Gender:

Occupation:

Educational level:

1. Do you know what smart phone is?

.....

2. Why do you want/don't want a smart phone?

.....

3. What kind of mobile phone do you use?

.....

4. What do you do with your mobile phone?

.....

5. What kind of music do you listen to with your mobile/MP3 player?

.....

6. How do you find music in you mobile phone /Mp3 player?

.....

7. Name by number according to your preference

Colleagues

Friends

Family

Relatives

customers

8. Do you use your phone for any kind of celebration in mother's day?

.....

9. Can you categorize the names in your mobile according to family, friend,... groups?

.....
10. What do you want to share with others with your mobile phone?
.....

11. What do you want to show/exhibit with your mobile phone?
.....

5.2.5 Result and analysis

In this chapter the summary of the result of the case study is explained and also the evaluation of the methods and the test in the case study is presented here. The extracted information from the method in this case study as a result could be evidence of the asked research questions in this study. In the study of this research and the case study that was done, it is seen that the main factor in studying user experience needed to be studied is the user itself. So, according to this some key factors relating the users that have an influence on user experience were considered to be more emphasized on as below:

If user's socio cultural factors as *age* influence the way they experience a smart phone.

If user's socio cultural factors as *educational level* influence the way they experience a smart phone.

If user's socio cultural factor as *gender* influences the way user experience a smart phone.

From all the applied methods above some results from the applications tests on users have been extracted that show the time of errors and number of errors in tables below. Besides, from the comparison between users according to their socio cultural factor such as age, gender and educational level the type of errors and those types that were frequently done by them were extracted that are followed in tables below:

Table 5.11: Age comparison and users' type of frequent errors which are the same in result

Age group of upper than 33.5 year -old:
Not easily finding the music application from the application menu
Trying to add a song but playing it at the same time
Not distinguishing the option button from the device itself
Not capable of saving a contact after filling the fields
Incapable of finding a saved contact and creating a new one by mistake
Age group of lower than 33.5 year-old:
Not easily finding the music application from the application menu
Trying to add a song but playing it at the same time
Not distinguishing the option button from the device itself
Not capable of saving a contact after filling the fields
Incapable of finding a saved contact and creating a new one by mistake

Table 5.12: Gender comparison and users' type of frequent errors.

Male group:
Most of the men in order to find a name from list of contacts, first click on the rectangle part of the part in order to activate that to type a name in it.
Most of the users click on rectangle part in searching a name for music song or the name of the singer.
Most of the users find the search button from the hardware part of the device and not search from the screen to find the search option in searching for contacts.
Most of the users find the button of option from the hardware part of the device in order to add a song to a specified list.
Female group:
Nearly any user, in order to find a name from list of contacts, not click on the rectangle part of the part in order to activate that to type a name in it, directly goes to find the alphabetical icons to type before any click.
Nearly every user, not click on rectangle part in searching a name for music song or the name of the singer, directly scrolling the list to search the name.
Most of the users, not find the search button from the hardware part of the device and searching in the screen to find the search option in searching for contacts.
Nearly any users, not found the button of option from the hardware part of the device in order to add a song to a specified list.

Table 5.13: Education comparison and users' type of frequent errors.

Educated group:
Nearly every users, not used the "Shuffle" icon by mistake when they attempt to add a song to a list
Nearly every users, not used the "Repeat" icon by mistake when they attempt to add a song to a list
Nearly every users, understood the star icon (*) that stand for favorite when they attempt to add a contact in FAV list
Nearly all of the users not used the option icon instead of using star (*) icon
Nearly no user opened the existing favorite list instead of the adding to favorite option
Uneducated group:
Half of users used the "Shuffle" icon by mistake when they attempt to add a song to a list
Half of users used the "Repeat" icon by mistake when they attempt to add a song to a list
Most of the users , not understood the star icon (*) that stand for favorite when they attempt to add a contact in FAV list
Most of users, used the option icon instead of using star (*) icon
Half of users, opened the existing favorite list instead of the adding to favorite option



Figure 5.7: Using the “Shuffle” and “Repeat” icon by mistake while adding song.



Figure 5.8: Error of not finding the option from the device button but from th screen.

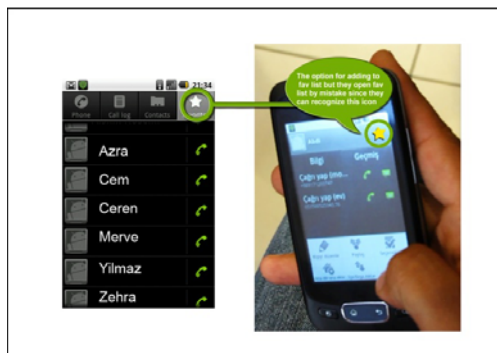


Figure 5.9 : Error of opening the favorite list by mistake instead of adding to the list itself.



Figure 5.10: Error of not finding the music application from the application menu.



Figure 5.11: Error of clicking on rectangle part to activate it for typing a name.

Table 5.14: Comparison according to gender differences.

	Task completion time(music) Average	Task completion time(contact lists)average	Average of errors(music)	Average of errors(contact list)	Standard Deviation Music	Standard Deviation contact application
Men	131.38	188.48	7.37	8.2	46.549	89.705
Women	130.57	193.52	7.33	9.06	67.721	96.563

Table 5.15: Comparison according to educational level differences.

	Average time of errors in music task	Average time of errors in contact application task	Standard deviation in Music task	Standard deviation In contact list application	Number of errors in music App	Number of errors in contact list app
Age upper than 33.5 year old	147.73	202.6	60.81	88.22	6.4	9.8
Age lower than 33.5 year old	105.4	125.33	41.23	27.067	7.06	7.9

Table 5.16: Comparison according to age differences.

	Average time of errors in music task	Average time of errors in contact application task	Standard deviation In music app	Standard deviation In contact list app	Number of errors average in music	Number of errors average in contact
Educated	130.75	196.85	53.5	78.4	4.75	8.55
not educated	135.25	194.45	56.3	102.8	6.9	9.2

6. CONCLUSION AND FUTURE RESEARCH

Here the problems were considered by two main research questions and one question relating to the result of the case study as below and after that the discussion relating to the answers of the questions is followed.

1. How does product experience influence the tendency of the potential users to smart phones? What are the main influential parameters?
2. Is it possible to define some categories of social factors of users such as gender differences, educational level and age differences of mobile phone potential users according to the reasons of their tendency or resistance towards smart phones?
3. How do the results of this study can be extended to the design process of mobile devices?

1. In user experience research the main point is to know what influences and what contexts of users it influences accordingly. In this case it is essential to decide on the issue that should be studied on this topic since there is not an exact definition about user experience. So, this should be evaluated in pragmatic level. Thus, it means that the influential parameters on user experience and the main factors should be explored by researchers. Hence, after recognizing the goals, the researcher should explain what methods are appropriate for experimenting. Moreover, the researcher should be certain that all the questions are going to be answered by the tests from users. In this case in this thesis with a help of a plan (framework) it could be understood what parameters and factors may affect the user experience. By this, it could be recognized that the users' own socio cultural factors have an influence on user experience. This framework may also assist other researchers on how and with what tools they can have the study on user experience. Here, it is seen that the users' socio cultural factors as age, gender, education are the significant factors influencing their experience. Also, these factors could be considered as the parameters that affects the tendency of the users in the context of smart mobile usage.

2. Another point in user experience research is how and by which methods this study should be done. A research conductor can choose different methods and select the best method relating to the condition of the study for example a researcher should choose which method should be used in laboratories and which one in the tests. Moreover, since the user experience topic is a comprehensive and subjective issue, it has an impact on the way of collecting data on this subject. So, some ways of data collection like non verbal communication like face to face talking by users, observation, video taking and verbal ways like conducting surveys is recommended, thus a mixture of ways in data collection is needed in this case. In analysis level, there is a question if the user experience could be measured or not , so relating the type of experience here ,an evaluation rather than measurement is required and the qualitative way for analyzing is preferred.

3. The next point in researches in user experience topic is how it could be designed for. Of course, design for experience or experience design is a term that is still being criticized and no one can design such a subjective thing for others (Sanders 2001) but for designers it is important to know what to design for experience and what elements of users should be taken into accounts in the design process that could fit their needs and lives. It means the product developers should study users and the developing product and the condition of using that product, so they increase their capability to design the products that shape those users' experiences that were aimed. Studying user experience is possible but it is a hard work to do and in every moment of studying it, it can be a surprising work by what users may experiment and if the users of the study are not well recognized, the user experience collection is going to be impossible, so researchers must know their users, users' condition of use and users' history or background so then they can understand what they are experiencing and how.

Implementation of the study

There could be some possible implementations of this study into design, education and to the market. That is, this research suggests some tools and techniques to the help of designers and also in design world there would be a new generation of designers with suitable expertise; moreover, practitioners are advised with design

skills so they may exchange their knowledge vice versa and can integrate user experience information to the design process. In addition, this thesis suggests some theoretical guidelines that can be introduced and be used in practice.

Limitations of the study:

Selecting the product:

In this thesis the selected product in making the case study was a smart phone that was given to the participants in order to be experimented by them, however, this could be done in another way that the users could be tested by their own mobile , but for a specific aim of putting the users in the same situation a smart phone with its specific options was suggested by its manufacturer company was selected; so, this product was selected and given to all of the users in the case study to be experienced.

Choosing users:

In sampling users the method of random sampling of users were selected and this way of sampling can be changed in future researches and other types of user sampling such as probability sampling, systematic sampling, stratified sampling, and non probability sampling may be taken in use and also in future studies the number of users could be more than the numbers of the users selected in this thesis, here the 40 number of users could be accepted as a small scale of a larger amount of society or group of people.

Selecting the method:

Despite the combination of different methods used as a package to study user experience, other types of methods rather than usability method such as the method of protocol analysis and contextual mapping can be used in other studies with the same topic in experience.

Discussion

Due to the qualitative analysis on the errors made to recognize the differences in making errors considering users' socio cultural factors such as age, gender and education, this may help designers in the degree of feasibility of use and its effective parameters in experiencing a new technological products by users, so they can

consider these factors in the process of their design and also, the consumer responses give an intuition for designers that can be incorporated into their design.

Age:

In the study, the first question is that how product experience influences the tendency of the potential users of smart phones and the second one is what the main influential parameters are, and whether the users' socio-cultural factor influences the way they experience this new technology. In the first question it was tried to identify the type and number of errors that are made by different users and in the second question the frequency of the errors made in each gender group, age group and education group was identified. In the table of repeated errors in age group, finding music application, adding the song to a play list, capability of saving contacts, capability of finding a saved contact and creating a new one, both of the age group of upper 33.5 (mode of the age level) and lower than 33.5 had the same behavior. So, no difference is seen in how users may differently experience a smart phone. Yet, Table 7 represents the average time and the average error on task completion in the two age groups in which a noticeable difference in number nearly 10 number more in the older group is seen than in the younger one in time of errors and in the number of errors made. This shows that the older group may have more difficulties in completing the two tasks and this validates the fact that in using technology there is a notion that elderly people are more incapable when they face new technology in a product and they show more resistance in comparison with younger people (Parson et al., 1994). In addition, Zeithaml and Gilly (1987) also proved that the people with the age upper than 65 do not have the tendency to have ATM cards than the people younger than 65 years of age do. Thus, with all the above knowledge it is understood that age factor was not very significant in 'how' a user may experience a smart phone but it could be considered as an influential factor on elderly and young users' tendency toward a new technology. Moreover, with respect to mobile phones and gender, it can be suggested that because a mobile phone is designed to be used in general for any age group it may be found difficult to be used by old generation in comparison with young ones, may be elderly people need a phone to be less complicated with recognizable symbols and simpler forms and more tangible buttons, also it is suggested that, the new technological products for them can be oriented to product design aspects rather than interface design specifications, for

instance as a suggestion, the simulated buttons in the form of new technology in mobile interfaces could be designed more tangibly and closely to real ones with bigger size.

Gender

According to the questions of the study, some types of errors which were repeated frequently are also mentioned in gender group, such as finding a name from the list of contact. The error of clicking on a rectangle part on the screen in order to activate it to type a name on it and clicking on rectangle part for searching a name of music song or the name of the singer can be interpreted as an origination of the behavioral differences of men and women (Garret, 1987). Moreover, the difficulty in finding the search button from the hardware part of the device and searching on the screen to find the search option in searching for contacts and the difficulty in finding the button of option from the hardware part of the device in order to add a song to a specified list, are the types of frequent errors made by two gender groups. Here, nearly no female and every man found the option button on the hardware part of the device in both music application and contact list application. This gives some data that men in comparison with women have more tendencies to be focused on the salient characterization of a product or an environment (e.g., Meyers-Levy, 1989; Meyers-Levy and Maheswaran, 1991). Here, from the product design point of view, this result can lead to a design of a mobile phone for men, stress on the elements that is more objective, these attributes may include more buttons, more tangible keys, and the bigger screen, more salient texture of the phone shell, Adversely, in designing such products for female the so-called attributes are suggested oppositely as the facets that are stressed with less buttons, less tangible keys, smoother texture of buttons and keys with normal screen size.

Moreover, in the error of clicking on the rectangle part to activate it in order to type a name could be a validation to the fact that males and females are given some attributes oppositely (Basow, 1992). So, with respect to smart phones design, men are more conservative than women in assessing the product function (Yavas, 2006). According to these data it can be suggested that a product that is directed to males could emphasize on a model of navigation that may lead the consumers with the least ambiguity in their navigation. These attributes consist of guiding tools such as using

written guidance on every tabs of application. In contrast, in designing for females less tactful aspects may be considered, as not considering navigation tabs with written guidance for them and to consider the whole designed package in less detail for women rather than men.

From all above-mentioned data, this is what that can be compared in near future between normal phones and smart phones, that in using real buttons in normal phones the location of buttons and their function are more obvious to the users while in smart phones users may get confused firstly to search for the suitable option from the screen and not from a recognized button in the device. In comparison with smart phones in which many aspects of a product were faded, the model of navigation in normal phones could be considered as an advantage regarding to the existing real buttons on the device and not on the visualized screen.

Furthermore, in general the time of errors made by the two groups of men and women that is shown in table 12 is different about 10 numbers more in a female group than in a male group in completing the contact list application task. This gives a clue that the consumer experience may get affected by the socio cultural factor of gender.

Education

- In education group the types of errors repeated frequently are;
- Using the “Shuffle” icon by mistake when they attempted to add a song to a list.
- Using the “Repeat” icon by mistake when they attempted to add a song to a list.
- Not understanding the star icon (*) that stands for favorite when they attempted to add a contact in FAV list,
- Using the option icon instead of using star (*) icon.
- Opening the existing favorite list instead of adding to favorite option.

Here, it means that most users in educated group (educated:university students and above) comparing to the uneducated group (below high school graduated) and the ability to recognize the graphic signs, while in uneducated group no user had the ability to recognize them. This approves that in virtual world higher educated people are more frequent users of technology (Cyberatlas.com, 2000). Since products are

getting more complex and digital; it is needed to be more imaginative for users to anticipate how a product or service can be used. This is getting significant when there is a sophisticated product in use. However, many old users complain about the product sophistication of use after product evaluation (Murray et al., 1991).

Also, in using the icon (*) that stands for adding to favorite list, educated users could easily find and use it with nearly no errors while most of the uneducated users had problems using such an option. In addition, educated users had no problem in choosing the (*) icon instead of going to option part of the device, while most of the uneducated group had frequent errors in this part, this gives credit to the point that people with less education may have difficulties while using products or services, and finding themselves disable to get help from their own experiences (Hoch and Deighton, 1989).

In addition, higher education equips people with more abilities and skills about future possibilities in products performance (Keaveney et al., 2001). These data for the second question of the study, introduce the following essential inferences that with respect to smart phone design as a computed product, educated people have the ability to use their previous experience regarding the computer literacy they have gained during their education; indeed, they may recognize the signs and symbols which they had an experience of using before. In contrast, because of the shortage of the so-called literacy in uneducated people, this group may not have the ability to refer to their previous experience while using a smart phone. In accordance with these data in designing a smart mobile phone for uneducated people there could be emphasis on the elements that enable the phone with simpler signs and more narrative aspects that is recognizable by this group.

At last, in opening the existing favorite list instead of adding to favorite option, educated group had nearly no errors while every user in uneducated group had such an error. This is an accreditation to the fact that in a society people with higher educational levels may have more abilities in conducting more complex services or products (Keaveney et al., 2001). In general, in table 13 there is a significant difference in the average time of errors in uneducated users comparing to the educated ones. This increases the probability of that the first group is more disable in

performing tasks in a technologically equipped device. This validates the fact that the time of reaction on an action becomes more, when the one's knowledge is not extended (Wikipedia.com, 2012).

Here, normal phones with more tangible product design attributes rather than interaction design with screen attributes seem more advantageous in bringing ease of use to users in comparison with smart phones. Thus, it is suggestive that in designing new smart products, designers consider the elements of the previous generation of mobile phones mixed with new smart ones.

Moreover, from all the information above, and the asked questions from the participants by the surveys conducted, the answers of users in the table 5.8 shows the answers when their users were asked that if they like to have a smart phone or not and if they already had the smart phone or not, that 19 users (nearly half) did not like to have smart phone. This is when 29 users out of 40 did not have the smart phone and there were also users who had smart phones and did not like to have. This gives a clue that despite the users' fast range of usage types there is probably a resistance of use among people who have or not have it. Moreover, these kinds of studies may be advantageous in translating the next level of product experience which is emotional experience as what feelings and emotions consumers will have after the first level of product experience, and the extracted elements could be taken in details in product design and also interaction design process.

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