THE ROLE OF USER-CREATED INTERFACE DESIGN IN PLAYERS' SATISFACTION DERIVED FROM MASSIVELY MULTIPLAYER ONLINE ROLE PLAYING GAMES: PLAYERS IN THE TURKISH MARKET

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by
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ABSTRACT

THE ROLE OF USER-CREATED INTERFACE DESIGN IN PLAYERS' SATISFACTION DERIVED FROM MASSIVELY MULTIPLAYER ONLINE ROLE PLAYING GAMES: PLAYERS IN THE TURKISH MARKET

Gaming sector functions like a giant factory and a huge industry. Investments in and required labor for the design of a game can be taken as an indicator of the importance of the sector. While designing their games, all companies working in this sector primarily focus on how the players feel, and thus, explore the ways to stimulate their interests in the game for a long period. One of the main strategies to increase user interest in a game appears to be the use of add-ons. Games enabling users to transfer their own created contents to the game in the form of add-ons seem to be the most successful in the sector.

Accordingly, the main objectives of this study are to analyze how user-created contents affect players' performance while playing the game and how they feel when using the content they created themselves. For the latter, a special eye-tracking system will be used in order to measure players' respond periods during gaming. To this end, Mihaly Csikszentmihalyi's "theory of flow", which is considered to be a groundbreaking work in the field, and Jan o. Blom & Andrew F. Monk's "theory of personalization" will constitute the theoretical background. When it comes to players' perception of and engagement with the game, a survey will be conducted online, catering to a large group of players in addition to that which will be conducted with the sample group of said experiment. This will also allow me to compare the two data.

ÖZET

KULLANICI TARAFINDAN YARATILMIŞ ARAYÜZ TASARIMININ OYUNCULARIN DEVASA ÇOK OYUNCULU ÇEVRİMİÇİ ROL YAPMA OYUNLARINDAN SAĞLADIKLARI TATMİNDEKİ ROLÜ: TÜRKİYE PAZARINDAKİ OYUNCULAR

Oyun sektörü çok büyük bir endüstridir ve dev bir fabrika gibi çalışır. Oyun tasarımı için yapılan yatırımlar ve gerekli iş gücü sektörün önemini gösteren veriler olarak değerlendirilebilir. Bu sektörde çalışan bütün şirketler oyunlarını tasarlarken öncelikle oyuncuların nasıl hissedeceğine odaklanmakta ve böylece oyuncuların oyuna ilgisini daha uzun süreli uyarabilmenin yollarını aramaktadırlar. Oyunda kullanıcı ilgisini arttırma üzerine başlıca stratejilerden biri eklenti kullanımı gibi görünmektedir. Kullanıcıların kendi oluşturdukları içerikleri eklenti olarak oyun içine aktarabilmeye olanak tanıyan oyunların sektördeki en başarılı oyunlar olduğu anlaşılmaktadır.

Bu bağlamda, bu çalışmanın ana hedefi kullanıcı tarafından oluşturulmuş içeriklerin oyuncuları performansını nasıl etkilediğini ve kendi oluşturdukları içerikleri kullanırken neler hissettiklerini analiz etmektir. Bu doğrultuda, oyuncuların, oyun sırasında tepki sürelerini ölçmek için özel bir göz takip sistemi kullanılacaktır. Mihaly Csikszentmihalyi'nin alanında çığır açan "flow teorisi" ile Blom ile Andrew F. Monk'un "kişiselleştirme teorisi" çalışmanın kuramsal arka planını oluşturmaktadır. Oyuncuların oyunu algılayışlarını ve duygusal tepkilerini ölçmek adına, büyük bir oyuncu grubuna çevrimiçi bir anket sunulacak ve ayrıca aynı anket bahsedilen deneye katılan katılımcılara da uygulanacaktır. Bu, aynı zamanda farklı iki verinin karşılaştırılmasına da olanak sağlayacaktır.

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CHAPTER 1

INTRODUCTION

1.1. Problem Definition

User interface in software is the main tool for users to interact with a computer. Therefore, it is one of the most important elements of software. Users of the software only see the graphical interface and base their decision whether it is good or bad merely on this. When software lacks a needed/desired feature in user interface, users usually try to solve it by adding third-party applications on to software, provided that the developer allowed it.

Before the invention of the computer mouse, computers were only operable by highly trained operators. When Engelbart introduced the computer mouse in the 1960s, a new idea of user interface design arose, and subsequently, computer software developers have started creating operating systems, which had a graphical interface that would allow people to interact with computers easily. The most familiar example of early user interface design on a computer is *Macintosh*, released in 1984 by a personal computer manufacturer company, which is now a worldwide renowned brand, *Apple*. With *Macintosh*, people had an ability to design their computers' virtual desktops for the first time by dragging and relocating the folders around. In 1990, *Microsoft* released the third version of their operating system named *Windows 3.0* (Ceruzzi, 2003). With this operating system, users had control on the windows' color schemes. Modifying a user interface visually or adding new features on an interface which are not considered by the software developers in the first place became popular and common practice in the design field in the following years. Now, almost every developer -in one way or another- permits users to modify the user interface. Changing the user interface according to users' needs and taste is called the personalization of the user interface.

> The value of affectively designed software increases as computers are continually integrated further into our lives. Designing for function and performance remains important, but increasingly the significance of designing for pleasure is recognized. Designing for positive affect is emerging as an important field of study and researchers interested in affective design face a variety of novel challenges. One important question to explore, at this early stage, is 'what factors lead to positive affect in software users'? (Johnson & Wiles, 2003, p. 1332)

A well-designed interface creates positive effects on people, and yet people change the interface. From view of spectators, those positive effects do not seem to coincide with the reality. Via their theory of personalization of appearance, Jan o. Blom and Andrew F. Monk explain why people want to change the user interface. Personalization could be performed due to work-related motivations such as organizing the environment of user's work place, or it could be triggered by social motivations such as changing the melody of a mobile phone with a piece that the user particularly likes to listen to in order to share the enjoyment with their friends etc. (J. o. Blom & Monk, 2003). Mihalyi Csikszentmihalyi brings another perspective to the issue by arguing that all the things people like to do or not are strictly related with the flow. According to Csikszentmihalyi, flow is a state of mind when one's consciousness is tuned in order to pursue whatever one is doing in the moment (Csikszentmihalyi, 1990, p. 6).

The personalization of user interface can be seen almost in every application today. Among the most common examples are the apps that are used in computers and mobile phones. People change and organize their own computers' and mobile phones' interfaces on daily basis. Video game industry constitutes another actor in the field, using interface personalization heavily.

Video game industry has been using interface personalization to get game players' attention and to bestow them with a sense of ownership, which would ultimately strengthen their emotional connection to the game, and thus, create loyalty. There are lots of game genres which are using personalized user interfaces. Among them, massively multiplayer online role playing games (MMORPGs) come to the fore. Producers of MMORPG genre allow users to create their own interfaces which users can add on to the game. The genre's unique combination of social and theatrical interaction with the virtual world and players, takes attention of many different study fields. The terms of personalization and the flow are analogous with sociology and psychology and sometimes can be related to them, but never stuck into them thru out the study. User-created interfaces could be the future of software.

1.2. Objectives

This study focuses on MMORPGs' user interfaces which are created by users themselves. The primary aim of this study is to evaluate the players' satisfaction derived from MMORPGs through user-created interfaces. It tries to understand the urge and reasons why users customize the user interface of the game which is already built by the developer, and to explore the consequent special connection between users and the given software. To this end, *World of Warcraft*, which is an MMORPG developed by the company *Blizzard*, is chosen as the representative since it is a renowned example across the world with ten millions of active players (Blizzard, 2014). Working with the users of this this game therefore would yield important results.

In brief, user interface in general and user-created interfaces in particular are discussed and analyzed in this thesis within the specific context of industrial design. By exploring how user interface personalization alter the feeling of a user and how users' contribution to the design of interface change the performance and mood of a user, this study strives to open up discussions for industrial designers.

1.3. Methodology

All in all, a literature review, an analysis, interpretation and reporting have been carried out throughout the study. The primary strategy of enquiry has been literature review. In this respect, a large collection of written text on user interface design and MMORPGs, books, articles, journals, conference papers etc., has been critically read, and then reviewed in order to prepare a foundation for the analysis section of the thesis.

In addition, to be able to reach as many people as possible and to accumulate and summarize responses as efficiently as possible, an online structured survey is designed for the users of the game. This survey was about the user-created interfaces which are specifically developed for *World of Warcraft* and was administered to understand how and why users modify the default interface of the game.

Since interfaces are first and foremost about 'seeing', assessing how gamers see the interfaces proves significant. To measure the gamers' eye reflexes in the game while using user-created interfaces, volunteered gamers were taken to an eye-tracking laboratory. Eye-tracking laboratory uses a specialized infra-red camera and software to

track participant's eye movements on the screen and analyzes it. Two groups have been created and each participant played the game for ten minutes in front of the eye-tracking device. In the end, a comparative analysis of online survey results and the experiment's outputs has been presented

1.4. Outline of the Study

This thesis is organized in five chapters:

Chapter 1 briefly discusses the necessity of this study. It presents the aim, methodology and the structure of this thesis.

Chapter 2 has two main sections. The first section is about the user interface in general, its history and importance, with a particular emphasis on its relation with the game and video game players. The second section centers on MMORPGs and their development.

Chapter 3 consists of three parts. First, it explains the concept of satisfaction for game players. It also discusses user interface and the act of personalization. Lastly, *World of Warcraft*'s user interface and its user-created interfaces are explained.

Chapter 4 presents the analysis of online survey and the eye-tracking experiment's outputs.

Chapter 5 is the conclusion chapter whereby the findings and the results are organized and briefly discussed. Moreover, it proposes suggestions for further study.

CHAPTER 2

BRIEF HISTORY OF USER INTERFACE AND MMORPG

User interface design has a long history beginning with the human-computer interaction (HCI). In this history, computers that everybody used became computation-intensive designed to presentation-intensive designed. The age of user interfaces started with the invention of the digital computer. It shifted to command-line interfaces once screens thought to be useful on computers. The invention of computer mouse by Douglas Engelbart[1] in the 1960s, user interface design has become a very important aspect of software. The technological advancements made sophisticated products of history a daily life routine. Today, everybody uses computers to work, to study or for fun. Washing machines have a screen which one can select the desired program by touching. People carry mobile phones which have capabilities of a computer yet they use it without getting confused. Significance of the user interface design still grows in the field of industrial design and its usage area is expanding.

> Research in human–computer interaction (HCI) has been spectacularly successful and has fundamentally changed computing. One example is the ubiquitous graphical interface used by Microsoft Windows 95, which is based on the Macintosh, which is based on work at Xerox PARC, which in turn is based on early research at the Stanford Research Laboratory (now SRI) and at Massachusetts Institute of Technology. (Myers, 1998, p. 45)

2.1. Early Era of User Interface

The first computer systems in history were used by highly trained operators because of their complicated and rudimentary interfaces. Their computing power was also primitive and expensive. Operators were using punched cards or punched paper tapes to make the inputs, so they could take the outputs from a line printer. A well-known example of the early era user interface could be *International Business Machines Corporation's* (IBM) *Type 029*[2] computing machine (see *Figure 2.1*) and the companies

[1] Douglas Engelbart (January 30, 1925 – July 2, 2013) was an engineer and inventor at his Augmentation Research Center Lab in Stanford Research Institute (SRI).
[2] The IBM 029 Key Punch is also known as "IBM 29", "IBM Type 29" or "IBM 29 Card Punch".

archive says that "*The IBM 29* remained in the product catalog until May 1984" (IBM, 2015). Those computers were also called "batch processors" (Ceruzzi, 2003, p. 78).

Figure 2.1. The IBM 029 Key Punch (1964)

(Source: http://www.columbia.edu/cu/computinghistory/029b.jpg)

Operating the *IBM 029* involved preparing a deck of punched cards in the first place. Batch of punched cards then was send to a machine, a monitoring device had monitored the input cards to be analyzed and the results were printed out on a paper. This job usually took a day to be processed.

In 1965, an operating system (OS) called *Multics* was developed and it used a special interface which was called command-line interface (CLI). CLIs evolved from batch processor monitors. OSs that used CLI reduced time requirement to process jobs from days to seconds. Those CLI computers were also called teletypes (see *Figure 2.2*).

Teletypes invention dates back to 1902, and they were used for automated telegraph receiving. In the 1920s they were been used for newsrooms (Hempstead & Worthington, 2005, pp. 605-607).

Figure 2.2. ASR-33 Teletype (1965)

(Source: http://www.pdp8.net/asr33/asr33.jpg)

Research and developments regarding display units created "glass teletypes" or video-display terminals (VDTs)[3] (see *Figure 2.3*) which were some early computers that have monitors. Therefore, batch processors were no longer used in printing mechanism to display what was written for input as in *Figure 2.2*, instead they used cathode ray tube (CRT)[4] screens. In *A Dictionary of Computing* glass teletypes described as "A simple VDU[5], now obsolete, that emulated the properties of a

[3] VDT: Video-display terminal. A terminal computer which uses CRT monitor as a display unit.
[4] CRT: Invention of CRT dates back to 1897 by Karl Ferdinand Braun (Hempstead & Worthington, 2005, p. 182), but the technology's implementation to television was in 1907 by Boris Rosing (Hempstead & Worthington, 2005, p. 819).
[5] "Abbrev. for visual display unit. A device that consists of a display, keyboard, and computer connection" (Daintith & Wright, 2008)

teletypewriter. These devices evolved into today's terminals, offering many additional emulations and features" (Daintith & Wright, 2008) The software inside the computer was behaving like a teletype and therefore one can assume that VDTs existence had been to cut the cost of papers.

Figure 2.3. DEC VT100 a glass teletype (1978)

(Source: https://www.flickr.com/photos/textfiles/9636183501/in/photostream/)

In 1968 a remarkable device was introduced. Advanced Research Projects Agency (ARPA)[6] was funding a project which was called "Augmenting Human Intellect: A Conceptual Framework" in Stanford Research Institute (SRI). Dr. Douglas Engelbart was the manager of that project. He demonstrated the remarkable device in the *Fall Joint Computer Conference* in San Francisco in 1968 (Myers, 1998, p. 4). He called this device "Mouse" because of the resemblance (see *Figure 2.4*). He also demonstrated several new technologies and usage areas for computers on that conference (e.g. hypertext, audio and video streaming over network, screen sharing over network), but utmost attention was on the mouse (Ceruzzi, 2003, p. 207). Fall Joint

[6] Also known as Defense Advanced Research Projects Agency (DARPA). ARPA was created by the 34th President of the United States Dwight D. Eisenhower to execute research and development projects for immediate use in military department (Belfiore, 2009, pp. 12-13).

Computer Conference in 1968 had created a new era for computer developers which was the graphical interface era. Adaptation of CRT monitors to graphically enhanced OS's became popular after 1970 (Hempstead & Worthington, 2005, p. 207).

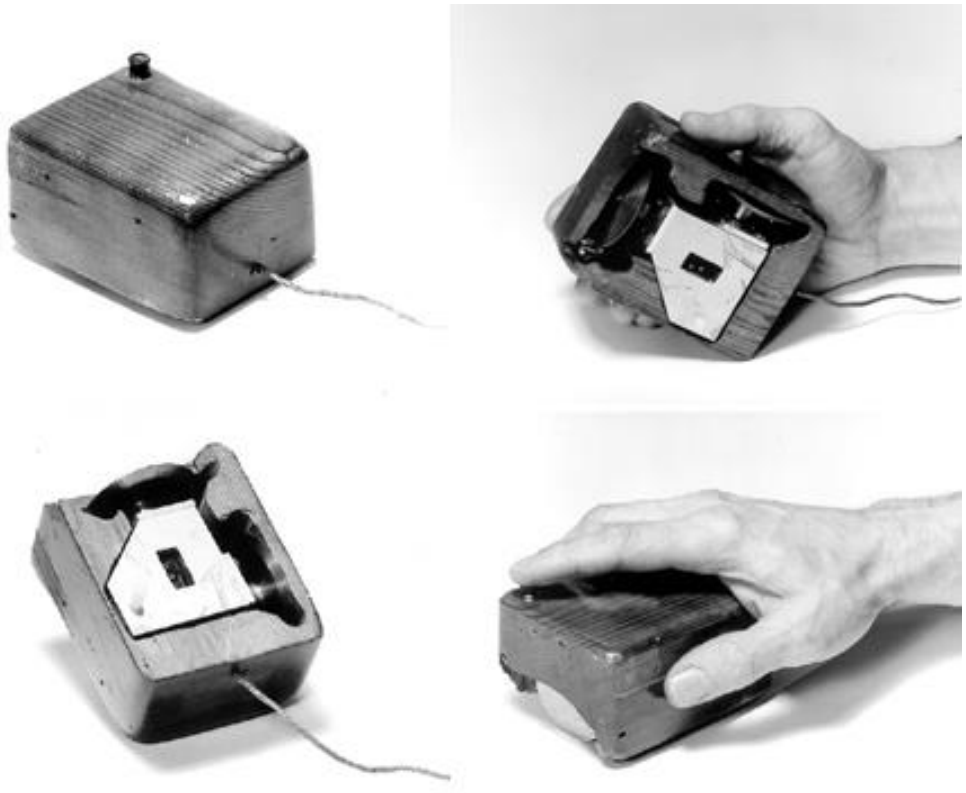

Figure 2.4. Engelbart's mouse

(Source:http://web.stanford.edu/dept/SUL/library/extra4/sloan/MouseSite/Archive/patent/Mouse.html)

2.1.1. Graphical User Interfaces and Video Games

Video games had been the pioneering applications for VDTs. They became mass-market products even before then computers because of their obsolete programs which were running on cheap and basic processors. Inexpensive arcade games created an entertainment media for a large number of people.

In 1966, a game called *Periscope* (see *Figure 2.5*) was released by Sega, which was the largest game company in Japan. *Periscope* was an electromechanical game. The objective of the game was to sink the enemy ships with the submarine's torpedoes. To make that game they used grids of lights on the surface which represent the ocean,

cardboard ships which on rails, and plastic waves which simulate sinking ships. Arcade stores in the United States saw the game's success and ordered this game. Shipment was very expensive and because of that, the game became the first game that required a quarter[7] (twenty five cents) to play rather than a dime (ten cents) (Kent, 2010). Later in 1971, a first mass-manufactured arcade video game named *Computer Space* (see *Figure 2.6*) produced by Nutting Associates. It used black and white CRT screen which was modified for the game. It was also the first mass-manufactured coin operated arcade game (Carr & Comtois, 2004). Using video displays in arcade games created a market for inventors in the early 1970s.

Figure 2.5. Periscope by Sega (1966)

(Source: http://segaretro.org/images/8/8e/Periscope_machine1.jpg)

[7] A short term for a quarter dollar.

Figure 2.6. Computer Space by Nutting Associates (1971)

(Source:https://upload.wikimedia.org/wikipedia/en/f/f2/Nutting_ComputerSpace-Blue-Screen.JPG)

The first commercial game console for television was released by Magnavox which was called *Odyssey* (see *Figure 2.7*) in 1972. It was a digital console and used with a sheet of semi-transparent overlays on the TV screen (see *Figure 2.7*). Game market invaded homes owing to game consoles. Later in 1977, a game console company named Atari released its first home video game entertainment console *Atari VCS*[8] (see *Figure 2.8*). The game system was using ROM (read-only memory) cartridges to play different games. With the release of *Atari VCS,* using micro-processor and ROM cartridges[9] became popular.

[8] When Atari released their second home entertainment system *Atari 5200*, the company changed its name from *Atari VCS* (video computer system) to *Atari 2600* (Montfort & Bogost, 2009, p. 6).
[9] ROM cartridges: Mainly used in gaming consoles as a read-only memory that runs hard-coded games from a cassette-like electronic device (Montfort & Bogost, 2009, pp. 20-21).

Figure 2.7. Magnavox Odyssey (1972) and its overlays

(Source: http://www.theverge.com/products/odyssey/1716 and http://gaming.wikia.com/wiki/Magnavox_Odyssey)

Figure 2.8. Atari VCS (1977)

(Source: https://upload.wikimedia.org/wikipedia/commons/b/b9/Atari-2600-Wood-4Sw-Set.jpg)

Following Atari's wide-spread use, video game graphics became the center of attention and took interest of computer software developers like Steve Jobs. In 1976, Jobs and his friends Ronald Wayne and Steve Wozniak established a computer company named Apple. In the same year, they introduced their first personal computer (PC) kit *Apple I (Wozniak, 1984).* This was almost a complete computer (see *Figure 2.9*). It was basically a "do it yourself" (DIY) project with the price tag 666.66 dollars

(Ceruzzi, 2003). In 1979, Apple started developing two other computers; *Lisa* (see *Figure 2.12*) and *Macintosh* (see *Figure 2.14*).

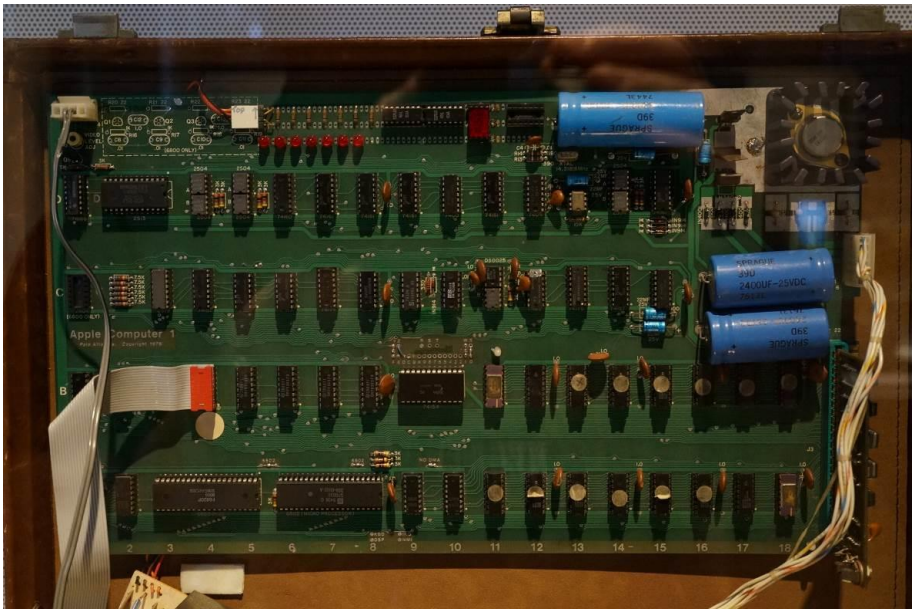

Figure 2.9. Apple I by Apple (1976)

(Source:https://upload.wikimedia.org/wikipedia/commons/0/0a/Original_1976_Apple_1_Computer_PCB.JPG)

In 1981, Xerox Palo Alto Research Center (PARC) commercially introduced their new computer which was *Xerox Star* (see *Figure 2.10*). It was the first commercial computer which had bitmap display, Ethernet connection, printer server, window-based graphical user interface (GUI) (see *Figure 2.11*) and also a two button mouse as a part of it. While *Star* was under development, Jobs and Wozniak had a chance to visit Xerox PARC in 1979 and transferred some people from Xerox PARC to their own company by hiring them. After that visit, Apple released their new computer which had a similar graphical user interface (see *Figure 2.13*) like *Star* in 1983. Apple named that computer as *Lisa*. After a year, Apple introduced their new cheaper personal computer which was *Macintosh*, at the Super Bowl[10] XVII broadcast on CBS TV channel with an advertisement. *Macintosh*'s user interface was dazzling with icons appropriate to what they represents, like files had a file icon or folders had a folder icon, and to delete something one could easily click and drag it on to the top of the trash can icon (Ceruzzi, 2003). *Byte Magazine* stated in the 1984 September issue that Apple have had almost

[10] Super Bowl is a national American football championship game in the USA.

two billion dollars revenue for that year after IBM whose revenue was four billion dollars (Libes, 1985).

Figure 2.10. Xerox Star (1981)

(Source: http://www.digibarn.com/collections/systems/xerox-8010/)

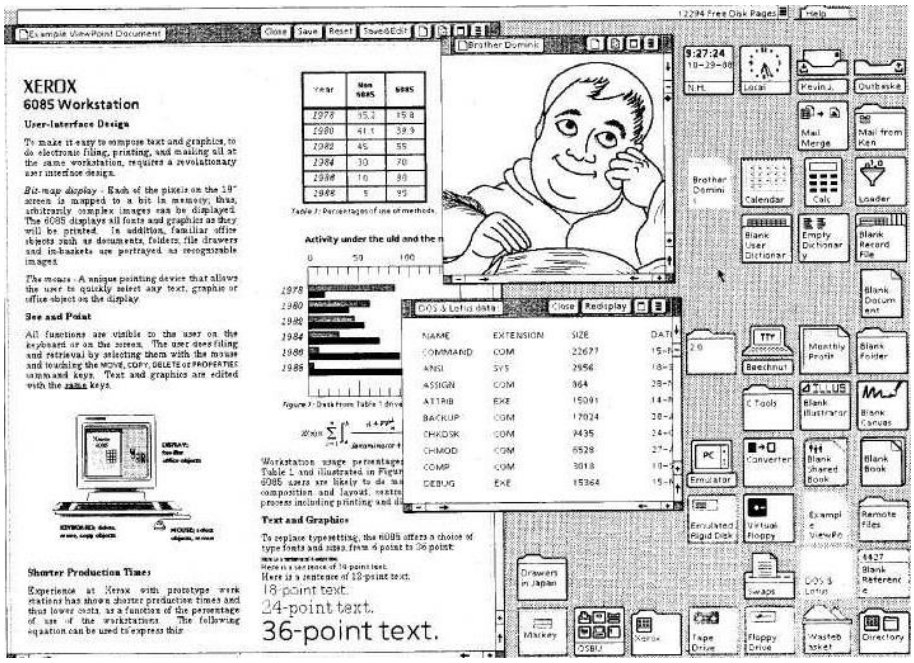

Figure 2.11. Screenshot from Xerox Star (1981)

(Source: http://toastytech.com/guis/gvstar3.jpg)

Figure 2.12. Apple Lisa (1983)

(Source: http://www.mac-history.net/wp-content/uploads/2007/10/Apple_Lisa_1.jpg)

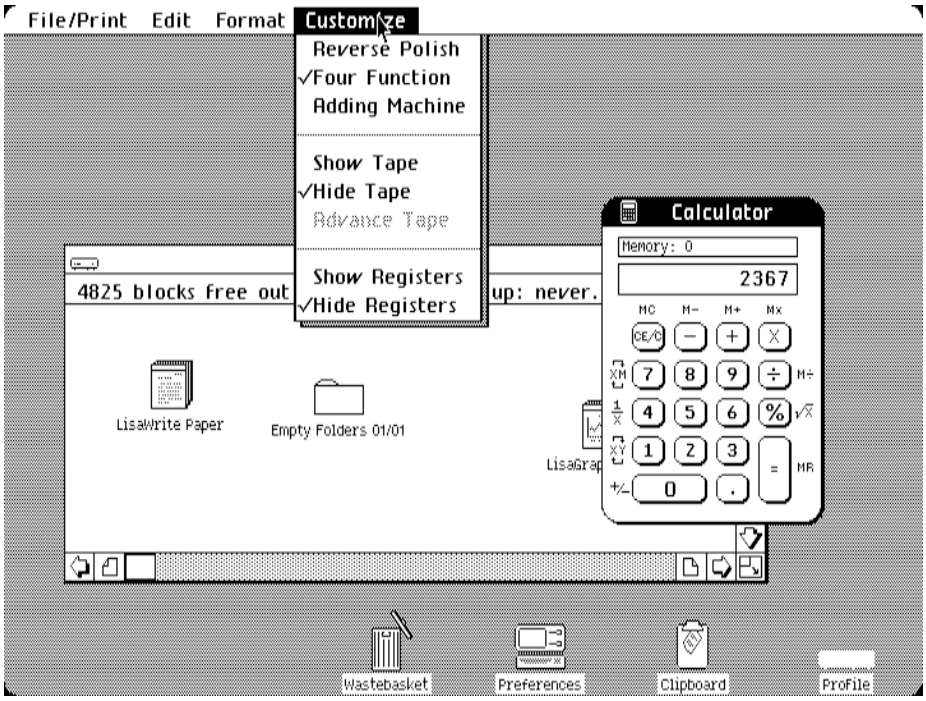

Figure 2.13. Apple Lisa interface 1983

(Source:https://upload.wikimedia.org/wikipedia/en/5/52/Apple_Lisa_Office_System_3.1.png)

Figure 2.14. Apple Macintosh (1984)

(Source: http://www.mac-history.net/top/2011-01-24/the-history-of-the-apple-macintosh/attachment/4-0-1)

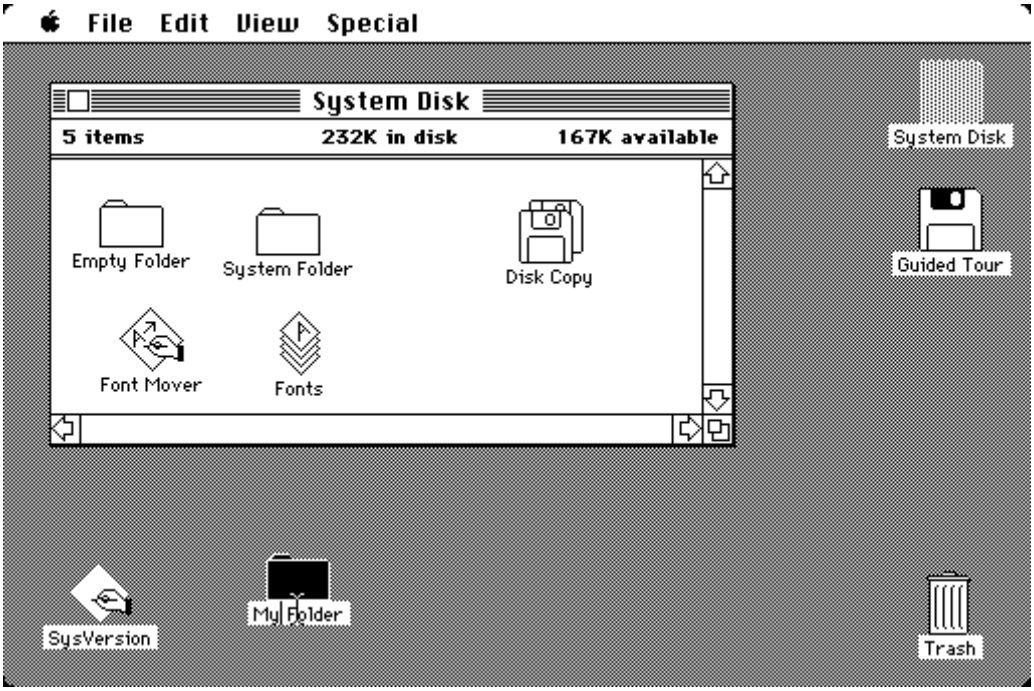

Figure 2.15. Screenshot from Apple Macintosh (1984)

(Source:https://upload.wikimedia.org/wikipedia/en/5/50/Apple_Macintosh_Desktop.png)

In 1986, a new GUI which was named *X-Window System* (see *Figure 2.16*) for UNIX[11] based computers was released by Massachusetts Institute of Technology (MIT). Its development started in 1984, but it was not known by the majority until 1986. X10 was a pioneer for supporting high resolution color screens. Its purpose was to construct a core protocol for defining a window system standard (Scheifler & Gettys, 1986). At the same year, Intel[12] introduced i386 which was the new central processing unit (CPU). It was the first true 32bit processor. Intel i386 allowed the cheap UNIX computers to become widely available.

[11] UNIX: Uniplexed Information and Computing Service (UNICS) (Zelkowitz, 2008, p. 6). UNIX is an open source OS. It has been distributed freely to the users (Ceruzzi, 2003).
[12] An American technology company located in California.

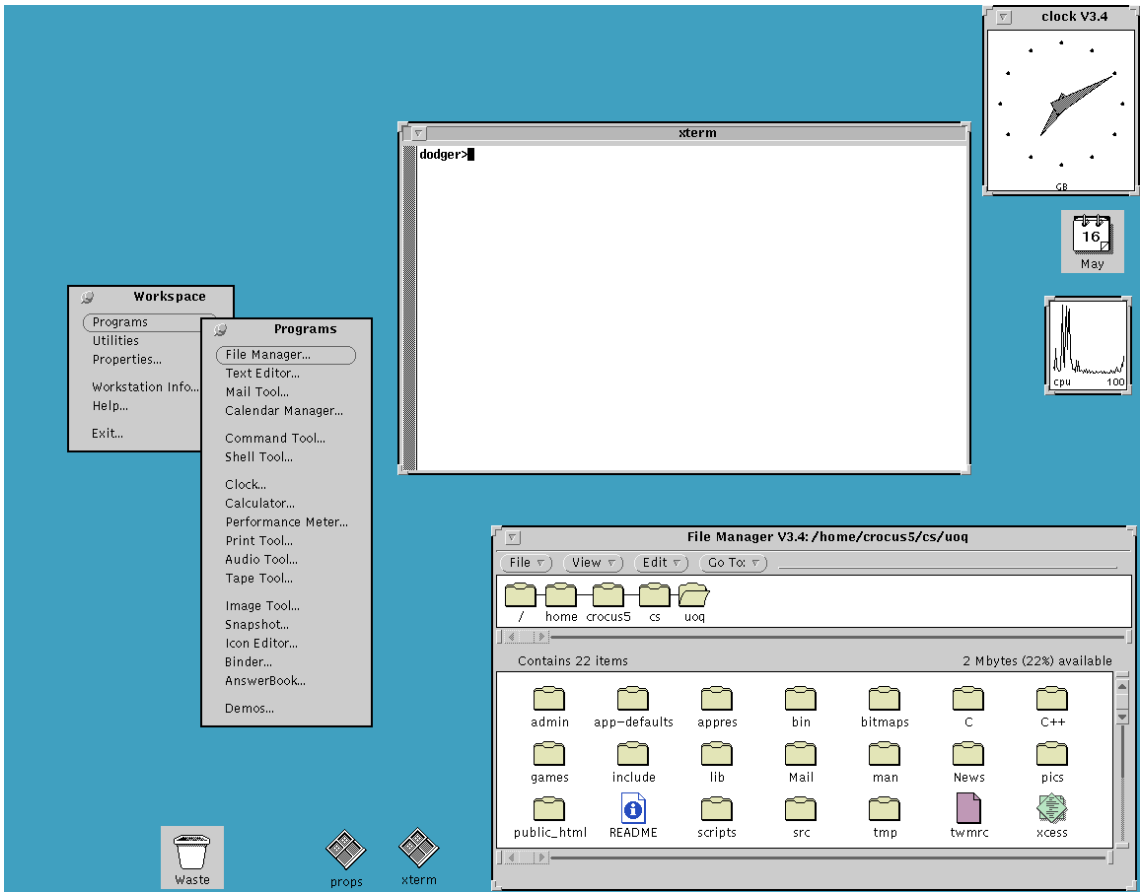

Figure 2.16. X Window System X10 (1986)

(Source: http://www.catb.org/esr/writings/taouu/html/graphics/olwm.png)

While GUIs were evolving, one company was struggling to stay in the market. Microsoft's[13] earlier attempts on developing OS for PCs did not go well. Its first OS was *Microsoft Windows 1.0* in 1985 and it was obsolete for its time. In 1987, Microsoft released their second generation OS, *Windows 2.0*, but its fate did not change. They were still using an obsolete interface when it is compared to others. It appears the company learnt its lesson with those market failures, because when the company released its third generation OS, it became indispensable. It was 1992 when Microsoft released the third OS which was *Windows 3.0* (see *Figure 2.17*) (Ceruzzi, 2003). Immediately after its release Apple sued Microsoft for copying their product Macintosh's interface and features but lost the case because "GUI" idea could not be protected under a patent ("Apple Computer, Inc. v. Microsoft Corp," 1994).

[13] Microsoft is a multinational technology company. It was founded by Bill Gates and Paul Allen in 1975.

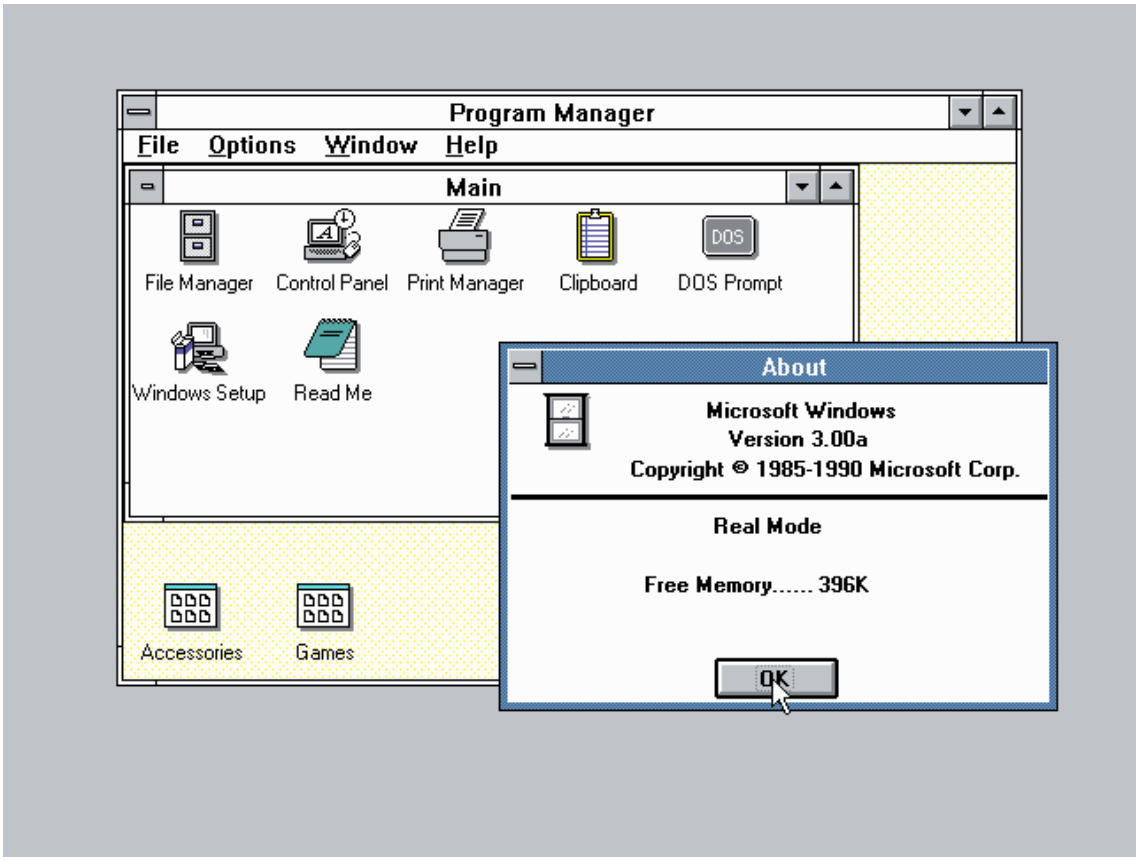

Figure 2.17. Microsoft Windows 3.0 (1992)

(Source: http://www.catb.org/esr/writings/taouu/html/graphics/win30progman.png)

In 1995, Microsoft's biggest accomplishment in its history happened. The company released *Windows 95* (see *Figure 2.18*), which reached a very high sales numbers around the world and had major changes in the user interface. Microsoft redesigned the desktop to hold shortcuts and folders, rather than showing the running programs. In fact, running programs were showed in the taskbar at the bottom of the screen. Users could run several programs or files without closing them to open space for new ones. Minimizing an open program with the "minimize button" was sending the window to the taskbar. The major error that Microsoft did while developing *Windows 95* was that the company could not foresee the internet's coming. The company did not include an internet browser for the first version of *Windows 95* but later in the same

year they included it in the *Microsoft Plus!*[14] package with *Internet Explorer 1.0* (Lessig, Corporation, & Court, 1997).

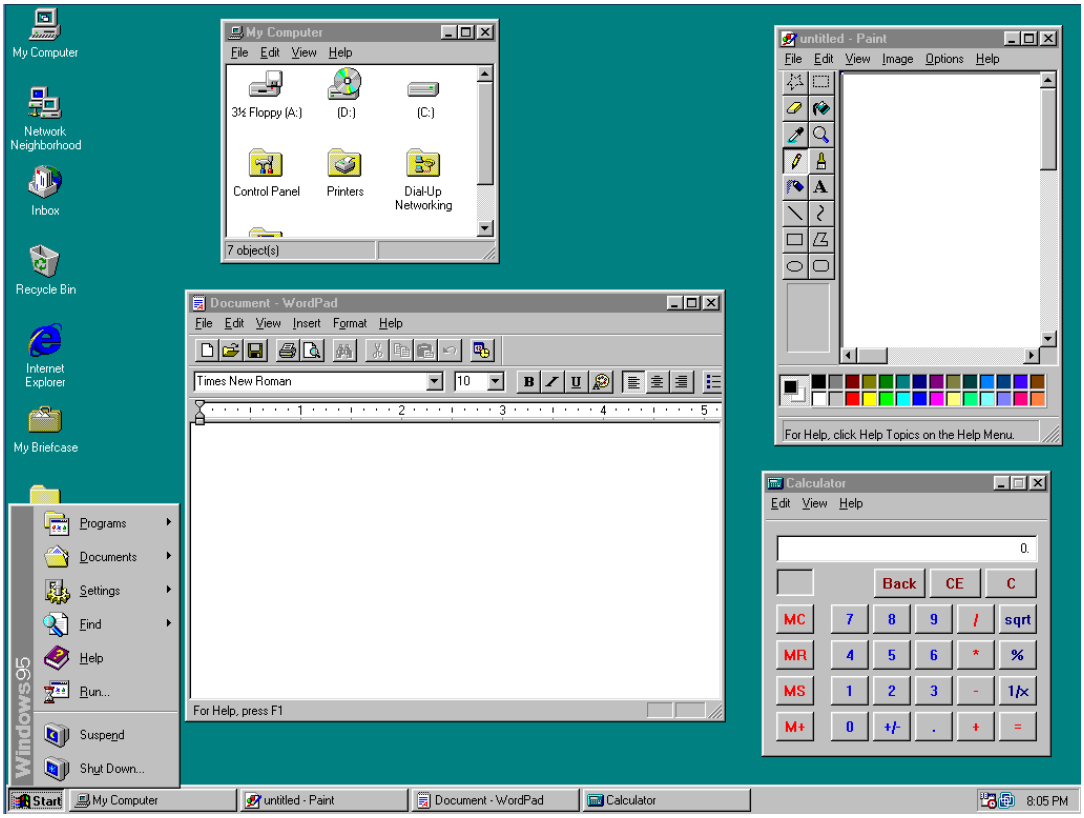

Figure 2.18. Windows 95 (1995)

(Source: http://www.jonnsworld.com/comp/img/win95_dt.png)

User interface changed a lot through in history and video games played a role in this history. Gradually changing UIs also changed the video games. New UIs have been developed for each generation of video games. To better understand the role of user-created interfaces compared to those created by companies, one should pay extra attention to video games which have a large community of user-created contents. MMORPGs prove to be reliable sources because of their worldwide community and interconnected players via internet, allowing players to communicate easily about their concerns and wishes that concern the game. Accordingly, the next section is about MMORPG and where it belongs in the game history.

[14] Microsoft Plus was an enhancement package for Windows 95 and it had included several new features like games, disk compression tools, and the Internet Explorer.

2.2. Genesis of MMORPG

Advancements in technology lead the online gaming industry to the tops. Thanks to the internet connection, massively multiplayer online (MMO) games as well as MMORPGs emerged. MMORPGs are the type of a blend game genre based on massively multiplayer online games (MMOG/ MMO games) and role playing games (RPG). Social interaction is a very important game element for these kinds of games, which usually lead to the creation of their own culture and, players follow that culture's rules.

The player takes a role of a character and stay in character as long as the game continues like in all RPGs. Main distinctive features of MMORPGs are the number of players able to play together and the constant virtual world, and thereby, differentiate them from single-player games or multiplayer online role playing games.

Activision Blizzard Inc.[15], Electronic Art Inc.[16], Giant Interactive Group Inc.[17], NCSOFT Corp.[18], Nexon Co. Ltd.[19], Aeria Games and Entertainment Inc.[20] and Ankama Games[21] are just a few of MMO-based game developer companies which lead the industry. While there are lots of game companies that develop MMO in the world, there is only one in Turkey (*TaleWorlds Entertainment*) whose works are recognized by the world's biggest companies.

TaleWorlds Entertainment is an independent company, which was founded in 2005 by Armağan Yavuz when he was working on a hobby project which is called *Mount & Blade* supported by the large group of gamers all around the world while it was still on beta[22] stage. Official release of the game was announced in 2008 and it was released in North America and Europe simultaneously. In the following years, company developed and released two more games, namely, *Mount & Blade: Warband* (2010) and *Mount & Blade: With Fire & Sword* (2011). Their second game was included in PC Gamer magazine's list of *100 Greatest PC Games of All Time* in 2013 (Decker, 2013, p. 36).

[15] Known by the game of *Warcraft* and its series.
[16] Known by the game of *Dragon Age* and its series
[17] Known by the game of *Allods*.
[18] Known by the game of *Aion.*
[19] Known by the game of *Atlantica*.
[20] Known by the games of *Age of Conan* and *Ragnarok Online*.
[21] Known by the game of *Dofus*.
[22] A testing version of the program which is executable but is still in development.

According to a market research[23] done in 2012 by the Newzoo Market Research Company, players spend $13 billion globally on MMOGs (McDonald, 2012). The same company released the estimated values for global game market share to be $81.4 billion[24] for 2014. *World of Warcraft*[25] alone had over 10 Million subscribers by the end of 2014 according to Blizzard Entertainment, Inc. (Blizzard, 2014). It can readily be assessed how big the game market and the share of MMOGs are. To understand the MMORPG better, looking into the history of the game and related genres would be helpful.

2.2.1. Role-Playing Games: Roots

According to Online Oxford English Dictionary the term "role-playing game'' is defined as "a game in which players take on the roles of imaginary characters who engage in adventures, typically in a particular fantasy setting overseen by a referee" (Role-playing, 2015). Players take roles and act within a narrative, sometimes by literally acting, sometimes making decisions and developing a character. Acts done in the game has consequences like in the real world, but within the system of rules and guidelines of the game.

RPG is occasionally called as the tabletop RPG, e.g. *Figure 2.19*, as its original type. In this type, players go through with the steps of discussions, but in the live action role play's (LARP), e.g. *Figure 2.20*, players must physically perform the necessary actions of their characters (Tychsen, 2006, pp. 75-82). In both types of games, there is an arranger of situations who is called the game master (GM). They do not participate in the game as a game character since they are supposed to remain unbiased as the ones who set the rules and act as a referee.

There are several varieties of RPG in electronic media too. The early type of digital RPG platforms is called multi-user dungeons/multi-user dimensions (MUD), which, over time, with the advent of graphical interface, evolved in to graphical MUDs.

[23] Released in 2012, Dec 12 at their website: *http://www.newzoo.com/infographics/the-global-mmo-market-sizing-and-seizing-opportunities/*
[24] Released in 2014, May 15 at their website: *http://www.newzoo.com/insights/global-games-market-will-reach-102-9-billion-2017-2/*
[25] A popular MMORPG created by Blizzard Entertainment in 2004

Figure 2.19. A tabletop RPG example "Dungeons & Dragons"

(Source: http://www.acrosstheboardgames.net/luke/top-5-dungeons-and-dragons-board-games/)

Figure 2.20. A fantasy LARP group

(Source: http://www.larping.org/portfolio/hardenstein-adventurers-group/)

RPGs have basically three elements to play. Those are player character, non-player characters (NPC) and the gamemaster (GM). Player character, whose actions are controlled by the player, is a standard concept in the fictional world of RPGs. Each player controls a separate protagonist in the story. NPCs are the ones who are controlled by the GM or game engine. Their purpose of existence is to fill out the population of the fictional story and to act as anything that GM wants. One common feature in many of all RPGs is the gamemaster whose duties can be listed as guiding the players through the game, creating rules and being a referee for the game. While maintaining the narrative flow, GM arbitrates the results of the actions of player characters. As well as tabletop RPGs, the video RPGs have the same GM functionality, yet here, these duties are fulfilled by the game engine itself.

2.2.2. Multi-User Dungeons

MUD is a text based virtual world that exists in real time. It consists of game elements like RPG, hack and slash[26], player versus player (PvP), interactive story and online communication. Because it is a text-based game, all of the interactions with the game has to be expressed in a text form. If you want your character to walk to the east, you have to write "walk to east" and so on. Every detail of the environment in the game is delivered to players with a text-based interface screen.

Many of MUDs evolved from dice-rolling tabletop games like *Dungeons & Dragons*[27] (Turkle, 1995, p. 11). Their unique features enabled some educators to create MUD-like programs to teach in their fields such as geoinformatics (Boring, 1993), medical informatics (Cruickshank & De Roure, 2004) and analytical chemistry (Schäfer et al., 2011, p. 1918). Also academic scholars in various disciplines such as like sociology, law and economics have shown interest in these types of games for research.

Early examples of MMORPGs like *EverQuest* or *Ultima Online* are called simply graphical MUDs because of their improved user interface (UI), which does not only include text but also graphical interactions.

[26] Originally comes from pen and paper RPG and refers to combat-focused gaming.
[27] A popular tabletop RPG. For detailed information: "https://dnd.wizards.com/products/tabletop-games/rpg-products".

Graphical MUDs use computer graphics to enhance the user's experience with the game by representing the virtual world as well as the player character via graphics (see *Figure 2.22*). *Habitat* was an early example for this genre which was written in 1985 (Egenfeldt-Nielsen, Smith, & Tosca, 2008, p. 78). Players needed to download clients and art works for the game to play on their computers.

With the increase of computer developing and network services since the late nineties, online gaming has changed its way towards masses, and the name 'graphical MUD' has changed too to become MMORPG (Safko & Brake, 2009, p. 377).

```
.RUN ADV11

WELCOME TO ADVENTURE!!  WOULD YOU LIKE INSTRUCTIONS?


YES
SOMEWHERE NEARBY IS COLOSSAL CAVE, WHERE OTHERS HAVE FOUND
FORTUNES IN TREASURE AND GOLD, THOUGH IT IS RUMORED
THAT SOME WHO ENTER ARE NEVER SEEN AGAIN. MAGIC IS SAID
TO WORK IN THE CAVE.  I WILL BE YOUR EYES AND HANDS. DIRECT
ME WITH COMMANDS OF 1 OR 2 WORDS.
(ERRORS, SUGGESTIONS, COMPLAINTS TO CROWTHER)
(IF STUCK TYPE HELP FOR SOME HINTS)


YOU ARE STANDING AT THE END OF A ROAD BEFORE A SMALL BRICK
BUILDING . AROUND YOU IS A FOREST. A SMALL
STREAM FLOWS OUT OF THE BUILDING AND DOWN A GULLY.


GO IN
YOU ARE INSIDE A BUILDING, A WELL HOUSE FOR A LARGE SPRING.


THERE ARE SOME KEYS ON THE GROUND HERE.


THERE IS A SHINY BRASS LAMP NEARBY.


THERE IS FOOD HERE.


THERE IS A BOTTLE OF WATER HERE.
```

Figure 2.21. An example of MUD user interface "Adventure"

(Source: http://hightechhistory.com/2009/12/06/william-crowthers-adventure-the-first-computer-adventure-game/)

Figure 2.22. An early graphical MUD example "The Shadow of Yserbius"

(Source: http://upload.wikimedia.org/wikipedia/en/e/e6/Yserbiusfight.JPG)

2.2.3. Role Playing Video Games

A role playing video game is a video game genre based on classic tabletop RPG, which contains visually rich graphics, usually 3D (Rollings & Adams, 2003). It is commonly referred as RPG rather than RPVG. In this type of game, player controls a game character or several characters in a fictional world to conquer it or to complete certain tasks. It uses almost the same terminology with tabletop RPGs but removes the requirement of the game master and rises the rapid fighting resolution.

Role-playing video games' focus point is to make player character get skilled, powered and leveled up. To make this happen, game engine puts the character in different scenarios, quests, puzzles while exploring the virtual world and gaining experience. Usually RPGs do not challenge players with their reaction time, but action RPGs do[28]. Also role playing video games contain more complex and dynamic player character and NPC interaction than other type of games.

In the virtual world of RPG, player characters are supposed to develop their skills through various methods. A very common method to do so is called ''hack'n slash'', which literally means killing every opponent that the character confronts during

[28] Action RPGs focus on rapid fighting scenarios and player has to decide quickly and take action while engaging in the fight.

exploration. That is to say, one can achieve higher levels through classic kill and explore. An alternative method would be developing skills through role play scenarios such as getting quests from NPCs and completing the given tasks. In brief, quests can be described as the tasks the player is assigned to complete during the game. They are usually accepted from an in-game NPC at the appropriate player character level, but sometimes these quests appear when the character finds an item that has a specific role in the scenario.

What you chose to do in the game changes the entire story. Every step in the virtual world can alter the story and takes character to new places. At some point you can be friends with your enemies or some unknown relative can decide to show his face (Adams & Rollings, 2010). It is also important to have as strong dialogues with NPCs as the story line. Usually the player character can interact with NPCs and get information about the places or quests, even get friended with them and provide some assistance, acquire special quests or get rewarded with experience or currency.

2.2.3.1. Exploration

Exploring the virtual world is same as exploring the real world. Traveling around and looking for different places, different people, hidden stashes, climbing the mountains, riding mounts, etc. to see the world. Most RPGs have a fast travel system in it. When a player character reaches a check point –like a village which has a bus stop- character can use that point to instantly travel to previous points that it has already visited before.

Virtual world of RPG is an important element. Players walk, talk to NPCs, and pick up objects on the way. Some type of RPGs has a structure of randomized dungeon maps. When players return to where they were before they find it altered or changed as in some games like *Fate* or *Diablo*. This makes the game even more full of fun to play again several times (Adams & Rollings, 2010). Players have to get enough power to challenge the boss NPCs and proceed to next area/dungeon.

In old games, combat mode is different than exploring mode. When the player encounters a combatant, game engine immediately sends the player to a different place where the fight emerges. Modern games on the other hand have independent NPCs and a player is more likely to get in a fight with them. Wherever they encounter when the

fight starts, players' first choice is to get in position rather than selecting which action to take.

Only one character can act at a time in a classical turn-based games. Those type of games force the player to think strategically rather than being quick. This, often, does not mean the player has all the time in the world. Player has to take action in a given period of time. Otherwise the game engine takes this as a pass and gives the turn to an opponent. Real-time combat has features similar to action type games, and creates real-time RPG battles. Those type of games challenge the player with reflexes and quick thinking.

2.2.3.2. Visual

Appearance is a very important element for RPG. Players usually want to dress their characters as they want to be. Each player designs their characters' outfit themselves. Different shapes of armors, weapons, accessories create a life-like game. In other words, the more realistic the characters look the better the gaming experience gets. In the specific world of RPG this element is commonly referred as 'visuality'. These aforementioned clothing items and weapons can be owned via loots[29]. Players usually find loots while exploring the world or doing quests. These loots can be useful items such as armors, weapons, and clothing or useless items such as junk metal or rusty weapons. While players can carry more than one weapon or armor set in their inventory, the inventory system is restricted by the game's rules. Because of the restriction, inventory management gets very important when the player advances through the story. Some games handle the inventory management by limiting the character with the items' total weight, some games by the number of items (Adams & Rollings, 2010). Items' unique graphic designs help player to identify them in their inventory along with other items (see *Figure 2.23*).

The visual of user interface is another important element for RPG. Overlaid units (e.g. character's abilities, health indicator, map, active quest information) must be easily identifiable by the player. Designing the user interface is also relevant to designing a user interface which fits to the story or period of the game (Adams & Rollings, 2010).

[29] Loot refers to an item(s), which is either useful or useless, found in the virtual world throughout the scenario by doing quests, killing enemies or finding hidden stashes.

Figure 2.23. Character inventory screen from the game "Diablo"

(Source: http://www.mobygames.com/game/macintosh/diablo/screenshots)

2.2.4. MMO Games

"Online gaming is a technology rather than a genre, a mechanism for connecting players together rather than a particular pattern of gameplay"(Adams & Rollings, 2010). An online game is a general type of specific games which are played through special networks or internet. According to Spilgames research; seventy percent of online people play games, and seven hundred million people play online games worldwide (Johnston, 2013).

A multiplayer online game is a game type which is played through special network or internet via game server, involving many players simultaneously around the world. These types of games differ from MMO games because they do not have a

persistent world, instead they create dungeons/arenas for a single game /round with listen servers.[30]

MMOG is a multiplayer video game type which allows thousands of players to play simultaneously. It is played on the internet because of huge data traffics. MMOGs create an environment where players can collaborate or compete with each other in a crowd. It is a game genre, and it further creates different sub-genres such as MMORPG, MMOFPS[31], MMOBBG[32], MMORTS[33], and so on. Jennifer Grouling Cover argues in her book that "…current rhetorical theory has come to recognize that genres are not stable forms, but living entities that change over time" (Cover, 2010, p. 39). Since the game uses the internet, it encourages players to contribute to the development of the MMOG and its sub-genres by paying via various methods.

There are two kinds of game subscription in this genre; Free-to-Play (F2P) and Pay-to-Play (P2P). F2P games are basically games that one can play indefinitely for free. This kind of games usually offer in-game stuff, e.g. armors, weapons, clothing, accessories and mounts. Players buy these items to support the developers and also to obtain high-end game items quickly. These purchases are also the means of creating a sense of fashion within the game world, which creates its own followers. On the other hand, P2P games require monthly payments to play the game, but they do not sell in-game items that alter the game play. They, on the contrary, help to create a sense of balance between players.

Table 2.1 shows how big the P2P game market is and why the finance of MMOG is important for the game industry. In the table, one can see how *World of Warcraft* leads the market with the highest share and approximately with a billion dollar revenue which is one third of the total revenue in MMO market (Tassi, 2014). The following section of this chapter is about MMORPGs, which are considered a sub-genre of this type of MMO games.

[30] Listen server is different from main game server, but runs in it with an appropriate software. It creates a temporary peer to peer (P2P) connection for each player who are inside of the arena/dungeon (Khoo, Dunham, Trienens, & Sood, 2002, p. 50).
[31] Massively Multiplayer Online First Person Shooter.
[32] Massively Multiplayer Online Bulletin Board Game.
[33] Massively Multiplayer Online Real Time Strategy.

Table 2.1. Top subscription-based MMO titles, 2013 – worldwide

(Source: http://www.forbes.com/sites/insertcoin/2014/07/19/world-of-warcraft-still-a-1b-powerhouse-even-as-subscription-mmos-decline/)

TOP SUBSCRIPTION-BASED MMO TITLES, 2013 - WORLDWIDE				
RANK	TITLE	PUBLISHER	WORLDWIDE REVENUES (MIL $)	MARKET SHARE 2013
1	World of Warcraft	Activision/Blizzard	$1,041	36%
2	Lineage 1	NCsoft	$253	9%
3	TERA: Online	NHN Corporation	$236	8%
4	Star Wars: The Old Republic	Electronic Arts	$165	6%
5	Lord of the Rings Online	Turbine, Inc.	$104	4%
6	EVE Online	CCP Games	$93	3%
7	Aion	NCsoft	$88	3%
8	Blade and Soul	NCsoft	$65	2%
9	Lineage 2	NCsoft	$45	2%
10	RIFT	Trion	$36	1%
Worldwide market for subscription-based MMOs, 2013			$2,882	

2.2.5. MMORPGs

As seen on *Table 2.1*, while it is mainly concerned with MMO titles, a MMORPG game takes the first place on the market share table. Therefore, one can readily argue that MMORPG is the most subscribed sub-genre of MMO game.

MMORPGs blend the genres of RPGs and MMOGs. Like all the other RPGs, players control the character's actions and take a role of a character in a virtual world. Their difference from single-player and multiplayer RPGs is the number of players who interact with each other in the game's persistent world.

The development of the player character is the primary goal for progression in MMORPG as in all RPGs. Players can gain experience throughout the game by completing tasks, by combat victories or by artificially chatting with NPCs[34]. The best way to become experienced is to get involved in a combat, whereby players can get better items (usually items for further combats).

Some MMORPGs do not have a level limitation for characters, meaning they allow players to gather experience and level up as long as they play. In these types of games, producers often announce the best players' avatar on the game site and post their scores. Some, on the other hand, limits the maximum reachable level and make players

[34] Pre-coded dialogues create an environment that players feel they are having a conversation with a real person.

to race for the best outfit for both boss NPCs and PvP fights. Players who reach the maximum reachable level get game money, item or other useful stuff rather than gain experience. In each case, a player needs social interaction with other players to proceed to the next level or fight.

2.2.5.1. Social Interaction, Culture and Psychology

Social environment is an important aspect of these kinds of games. It is a remarkably big world, where players often need other players' help. Players usually use an in-game chat application to find another player who can help with one's quest. Sometimes players create a guild/clan or get in one to be a part of a team to achieve certain levels. At some parts of the game, players join a small team to support other players by tanking[35], healing[36] or damaging[37] enemies. Social interaction in the game is similar to that in the real world. Most people find it very easy to socialize and be friends with the strangers in the game. Twenty-one per cent of players prefer online socializing to the real one. When it comes to interaction and seeking for help, female player characters have more social attraction than the male ones for the majority of the players in the game are males. Players would like to talk to girls rather than boys or help them in their quests (Hussain & Griffiths, 2008, p. 50). That is why players tend to choose female player characters in the game.

Players write in the chat section to their team mates in a very casual fashion or tip other players for their help with game money or goods. If players like each other, they usually add each other to their friend list so they can meet again when they become online again in the future.

When people start making groups, it is almost inevitable to create unique signs, jargon and representations over time which are only meaningful to the members of that group. In this context, players often talk about their dissatisfaction, 'grind'[38] or discuss

[35] Some players are geared for taking damage by taunting the enemies to attack him/her. These players are called "tanks". Thanks to the tanks other players in the same team can keep progressing in the game.
[36] Some players are geared for healing. They are skillful healers to aid tank and other damagers in the team.
[37] Some players are geared for damaging. They are called DPS (damage per seconders). They are specifically developed for doing lots of damage to enemies.
[38] A slang term for all time-consuming, tedious, repetitive actions in a game.

buffs[39] and nerfs[40], which are gibberish to gamers who do not play MMORPG. There are several unwritten social rules and restrictions about the game regarding how to get invited to quest groups or how to get the equal treasure in a group. Equality is in the hands of the group leader while one is in a group. Group leader decides who will be awarded or punished on the basis of their behaviors. If a player understands and does whatever needed in the group, they are awarded with the bounty of the group activity. If one wants to get in a group like this, one should always look for the group announcements on the chat panel, and it has to be done in a kind manner while patiently waiting for a sign in the virtual world's major cities (Nardi, 2010).

Roger Caillois, who is a French psychological anthropologist, explains activities which need alternative realities to demonstrate the action in the category of mimicry (Caillois, 1955, p. 68). Mimicry is the key point for game playing activities. To escape one's limited ego, they create and become their fantasy beings. When players play their characters in the virtual world they do not just become the character, but they also feel like the character. If the character is opposite sex, they feel, speak or act like that gender during the game. Players get in a role of their fantasies and play in alternative realities where they can be more of themselves, which is an act that dates back as far as Mayans. This Mesoamerican society used to play a game like basketball with their masks on their faces. This act akin to religious rituals gives the players a spiritual strength of Gods (Csikszentmihalyi, 1990, pp. 76-77). Momentarily, game players feel the strength of their characters in them and this creates certain satisfactory feelings that are linked with the flow theory[41]. Some experts believe that this state of the player has an effect like a drug that creates addiction to the game. Yet, despite common references to the situation as an addiction, especially among worried families, it is still not considered an addiction by the majority of medical doctors or psychologists (Wood, 2008). Nicholas Yee on the other hand, approaches this phenomenon in a psychological addiction. Yee resembles attraction factors of MMORPGs to "carrot on a stick" (Nicholas Yee, 2002, p. 8). Players get rewards easily at the beginning of the games, but in time, when player character gets skilled, it gets harder to obtain rewards.

[39] A temporary beneficial status effect.
[40] When developers upgrade the game with a new version, they usually alter some characters' abilities by either strengthening or weakening a specific ability.
[41] For a detailed explanation see Chapter 3.3.

In one of Yee's research which is about players' motivations on playing online games, he categorizes these motivations in three components. *Table 2.2* shows those categories and related motivations in order.

Table 2.2. Yee's categorization in players' motivation on playing games

(Source: (Nick Yee, 2006))

Achievement component	**Social component**	Immersion component
Advancement: "The desire to gain power, progress rapidly, and accumulate in-game symbols of wealth or status"	**Socializing:** "Having an interest in helping and chatting with other players"	**Discovery:** "Finding and knowing things that most other players do not know about"
Mechanics: "Having an interest in analyzing the underlying rules and system in order to optimize character performance"	**Relationship:** "The desire to form long-term meaningful relationships with others"	**Role-Playing:** "Creating a persona with a background story and interacting with other players to create an improvised story"
Competition: "The desire to challenge and compete with others"	**Teamwork:** "Deriving satisfaction from being part of a group effort"	**Customization:** "Having an interest in customizing the appearance of their character"
		Escapism: "Using the online environment to avoid thinking about real life problems"

At some point, game pushes the player to team up with other players so s/he can progress better. Sometimes players cancel their real-world schedules to keep up with the game, i.e. students skip school, mothers have difficulty in taking care of their babies (Ivory, 2012, pp. 66-67).

> Some people may have difficulty forming and sustaining relationships in real life. They may have problems with platonic or romantic relationships or both. An MMORPG effectively simplifies the channel of communication, and relieves the pressure of having to deal with real-time face-to-face conversation. Some individuals who are shy or have low self-esteem may be able to form relationships in the virtual world which they are not able to in the real world. (Nicholas Yee, 2002, p. 13)

Playing the game gives players freedom to act as they wish. Even if the environments in the game are virtual, the players who interact with each other are real. Many people are reported to expand their emotional state by exploring the game with different roles in a long time period (Hussain & Griffiths, 2008, p. 47). Along with the mimicry, having an option of changing the role of one's character gives an alternative path to fantasy world of players. Long play times become obligatory and indispensable for them.

CHAPTER 3

THE ROLE OF USER INTERFACE OF VIDEO GAMES IN PLAYERS' SATISFACTION

There are several major elements to design a computer software. When the software developers design software, they consider creating a balance between the two most important elements; performance and function. An issue regarding the software, namely the lack of ergonomics in UI, as a problem caught the interest of industrial designers when programs became a part of everyday life for everybody with the advent of personal computers. Mentioned ergonomics issue was the UI's readability and intelligibility problems[42], which caused users to have difficulties while using the program. Missing tooltips on icons caused people to have difficulties in understanding while using the program. Also, creating very little clickable buttons on the screen or locating theme very close to each other makes people uncomfortable while using the program. Owing to this new developed awareness on interface design, user interface became the most important element in software design (Johnson & Wiles, 2003).

UI can be described basically as an interface between people who interact with the program and the software itself. It is a very vital element for the software and for the users. Simplicity and manageability are the key factors for UI design (Bernhaupt, 2010). Like all software, games have a UI design that tries to satisfy gamers' needs. Every game has a different UI even though most of them remain similar at the heart, which is mainly because of the gamers' habits (Johnson & Wiles, 2003). The gamers tend to look for their character's health indicator in the corners of the screen or their game items on the edges of the screen. This has become a standard in the game industry and developers and companies still maintain this tradition in their games.

From the very beginning of the UI development in games, on-screen information has been a very crucial element for the gamers (Johnson & Wiles, 2003). It affects the flow of the game, pleasure that gamers take and also the market success of the given

[42] A very popular example of this ergonomics issue is *Microsoft Windows'* UI's continuous improvement after the first version of the program.

game (Targett, 2011). With the recent trend of modifying (modding)[43] existing games, developers started creating games that allow gamers to create their own user interfaces. Modifications (mods) or addons[44] which are created by game developers or game enthusiasts increase the play time and enhance the game interface usability for different types of player character roles.

Figure 3.1. Left: Original "Doom" interface. Right: Bill Gates presenting "Windows95"

(Source:https://upload.wikimedia.org/wikipedia/en/d/de/Doom_ingame_1.png http://www.orangeek.org/images/bill_gates_into_doom.jpg)

In 1993, game development changed with the game named *Doom* by *id Software*. Until then the games mostly used user interfaces just to tell the scores of the players. With the release of *Doom*, gamers did create and share their own modified characters and maps with the game community through gaming forums. A very popular example for this phenomenon is the *Windows95* promotion done by *Microsoft Inc.* who included Bill Gates as an actor in the *Doom*'s game engine (see *Figure 3.1*). Some game mods proved even more popular than the original game after modding became a common practice in the community. A very good example for this phenomena is *Counter-Strike* (a first person shooter played by two teams. Teams are identified as

[43] Modding is not a real word but used by game players and developers for explaining what they do to games by modifying the game interface. Shortened by game enthusiasts such as developers as "modding".

[44] Known as add-on but gaming community recognizes this word as addon and it is always written as seen in the paragraph above. It means an additional application that usually cannot work by itself and instead depends on game database.

"terrorists" and "anti-terrorists"), which is in fact an addon for *Half-Life*[45] developed by the producer company *Valve.*

World of Warcraft, which is by far the most popular online game, is very flexible about addons. The game has over ten million active players (Blizzard, 2014) and it has a huge addon community in various kinds. For that reason, *World of Warcraft* will be used as a case study and discussed in detail in this dissertation.

3.1. UI and Modding

Satisfaction is the key element in games and entertainment business. Since most players tend to watch promotional game videos or play the game demo[46] to decide whether to actually buy the game, it proves important that the game satisfies their expectations. There are various elements that provide satisfaction for gamers in a game such as the script, the quality of soundtracks, resolution, point of view shots and so on. Arguably the most important of them all is the graphical elements. When players start a new game they find themselves in a virtual world and the first thing they perceive and appreciate is the graphical elements (see *Figure 3.2*) that are supposed to create a sense of flow; namely, colors, shapes, tools, characters, and UI. Majority of the games have a story to tell and they use said features.

Developers always create a goal for players' satisfaction before they start creating a game. They consider the flow of the game to achieve this goal. Good food, good sex, good drinks or good gadgets that money can buy create pleasure on people's consciousness; the developers intend to do the same by their games. When players have a pleasurable moment that passes the expectations and create a different emotion, they feel the flow and enjoyment. One can say that flow is a joyful moment of awareness and participation. Joyful moments are the ones one wishes to last and even repeat (Csikszentmihalyi, 1990, pp. 100-103).

[45] *Half-Life* is a first person shooter which involves a scientist called Gordon Freeman, who fights against aliens and tries to survive through an apocalyptic accident in an underground facility.
[46] Game demo is a promotional software distributed freely by the game company that only allows limited play time or limited game level so that the player will have enough information and experience to decide whether the game is worth buying.

Figure 3.2. An in-game screenshot for a virtual world from World of Warcraft (Source: http://wow.4fansites.de/bilder/warlords-of-draenor/warlords-of-draenor-19.jpg)

While games were evolving over time, gamers' demands evolved, too. Complexity in changing game informatics unveiled the need of personalized UIs. These kinds of UIs make gamers more in control with the game and more attached to it. While some games allow players to change the UI at basic level, some games do not allow changes. Players pass this restriction by adding modifications to the game (a.k.a. addons). Addons are user-designed software and they make games more satisfying and fluent. Because they are designed by the players, these addons are specifically coded for the missing piece of UI which is needed by the players. Whilst there are so many addons in free sharing portals, each of them can be personalized for gamers.

World of Warcraft has various kinds of addons. Back in 2004 when the game was released, there were no addons, nor any user-created content. The game itself had only its original UI which was created by the company's developers. Gamers experienced difficulties even when they were doing the simplest actions while playing the game. Over time some addons started to come out. The most popular, which is also considered to be the very first, addon, *QuestHelper*, was created because of the insufficient information about quests and quest area whereabouts. It became so popular

that company thought about implementing a new UI to help people on their quests and embedded it in the game's main core system in the following years.

3.2. WoW Interface

There are several main features about user interface in this worldwide renowned game. To better understand the game and its interface, a detailed evaluation will be presented in this section. This will also provide a background when it comes to investigating the lacking features of the UI in this specific game. While there are more informatics and elements in the game than what developers foresee, developers either missed or intentionally did not put an UI for those. This attitude ultimately leads the players to create their own addons for the missing UI.

When a player starts the game as a fresh beginner they see a server screen with an empty character list. At the bottom of the list there is a "Create" button which takes players to character creation page (see *Figure 3.3)*. Also at the bottom left of the screen there is a button named "AddOns" where you can manage your installed addons before you start playing, a feature which we will be discussed later in this chapter.

On character creation screen there are several sub-categories to choose from to create a character (*see Figure 3.4*). Right pane indicates which class[47] one wants to play with, left pane indicates which race a player would like to be. When one clicks on "More Info" button at the left bottom side of the screen, relevant information about races and classes is revealed.

After selecting the race and class, clicking the "Customize" button takes the player to character customization screen where they change their character's look (see *Figure 3.5*). Each race has its own customization options. Sometimes one can chose how their character's ears will look like, sometimes they chose the horn type[48]. To finish the character creation, the player clicks on the "Finish" button and the screen takes the player to the server's character screen again (*see Figure 3.6*).

[47] Class is the role you play in the game. Warrior, Paladin, Rogue, Hunter, Priest, Shaman, Mage, Warlock, Monk, Druid, Death Knight are the classes in the game.
[48] For instance, Tauren race looks like an ox that stands on its rear two legs and has horns.

Figure 3.3. WoW character creation screen

(Source: World of Warcraft in-game screenshot, v.6.2.2.20574, screenshot taken by U. Kocaman)

Figure 3.4. WoW character creation page

(Source: World of Warcraft in-game screenshot, v.6.2.2.20574, screenshot taken by U. Kocaman)

Figure 3.5. WoW character customization screen

(Source: World of Warcraft in-game screenshot, v.6.2.2.20574, screenshot taken by U. Kocaman)

Figure 3.6. WoW server's character selection screen

(Source: World of Warcraft in-game screenshot, v.6.2.2.20574, screenshot taken by U. Kocaman)

Game's main screen (see *Figure 3.7*) is very basic. When entered the game for the first time, a tutorial window welcomes the player. It explains the basics and it occurs occasionally when there is a new action to be explained to the gamer.

Figure 3.7. WoW main screen

(Source: World of Warcraft in-game screenshot, v.6.2.2.20574, screenshot taken by U. Kocaman)

Figure 3.8 shows specific UI elements which are marked with letters. Character window shows both player characters' remaining health pool and another pool that changes depending on a character's class. The latter sometimes transforms into a mana pool[49], rage pool[50], focus pool[51] or runic pool[52]. When the character faces an opponent, player use the skill bar as well as action bars. Skill bar is basically used for character's attacking skills. Action bars are extra spaces for a character's skills, such as for placing

[49] Wizard like characters that depend on spells and who need magic power a.k.a. mana to cast have mana pools. Mana pools show how much mana a character has at the moment.
[50] Heavy melee classes need rage to fight. They get angry when the opponent hits them and their rage pool slowly fills. They use this special kind of rage power to cast powerful attacks.
[51] Light melee classes such as knife users or archers who need precise attacks to do high damage to an opponent use focus. They have to give all their attention to those strikes. Focus is the power source of these kinds of attacks.
[52] Runic power is a class specialty of Death Knights. They are risen from dead and now they are working for their original races. They are heavy melee classes but use runic power instead of rage.

foods and drinks or for placing buffs and crowd control (CC) spells[53] which are not usually used in combat.

When players call/summon their companions[54] for help, relatively smaller window appears below their character window. It shows the similar information like in their character window, depending on the companion's type. Player can use pet's skill bar to give orders to attack or to wait. Also, if character's companion is on aggressive mode, it will attack to the target when player attacks to the target.

Figure 3.8. WoW UI

A: Character window B: Companion window C: Target window D: Mini map
E: Buffs and debuffs[55] F: Additional action bars G: Skill bar. H: Action Bar
I: Companion skill bar J: Game relevant options bar K: Bags bar L: Chat window
M: Enemy indicators

(Source: http://procrastinationamplification.com/wp-content/uploads/2010/03/sq5kxz.png.jpg)

[53] When players fight more than one opponent, they usually cast a skill to limit other opponent(s) activity to participate in the fight.
[54] Some of the classes have companions to fight alongside with the characters. Hunter classes tame open world animals, warlock classes have demon companions and mage classes have frost elementals.
[55] Buff is a general term for a temporary beneficial spell that alters characters. A debuff is the opposite of a buff.

Target window shows the target's information same as the character window. "M" shows the possible targets that character can engage. Window "M" has a range proximity setting. If a character is far from the target and cannot engage in any means the window disappears.

While traveling around in the virtual world, players find their ways through a map system. There are two different map systems in the game. While one is stationary on the upper left corner and indicates where to go for the active quest, the other one is activated by pressing the "M" key on the keyboard and shows a bigger full screen map. Next to mini map to the left, there is a special area for buffs and debuffs. Players can check this area to see if they have their buffs on them or if they are affected by debuffs. Also if a character has an active quest, a quest window appears below the mini map showing quest name and what needs to be done.

Characters can get loot from dead opponents as well as chests or as a reward by completing a quest. Those loots are transferred to the character's bags automatically. For the character's bags there is a special window at the down right side of the screen. Characters can have only five bags and one is given by the game free when the character starts the game and cannot be changed or deleted.

If players want to look at their characters' spell book or talent tree[56] they use the game's relevant options bar. Each button represents a special window like character attributes window, talent skills window or game preference window. Chat window is often used for communicating with strangers but in virtual world's cities, it is mainly used by players who want to sell their goods or want to buy some.

While every UI element seems to be include in the game, some gamers were not satisfied by the game's lacking features for the advanced gamers' community; e.g. DPS meter[57]. The absence of a feature—which seemed crucial for the gamers—in the game generates a new kind of interaction with the game's user interface. A user-created user interface becomes popular and reachable for everyone.

[56] Each class has three or four talent trees to choose from. Those talents trees direct the player to a role to participate in a group or activity.
[57] DPS meter is a term for an addon which calculates the average rate of damage done in time.

3.3. A Rising Mode of UI in WoW: Modding

The sense of flow and enjoyment seems to be the main motivation behind any fun activity in general and online gaming in particular. Players seek to derive the most satisfaction possible from their engagement in the game. This ties in very well with the theory of flow as explored by Csikszentmihalyi (1990) and the theory of personalized user interface as explored by Blom and Monk (2003).

People usually personalize their environment according to their habits, likes/dislikes, and functionality of their spaces. Organizing a desk in a work place, using different colored plastic covers on mobile phones, changing the font size of software can be classified as personalization. This study will focus on a more specific area of personalization; namely, the user interface personalization in the game. Personalization can be defined here as changes that are done on the user interface and change of information content that user adds to/removes from the original software. According to Blom (2000), motivations to alter the look and functionality of a user interface derives from two major categories: 1) work-related motivations, and 2) social-related motivations. Customizing one's work space because of one's visual disabilities could be evaluated as a work-related motivation, on the other hand, attaching stickers to laptop computers for expressing one's feelings could be evaluated as a social-related motivation. In the first example, people personalize their own environment to alter working performance and working mood. Second example is about social sharing. They attach stickers to identify themselves with a particular group. The idea is simple; advertising/announcing the person's liked groups/ideas to their own social environment (J. o. Blom & Monk, 2003).

The other theory that is relevant to players' behaviors about changing the user interface in the game is the flow theory. The theory itself is not a new article in the field of psychology, yet, till Csikszentmihalyi, it was not discovered nor theoretically described in the field. In his book he explains that "'Flow' is the way people describe their state of mind when consciousness is harmoniously ordered, and they want to pursue whatever they are doing for its own sake." (Csikszentmihalyi, 1990, p. 6). Flow is described as a form of happiness. It is not a purchasable thing to go and buy and stock it under the bed for unpleasant days. It stands in every individual's mind in its own way.

It has a unique form of happening for everybody whose indicators are the people's feelings. To achieve that state of mind, flow requires happiness.

The behavior of modifying the user interface can be caused by a work-related motivation or a social-related motivation. Above all, it can be related to "flow". As executed in the physical world, the idea of personalized spaces does exist in virtual worlds too. Players in a MMORPG try to create their own spaces by altering their characters or interfaces with various different options that the game allows them to do. Creating a user interface for a missing game feature or changing the UI frame size to make it bigger can be a work-related motivation for personalization theory. Changing the UI is basically a search for ergonomic interface to play better, to understand better or to differentiate better. When users create their own addons, they usually upload them to addon portals to share with the community. Those kinds of communities enable free sharing and the creators of the contents in the portal do not get paid by their works. Nevertheless, the community is getting larger by the day. In this context, social related motivation for the personalization theory can be the fame acquired in gaming community. The more user-created interface is downloaded and used by other players the more reputation the content developers get. Having their content widely shared in the social media, and subsequently receiving positive comments, motivate developers to continue their work. By adopting user-created contents, players create a bond with the game and feel a stronger connection between their characters.

Ergonomics in UI is not a new understanding in UI design. Every software's UI gets new upgrades and changes in the next version. On the other hand, companies like *Blizzard* let the users to change the UI without upgrading the original UI. Blizzard's leading game *World of Warcraft* gives players freedom to create their own personalized gaming experience and ergonomics in user interface creation (Prax, 2012).

Changing user interface is very easy even for non-developer players. A well-known website *www.curse.com* has an application to download (see *Figure 3.9*). This application automatically scans for the game and allows users to download shared content to the game's directory. To better understand the process, two of the most downloaded and used UI customization addons, *Z-Perl* and *Bartender*, will be examined and explained here.

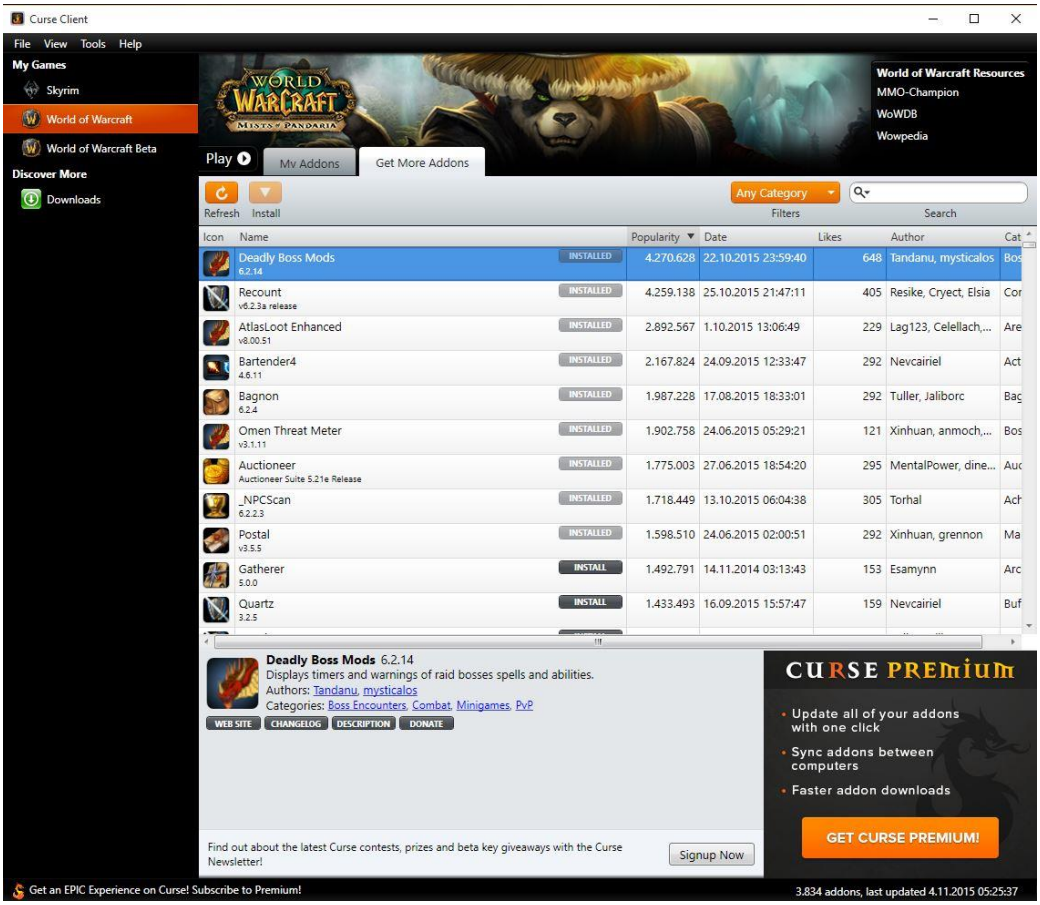

Figure 3.9. Curse client's interface

(Source: Curse Client screenshot, v.5.1.1.844, screenshot taken by U. Kocaman)

Z-Perl[58] is a unit frame addon, which does basically change the game's unit frames and their positions; e.g. character's health information window, target's information window, group information window. In the original interface of the game, unit frames have been anchored to the corners of the screen, giving players a wide open area for viewing (see *Figure 3.10*). The game allows players to change the interface—in this matter the unit frames—the way they want it to be (see *Figure 3.11*). It is not only colors, but also style and location of the frames can be changed.

Creating different layouts for unit frames rather than the default designated locations develops a sense of ownership. This act can also develop a flow-like a state of mind. Player character is located in the center of the screen while playing the game. When the player involves in an action scene, all the happenings occur in the center of the screen. Gathering fatal indicators, like player's unit frame or target's (enemy) unit

[58] *Z-Perl* was previously known as *X-Perl.*

frame in the center, creates a focusing area for the player. While a player is fighting, one can still easily track the character's health and enemy's health at the same time.

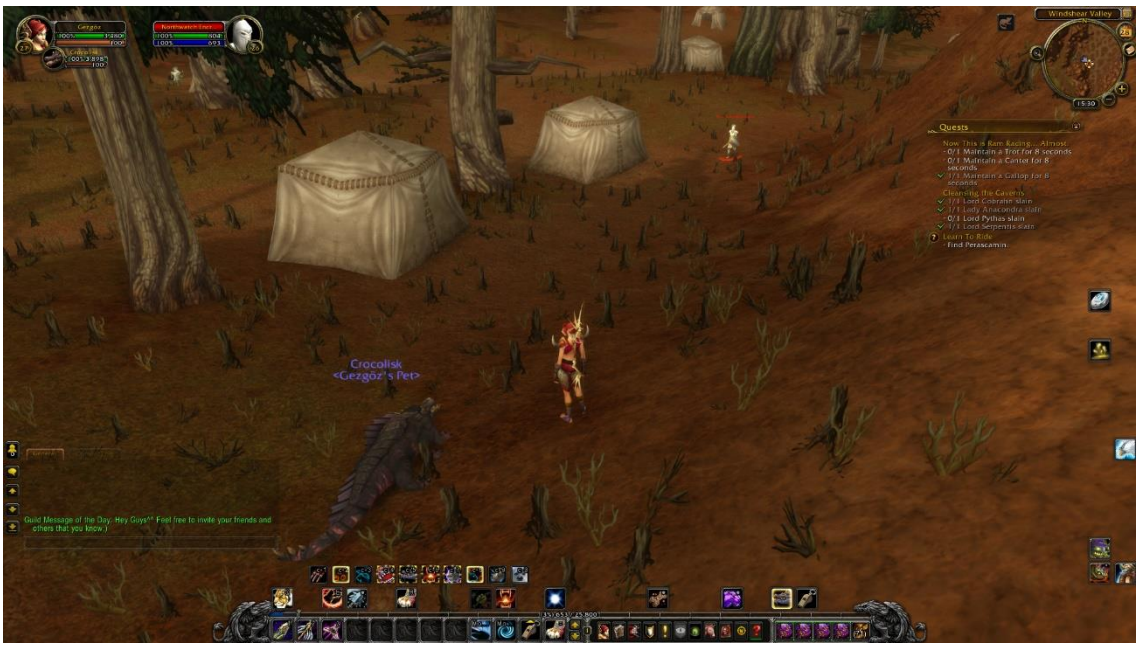

Figure 3.10. Standard UI of WoW

(Source: World of Warcraft in-game screenshot, v.6.2.2.20574, taken by U. Kocaman)

Figure 3.11. A unit frame add-on which is called Z-Perl is enabled

(Source: World of Warcraft in-game screenshot, v.6.2.2.20574, taken by U. Kocaman)

Figure 3.12. An action bars addon which is called Bartender and Z-Perl is enabled

(Source: World of Warcraft in-game screenshot, v.6.2.2.20574, taken by U. Kocaman)

Bartender, on the other hand, is an action bar addon and has nothing to do with the unit frames. It changes the behavior of the action bars. As seen on *Figure 3.12*, this specific addon gives players freedom of changing the location, size and style of each action bars individually. In the original UI, action bars are gathered in the bottom-center of the screen horizontally. Also the extra action bars which are located vertically on the right side of the screen in the original UI can be enabled in the options menu by player's will. *Bartender* allows players to redefine the action bars' locations on the screen anywhere they want vertically or horizontally without any restrictions.

Player character's skills can be used by clicking on the action bar shortcuts or players can assign keyboard shortcuts to a specific skill. Standard action bar slots are reachable by keyboard's number keys. Some players get accustomed to use the skills even without looking which key is assigned to which skill. Those type of players prefer dragging action bars to sides of the screen and make them smaller via *Bartender*, so they do not get disturbed by the action bars while playing.

To better understand this phenomena, in the next chapter, an online survey and an experiment conducted by tracking the eye movements of the player, will be analyzed and discussed through.

CHAPTER 4

THE EXPERIMENT

This chapter explains the survey and the laboratory experiment conducted for the purposed of this research. The goal of this study was to understand users' satisfaction derived from using UIs created by themselves. To this end, first, an online survey was prepared for the gamers. With the aid of social media and forum sites about WoW, the survey reached over two hundred people. Moreover, a laboratory experiment was conducted with an eye tracking equipment to analyze gamers' visual activities. Volunteered students from İzmir University of Economics participated in the experiment.

4.1. Survey

To understand gamers' habits on usage of addons, an online questionnaire conducted. Two hundred and twenty-three people participated in this survey consisting of twenty questions. Survey's main objective was to find out whether players think that using addons will improve their skills in the game or not. Secondary objective was to know where the unit frames locations are when players change the user interface with an addon. Knowing the location of changed unit frames would help to determine where to place them on the screen during the laboratory experiment. Collateral questions were to determine the sample group for the laboratory test.

The online questionnaire was created by the researcher using *Google Forms* (Google, 2015). The cause of choosing *Google*'s service was 1) the company is reliable and can be trusted and 2) they offer their services for free. Researcher indicated on the survey that three people from the participants will earn two months of WoW play time in random drawing. The survey was available for 15 days before it was closed. After its closure, the data collected from the web site was transferred to an Excel file. *Figure 4.1* shows the distribution of people who participated in the survey by day. The online survey's complete question guide can be seen in *APPENDIX A.*

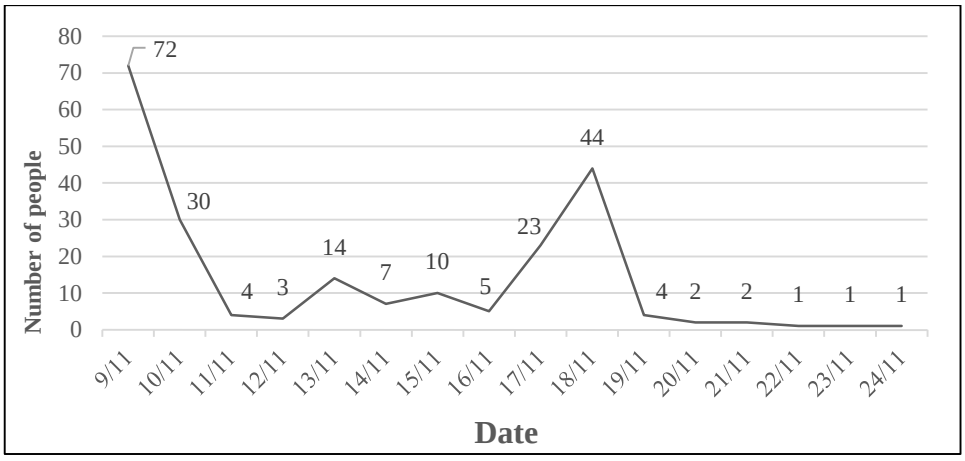

Figure 4.1. The distribution of people surveyed by day.

An international market research company *Newzoo* mentions that thirty-five percent of WoW players are females in the world (cited in Mueller, 2015). From 223 people, 8 people were females who answered the questions in survey. Based on the limited scope of the survey it can be assumed that in the Turkish market the numbers do not correspond to global percentages.

Within participants, thirty-five percent answered their time spent on WoW by "Everyday", and twenty-nine percent answered by "I do not play anymore". Among the latter, twenty-three percent are married. The percentage of married people seems higher in the graphics premised on play-time (see *Figure 4.2*). Rise in percentages, therefore, could be related to marital status change.

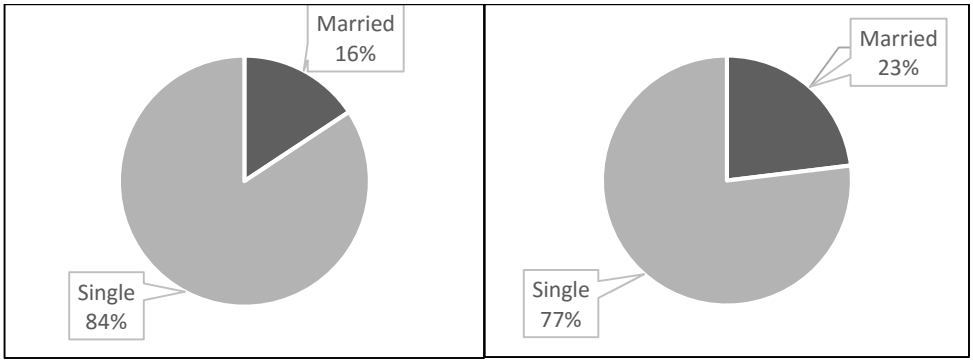

Figure 4.2. Left: Total percentages of marital status. Right: Martial status percentages who said "I do not play anymore"

According to the online survey that researcher prepared, thirty-five percent of people answered "yes" to the question "Have you ever installed an addon which you did

not need because of someone that you know used it?". This be interpreted in light of what Blom examined in his research (J. Blom, 2000) as social motivations that make users change their UIs. Thirty-eight percent of participants who said "no" to that question, learned the game's addon feature from their friends. This also ties well with the theory of personalization and its social motivation phenomenon that explores people's desire to become a part of a social group. Eighty-one percent of who used addons because of their friends also installed similar addons to compare and to find which was suitable for them. Regardless of whether players used addons because of their friends or not, in time, they searched for better UIs. One can say that social-related motivations which direct people to personalize their surroundings –in this case the surroundings are UIs– could evolve in to work related motivations.

Some addons can manipulate what macros[59] can do in game. An addon can do a better job than a several-line long code. *Table 4.1* shows a particular macro which helps *enchanters*[60] in the game to easily create an enchantment scroll. On the other hand, *OneClickEnchantScroll* (see *Figure 4.3*) addon makes this very easy with a push of a button. Nineteen percent of people said that they do not use macro feature in the game, but this percentage rises to twenty-four concerning graphics on who discovered the addon feature via their friends. Using addons instead of using macros could due to work-related motivations as described by the theory of personalization.

Table 4.1. A macro sample for WoW

(Source: http://wowwiki.wikia.com/wiki/Useful_macros)

```
/run DoTradeSkill(GetTradeSkillSelectionIndex());
/run for i=0,4,1 do for l=1,GetContainerNumSlots(i),1 do if
GetContainerItemID(i,l)==38682 then UseContainerItem(i,l);end;end;end;
/run ReplaceEnchant();
/run ClearCursor();
```

[59] Macro is a game feature in which players can write basic codes to execute mundane works with ease (e.g. Crafting armors, enchanting weapons, milling herbs).

[60] Enchanting is one of the professions in WoW which player's character get by learning from an appropriate profession trainer. This profession can create magical enchantments to enhance characters' in game items.

Figure 4.3. Right: Without OneClickEnchantScroll Left: With the addon

(Source: Partial in game screenshot from WoW taken by U. Kocaman)

Common belief in group of WoW players is using an addon makes them more advantageous compared to non-users. Ninety percent of people agreed that using addons in the game gives them advantage against other players who do not have or use. On the other hand, the percentage drops to seventy-three when the researcher asks about whether addons help them to level-up. The researcher presumes that players who use addons while playing the game think that addons are more useful in PvP gaming rather than PvE[61]. Although, who said that using addon does not make themselves advantageous' percentage rises from ten to twenty-six when you eliminate who said addons help them to level-up. Seven percent of people from the survey do not think that addons neither help them to level-up nor advantage.

The percentage of addon counts that participants used in the game is shown in *Figure 4.4*. While figure shows that the highest percentage slice in the pie chart is "five to ten" addon usage with forty-one percent, the second highest percentage becomes "four or less" addon usage with twenty-four percent. The ratio seems high enough to presume that twenty-four percent of people either does not use unit frame enhancement addons or they use addons that do not affect game play significantly (e.g. DPS meter). To understand better, one must also look for the unit frame addon usage in the survey

[61] PvE refers to player versus environment.

and compare it with who does not find addons useful for the game. When the ratios are compared, the percentage of who does not think addons are helpful in any way and does not use any unit frame addon can be seen as one percent in total.

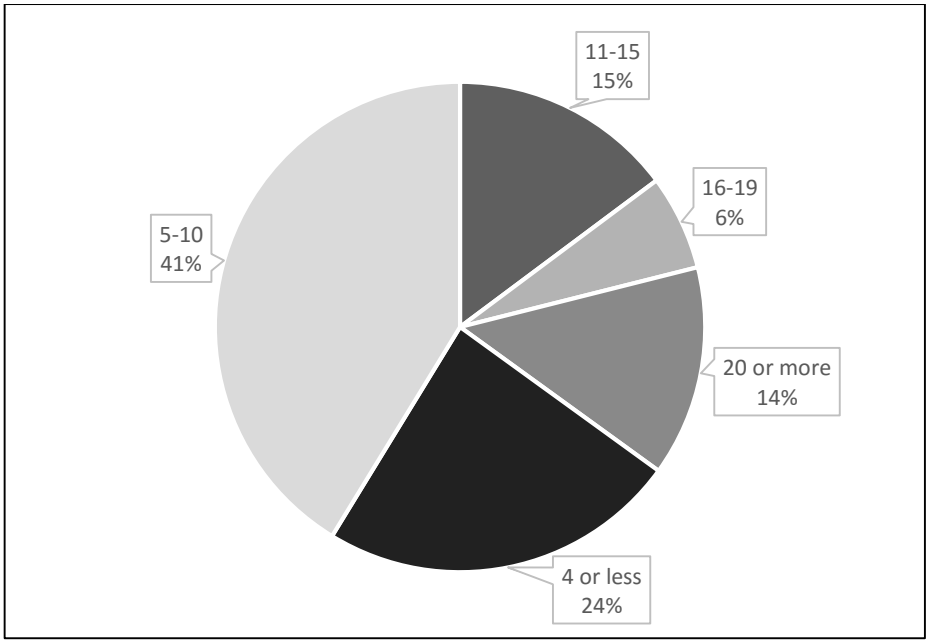

Figure 4.4. Percentage of "How many addons do/did you use?" question.

Using unit frame replacement to relocate or change the visual of a specific unit frame seems popular among WoW players. Two hundred and one people said that they use at least one unit frame addon which constitutes ninety percent of all. For the laboratory experiment the researcher asked contributors where they relocate specific unit frames when they change them with a user-created addon by showing them a gridded in-game screenshot (see *Figure 4.5*). Shown picture was gridded five-to-five, columns were labeled one-to-five and rows were labeled A-to-E.

Figure 4.5. Gridded in-game screenshot from WoW created by U. Kocaman.

The distribution of mini-map usage shows that players tend to use mini-map on its original location even if they use an addon for that unit (see *Figure 4.6*). Also, most people use the original unit frame and they do not feel an urge to change its visual. Theory of personalization indicates that people tend to personalize their surroundings in a way that is suitable for them (J. Blom, 2000). In relation with this, one can see that the percentage of addon usage on mini-map is rather high, seventy percent. Player and enemy unit frames on the other hand have a different distribution on addon usage. From the *Figure 4.7*, it can be clearly seen that player unit frame is relocated by a large group of people than mini-map. While player unit frame's first location when it is relocated by using addon is "D2", the next highest two choices are "A1" which is its original location coordinates, and "I do not use mini-map addon" choice, meaning they prefer its original location. *Figure 4.8* shows the distribution of enemy unit frame addon usage; the highest percentage is the opposite location of player unit frame's relocated place, "D4". The second highest percentage is similar to that of the answer regarding player unit frame addon usage.

The findings of the online survey helped the researcher to organize his laboratory experiment about user-created addons and to gather statistical data for sample user group. The data gathered from survey is presented in the next section along with experiment tools. For the detailed answer data see *APPENDIX B*.

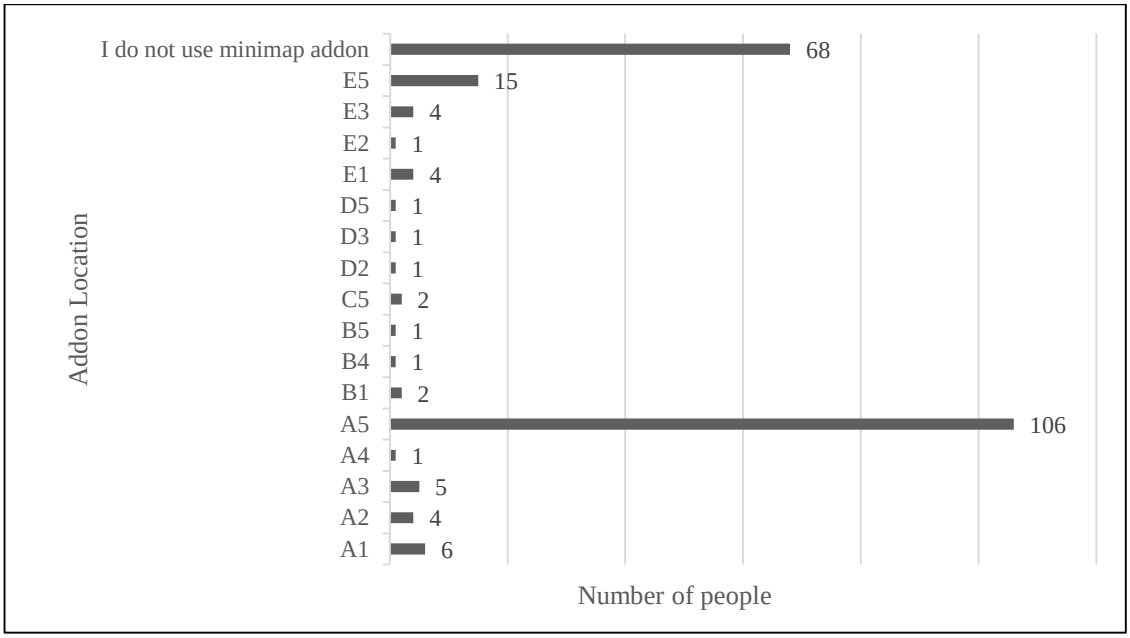

Figure 4.6. Distribution of mini-map addon usage

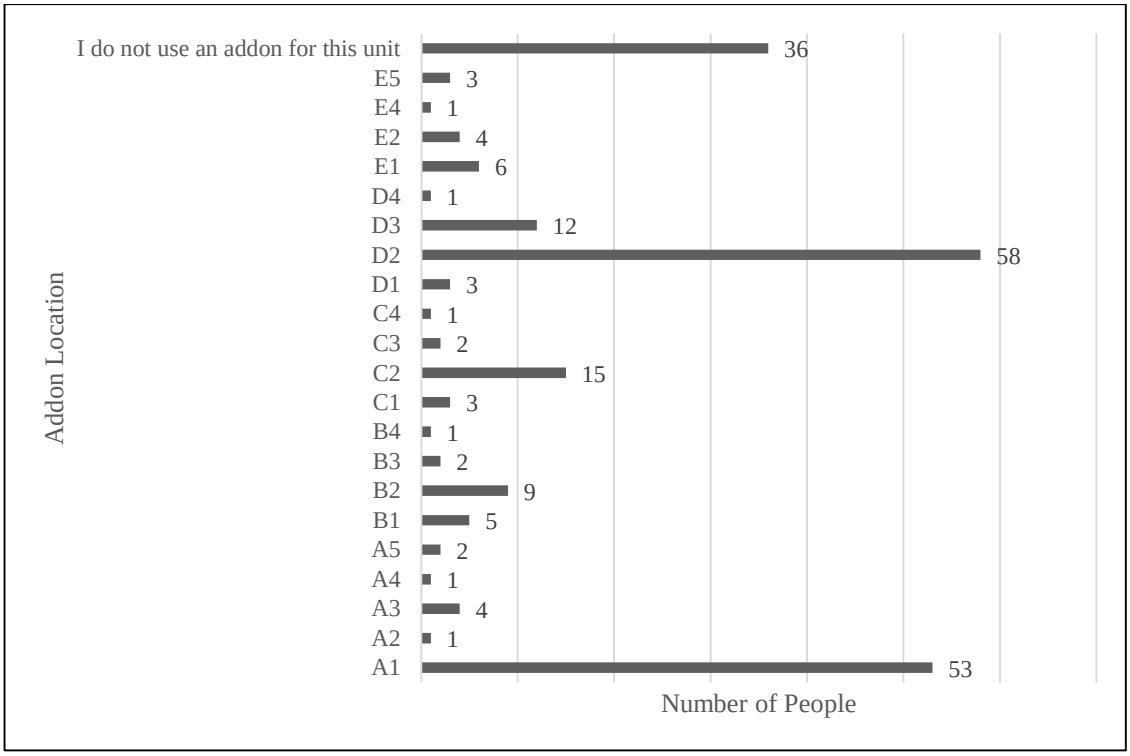

Figure 4.7. Distribution of player unit frame addon usage

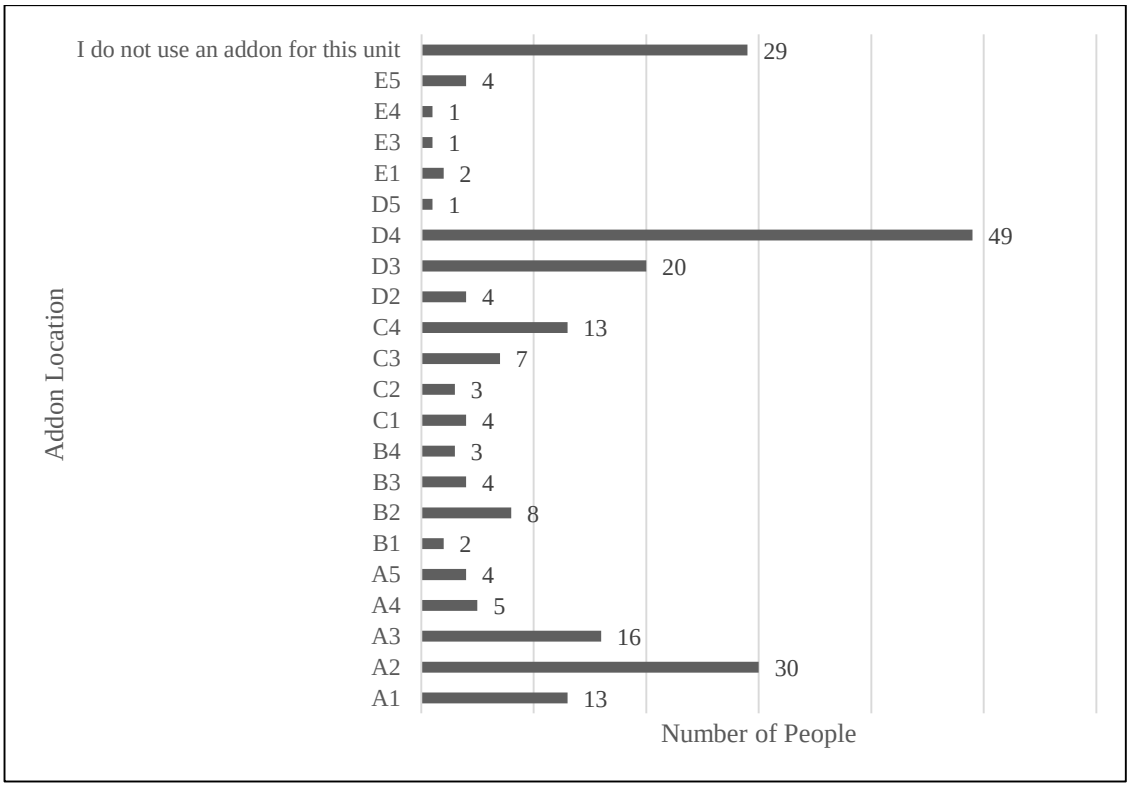

Figure 4.8. Distribution of enemy unit frame addon usage

4.2. Experiment

The study on user-created interface took place in İzmir University of Economics (IUE) Psychology Department's laboratory. The reason of conducting the experiment there rather than the researcher's affiliated university (İzmir Institute of Technology) is the needed eye-tracking hardware and software were only available in the IUE. The eye-tracking system basically consists of a camera which is connected to computer and a dedicated software to analyze players' eye movements.

The eye-tracking camera system's working principle is based on tracking pupil and Purkinje images[62] on the eye and then analyzing it in 3D space (Duchowski, 2007) while a stimulus is presented by researchers. Eye movement analyzing software tracks fixations[63] and saccades[64] in general. *Figure 4.9* describes the pupil's locations and Purkinje images (in this case they are the camera's infra-red lights) in schematic view.

[62] Purkinje images, which are named after Jan Evangelista Purkyně's studies in anatomy, are the reflections of the images that drops on the corneal surface of the eye (Crane, 1994).

[63] Fixation is an eye movement action which happens when eyes are concentrated on something.

[64] Saccade is a rapid eye movement between fixation points.

There are two kinds of modern eye-tracking systems (see *Figure 4.10*); 1) head-mounted systems, and 2) table-mounted systems (Duchowski, 2007).

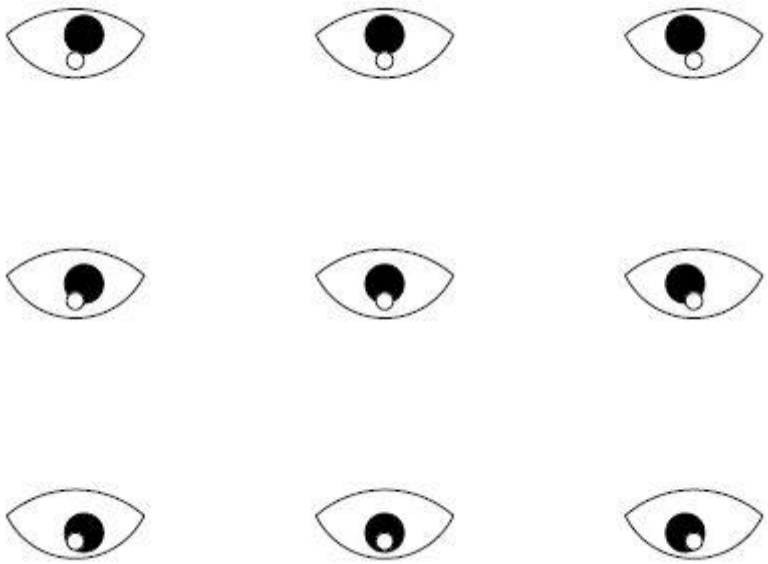

Figure 4.9. Relative positions of pupil and Purkinje images as seen by the eye tracker's camera.

(Source: (Duchowski, 2007, p. 58))

Figure 4.10. Left: Head-mounted eye tracking device. Right: Table-mounted eye-tracking device.

(Source: http://www.smivision.com/)

Head-mounted eye-tracking systems are designed for mobility. These devices are particularly useful for advertisement and marketing sectors. User satisfaction and recognition tests are head-mounted eye-tracking systems' mostly used areas. Table-mounted eye-tracking systems are not mobile and also they are much heavier than head-

mounted units. Table-mounted units provide better precision on analyzing eye movement data.

There are lots of companies and research facilities which develop eye-tracking devices to sell or to help other companies. SensoMotoric Instruments Inc. (SMI) is one of them which develops eye-tracking modules and gives consultation services to whom needs it. The laboratory that the researcher used had SMI *RED250* model (as seen on *Figure 4.11* and *Figure 4.12*). System was running with two computers. One of them was a company dedicated laptop (can be seen on *Figure 4.12* under the table to the left) computer which runs eye-tracking camera and operates it. The other one was a university dedicated computer (can be seen on *Figure 4.12* under the table to the right) which runs the analyzing software. The computers communicate with each other through university's local network. Laptop computer sends the eye movement data over Ethernet cable to the other computer to be analyzed. Because the system is a table-mounted eye-tracking system, there is also another tool for participants; a steel support for their chins (see *Figure 4.11*) to stable their head movements. University prohibits online game activity by blocking dedicated ports on their servers. Therefore, the researcher used a USB 3G mobile modem to be able log in to the online game.

Figure 4.11. SMI RED250 in IUE Psychology Department Eye-Tracking Laboratory

(Source: Photographed by U. Kocaman)

Figure 4.12. IUE Psychology Department Eye-Tracking Laboratory

(Source: Photographed by U. Kocaman)

The researcher decided to create a sample group among university students. Students who are at the ages between nineteen to twenty-five would be the experiment's sample group. To understand where to locate the user interface via user-created addon, the researcher filtered the output of online survey with age and profession data to find the sample group's distribution statistics. On the basis of the researcher's findings it appears that unit frames distribution was similar to the total distribution (see *Figure 4.13* and *Figure 4.14*).

Before the experiment, the game's user interface was prepared by using *Z-Perl* addon. Player and enemy unit frames including companion's unit frame were relocated to positions where the survey indicated. Participants took place one-by-one and they first played the game five minutes with original user interface, and afterwards, they played another five minutes with user-created user interface. To get a precise output from each participant, researcher grouped them by numbering. Odd numbered participants played the game with its original interface first, and then played the game while addon was active. Even numbered participants did it in the opposite order. With nine male students and one female student, ten people participated in the experiment in total.

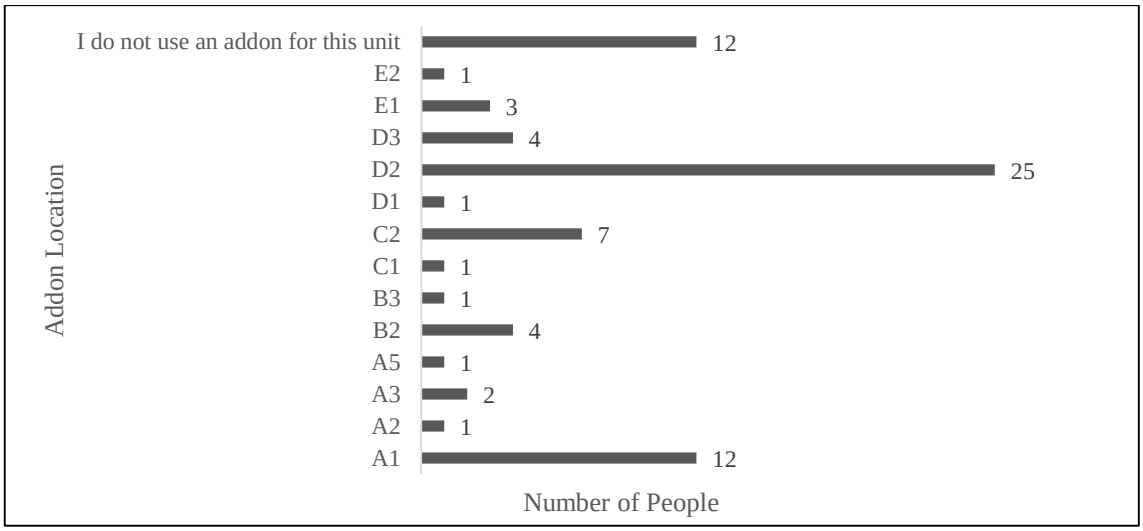

Figure 4.13. Distribution of player unit frame addon usage among students, aging between 19-26

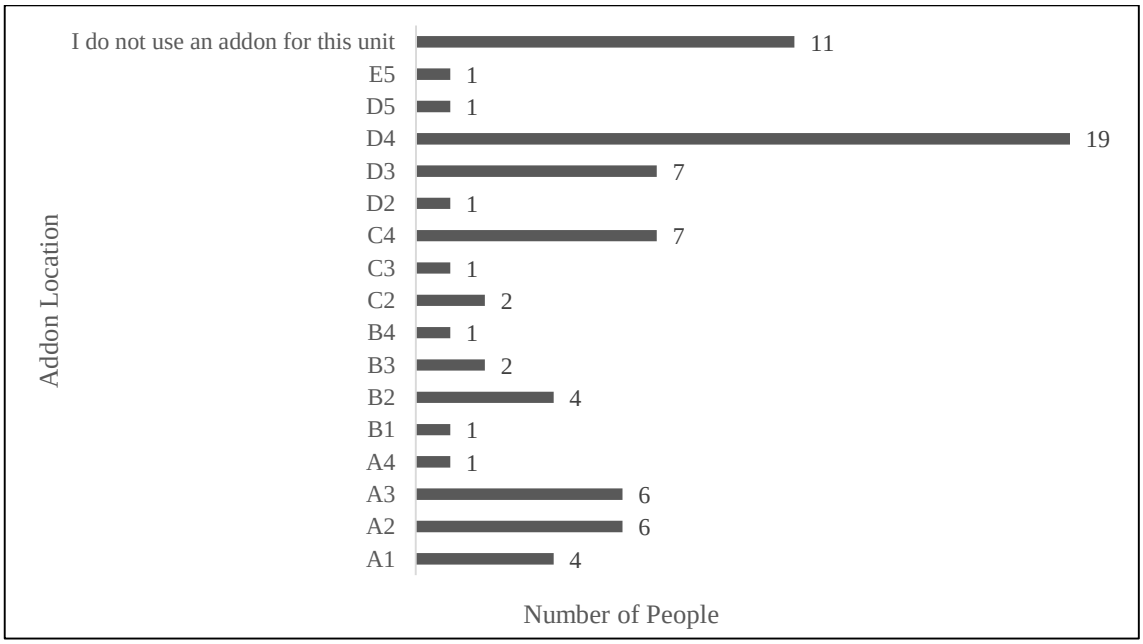

Figure 4.14. Distribution of enemy unit frame addon usage among students, aging between 19-26

Before the experiment started, each participant's eye movements were calibrated with the SMI's eye-tracking software (see *Figure 4.15*), which is called *Experiment Center* (SMI, 2015c). The software's settings were adjusted to run only for five minutes for each session for each participant before the experiment. Because the eye-tracking

software tracks even a tiny eye movement, all the duration settings were in milliseconds rather than seconds. For each session the software was set to run 300.000 milliseconds (5 minutes). When participants were ready for the session, they put their chins on to the steel support and the researcher clicked the record button below the screen. Calibration was done by looking at a moving circle on the screen and making software to detect the eyes of a participant. After calibration, the software shows an output data for how good or bad was the calibration process in percentages. General idea is to eliminate wrong readings from participants' eye movements; error percentage is advised to be lower than one percent by laboratory assistant. If the calibration's error percentage is lower than one percent, then software runs a crosscheck calibration for current settings. After the experiment was finished, all the collected data was analyzed in *SMI BeGaze* software (SMI, 2015a).

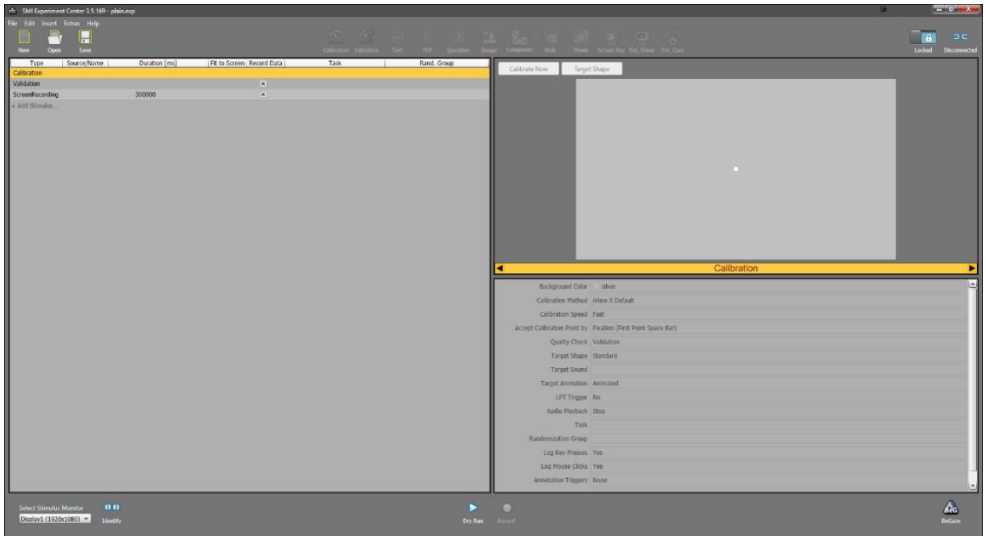

Figure 4.15. SMI Experiment Center

(Source: SMI Experiment Center version 3.5 screenshot taken by U. Kocaman)

BeGaze software is a tool to analyze the output data from the *Experiment Center*. One can preview the sessions via recorded session (see *Figure 4.16*) videos which is captured by the *Experiment Center*. In the software's stimulus windows, the location where eyes were looking at is shown by a pink circle. So the researcher could watch the entire session to review.

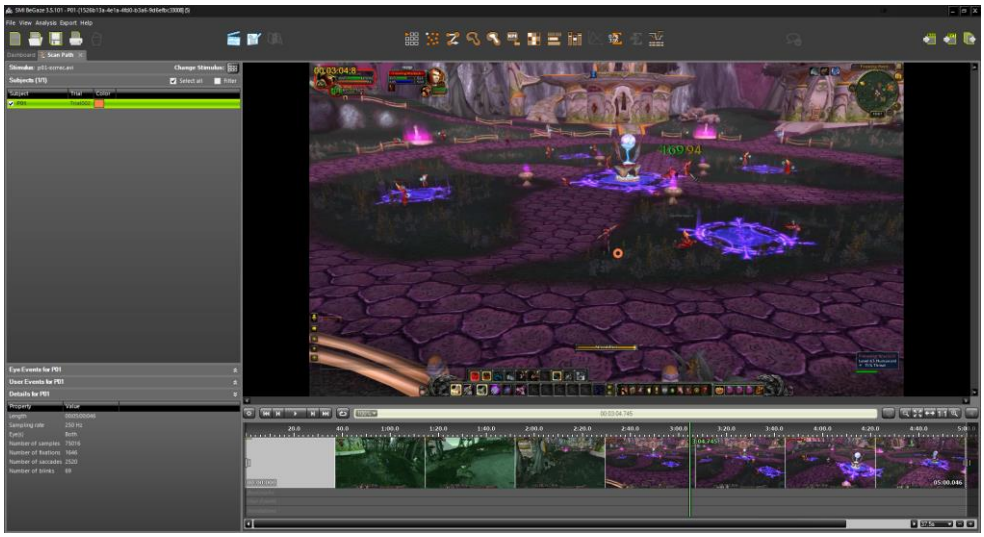

Figure 4.16. SMI BeGaze: Experiment preview while stimulus is active

(Source: SMI BeGaze version 3.5 screenshot taken by U. Kocaman)

Analysis of the gathered eye movement data could be seen in a window of the software. *Figure 4.17* shows fixations as circles, and saccades as lines. Fixations' and saccades' numbers got increase over time due to the eye movements of the participant. Easily recognizable fixations become very hard to identify from one to another (see *Figure 4.18*). The software has a built-in area-of-interest (AOI) section for identifying the fixations which are not relevant in a specific study.

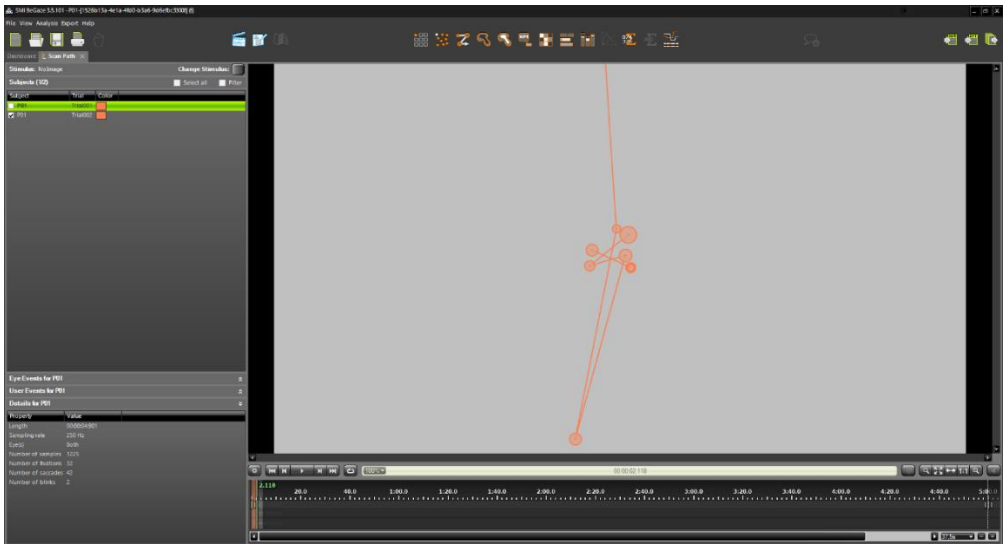

Figure 4.17. SMI BeGaze: Analyzed fixations and saccades at the beginning of the session.

(Source: SMI BeGaze version 3.5 screenshot taken by U. Kocaman)

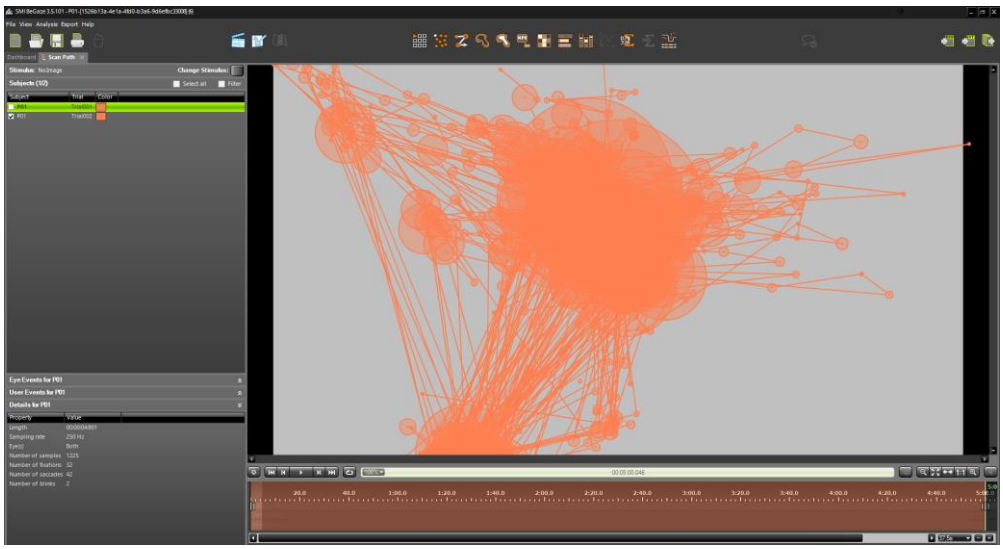

Figure 4.18. SMI BeGaze: Analyzed fixations and saccades at the end of the session.

(Source: SMI BeGaze version 3.5 screenshot taken by U. Kocaman)

AOIs are created in the software by selecting AOI creator section. For the experiment which is done by the researcher, AOIs are created on top of where the unit frames were located (see *Figure 4.19*). Then the researcher ran the software to analyze the data according to given AOI parameters. *Figure 4.20* shows a session's complete fixation data without any assigned AOI and *Figure 4.21* shows fixations on AOI. With

so much information for one session, it becomes very difficult to research if one does not use AOI.

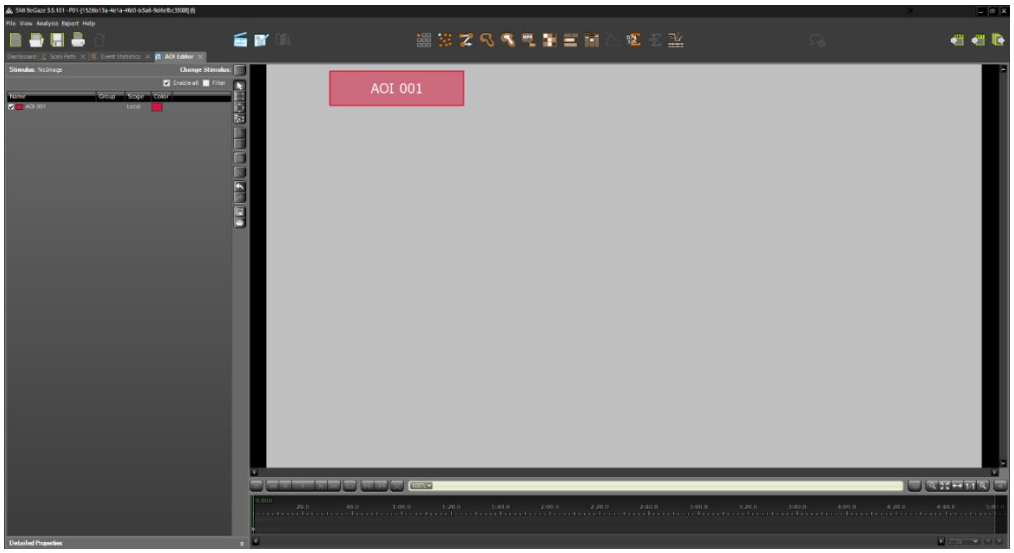

Figure 4.19. SMI BeGaze: Creating AOIs for detailed analyze

(Source: SMI BeGaze version 3.5 screenshot taken by U. Kocaman)

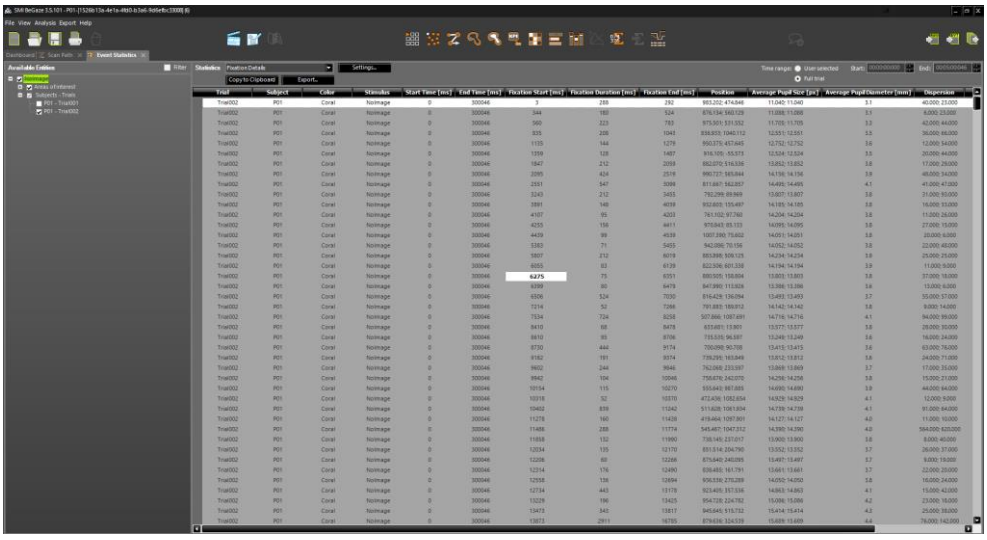

Figure 4.20. SMI BeGaze: Output screen of analyzed data is showing fixations

(Source: SMI BeGaze version 3.5 screenshot taken by U. Kocaman)

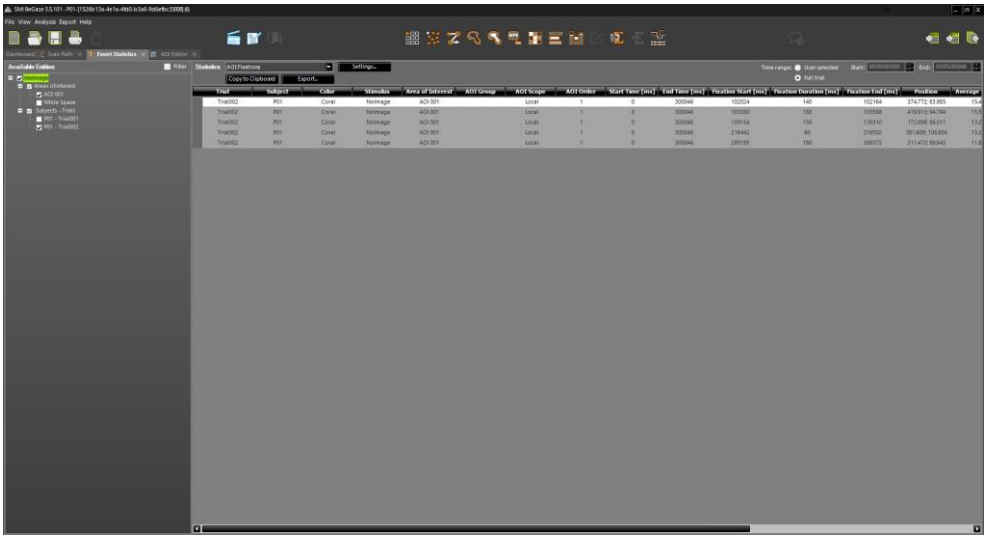

Figure 4.21. Output screen of analyzed data is showing AOI fixations

(Source: SMI BeGaze version 3.5 screenshot taken by U. Kocaman)

On the software's UI, each eye movement event is categorized by terms. Namely they are "net dwell time"[65], "dwell time"[66], "glance duration"[67], "diversion duration"[68], and "fixation time". The software can export these results in a form of *SPSS*[69] file and allows researchers to analyze the data outside of *BeGaze* for statistical reading. Along with the definitive differences with the two experiment groups, the results of the experiment will be explained and discussed in the *Experiment Analysis* section.

4.3. Experiment Analysis

Numerical data of the experiment seems to be variable in terms of using changed interface via addon and using original interface. The first impression was that using addon to change interface greatly alter players' eye movement activity. To see the data on population distribution, the researcher ran a statistical analysis computer program called *SPSS*.

[65] "Sum of sample durations for all gaze data samples that hit the AOI" (SMI, 2015b, p. 294).
[66] "Starts at the moment the AOI is fixated and ends at the moment the last fixation on the AOI ends = sum of durations from all fixations and saccades that hit the AOI" (SMI, 2015b, p. 294).
[67] "Saccade duration for entering the object + sum of all fixation durations and saccade durations before the eyes begin to leave the AOI = dwell time + duration of saccade entering AOI" (SMI, 2015b, p. 294).
[68] "Sum of saccade durations for entering and leaving the object + sum of all fixation durations and saccade durations before the eyes begin to leave the AOI = glance duration + duration of saccade leaving AOI" (SMI, 2015b, p. 294).
[69] SPSS is a statistical analyzing software which is developed by IBM.

The priority of analysis is making sure that two groups which were "even-numbered" and "odd-numbered" were not significantly different from each other. To run an independent-samples test, participants' eye data is compiled, added to each other, and all data is grouped in where they belong (see *Table 4.2*, *Table 4.3* and *Table 4.4*).

Table 4.2. Group statistics of odd-numbered and even-numbered groups

	Subject	N	Mean	Std. Deviation	Std. Error Mean
Events (in seconds)	Odd	6	46,667	47,7058	19,4758
	Even	6	30,967	24,0384	9,8136

Table 4.3. Independent samples test of odd-numbered and even-numbered groups (A)

		Levene's Test for Equality of Variances	
		F	Sig.
Events' duration (in seconds)	Equal variances assumed	,920	,360
	Equal variances not assumed		

Table 4.4. Independent samples test of odd-numbered and even-numbered groups (B)

t-test for Equality of Means						
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
0,720	10	,488	15,7000	21,8086	-32,8926	64,2926
0,720	7,385	,494	15,7000	21,8086	--35,3288	66,7288

An independent-samples t-test was conducted to compare total activities (e.g. on AOIs that each participant's eyes did during two sessions between odd-numbered participants and even numbered participants. There was no significant difference in the scores for odd-numbered group (M=46.7, SD=47.7) and even-numbered group (M=31, SD=24) conditions; t (10) =1.1, p = 0.488. These results suggest that playing sequence

with or without an addon does not have an effect on eye movement data collection. Specifically, the researcher's results suggest that even if every participant would have started playing in the same sequence (i.e. starting the first five minutes with an original interface) the results of the experiment would be the same.

To analyze the actual data of participants' eye movement recordings, the researcher ran a paired-samples test. Because each participant played the game two times; one is with an addon, and one is with an original interface, the researcher ran a paired-samples tests (see *Table 4.5*, *Table 4.6*, and *Table 4.7*) to understand the significance for data of play times with addon and data of play times with original interface.

Table 4.5. Paired Samples Statistics on five major eye movements

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	NDT original	3,308	12	3,8092	1,0996
	NDT addon	7,292	12	6,9125	1,9955
Pair 2	DT original	,467	12	,5742	,1658
	DT addon	4,558	12	6,9367	2,0024
Pair 3	GD original	2,325	12	2,6403	,7622
	GD addon	6,383	12	7,0850	2,0453
Pair 4	DD original	2,533	12	2,8173	,8133
	DD addon	7,075	12	7,4614	2,1539
Pair 5	FT original	,425	12	,5529	,1596
	FT addon	4,450	12	6,8699	1,9832

*GD: Glance Duration *DD: Diversion Duration *FT: Fixation Time

*NDT: Net Dwell Time *DT: Dwell Time

Table 4.6. Paired Samples Correlations on five major eye movements

		N	Correlation	Sig.
Pair 1	NDT original & NDT addon	12	,228	,477
Pair 2	DT original & DT addon	12	-,072	,824
Pair 3	GD original & GD addon	12	,132	,683
Pair 4	DD original & DD addon	12	,135	,675
Pair 5	FT original & FT addon	12	-,115	,721

*GD: Glance Duration *DD: Diversion Duration *FT: Fixation Time

*NDT: Net Dwell Time *DT: Dwell Time

Table 4.7. Paired Samples Test on five major eye movements

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	NDT original - NDT addon	-3,9833	7,0930	2,0476	-8,4900	,5233	-1,945	11	,078
Pair 2	DT original - DT addon	-4,0917	7,0015	2,0212	-8,5402	,3569	-2,024	11	,068
Pair 3	GD original - GD addon	-4,0583	7,2280	2,0866	-8,6508	,5341	-1,945	11	,078
Pair 4	DD original - DD addon	-4,5417	7,6107	2,1970	-9,3773	,2939	-2,067	11	,063
Pair 5	FT original - FT addon	-4,0250	6,9553	2,0078	-8,4442	,3942	-2,005	11	,070

*GD: Glance Duration *DD: Diversion Duration *FT: Fixation Time

*NDT: Net Dwell Time *DT: Dwell Time

Table 4.7 shows the significance values of given conditions in two-tailed significance probability. Since the researcher is concerned with the positive direction of mean growth, the value of two-tailed significance will be divided by two (Bryman & Cramer, 2005; Field, 2013, p. 558).

A paired-samples t-test was conducted to compare:

- Net dwell time while playing with original user interface and while playing with changed user interface by addon conditions. There was a significant difference in the scores for NDT Original (M=3.3, SD=3.8) and NDT Addon (M=7.3, SD=6.9) conditions; t(11)=-2, p = 0.04 (0.078/2).
- Dwell time while playing with original user interface and while playing with changed user interface by addon conditions. There was a significant difference in the scores for DT Original (M=0.5, SD=0.6) and DT Addon (M=4.6, SD=7) conditions; t(11)=-2, p = 0.03 (0.068/2).
- Glance duration while playing with original user interface and while playing with changed user interface by addon conditions. There was a significant difference in the scores for GD Original (M=2.3, SD=2.6) and GD Addon (M=6.4, SD=7.1) conditions; t(11)=-2, p = 0.04 (0.078/2).
- Diversion duration while playing with original user interface and while playing with changed user interface by addon conditions. There was a significant difference in the scores for DD Original (M=2.5, SD=2.8) and DD Addon (M=7.1, SD=7.5) conditions; t(11)=-2.1, p = 0.03 (0.063/2).
- Fixation time while playing with original user interface and while playing with changed user interface by addon conditions. There was a significant difference in the scores for FT Original (M=0.4, SD=0.6) and FT Addon (M=4.5, SD=6.9) conditions; t(11)=-2, p = 0.04 (0.070/2).

The results show that changing user interface by addons and relocating them to where the majority of survey participants agreed on does increase eye movements over unit frames. For a detailed view of eye movement data see *APPENDIX C*.

4.4. Result

Players' tendencies of changing user interface consist of a set of complex discussions. Deciding whether to use the addon feature in the game seems to be related with social environment in general. Most users met the addon feature via their friends or relatives. That is mainly resulted from their lack of knowledge about the game and how to install it. The acquaintance modifiers also affect addon choice when players start playing the game for the first time. They were acting as a role model in players' addon choices. Players' early addons were the ones which their friends used.

Social influences seem to affect users to play with an addon. Social environment of *World of Warcraft* players consists of addon users, therefore being a part of this group means one must use an addon. It is not important for this group how one found out about the addon feature; instead, it is important how they use it. Yet, when players get accustomed to addons, they start searching for another addon which does the same thing similar to what they were using before. It seems that players' motivation of changing user interface is both related with social environment and working environment –in this case "work" means "playing performance"–. Playing performance can be defined as "focusing on the action rather than unit frames throughout the game". Time spent on unit frames by glancing to check character's health, companion's health, or enemy's health percentage could discourage players to play the game. Using different addons and changing the interface until one of them satisfy the player's feeling is related with what Blom describes as "…to accommodate work goals." (2000, p. 313).

Finding an addon which feels right for players allows them to play the game without getting bored. It might seem directly related with playing performance of players, but the result of the eye–tracking experiment showed that players spent more time looking at changed unit frames while playing the game almost three times more than the original unit frames. If a player character's class is a healer type class, then this result could be defined as increased playing performance due to addon usage. Healer classes are responsible for the group members' health regeneration. Looking at unit frames rather than action is their duty for the sake of the group.

Csikszentmihalyi argues that "when we choose a goal and invest ourselves in it to the limits of our concentration, whatever we do will be enjoyable" (1990, p. 42). In accordance with this, players take time to find what is suitable for them to express their

feelings while playing. The search and the path to finding one eventually create a flow in their minds. When their minds enter the state of ultimate focusing, they want to maintain the feeling or to feel the same emotion again. The reason why addons make gamers feel more satisfied is not being a member of a social group, or adding a needed UI to play better; but expressing the self—as in mimicry—more than what they actually are through fantasy (Csikszentmihalyi, 1990). For this reason, the superior motive for playing MMORPGs and playing with addons appears to be the flow itself.

CHAPTER 5

CONCLUSION

User interface design seems to be relevant with computer sciences, but it is also relevant with industrial design. The human factor and interface ergonomics makes it an interdisciplinary field for both engineers and product designers. Up until the graphical user interface era, user interface has never been conceived as a product design. The change in the software developers' minds began with the video games' invasion of the market. Colorful and attractive video game interfaces attracted a great deal of attention from people. Today, user interfaces are among the most important aspect of products.

Widely developed user interfaces are generally in the game industry. The reasons of large-scale user interface developing for games are the size of game industry and its annual revenue. Therefore, with every release of a game, a new innovative change in user interface comes up for users. Diversity in game genres diversifies the user interface designs, and accelerates user interface design study. The most open-sourced user interface design is in MMORPG type games owing to their massive player population and socially interactive virtual worlds. A renowned MMORPG, *World of Warcraft,* is a popular example about user interface development. Creating a user interface is allowed for players by the company. Changing user interface via players' own creations has become a common interest and practice over time.

Throughout the literature review, two theories that describe people's behaviors concerning user interface changes came to the fore. These two theories ("theory of personalization" and "flow theory") describe the behavior differently. Working, social, and psychological tendencies are given as the main reasons for changing a UI. To study this phenomenon, an online survey—which was about *World of Warcraft* user interface addons—was created to understand whether it is work-related motivation or social-related motivation as Jan Blom mentioned in *Personalization: A Taxonomy* in 2000. Answers from over two hundred participants proved that using addons in *World of Warcraft* is clearly a social motivation at the beginning of the usage. Over time, it transforms into a work-related motivation. The other finding from the survey was that players believed that using addon supposedly increases the players' playing performance.

For a quantitative analysis of addon usage, we conducted an experiment to measure the changes on changed interfaces. Volunteered university students participated in eye-tracking study to play *World of Warcraft* for ten minutes in two sessions (five minutes with original interface and five minutes with an interface changed by addon). The experiment's result showed that using addon does not lower the need of looking at the unit frames during the game play, instead, players tend to look much more than an original interface's unit frame. The result strengthens the correlations with addon usage tendency and flow which is described by Mihaly Csikszentmihalyi in *Flow: the psychology of optimal experience* as a state of mind.

We found that people tend to act on the opinion of their social environment. Accepted user interface changes from social circles become indispensable for them. Having accustomed to changes in user interface evolves into needing it. Being allowed to change the game's interface according to their desires creates flow in their minds.

It is emphasized that the role of user-created user interfaces in the satisfaction of players derived from MMORPGs is directly related with the flow. Theory of personalization is also related, but indirectly. Findings suggest that there is no evidence about decreasing time spent over unit frames in the eye-movements while using addons.

Although the study has reached its goals, there were some limitations to it. First, the eye-tracking experiment was conducted only on a small size population who were university students and living in İzmir. Therefore, to generalize the results for larger groups, the study should have involved more participants from different countries, cities, professions, ages and marital statuses. Second, as a result of the university's network policy that prohibits gaming activity, we had to use USB 3G mobile modem in the experiment, which might have discouraged participants' interest and motivation to play the game.

Lack of written material on user-created user interfaces and their effects on users, which is the main topic of the thesis, could be another limitation for this research. However, the earlier studies which were about user interfaces and personalizations, have guided this research, and thus, the research has made a significant contribution to knowledge.

Throughout the thesis, it is explained that why *World of Warcraft* is played and embraced by large groups, and how user interfaces affect users' behaviors. For future studies, these findings can help industrial designers to design a user interface which is

created for users and designed in a user-oriented fashion instead of creating software-oriented user interfaces.

REFERENCES

Adams, E., & Rollings, A. (2010). *Fundamentals of game design* (2nd ed. ed.). Berkeley, Calif.: New Riders ; London : Pearson Education [distributor].

Apple Computer, Inc. v. Microsoft Corp, No. No. 93-16867, 35 1435 (Court of Appeals, 9th Circuit 1994).

Belfiore, M. (2009). *The Department of Mad Scientists*: HarperCollins.

Bernhaupt, R. (2010). *Evaluating user experience in games : concepts and methods*. New York: Springer.

Blizzard. (2014). World of Warcraft® surpasses 10 million subscribers as Warlords of Draenor™ launch begins. Retrieved from http://blizzard.gamespress.com/WORLD-OF-WARCRAFT-SURPASSES-10-MILLION-SUBSCRIBERS-AS-WARLORDS-OF-DRAE. Accessed 2015, March 31

Blom, J. (2000). *Personalization: a taxonomy*. Paper presented at the CHI '00 Extended Abstracts on Human Factors in Computing Systems, The Hague, The Netherlands.

Blom, J. o., & Monk, A. F. (2003). Theory of Personalization of Appearance: Why Users Personalize Their PCs and Mobile Phones. *Human–Computer Interaction, 18*(3), 193-228. doi:10.1207/S15327051HCI1803_1

Boring, E. (1993). *PanaeaMud An Online, Object-oriented Multiple User Interactive Geologic Database Tool.* (Masters), Miami University. (MU-SEAS-CSA-1993-010)

Bryman, A., & Cramer, D. (2005). *Quantitative data analysis with SPSS 12 and 13 : a guide for social scientists*. London: Routledge.

Caillois, R. (1955). The structure and classification of games. *Diogenes, 12*, 62-75.

Carr, D., & Comtois, D. (2004). Video Game Invasion: The History of a Global Obsession. *Beantown Productions, Documentary*.

Ceruzzi, P. E. (2003). *A history of modern computing*: MIT press.

Cover, J. G. (2010). *The creation of narrative in tabletop role-playing games*. Jefferson, N.C.: McFarland & Co.

Crane, H. D. (1994). The Purkinje image eyetracker, image stabilization, and related forms of stimulus manipulation. *Visual science and engineering: Models and applications*, 15-89.

Cruickshank, D., & De Roure, D. (2004). *A Portal for Interacting with Context-Aware Ubiquitous Systems*. Paper presented at the First International Workshop on Advanced Context Modelling, Reasoning And Management. http://eprints.soton.ac.uk/259975/

Csikszentmihalyi, M. (1990). *Flow: the psychology of optimal experience* (1st ed.). New York: Harper & Row.

Daintith, J., & Wright, E. (2008). *A dictionary of computing* (6th ed.). Oxford: Oxford University Press.

Decker, L. (2013, September). Greatest PC Games of All Time. *PC Gamer*, 34-49.

Duchowski, A. (2007). *Eye tracking methodology: Theory and practice*. London: Springer Science & Business Media.

Egenfeldt-Nielsen, S., Smith, J. H., & Tosca, S. P. (2008). *Understanding video games : the essential introduction*. New York, NY ; London.: Routledge.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*: Sage.

Google. (2015). Google Forms. *Google Docs.* Retrieved from https://docs.google.com/forms/. Accessed 2015, October, 15

Hempstead, C., & Worthington, W. E. (2005). *Encyclopedia of 20th-century Technology*: Routledge.

Hussain, Z., & Griffiths, M. D. (2008). Gender swapping and socializing in cyberspace: An exploratory study. *CyberPsychology & Behavior, 11*(1), 47-53.

IBM. (2015). IBM 29 card punch. Retrieved from https://www-03.ibm.com/ibm/history/exhibits/vintage/vintage_4506VV4002.html. Accessed 2015, October 16

Ivory, J. D. (2012). *Virtual lives : a reference handbook*. Santa Barbara, Calif.: ABC-CLIO.

Johnson, D., & Wiles, J. (2003). Effective affective user interface design in games. *Ergonomics, 46*(13-14), 1332-1345. doi:10.1080/00140130310001610865

Johnston, S. (2013). *State of Online Gaming Report*. Retrieved from www.spilgames.com: http://www.spilgames.com/state-online-gaming-2013-2/

Kent, S. (2010). *The Ultimate History of Video Games: from Pong to Pokemon and beyond...the story behind the craze that touched our li ves and changed the world*: Crown/Archetype.

Khoo, A., Dunham, G., Trienens, N., & Sood, S. (2002). *Efficient, realistic NPC control systems using behavior-based techniques.* Paper presented at the AAAI Spring Symposium on Artificial Intelligence and Computer Games.

Lessig, L., Corporation, M., & Court, U. S. D. (1997). *United States versus Microsoft document collection*.

Libes, S. (1985). Bytelines. *Byte Magazine, 10*, 490.

McDonald, E. (2012). The Global MMO Market; Sizing and Seizing Opportunities. Retrieved from http://www.newzoo.com/infographics/the-global-mmo-market-sizing-and-seizing-opportunities/. Accessed 2015, Jan 17,

Montfort, N., & Bogost, I. (2009). *Racing the beam: The Atari video computer system*: Mit Press.

Mueller, S. (2015). Female WoW Players Tell All: What Is World Of Warcraft Really Like For Them? Retrieved from http://www.ibtimes.com/female-wow-players-tell-all-what-world-warcraft-really-them-1999879. Accessed 2015, November. 16

Myers, B. A. (1998). A brief history of human-computer interaction technology. *interactions, 5*(2), 44-54. doi:10.1145/274430.274436

Nardi, B. A. (2010). *My life as a night elf priest an anthropological account of World of warcraft Technologies of the imagination* (pp. 1 online resource.).

Prax, P. (2012). Co-creative interface development in MMORPGs – the case of World of Warcraft add-ons. *Journal of Gaming & Virtual Worlds, 4*(1), 3-24. doi:10.1386/jgvw.4.1.3_1

Role-playing. (2015). "role-playing game, n." Retrieved from http://www.oed.com/view/Entry/246441?redirectedFrom=role+playing+game. Available from Oxford University Press Oxford University Press (http://www.oed.com) Retrieved September,28th, from Oxford University Press http://www.oed.com/view/Entry/246441?redirectedFrom=role+playing+game

Rollings, A., & Adams, E. (2003). *Andrew Rollings and Ernest Adams on game design*. Boston: New Riders ; [London : Pearson Education, distributor].

Safko, L., & Brake, D. K. (2009). *The social media bible : tactics, tools, and strategies for business success*. Hoboken, N.J.: John Wiley & Sons.

Schäfer, D., Mardare, C., Savan, A., Sanchez, M. D., Mei, B., Xia, W., . . . Schuhmann, W. (2011). High-Throughput Characterization of Pt Supported on Thin Film Oxide Material Libraries Applied in the Oxygen Reduction Reaction. *Analytical chemistry, 83*(6), 1916-1923.

Scheifler, R. W., & Gettys, J. (1986). The X window system. *ACM Trans. Graph., 5*(2), 79-109. doi:10.1145/22949.24053

SMI. (2015a). BeGaze (Version 3.5). Boston, USA: SMI. Retrieved from http://www.smivision.com/en/gaze-and-eye-tracking-systems/support/software-download.html

SMI. (2015b). *BeGaze Manual* (pp. 433). Retrieved from http://www.smivision.com Retrieved from http://www.smivision.com

SMI. (2015c). Experiment Center (Version 3.5). Boston, USA: SMI. Retrieved from http://www.smivision.com/en/gaze-and-eye-tracking-systems/support/software-download.html

Targett, S. C. (2011). *A study of user created interfaces in video games.* (Dissertation/Thesis), LAC, Ottawa. Retrieved from http://uregina.summon.serialssolutions.com/2.0.0/link/0/eLvHCXMwY2AwNtIz0EUrE1KSE5MsLUxTTQ2TDE1SDFPMkoHVlpFpSnKqsXGiOfg2N8StnUgFvJsQA1NqniiDnJtriLOHLvS2gnjo0Ea8Iej-VgtTIzEGFmBnOVWCQSEFWKMZWaYYWyRbpJiYAfsWFsAsmWqUaJlimGaSZpkIABRVJ1I

Tassi, P. (2014). 'World of Warcraft' Still A $1B Powerhouse Even As Subscription MMOs Decline. Retrieved from http://www.forbes.com/sites/insertcoin/2014/07/19/world-of-warcraft-still-a-1b-powerhouse-even-as-subscription-mmos-decline/. Accessed 2015, June,21th

Turkle, S. (1995). *Life on the screen : identity in the age of the Internet*. New York: Simon & Schuster.

Tychsen, A. (2006). *Role playing games: comparative analysis across two media platforms*. Paper presented at the Proceedings of the 3rd Australasian conference on Interactive entertainment, Perth, Australia.

Wood, R. T. (2008). Problems with the concept of video game "addiction": Some case study examples. *International Journal of Mental Health and Addiction, 6*(2), 169-178.

Wozniak, S. (1984). Homebrew and how the apple came to be. *Digital Deli–The comprehensive user-lovable menu of computer lore, culture, lifestyles and fancy. New York: Workman Publishing*.

Yee, N. (2002). Ariadne-Understanding MMORPG addiction. *Unpublished manuscript. Retrieved March, 31*, 2004.

Yee, N. (2006). Motivations for play in online games. *CyberPsychology & Behavior, 9*(6), 772-775.

Zelkowitz, M. V. (2008). *Advances in Computersseries editor* (Vol. 73). USA: Academic Press.

APPENDIX A.

SURVEY QUESTIONS

Survey Questions in Turkish

1) Cinsiyetiniz nedir?

◯ Erkek ◯Kadın

2) Medeni durumunuz nedir?

◯ Evli ◯Bekar

3) Yaş aralığınız nedir?

◯ 18 ve altı ◯19-25 ◯ 26-35 ◯ 36-45 ◯ 46 ve üstü

4) Mesleğiniz nedir?

◯ Özel ◯Kamu ◯ Serbest ◯ Öğrenci ◯ Çalışmıyorum

5) WoW 'u ne sıklıkla oynuyorsunuz?

◯ Hergün ◯Haftada 1-2 gün ◯ Haftada 4-5 gün ◯ Ayda 1-2 gün

◯ Düzenli “raid” yapıyorum ◯ Boş vakitlerimde ◯ Artık oynamıyorum

6) Oyunu oynamaya başladığınızda en son genişleme paketi hangisiydi?

◯ Henüz genişleme paketi yoktu ◯ Cataclysm ◯ Wrath of the Lich King

◯ The Burning Crusade ◯ Mists of Pandaria ◯ Warlords of Draenor

7) Oyunun makro özelliğini kullanırken makroları siz mi yazıyorsunuz yoksa başkalarının yazdığı makroları mı kullanıyorsunuz?

◯ Kendim yazıyorum ◯ Hazır yazılmışını kullanıyorum

◯ İkisini de yapıyorum ◯ Macro özelliğini kullanmıyorum

8) Oyuna addon olarak bir şeyler eklenebileceğini ve bu eklentiler ile oyunun arayüzünde ve kullanımında bazı değişiklikler yapabileceğinizi ilk nasıl öğrendiniz?

◯ Oyunu oynayan arkadaşımdan ◯ İnternet'te paylaşılan oyun videolarından

◯ Oyunun kendi internet sitesinden ◯ Kendi kendime keşfettim

◯ Oyunla ilgili paylaşımların yapıldığı forum sitelerinden

9) İhtiyacınız olmadığı halde, sırf bir tanıdığınız kullandığı için sizin de yüklediğiniz bir addon var mı?

◯ Evet ◯ Hayır

10) Aynı görevi gören başka eklentiler indirip, aralarında karşılaştırma yaptığınız oldu mu?

◯ Evet ◯ Hayır

11) Addon kullanmanızın, kullanmayan bir kişiye göre daha avantajlı olmanızı sağladığını düşünüyor musunuz?

◯ Evet ◯ Hayır

12) Eklentilerin oyunda seviye atlamanıza yardımcı olduğunu düşünüyor musunuz?

◯ Evet ◯ Hayır

13) Eklentilerde görselliğe önem veriyor musunuz?

Eklentilerin renklerini değiştirebilme, tema ekleyebilme, vs. gibi.

◯ Evet ◯ Hayır

14) Eklentileri nereden indiriyorsunuz?

◯ Curse Client üzerinden

◯ Addon paylaşım sitelerinden

◯ Doğrudan geliştiricinin ya da forum sayfalarından

◯ Başka bir yerden

Eğer başka bir yerden addon indiriyorsanız indirdiğiniz yeri açıklamak ister miydiniz?

……

15) Toplamda kaç addon kullanıyorsunuz ya da kullanmıştınız?

Eklentinin kendi eklentilerini hesaba katmayınız. (Titan panel broker, Titan panel bags, Titan panel professions, gibi)

○ 5'den az ○ 5-10 ○ 11-15 ○ 16-19 ○ 20 ve daha fazla

16) Kullandığınız bu eklentilerden kaç tanesi orijinal arayüzü değiştirmeye yarıyor?

X-Perl, Z-Perl, SexyMap, Bartender, TidyPlates, Bagnon, Milkscrolling Text, Quartz, gibi. (AtlasLoot, DPSmeter, Altholic, gibi sonradan oyuna bütünleşmiş olan yardımcı arayüzler sayılmayacaktır)

○ 1-2 ○ 3-5 ○ 6-9 ○ 10 ve daha fazla

17) Arayüzü addon kullanarak değiştirmenizin sebebi aşağıda verilen seçeneklerden hangisi ile daha iyi anlatılmıştır?

○ Addon kullanarak daha estetik bir arayüze sahip olduğum için.

○ Addon kullanarak arayüzü daha kullanışlı bir hale getiriyorum

○ Addon kullanarak arayüzü hem daha estetik hem de daha kullanışlı bir hale getiriyorum.

Soru 18, 19 ve 20'yi aşağıdaki resme göre cevaplayınız.

18) Sağ üst köşedeki küçük haritayı addon ile değiştirdiğinizde, değiştirilmiş haritayı yukarıdaki resimde belirlenmiş bölgelerden çoğunlukla hangisine taşıyorsunuz?

◯ Harita eklentisi kullanmıyorum

◯ A1 ◯ A2 ◯ A3 ◯ A4 ◯ A5

◯ B1 ◯ B2 ◯ B3 ◯ B4 ◯ B5

◯ C1 ◯ C2 ◯ C3 ◯ C4 ◯ C5

◯ D1 ◯ D2 ◯ D3 ◯ D4 ◯ D5

◯ E1 ◯ E2 ◯ E3 ◯ E4 ◯ E5

19) Sol üst köşede karakterinizin sağlık göstergesinin bulunduğu pencereyi addon ile değiştirdiğinizde, değiştirilmiş pencereyi yukarıdaki resimde belirlenmiş bölgelerden çoğunlukla hangisine taşıyorsunuz?

◯ Bu birim için eklenti kullanmıyorum

◯ A1 ◯ A2 ◯ A3 ◯ A4 ◯ A5

◯ B1 ◯ B2 ◯ B3 ◯ B4 ◯ B5

◯ C1 ◯ C2 ◯ C3 ◯ C4 ◯ C5

◯ D1 ◯ D2 ◯ D3 ◯ D4 ◯ D5

◯ E1 ◯ E2 ◯ E3 ◯ E4 ◯ E5

20) Sol üst köşede düşmanın sağlık göstergesinin bulunduğu pencereyi addon ile değiştirdiğinizde, değiştirilmiş pencereyi yukarıdaki resimde belirlenmiş bölgelerden çoğunlukla hangisine taşıyorsunuz?

◯ Bu birim için addon kullanmıyorum

◯ A1 ◯ A2 ◯ A3 ◯ A4 ◯ A5

◯ B1 ◯ B2 ◯ B3 ◯ B4 ◯ B5

◯ C1 ◯ C2 ◯ C3 ◯ C4 ◯ C5

◯ D1 ◯ D2 ◯ D3 ◯ D4 ◯ D5

◯ E1 ◯ E2 ◯ E3 ◯ E4 ◯ E5

Survey Questions in English

1) What is your gender?

◯ Male ◯ Female

2) What is your marital status?

◯ Married ◯ Single

3) What is your age range?

◯ 18 or less ◯ 19-25 ◯ 26-35 ◯ 36-45 ◯ 46 or more

4) What is your profession?

◯ Private ◯ Public ◯ Self-employed ◯ Student ◯ Not working

5) How much do you play WoW?

◯ Everyday ◯ 1-2 days in a week ◯ 4-5 days in a week ◯ 1-2 days in a month

◯ I regularly participate in raids ◯ In my spare time ◯ I do not play anymore

6) Which expansion pack was on sale when you started playing WoW?

◯ There were no expansion pack at that time

◯ The Burning Crusade ◯ Wrath of the Lich King

◯ Cataclysm ◯ Mists of Pandaria ◯ Warlords of Draenor

7) When you use the "macro" feature of the game, do you create your own macros or do you use other players' macros?

◯ I write myself ◯ I use other players' macros

◯ I do both of them ◯ I do not use macro feature

8) How did you learn to add contents to the game as an addon and that you can change the user interface with it?

◯ Via my friend who plays the game ◯ Via game videos that shared online

◯ Via the game's web site ◯ I discovered myself

◯ Via forum sites which share contents about the game

9) Have you ever installed an addon which you did not need because of someone that you know used it?

◯ Yes ◯ No

10) Have you ever installed an addon which does the same thing that you used before just to compare them?

◯ Yes ◯ No

11) Do you believe that using an addon puts you at an advantageous position compared to those who does not?

◯ Yes ◯ No

12) Do you think that using an addon helps to level-up?

◯ Yes ◯ No

13) Do you care about visuals of addons?

Changing the colors of an addon, applying theme for an addon, etc.

◯ Yes ◯ No

14) How do you get addons?

◯ Through Curse Client

◯ Addon sharing websites

◯ From developers' website or forum site

◯ Some place different

Would you like to explain the place where you get addons if it is different than the choices?

……

15) How many addons do/did you use?

Do not count addon's own panels (Titan panel broker, Titan panel bags, Titan panel professions, etc.)

◯ Less than 5 ◯ 5-10 ◯ 11-15 ◯ 16-19 ◯ 20 or more

16) How many of that addons are for changing the original interface?

X-Perl, Z-perl, SexyMap, Bartender, TidyPlates, Bagnon, Milkscrolling Text, Quartz, etc. (Do not count addons which add an extra UI like AtlasLoot, DPSmeter, Altholic)

○ 1-2 ○ 3-5 ○ 6-9 ○ 10 or more

17) Which answer describes your reason for changing the interface?

○ Addon makes user interface more aesthetic.

○ Addon makes user interface more useful

○ Addon makes user interface more aesthetic and useful.

Please answer 18th, 19th, and 20th questions according to the picture below.

18) When you change the minimap with an addon, where do you place it on designated areas?

◯ I do not use minimap addon

◯ A1	◯ A2	◯ A3	◯ A4	◯ A5
◯ B1	◯ B2	◯ B3	◯ B4	◯ B5
◯ C1	◯ C2	◯ C3	◯ C4	◯ C5
◯ D1	◯ D2	◯ D3	◯ D4	◯ D5
◯ E1	◯ E2	◯ E3	◯ E4	◯ E5

19) When you change your character health indicator with an addon, where do you place it on designated areas?

◯ I do not use an addon for this unit

◯ A1	◯ A2	◯ A3	◯ A4	◯ A5
◯ B1	◯ B2	◯ B3	◯ B4	◯ B5
◯ C1	◯ C2	◯ C3	◯ C4	◯ C5
◯ D1	◯ D2	◯ D3	◯ D4	◯ D5
◯ E1	◯ E2	◯ E3	◯ E4	◯ E5

20) When you change the enemy health indicator with an addon, where do you place it on designated areas?

◯ I do not use an addon for this unit

◯ A1	◯ A2	◯ A3	◯ A4	◯ A5
◯ B1	◯ B2	◯ B3	◯ B4	◯ B5
◯ C1	◯ C2	◯ C3	◯ C4	◯ C5
◯ D1	◯ D2	◯ D3	◯ D4	◯ D5
◯ E1	◯ E2	◯ E3	◯ E4	◯ E5

Survey’s QR Code and Link

http://goo.gl/forms/5nVfWbECUn

APPENDIX B.

SURVEY ANSWERS

Abbreviations in the Answers Table

Q#:	Represents question and number
Not (in Q4):	Not working
Self (in Q4):	Self-employed
Not (in Q5):	I do not play anymore
No Exp:	There were no expansion packs at that time
TBC:	The Burning Crusade
WotLK:	Wrath of the Lich King
Cata:	Cataclysm
MoP:	Mists of Pandaria
WoD:	Warlords of Draenor
Not (in Q7):	I do not use macro feature
Self (in Q7):	I write myself
Both:	I do both of them
Others:	I use other players' macros
Friend:	Via my friend who plays the game
Videos:	Via game videos that shared online
Official:	Via the game's web site
Myself:	I discovered myself
Forum:	Via forum sites which share contents about the game
Curse:	Through Curse Client
Website:	Addon sharing websites
Forum:	From developers' website or forum site
Different:	Some place different
Aest.:	Addon makes user interface more aesthetic.
Useful:	Addon makes user interface more useful
Aest. useful:	Addon makes user interface more aesthetic and useful

Survey Answers

P	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Explain	Q15	Q16	Q17	Q18	Q19	Q20
1	Male	Married	26-35	Private	Spare Time	WotLK	Not	Friend	Yes	Yes	Yes	Yes	Yes	Curse		5-10	3-5	Aest. useful	A5	A1	A2
2	Male	Single	26-35	Private	1-2 days	No Exp.	Myself	Videos	Yes	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Aest. useful	Not	Not	D3
3	Male	Single	26-35	Private	Not	WotLK	Others	Friend	No	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Aest. useful	A5	A1	A3
4	Male	Single	26-35	Private	Not	MoP	Both	Friend	Yes	Yes	Yes	Yes	Yes	Curse		16-19	3-5	Useful	Not	A1	C1
5	Male	Single	26-35	Private	Everyday	TBC	Both	Forum	No	Yes	Yes	Yes	Yes	Curse		20+	3-5	Aest. useful	Not	C2	C4
6	Male	Single	26-35	Private	Spare Time	No Exp.	Both	Forum	Yes	Yes	Yes	Yes	No	Curse		4-	1-2	Aest. useful	Not	C2	C4
7	Male	Single	26-35	Not	Raiding	TBC	Both	Official site	No	Yes	Yes	No	No	Curse		5-10	1-2	Useful	E5	A1	A2
8	Male	Single	19-25	Student	Spare Time	Cata	Others	Videos	Yes	Yes	Yes	Yes	Yes	Curse		16-19	1-2	Aest. useful	A5	A3	A1
9	Male	Single	26-35	Not	Everyday	No Exp.	Myself	Videos	No	Yes	Yes	Yes	No	Curse		11-15	3-5	Useful	A5	D2	D4
10	Male	Single	26-35	Private	Not	No Exp.	Both	Videos	Yes	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Aest. useful	A5	A1	E1
11	Male	Single	19-25	Private	Raiding	Cata	Myself	Friend	Yes	Yes	Yes	Yes	Yes	Website		11-15	3-5	Aest. useful	A3	E2	E4
12	Male	Single	19-25	Public	Everyday	WotLK	Both	Forum	No	Yes	Yes	Yes	Yes	Curse		11-15	3-5	Aest. useful	A5	A1	A2
13	Male	Single	26-35	Private	Not	TBC	Both	Friend	No	Yes	Yes	Yes	Yes	Website		5-10	1-2	Aest. useful	Not	A1	A2
14	Female	Married	26-35	Public	Not	TBC	Both	Friend	Yes	No	Yes	No	Yes	Website		4-	1-2	Useful	Not	E4	A3
15	Male	Single	19-25	Student	Not	MoP	Myself	Friend	Yes	Yes	Yes	Yes	No	Website		5-10	1-2	Useful	Not	D2	D3
16	Male	Single	19-25	Private	Not	No Exp.	Myself	Videos	No	Yes	Yes	Yes	Yes	Curse		4-	1-2	Aest. useful	E1	D2	D3

Total AOI Events During the Experiment (in Seconds)

P	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Explain	Q15	Q16	Q17	Q18	Q19	Q20
17	Male	Married	26-35	Private	Not	WoD	Not	Friend	Yes	Yes	Yes	No	Yes	Website		5-10	3-5	Aest. useful	Not	A1	A2
18	Female	Single	19-25	Student	Spare Time	No Exp.	Both	Friend	Yes	Yes	Yes	No	Yes	Curse		5-10	3-5	Aest. useful	Not	Not	Not
19	Male	Single	19-25	Not	Not	WotLK	Others	Friend	No	Yes	Yes	No	Yes	Website		4-	1-2	Aest. useful	A5	Not	Not
20	Male	Single	19-25	Private	4-5 days	WotLK	Not	Friend	No	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Useful	E5	Not	A5
21	Male	Single	19-25	Private	Not	Cata	Not	Friend	Yes	No	Yes	No	No	Developer		4-	1-2	Useful	A5	Not	Not
22	Male	Single	19-25	Student	Not	No Exp.	Others	Friend	No	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Useful	Not	Not	B2
23	Male	Married	26-35	Private	Not	No Exp.	Not	Videos	No	No	No	No	No	Different		4-	1-2	Aest. useful	E1	E1	E1
24	Male	Single	19-25	Student	Raiding	TBC	Both	Videos	No	Yes	Yes	Yes	Yes	Curse		11-15	1-2	Aest. useful	A5	D2	D4
25	Male	Single	19-25	Student	Everyday	No Exp.	Both	Friend	No	Yes	Yes	Yes	No	Curse		5-10	3-5	Aest. useful	E5	E1	A3
26	Male	Married	26-35	Private	1-2 days	WoD	Both	Friend	No	No	Yes	No	Yes	Curse		5-10	1-2	Aest. useful	Not	B3	B4
27	Male	Married	26-35	Private	Not	No Exp.	Not	Friend	No	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Useful	A5	A1	A2
28	Male	Single	19-25	Student	Everyday	MoP	Both	Videos	Yes	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Useful	A5	A2	B2
29	Male	Single	19-25	Student	Everyday	WotLK	Both	Friend	Yes	Yes	Yes	Yes	Yes	Website		16-19	3-5	Aest. useful	A5	D2	D4
30	Male	Single	19-25	Private	Not	TBC	Not	Friend	Yes	Yes	Yes	Yes	Yes	Curse		20+	10+	Aest. useful	Not	C3	C3
31	Male	Married	26-35	Private	Spare Time	No Exp.	Both	Forum	No	Yes	Yes	Yes	Yes	Curse		16-19	3-5	Aest. useful	Not	D2	D4
32	Male	Single	≤18	Student	Everyday	No Exp.	Both	Forum	No	Yes	Yes	Yes	Yes	Curse		5-10	3-5	Aest. useful	A1	B1	C1

Total AOI Events During the Experiment (in Seconds)

P	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Explain	Q15	Q16	Q17	Q18	Q19	Q20
33	Male	Single	19-25	Not	Everyday	TBC	Myself	Forum	Yes	Yes	Yes	Yes	Yes	Website		20+	10+	Aest. useful	A5	D2	D4
34	Male	Single	26-35	Not	Everyday	WotLK	Both	Friend	No	No	Yes	Yes	Yes	Curse		20+	3-5	Aest. useful	Not	Not	Not
35	Male	Single	26-35	Public	Not	No Exp.	Both	Videos	Yes	Yes	Yes	Yes	No	Curse		20+	3-5	Aest. useful	A5	D3	D3
36	Male	Single	≤18	Student	Not	WoD	Myself	Forum	Yes	Yes	Yes	No	Yes	Curse		20+	3-5	Aest.	A5	A1	D3
37	Male	Married	26-35	Private	Everyday	No Exp.	Myself	Forum	No	No	Yes	Yes	Yes	Curse		5-10	1-2	Aest. useful	Not	D2	D3
38	Male	Married	26-35	Private	Spare Time	TBC	Others	Videos	No	Yes	Yes	Yes	Yes	Curse		4-	1-2	Useful	A3	D2	D4
39	Male	Single	19-25	Student	Spare Time	TBC	Not	Friend	No	Yes	No	No	Yes	Website		5-10	1-2	Aest. useful	Not	E2	D3
40	Male	Single	26-35	Private	Not	No Exp.	Not	Myself	Yes	No	Yes	Yes	No	Website		4-	3-5	Useful	A3	A5	A1
41	Male	Married	26-35	Private	Not	WotLK	Both	Friend	Yes	Yes	Yes	Yes	Yes	Website		5-10	1-2	Useful	E5	E1	A3
42	Male	Single	26-35	Private	Not	TBC	Myself	Friend	No	Yes	Yes	Yes	Yes	Curse		11-15	3-5	Aest. useful	E5	A1	A2
43	Female	Married	26-35	Not	Not	No Exp.	Not	Friend	No	No	No	No	No	Different		4-	1-2	Aest.	B1	B4	A4
44	Male	Married	26-35	Private	Spare Time	No Exp.	Not	Friend	No	No	No	No	No	Website		4-	1-2	Aest. useful	A5	B2	B4
45	Male	Married	26-35	Private	Not	No Exp.	Others	Friend	No	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Useful	A5	D3	D4
46	Male	Married	26-35	Private	Not	No Exp.	Both	Forum	Yes	Yes	Yes	Yes	Yes	Curse		20+	3-5	Useful	E5	C2	C4
47	Male	Single	26-35	Private	Everyday	TBC	Myself	Friend	No	No	Yes	Yes	Yes	Curse		11-15	3-5	Useful	A5	A1	A1
48	Female	Single	26-35	Private	Not	No Exp.	Others	Friend	Yes	Yes	Yes	Yes	Yes	Developer		4-	1-2	Aest.	A1	B1	B1

Total AOI Events During the Experiment (in Seconds)

P	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Explain	Q15	Q16	Q17	Q18	Q19	Q20
49	Male	Single	19-25	Student	4-5 days	No Exp.	Myself	Forum	No	No	Yes	Yes	No	Curse		4-	1-2	Useful	E5	A1	A2
50	Male	Single	19-25	Student	Everyday	Cata	Not	Forum	No	No	Yes	No	Yes	Curse		4-	1-2	Useful	A5	D3	A1
51	Male	Single	26-35	Private	4-5 days	No Exp.	Not	Official site	No	No	No	No	No	Curse		4-	10+	Aest.	B5	D1	A4
52	Male	Single	26-35	Student	Not	TBC	Both	Forum	No	Yes	Yes	Yes	No	Curse		4-	1-2	Useful	Not	B2	B2
53	Male	Single	26-35	Private	Everyday	Cata	Myself	Myself	No	Yes	Yes	Yes	No	Curse		4-	1-2	Useful	A5	A1	A2
54	Male	Single	26-35	Self	Everyday	Cata	Others	Friend	No	Yes	Yes	Yes	No	Curse		4-	1-2	Useful	A5	A1	A2
55	Male	Single	26-35	Private	Everyday	No Exp.	Both	Friend	No	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Aest. useful	A5	D2	D4
56	Male	Single	26-35	Public	Not	No Exp.	Not	Videos	No	No	Yes	No	Yes	Different		4-	1-2	Useful	A5	A1	A1
57	Male	Single	26-35	Private	Not	No Exp.	Myself	Myself	Yes	Yes	Yes	Yes	Yes	Developer		4-	3-5	Useful	A5	E5	A1
58	Male	Single	26-35	Not	Not	WoD	Both	Myself	No	Yes	Yes	Yes	No	Curse		5-10	3-5	Aest. useful	A5	B2	B2
59	Male	Single	26-35	Private	Spare Time	TBC	Both	Myself	No	Yes	Yes	No	Yes	Curse		5-10	3-5	Aest. useful	Not	D2	D3
60	Male	Single	26-35	Self	Not	MoP	Myself	Myself	No	Yes	Yes	No	Yes	Curse		5-10	1-2	Aest. useful	E5	E2	E3
61	Male	Single	26-35	Private	Not	WoD	Myself	Friend	Yes	No	Yes	Yes	Yes	Developer		5-10	3-5	Useful	A5	A1	A1
62	Male	Single	26-35	Private	Not	MoP	Others	Friend	Yes	Yes	Yes	Yes	No	Curse		4-	1-2	Useful	A2	E5	E5
63	Male	Single	26-35	Private	Not	MoP	Others	Friend	Yes	Yes	Yes	Yes	No	Curse		4-	1-2	Useful	A2	E5	E5
64	Male	Single	26-35	Public	Spare Time	WotLK	Both	Myself	Yes	Yes	Yes	Yes	Yes	Website		4-	3-5	Aest. useful	E1	B1	C1

Total AOI Events During the Experiment
(in Seconds)

P	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Explain	Q15	Q16	Q17	Q18	Q19	Q20
65	Male	Single	26-35	Not	Not	WoD	Both	Friend	No	Yes	Yes	Yes	Yes	Curse		4-	1-2	Useful	Not	Not	Not
66	Male	Married	26-35	Self	Not	Cata	Both	Friend	Yes	No	Yes	No	Yes	Curse		5-10	1-2	Aest. useful	A5	A1	Not
67	Male	Single	26-35	Private	1-2 in month	WoD	Both	Friend	Yes	Yes	Yes	Yes	Yes	Website		20+	1-2	Aest. useful	Not	D2	D4
68	Male	Single	26-35	Private	1-2 days	WotLK	Both	Videos	No	Yes	Yes	No	Yes	Curse		5-10	1-2	Useful	A5	Not	Not
69	Male	Single	26-35	Student	Not	WotLK	Both	Forum	No	Yes	Yes	No	Yes	Curse		16-19	1-2	Useful	E3	D2	D4
70	Male	Married	364-5	Private	Everyday	WoD	Both	Friend	No	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Useful	A5	A1	A2
71	Male	Single	26-35	Self	1-2 days	MoP	Others	Videos	No	No	Yes	No	No	Website		5-10	1-2	Useful	A1	E1	A5
72	Male	Married	26-35	Private	4-5 days	WotLK	Myself	Friend	Yes	Yes	Yes	Yes	No	Curse		16-19	1-2	Useful	A5	D2	D4
73	Male	Married	26-35	Self	4-5 days	WotLK	Both	Forum	No	Yes	Yes	Yes	No	Curse		11-15	1-2	Useful	Not	D2	D4
74	Male	Single	19-25	Student	Everyday	WoD	Both	Friend	Yes	No	Yes	Yes	No	Curse		5-10	1-2	Aest. useful	Not	C2	C4
75	Male	Single	26-35	Private	Everyday	WotLK	Both	Videos	No	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Aest. useful	A5	A1	C2
76	Female	Single	26-35	Public	Everyday	MoP	Both	Friend	No	Yes	Yes	Yes	No	Curse		20+	3-5	Aest. useful	A5	C2	C3
77	Male	Married	26-35	Private	Spare Time	TBC	Others	Friend	No	Yes	Yes	Yes	Yes	Curse		5-10	3-5	Aest. useful	Not	D2	D3
78	Male	Single	19-25	Student	Not	No Exp.	Both	Friend	Yes	Yes	Yes	Yes	Yes	Curse		20+	3-5	Aest. useful	E5	D2	D3
79	Male	Single	19-25	Student	1-2 in month	WoD	Others	Forum	Yes	Yes	Yes	Yes	No	Curse		5-10	3-5	Aest. useful	A5	B2	B4
80	Male	Single	26-35	Private	1-2 days	No Exp.	Myself	Friend	No	Yes	Yes	No	Yes	Curse		11-15	1-2	Useful	A5	D3	D3

Total AOI Events During the Experiment (in Seconds)

P	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Explain	Q15	Q16	Q17	Q18	Q19	Q20
81	Male	Single	26-35	Private	Everyday	TBC	Not	Friend	No	No	Yes	Yes	Yes	Developer		5-10	1-2	Aest. useful	Not	Not	A2
82	Male	Married	26-35	Self	Everyday	No Exp.	Both	Forum	No	Yes	Yes	Yes	No	Curse		20+	3-5	Useful	Not	Not	A2
83	Male	Married	26-35	Private	Not	MoP	Not	Friend	Yes	Yes	Yes	Yes	Yes	Curse		20+	10+	Aest. useful	A5	A1	A2
84	Male	Single	26-35	Private	4-5 days	WotLK	Not	Friend	No	Yes	Yes	No	No	Curse		5-10	1-2	Useful	Not	Not	Not
85	Male	Single	19-25	Student	4-5 days	MoP	Others	Myself	No	No	Yes	Yes	Yes	Curse		11-15	3-5	Aest. useful	Not	D2	D4
86	Male	Single	19-25	Private	Not	WotLK	Not	Myself	No	No	No	No	No	Curse		4-	3-5	Aest. useful	Not	Not	Not
87	Male	Single	19-25	Student	Spare Time	TBC	Both	Friend	Yes	No	Yes	No	No	Curse		5-10	1-2	Useful	Not	Not	Not
88	Male	Single	26-35	Private	Raiding	WotLK	Both	Friend	No	Yes	Yes	Yes	Yes	Curse		5-10	3-5	Aest. useful	A5	E2	D2
89	Male	Single	19-25	Self	Not	No Exp.	Not	Friend	No	No	No	Yes	Yes	Website		4-	1-2	Aest. useful	A5	A1	B2
90	Male	Single	26-35	Private	Everyday	WotLK	Not	Friend	No	No	No	No	No	Curse		5-10	1-2	Aest. useful	A5	A4	A5
91	Male	Married	26-35	Private	Everyday	TBC	Both	Forum	No	Yes	Yes	Yes	No	Curse		5-10	3-5	Useful	Not	A1	Not
92	Male	Single	26-35	Private	Spare Time	WotLK	Others	Friend	No	Yes	No	No	Yes	Curse		5-10	1-2	Aest. useful	A5	Not	Not
93	Male	Single	26-35	Private	Everyday	TBC	Both	Friend	No	Yes	Yes	Yes	Yes	Curse		4-	1-2	Aest.	A5	A1	A3
94	Male	Married	26-35	Private	Not	MoP	Not	Friend	Yes	Yes	Yes	Yes	Yes	Curse		20+	10+	Aest. useful	A5	D3	C3
95	Male	Single	26-35	Private	Not	No Exp.	Not	Forum	Yes	No	Yes	Yes	Yes	Curse		4-	1-2	Aest. useful	D3	D4	E5
96	Male	Single	≤18	Student	Spare Time	WotLK	Both	Videos	Yes	Yes	Yes	No	Yes	Curse		16-19	3-5	Aest. useful	Not	C2	C4

Total AOI Events During the Experiment
(in Seconds)

P	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Explain	Q15	Q16	Q17	Q18	Q19	Q20
97	Male	Single	26-35	Public	Everyday	No Exp.	Both	Forum	Yes	Yes	No	Yes	No	Curse		11-15	1-2	Useful	Not	Not	D3
98	Male	Single	19-25	Student	Raiding	WotLK	Both	Friend	No	No	Yes	Yes	Yes	Curse		4-	1-2	Useful	A5	D2	D4
99	Male	Single	19-25	Student	Raiding	TBC	Both	Videos	No	Yes	Yes	Yes	Yes	Curse		20+	6-9	Aest. useful	A5	D2	D4
100	Male	Single	19-25	Student	1-2 in month	MoP	Myself	Friend	Yes	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Useful	A5	A3	A1
101	Male	Single	26-35	Student	Not	WoD	Not	Friend	No	Yes	Yes	No	Yes	Curse		4-	1-2	Useful	A5	A1	A2
102	Male	Single	26-35	Private	Not	No Exp.	Both	Myself	No	Yes	Yes	No	Yes	Developer		4-	1-2	Aest. useful	A5	Not	A3
103	Male	Single	19-25	Student	Not	WotLK	Both	Friend	No	Yes	Yes	No	No	Website		4-	1-2	Aest. useful	Not	A1	A1
104	Male	Married	364-5	Private	Everyday	No Exp.	Not	Videos	No	No	Yes	Yes	No	Curse		4-	1-2	Aest.	Not	Not	Not
105	Male	Single	19-25	Student	Not	WotLK	Both	Friend	No	Yes	Yes	Yes	Yes	Curse		16-19	3-5	Aest. useful	A5	D3	B3
106	Male	Single	19-25	Student	Spare Time	MoP	Both	Videos	No	Yes	Yes	Yes	Yes	Curse		11-15	3-5	Aest. useful	A5	C2	C4
107	Male	Single	19-25	Student	1-2 days	WotLK	Both	Videos	No	Yes	Yes	Yes	Yes	Curse		11-15	1-2	Aest. useful	A5	D2	D4
108	Male	Single	26-35	Private	Spare Time	No Exp.	Myself	Videos	Yes	Yes	Yes	Yes	Yes	Curse		4-	1-2	Useful	A5	D2	D4
109	Male	Single	26-35	Private	Everyday	WotLK	Both	Friend	No	Yes	No	No	Yes	Curse		11-15	1-2	Aest. useful	A5	D2	D4
110	Male	Single	19-25	Student	Everyday	MoP	Both	Videos	Yes	Yes	Yes	Yes	Yes	Curse		11-15	1-2	Aest.	A5	C2	C4
111	Male	Single	26-35	Private	Spare Time	MoP	Both	Forum	No	No	Yes	Yes	Yes	Curse		5-10	1-2	Aest. useful	Not	A1	A2
112	Male	Married	19-25	Public	1-2 days	TBC	Myself	Forum	Yes	No	Yes	Yes	Yes	Curse		4-	1-2	Aest. useful	D2	D2	D2

Total AOI Events During the Experiment
(in Seconds)

P	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Explain	Q15	Q16	Q17	Q18	Q19	Q20
113	Male	Married	26-35	Private	Not	MoP	Both	Friend	Yes	No	Yes	Yes	Yes	Website		5-10	1-2	Useful	B4	C4	C3
114	Male	Single	26-35	Not	Everyday	TBC	Both	Myself	No	Yes	Yes	Yes	Yes	Curse		20+	3-5	Aest. useful	E2	D2	D4
115	Male	Single	19-25	Student	Everyday	WotLK	Others	Forum	No	Yes	Yes	Yes	Yes	Website		20+	1-2	Aest. useful	A5	D2	D4
116	Male	Single	19-25	Student	Everyday	WotLK	Both	Videos	Yes	Yes	Yes	No	Yes	Curse		11-15	3-5	Useful	A5	D2	D4
117	Male	Single	19-25	Student	Raiding	Cata	Both	Myself	No	Yes	Yes	Yes	Yes	Curse		11-15	3-5	Aest. useful	A5	C2	C4
118	Male	Single	19-25	Public	Everyday	TBC	Myself	Videos	Yes	Yes	Yes	Yes	Yes	Curse		20+	3-5	Useful	A5	A1	A3
119	Female	Married	364-5	Public	Everyday	TBC	Myself	Friend	Yes	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Aest. useful	A3	C3	C3
120	Male	Married	364-5	Private	4-5 days	WotLK	Both	Videos	No	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Useful	Not	D3	D3
121	Male	Single	19-25	Not	Raiding	TBC	Both	Videos	No	Yes	Yes	Yes	No	Curse		11-15	3-5	Useful	A5	D2	D4
122	Male	Single	19-25	Student	Everyday	TBC	Not	Myself	No	Yes	No	No	No	Curse		4-	1-2	Useful	Not	Not	Not
123	Male	Single	26-35	Private	4-5 days	WotLK	Both	Videos	Yes	Yes	Yes	Yes	Yes	Curse		20+	1-2	Aest. useful	A5	A1	A1
124	Male	Single	19-25	Student	Everyday	WotLK	Others	Forum	No	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Aest. useful	Not	Not	Not
125	Male	Single	19-25	Student	4-5 days	WotLK	Both	Forum	No	Yes	Yes	No	Yes	Curse		5-10	1-2	Useful	A5	A1	C2
126	Male	Single	19-25	Student	4-5 days	WotLK	Both	Friend	No	No	Yes	Yes	Yes	Curse		5-10	1-2	Aest. useful	Not	A1	A4
127	Male	Single	19-25	Student	Everyday	Cata	Both	Videos	No	No	Yes	Yes	Yes	Curse		11-15	6-9	Aest. useful	A5	D2	D4
128	Male	Single	19-25	Student	4-5 days	WotLK	Both	Videos	Yes	Yes	Yes	Yes	Yes	Website		5-10	1-2	Aest. useful	Not	D2	D4

Total AOI Events During the Experiment
(in Seconds)

P	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Explain	Q15	Q16	Q17	Q18	Q19	Q20
129	Male	Single	26-35	Private	4-5 days	TBC	Others	Videos	No	Yes	Yes	Yes	Yes	Curse		16-19	3-5	Aest. useful	D5	A1	A3
130	Male	Married	364-5	Private	1-2 days	TBC	Others	Forum	Yes	No	Yes	Yes	Yes	Curse		20+	6-9	Aest. useful	E1	D3	D4
131	Male	Single	26-35	Not	Everyday	WotLK	Others	Friend	Yes	Yes	Yes	Yes	No	Curse		5-10	3-5	Aest. useful	Not	A1	A2
132	Male	Single	19-25	Self	Spare Time	WotLK	Both	Myself	No	Yes	Yes	Yes	Yes	Curse		11-15	1-2	Aest. useful	Not	D2	D4
133	Male	Single	19-25	Student	Not	WotLK	Others	Forum	Yes	No	Yes	Yes	No	Curse		5-10	1-2	Useful	Not	Not	Not
134	Female	Single	26-35	Private	Everyday	WotLK	Both	Friend	Yes	Yes	Yes	Yes	No	Curse		5-10	1-2	Useful	A5	D2	D4
135	Male	Single	19-25	Self	Raiding	TBC	Both	Forum	No	Yes	Yes	Yes	Yes	Curse		11-15	1-2	Useful	Not	Not	Not
136	Male	Single	19-25	Student	Spare Time	Cata	Others	Friend	No	Yes	Yes	No	Yes	Curse		20+	1-2	Useful	C5	B2	B3
137	Male	Single	19-25	Student	1-2 days	MoP	Others	Videos	Yes	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Aest. useful	A5	D2	D3
138	Male	Married	26-35	Public	Not	MoP	Both	Forum	Yes	Yes	Yes	Yes	No	Curse		5-10	1-2	Aest. useful	Not	B2	B3
139	Male	Single	≤18	Student	4-5 days	Cata	Both	Forum	No	Yes	Yes	Yes	Yes	Developer		11-15	3-5	Aest. useful	E5	D2	D4
140	Male	Married	364-5	Private	Not	MoP	Others	Videos	Yes	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Aest. useful	A5	D2	D4
141	Male	Single	19-25	Student	Not	TBC	Both	Forum	No	Yes	Yes	Yes	No	Curse		20+	10+	Aest. useful	A5	D2	D4
142	Male	Married	26-35	Public	4-5 days	No Exp.	Not	Forum	No	Yes	Yes	Yes	No	Curse		4-	1-2	Aest. useful	Not	Not	Not
143	Male	Single	19-25	Student	Not	TBC	Both	Myself	No	Yes	Yes	Yes	Yes	Developer		5-10	1-2	Aest. useful	A3	C1	D2
144	Male	Single	26-35	Self	4-5 days	WoD	Not	Forum	No	No	Yes	Yes	Yes	Curse		4-	1-2	Useful	A2	A3	A4

Total AOI Events During the Experiment (in Seconds)

P	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Explain	Q15	Q16	Q17	Q18	Q19	Q20
145	Male	Single	26-35	Private	Not	WoD	Both	Friend	No	Yes	Yes	Yes	Yes	Curse		11-15	1-2	Aest. useful	A5	D3	D3
146	Male	Single	364-5	Self	Raiding	TBC	Not	Myself	Yes	Yes	Yes	Yes	No	Curse		20+	1-2	Useful	Not	Not	Not
147	Male	Single	26-35	Not	Raiding	WotLK	Both	Forum	Yes	Yes	Yes	Yes	No	Curse		5-10	1-2	Useful	E5	D3	C3
148	Male	Single	≤18	Student	Spare Time	WotLK	Both	Videos	No	Yes	Yes	No	Yes	Website		4-	1-2	Useful	A5	B2	B2
149	Male	Single	19-25	Student	Everyday	WoD	Both	Videos	No	No	No	No	Yes	Curse		4-	1-2	Useful	A2	A1	A3
150	Male	Married	364-5	Private	Everyday	TBC	Myself	Friend	No	No	Yes	Yes	Yes	Curse		5-10	3-5	Aest. useful	E5	D2	D4
151	Male	Single	26-35	Private	4-5 days	TBC	Others	Forum	No	Yes	Yes	Yes	Yes	Curse		5-10	3-5	Aest. useful	A5	D2	D4
152	Male	Single	19-25	Student	Spare Time	No Exp.	Myself	Myself	No	Yes	Yes	Yes	No	Curse		20+	3-5	Useful	A5	D2	D4
153	Male	Single	19-25	Student	Everyday	MoP	Not	Friend	No	Yes	Yes	Yes	No	Curse		20+	3-5	Useful	A5	Not	Not
154	Male	Single	≤18	Student	Not	WoD	Both	Friend	No	No	Yes	No	No	Curse		5-10	1-2	Useful	A5	C1	C4
155	Male	Single	≤18	Student	Everyday	WoD	Myself	Friend	No	No	Yes	No	Yes	Developer		5-10	1-2	Aest. useful	A5	D2	D4
156	Male	Single	19-25	Private	1-2 days	TBC	Both	Friend	No	Yes	Yes	Yes	Yes	Curse		20+	6-9	Aest. useful	A5	A1	A2
157	Male	Single	19-25	Student	Everyday	Cata	Myself	Friend	Yes	Yes	Yes	Yes	Yes	Curse		20+	1-2	Useful	A1	C2	C4
158	Male	Single	≤18	Student	Raiding	WotLK	Both	Videos	Yes	No	Yes	Yes	No	Curse		11-15	1-2	Aest. useful	Not	B1	A1
159	Male	Single	26-35	Private	Everyday	WoD	Others	Forum	No	Yes	Yes	Yes	Yes	Curse		11-15	1-2	Aest.	Not	Not	A2
160	Male	Single	19-25	Not	Everyday	No Exp.	Both	Forum	Yes	Yes	Yes	Yes	Yes	Curse		16-19	3-5	Aest. useful	A4	C1	C1

Total AOI Events During the Experiment (in Seconds)

P	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Explain	Q15	Q16	Q17	Q18	Q19	Q20
161	Male	Single	≤18	Student	4-5 days	TBC	Not	Videos	No	Yes	Yes	Yes	Yes	Curse		5-10	3-5	Aest. useful	A5	A1	A2
162	Male	Single	19-25	Student	Everyday	MoP	Myself	Myself	No	No	Yes	No	No	Website		5-10	1-2	Aest. useful	Not	D2	D4
163	Male	Single	19-25	Student	Not	WotLK	Others	Videos	No	No	Yes	Yes	Yes	Curse		5-10	3-5	Aest. useful	A5	E1	E5
164	Male	Single	19-25	Student	Everyday	WoD	Not	Friend	No	No	Yes	No	Yes	Curse		4-	1-2	Aest. useful	B1	B3	C3
165	Male	Single	19-25	Student	Everyday	MoP	Both	Forum	No	Yes	Yes	Yes	Yes	Curse		20+	6-9	Aest. useful	A5	D2	D4
166	Male	Single	19-25	Self	Everyday	No Exp.	Both	Forum	Yes	Yes	Yes	No	No	Curse		5-10	1-2	Aest. useful	A5	A1	A2
167	Male	Single	19-25	Student	Not	TBC	Others	Friend	Yes	Yes	Yes	Yes	Yes	Curse		11-15	1-2	Useful	A5	E1	A3
168	Male	Single	26-35	Private	Everyday	WotLK	Both	Myself	No	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Aest. useful	E3	D2	D4
169	Male	Single	≤18	Student	Spare Time	WoD	Not	Myself	No	No	Yes	Yes	Yes	Developer		4-	1-2	Aest. useful	A5	D2	D4
170	Male	Single	≤18	Student	Everyday	Cata	Myself	Friend	No	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Aest. useful	A5	D2	D4
171	Male	Single	19-25	Student	Raiding	MoP	Others	Forum	Yes	Yes	No	No	Yes	Curse		11-15	3-5	Aest. useful	A5	D2	D4
172	Male	Single	19-25	Private	Everyday	TBC	Myself	Myself	No	Yes	Yes	Yes	Yes	Curse		5-10	3-5	Useful	A5	C2	D3
173	Male	Single	19-25	Not	Everyday	Cata	Both	Myself	No	No	Yes	Yes	Yes	Curse		5-10	3-5	Aest. useful	A5	A1	A1
174	Male	Single	≤18	Student	4-5 days	WotLK	Myself	Videos	No	No	Yes	Yes	No	Curse		5-10	1-2	Useful	Not	Not	Not
175	Male	Single	26-35	Self	Everyday	MoP	Not	Friend	No	Yes	Yes	Yes	No	Different	wowmatrix	5-10	1-2	Useful	A5	A1	A4
176	Male	Single	19-25	Student	Not	WotLK	Both	Videos	No	No	Yes	No	Yes	Curse		5-10	1-2	Aest. useful	A5	D2	D4

Total AOI Events During the Experiment (in Seconds)

P	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Explain	Q15	Q16	Q17	Q18	Q19	Q20
177	Male	Single	19-25	Student	Everyday	WotLK	Myself	Forum	No	No	Yes	No	Yes	Curse		20+	3-5	Aest. useful	E3	B2	B2
178	Male	Single	19-25	Student	Everyday	MoP	Myself	Friend	No	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Aest.	Not	D2	D4
179	Male	Single	19-25	Student	Everyday	Cata	Both	Videos	No	No	Yes	No	Yes	Curse		5-10	1-2	Aest. useful	Not	Not	Not
180	Male	Single	26-35	Private	Spare Time	TBC	Not	Videos	No	Yes	Yes	Yes	Yes	Website		5-10	1-2	Aest. useful	Not	D2	D4
181	Male	Single	26-35	Self	4-5 days	Cata	Not	Friend	No	No	Yes	No	Yes	Curse		5-10	1-2	Aest. useful	A5	D2	D4
182	Male	Single	19-25	Student	1-2 in month	Cata	Not	Friend	No	Yes	Yes	No	Yes	Curse		4-	1-2	Aest. useful	Not	Not	Not
183	Male	Single	19-25	Student	Everyday	Cata	Both	Friend	No	No	Yes	No	No	Curse		4-	1-2	Aest. useful	Not	Not	Not
184	Male	Single	19-25	Student	Raiding	No Exp.	Myself	Myself	No	No	No	Yes	Yes	Curse		5-10	1-2	Aest.	A5	D3	A3
185	Male	Single	19-25	Student	Not	MoP	Myself	Myself	No	Yes	Yes	Yes	Yes	Website		5-10	3-5	Aest. useful	A5	A1	B1
186	Male	Single	26-35	Public	Everyday	TBC	Both	Forum	No	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Aest. useful	A5	D2	D4
187	Male	Single	19-25	Student	Not	MoP	Others	Forum	No	No	No	Yes	No	Developer		4-	1-2	Aest. useful	A5	A1	A2
188	Male	Single	19-25	Student	4-5 days	MoP	Both	Friend	No	No	Yes	Yes	Yes	Curse		4-	1-2	Aest.	A1	A5	A2
189	Male	Single	26-35	Student	4-5 days	TBC	Both	Friend	Yes	Yes	Yes	Yes	No	Curse		20+	3-5	Useful	A5	A1	A1
190	Male	Married	26-35	Public	Not	WoD	Others	Videos	No	Yes	Yes	Yes	No	Curse		5-10	1-2	Useful	Not	D2	D4
191	Male	Single	19-25	Student	Everyday	TBC	Not	Forum	No	Yes	No	No	Yes	Curse		4-	1-2	Useful	Not	D2	D4
192	Male	Single	19-25	Student	1-2 days	No Exp.	Both	Videos	Yes	Yes	Yes	Yes	Yes	Curse		16-19	6-9	Aest. useful	A5	D2	D3

Total AOI Events During the Experiment (in Seconds)

P	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Explain	Q15	Q16	Q17	Q18	Q19	Q20
193	Male	Single	19-25	Student	Everyday	WotLK	Both	Myself	Yes	Yes	No	Yes	Yes	Developer		20+	1-2	Useful	Not	C2	C4
194	Male	Single	19-25	Student	Everyday	WotLK	Myself	Videos	No	Yes	Yes	No	Yes	Website		11-15	1-2	Aest. useful	A5	A1	A2
195	Male	Single	26-35	Public	Not	WoD	Not	Forum	No	Yes	Yes	No	Yes	Website		4-	1-2	Aest.	Not	Not	Not
196	Male	Single	26-35	Student	Everyday	TBC	Myself	Friend	No	No	Yes	Yes	No	Curse		5-10	1-2	Useful	A5	A1	A2
197	Male	Single	19-25	Student	4-5 days	WotLK	Myself	Friend	Yes	Yes	Yes	No	Yes	Curse		16-19	10+	Useful	A5	A1	A3
198	Male	Single	19-25	Student	Spare Time	Cata	Myself	Friend	No	No	Yes	Yes	No	Curse		5-10	3-5	Useful	E5	D3	D3
199	Male	Single	19-25	Student	Not	WoD	Not	Myself	No	No	Yes	No	Yes	Website		4-	1-2	Aest. useful	A5	D2	B2
200	Male	Single	19-25	Student	Everyday	WotLK	Others	Friend	Yes	Yes	Yes	Yes	No	Curse		5-10	3-5	Useful	Not	Not	Not
201	Male	Single	19-25	Private	Everyday	WotLK	Myself	Official site	No	Yes	Yes	Yes	No	Curse		5-10	1-2	Aest. useful	Not	Not	Not
202	Male	Single	19-25	Not	Everyday	WoD	Not	Videos	No	No	No	No	No	Curse		4-	1-2	Aest.	A5	A1	A3
203	Male	Single	19-25	Student	Spare Time	MoP	Not	Videos	No	Yes	No	No	Yes	Curse		5-10	1-2	Useful	E5	C2	C4
204	Male	Single	19-25	Student	Raiding	TBC	Both	Videos	No	No	Yes	Yes	Yes	Curse		20+	1-2	Useful	Not	B2	C2
205	Male	Single	26-35	Not	Everyday	WotLK	Both	Friend	Yes	Yes	Yes	Yes	No	Curse		16-19	1-2	Useful	A5	A1	A2
206	Male	Single	19-25	Student	Not	WoD	Both	Friend	No	Yes	Yes	No	Yes	Curse		4-	1-2	Useful	Not	Not	Not
207	Male	Single	26-35	Private	Not	No Exp.	Myself	Forum	No	Yes	Yes	Yes	Yes	Curse		5-10	3-5	Aest. useful	A5	A1	A3
208	Male	Single	≤18	Student	4-5 days	WoD	Not	Friend	No	No	Yes	Yes	Yes	Website		11-15	1-2	Aest. useful	Not	C2	D2

Total AOI Events During the Experiment
(in Seconds)

P	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Explain	Q15	Q16	Q17	Q18	Q19	Q20
209	Male	Single	19-25	Private	4-5 days	WoD	Myself	Videos	No	No	Yes	Yes	Yes	Curse		11-15	3-5	Aest. useful	A5	C2	C4
210	Male	Single	≤18	Student	Everyday	Cata	Myself	Friend	Yes	No	Yes	Yes	No	Curse		4-	1-2	Aest.	C5	A1	A2
211	Male	Single	26-35	Private	Not	TBC	Both	Friend	No	Yes	Yes	Yes	Yes	Curse		11-15	1-2	Aest. useful	A5	D1	D3
212	Male	Single	≤18	Student	1-2 days	WotLK	Others	Videos	No	Yes	Yes	Yes	No	Curse		5-10	1-2	Useful	Not	Not	Not
213	Male	Single	19-25	Student	Everyday	Cata	Both	Friend	Yes	Yes	Yes	Yes	Yes	Website		5-10	3-5	Aest. useful	A5	D2	D3
214	Male	Single	19-25	Student	4-5 days	MoP	Both	Forum	No	No	Yes	No	No	Curse		4-	1-2	Aest. useful	A5	A1	A3
215	Male	Single	26-35	Private	Raiding	No Exp.	Both	Myself	No	Yes	No	No	No	Curse		4-	1-2	Useful	E5	A3	B3
216	Male	Single	26-35	Private	1-2 days	Cata	Others	Forum	No	Yes	Yes	Yes	No	Curse		5-10	1-2	Aest. useful	A1	B1	A5
217	Male	Single	19-25	Student	Everyday	WotLK	Others	Videos	Yes	Yes	No	Yes	Yes	Curse		16-19	1-2	Aest. useful	E3	D1	D5
218	Male	Single	19-25	Student	Not	No Exp.	Both	Myself	Yes	Yes	Yes	Yes	Yes	Curse		5-10	1-2	Useful	Not	A1	A2
219	Male	Single	19-25	Private	Not	MoP	Others	Friend	No	Yes	Yes	No	Yes	Curse		5-10	1-2	Aest.	A5	A1	A2
220	Male	Single	26-35	Private	4-5 days	TBC	Not	Forum	No	No	Yes	Yes	No	Curse		11-15	1-2	Useful	Not	Not	A3
221	Male	Single	19-25	Student	Everyday	WotLK	Myself	Videos	Yes	Yes	Yes	Yes	Yes	Curse		5-10	3-5	Useful	A5	D2	D4
222	Female	Single	19-25	Student	Spare Time	Cata	Others	Friend	Yes	Yes	Yes	Yes	Yes	Curse		11-15	1-2	Aest. useful	A5	A1	A2
223	Male	Married	26-35	Not	Everyday	No Exp.	Both	Videos	Yes	No	No	Yes	Yes	Curse		11-15	3-5	Useful	A5	D2	D4

APPENDIX C.

EXPERIMENT DATA

Abbreviations in Data Table

Original	Played with original user interface
Addon	Played with user-created user interface
NDT	Net dwell time
DT	Dwell time
GD	Glance duration
DD	Diversion duration
FT	Fixation time
sec	Seconds

Experiment Data Table

Participant	NDT original (sec)	NDT addon (sec)	DT original (sec)	DT addon (sec)	GD original (sec)	GD addon (sec)	DD original (sec)	DD addon (sec)	FT original (sec)	FT addon (sec)
P01	1,3	2,7	0,6	1,7	0,8	2,2	1,1	2,5	0,6	1,7
P02	0,3	2,7	0	1,6	0,1	2,3	0,1	2,6	0	1,5
P03	2,3	26,7	0,3	25,8	1,8	27,2	2	28,7	0,2	25,5
P04	5,7	1,4	1	0,6	4,3	1	4,8	1,1	0,8	0,6
P05	0,8	4,4	0	0,7	0,7	3,7	0,7	4,1	0	0,7
P06	1	5,8	0	1,9	0,8	4,2	0,8	5	0	1,8
P07	1,7	4,7	1,1	3,8	1,6	4,5	1,9	5	1	3,8
P08	1	2,7	0	1,3	0,8	1,6	0,8	2	0	1,3
P09	0,4	6,3	0	4,1	0,2	6,1	0,2	7,1	0	3,9
P10	9,3	7,8	1,8	2,3	6,6	5,5	7,2	6	1,8	2
P11	3,9	10	0,5	7,1	2	8,4	2,2	9,5	0,4	7
P12	12	12,3	0,3	3,8	8,2	9,9	8,6	11,3	0,3	3,6