REPUBLIC OF TURKEY
YILDIZ TECHNICAL UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
DEPARTMENT OF ART AND DESIGN
MA PROGRAM IN INTERACTIVE MEDIA DESIGN

MASTER'S THESIS

A UX ANALYSIS STUDY INTO 'BIGBLUEBUTTON' WITH YILDIZ TECHNICAL UNIVERSITY SCHOOL OF FOREIGN LANGUAGES USERS AMID COVID-19 PRECAUTIONS

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Asst. Prof. İSMAİL ERİM GÜLAÇTI

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ÖZ

YILDIZ TEKNİK ÜNİVERSİTESİ YABANCI DİLLER YÜKSEKOKULU KULLANICILARI İLE KOVID-19 ÖNLEMLERİ DÖNEMİNDE "BIGBLUEBUTTON" ÜZERİNE BİR KULLANICI DENEYİMİ ARAŞTIRMASI

Damla Tezel Yalkut

Haziran, 2020

Dünya çapında hızla etkisini gösteren COVID-19 virüsüne karşı alınan önlemler kapsamında okulların eğitime ara vermiş ve kısa bir süre sonra, sosyal mesafe kuralları gereği eğitimi uzaktan eğitim yolu ile devam ettirme kararı alınmıştır. Bu kararlar uyarınca Yıldız Teknik Üniversitesi'nde BigBlueButton web konferans sistemi üzerinden eğitim süreci tüm okulda aynı anda başlatılmıştır. Çalışmanın amacı, bu süreçte sistemin yeni kullanıcıları haline gelmiş olan Yıldız Teknik Üniversitesi Yabancı Diller Yüksekokulu öğretim görevlileri ve öğrencileri ile BigBlueButton sistemi üzerine bir kullanıcı deneyimi (UX) çalışması yürütmek ve sistemin kullanıcılar gözünden iyi ve kötü yönlerini analiz etmektir. Bu çalışma esnasında farklı nesillerin bir arada bulunduğu ve eğitimde teknoloji kullanımında kullanıcı deneyimine nesillerin yaklaşımının da çok önemli bir etkisinin olduğu da göz önünde bulundurularak kuşak kavramları ve katılımcıların kuşak özellikleri incelemesi de yapılmıştır. Çalışma üç aşamada yürütülmüş olup birinci ve üçüncü aşamasında okula mensup 302 öğrenci ve 25 öğretim görevlisinin katılımıyla anket çalışması ile gerçekleştirilmiştir. İlk aşama anketi katılımcıların demografik özellikleri üzerinedi. Araştırmanın ikinci aşamasında kullanabilirlik testi ilkeleri gereğince oluşturulan personalar ışığında AnyDesk programı ve BBB demo sistemi üzerinden odak grup olan 7 katılımcı ile kontrollü uzaktan kullanıcı deneyimi gerçekleştirilmiştir. Üçüncü aşamada uygulanan anket ise sistemi kullandıktan sonra sisteme yönelik duygu ve tutumlarını irdeleyen bir çalışma olmuştur. Bulgular katılımcıların eğitimde teknoloji kullanımı konusunda tutumlarının olumlu olduğunu gösterirken uzaktan eğitim sistemine ve uzaktan eğitim kavramına karşı olumsuz tutumları olduğu verisi elde edilmiştir. Kullanabilirlik testi ve kullanım sonrası anketi verileri sistemin hata bilgilendirme, düzeltme, geribildirim, geri almaya izin verme, anlaşılır ikon kullanımı gibi alanlarda sıkıntılarının olduğunu ve bunların kullanıcı deneyimini olumsuz yönde etkilediğini göstermiştir.

Anahtar Kelimeler: BigBlueButton, Kullanıcı Deneyimi, Kullanabilirlik, Kuşak

ABSTRACT

A UX ANALYSIS STUDY INTO BIGBLUEBUTTON WEB CONFERENCING SYSTEM: A CASE STUDY WITH YILDIZ TECHNICAL UNIVERSITY SCHOOL OF FOREIGN LANGUAGES USERS AMID COVID-19 PRECAUTIONS

Damla Tezel Yalkut
June, 2020

Within the scope of the measures taken against the COVID-19 virus, which has shown its effect rapidly worldwide, the schools had to close immediately and after a short time, it was decided to resume education through distance education. In accordance with these decisions, Yıldız Technical University decided to resume the education simultaneously throughout the school, via the BigBlueButton web conferencing system. The aim of this study was to carry out a user experience (UX) study on BigBlueButton system with the instructors and students of Yıldız Technical University School of Foreign Languages, who had become new users of the system in this period and thus analyzed the good and bad aspects of it.

The general approach of different generations to the use of technologies in education has a very important effect on user experience analysis of the system; therefore, to be able to better understand the attitude of the instructors and the students, a study on generation cohorts through questionnaires was conducted. The whole study was carried out in three stages: the first and the third stages were carried out through a questionaire study with the participation of 302 students and 25 lecturers from YTU SLF. The first stage questionnaire was a study on the demographic characteristics of the participants; the third stage was a post-use study to examine their experience and emotions towards the system. In the second stage of the research, in the light of the 'personas' created in accordance with the usability test principles, a controlled remote user experience was carried out with a focus group of selected 7 participants through AnyDesk software and the BBB demo system. While the findings showed that the attitudes of the participants about the use of technology in education were positive, data obtained showed that they had negative attitudes towards the distance education system and distance education concept. The usability test and post-use survey data showed that the system has problems in areas such as error prevention and recovery, feedback delivery, undo option, and the use of clear icons, and they negatively affect the user experience.

Key Words: BigBlueButton, User experience, UX, Usability Testing, Generation cohorts

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Bu süreci benim için nispeten kolaylaştıran ve pandemic nedeni ile evlere kapandığımız ve moral olarak çöktüğümüz süreçte sonsuz desteği ile moral olan sevgili eşim Koray Yalkut'a, sevgili aileme ve tezim için gerekli kaynaklara erişimimi kolaylaştıran sevgili dostum Fethiye Erbil'e teşekkürü bir borç bilirim.

İstanbul; Haziran, 2020 Öğr.Gör. Damla Tezel Yalkut

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ABBREVIATIONS

BBB : BigBlueButton Web Conferencing Systems
YTU SFL : Yıldız Technical University School of Foreign Languages
UX : User Experience
ibid : In the same source

1. INTRODUCTION

Developments in information technologies have brought about myriad of changes. Raising a generation born into a world of information technology, education systems, instutions and educators have been challenged more than ever. Conferences on education has turned their route towards more technology-based teaching and classes, various digital materials have been introduced to the lessons and today, teachers are expected to implement technology into their teaching as much as possible

In addition to all the technological advancements and implementations in terms of education, in the turn of 2020, the world began to struggle a pandemic called COVID-19, which caused the goverentments all over the world to take immediate cautions and embark social distancing protocols. One of the immediate solutions regarding the issue was to resume all the education through online systems in order not to lose time. It was both an exciting and a concerning issue since online teaching and learning require certain readiness from its participants. In addition to problems of connection, servers, equipment and so on as well as finding and utilizing the right platforms to start lessons, readiness level of the instructors and students became an issue to discuss. Implementing technologies into classroom up to some degree is something that can be achieved with some practice by many lecturers with or without much technology savviness since most of the teaching would still be manual; however, taking all the teaching process to an online platform and abandoning the comfort of physical classroom and face-to-face interaction are serious issues to be concerned about. Having not many options, soon instutions began employing web conferencing systems that had already been on market such as Zoom, Google Duo and BigBlueButton.

Along with many instutions, Yıldız Technical University begun to employ web conferencing systems to resume the term and took the lessons onto BigBlueButton Web Conferencing System. This research aims to investigate the user experience (UX) and usability effectiveness of this platform while trying to understand lecturer's approach and tech savviness as well as readiness for this platform. For this purpose,

first changes in education and their relation with generation cohorts and differences has been discussed. Following the discussion, generations in the context of Turkey has been analyzed. After literature on UX and usability testing processes has been reviewed, a UX and usability testing has been conducted on BigBlueButton Web Conferencing Systems used at Yıldız Technical University focusing on School of Foreign Languages instructors and students as users during COVID-19 shutdowns.

1.1. Problem Definition

Extreme situations often require extreme precautions; COVID-19 pandemic has forced the world to shutdown all the schools and to adopt distance education whether they were ready or not. Some instutions had already been using some form of distance education platform and had necessary preparations, yet there were and perhaps still are many other instutions without any experience of distance education.

Notwithstanding, it is clear that distance education has become a necessity for the world. Because of the new generation of today, Generation Z, and their technology savviness has dramatically increased the importance of technology use in education. Teachers of Generation Z have already been trying to improve their relation with technology to be able to appeal and reach to their students and because none of them are true natives of technology like Generation Z, they have had to put extra effort in adapting themselves and their teaching to these platforms of distance education in a very short time.

Another important issue that arised due to COVID-19 that, web conferencing systems had to be adopted without thorough evaluation of their effectiveness in answering the needs of instutions, teachers and students. Because most of the systems have been used greatly by companies and universities for meetings and web conferences and webinars, large scale online teaching and its requirements may not have been a major issue until these days. That is why, the assumption of this study is that those systems require a new UX and usability analysis regarding their new users and new circumstances.

Seldom has any research been conducted on investigating those systems in terms of UX and usability analysis in relation with distance education. To fill this absence, this study aims to investigate usability, UX design of one sample that is currently being used at Yıldız Technical University.

The questions to be investigated are as follows:

Q1: To what extend does technology savviness of the instructors and students affect their approach and effective use of distance education platform?

Q2: To what extend does the provided platform answer the needs of these specific new users?

Q3: What could possible improvement suggestions be after a thorough UX and usability analysis?

The findings of this study will hopefully provide better insight regarding the issues mentioned above and provide ideas about improvement of these platforms for better use in the future as use of these platforms and need for distance education seem to prolong.

1.2. Setting

This study took place amid COVID-19 pandemic and as a result of pandemic precautions, the research had to be conducted remotely with the target group; the instructors and students of Yıldız Technical University, School of Foreign Languages. All three stages of the research took place through online platforms. The first stage, questionnaire, was prepared using Google Forms and delivered to the participants via e-mail and direct message. The participant responses were gathered automatically via Google Forms.

The second stage of the research was conducted via AnyDesk and demo page of BigBlueButton web conferencing system. The focus group was observed through AnyDesk, a software which allows one of the party to control and observe the other one's desktop. The third stage was conducted at the same time through the same method with the first stage since it was also a questionnaire.

1.3. Participants

In this study there were two main categories of participants: instuctors and students of Yıldız Technical University School of Foreign Languages Department of Basic English. Although all departments of YTU begun to use the same system without exception, the participants of this study were especially kept limited to School of Foreign Languages because the study had to be conducted in a short time and it would

take a lot of time if all the academicians and students of YTU were to be reached during COVID-19 precautions.

1.3.1. Questionnaire Participants

With the aim of analyzing the user profile of YTU SFL and their attitude towards BigBlueButton web conferencing system and distance education, two online questionnaires have been prepared (Appendix A and B) and distributed to the participants via e-mail and social media. One of the questionnaires was for the instructors and the other one was for the students of YTU SFL. Participants were requested to fill in the questionnaires following a short introduction and explaination of the study and were informed that the participation was based on voluntary participation.

The questionnaires were divided into two sections. The first section of each questionannaire was about the demographic information of the participants which would later be userful for persona creation. The second section of the questionnaires asked questions about the experiences and attitudes of the participants who had already gained some experience regarding the system by the time these questionnaires were delivered.

The participation to the study was based on voluntary participation. 25 instructors and 302 students took part in the first part of the study which required a questionnaire to be answered. Among 302 student participants of the first stage, 144 were male and 153 were female. Of 25 instructors, 21 were female and 4 were male. Although the number of instructors is more than 100 at YTU SFL, only 25 of them volunteered to participate in this study. Age, experience with technologies have been the key issues for the sampling of this study.

1.3.2. Controlled Remote Usability Testing Participants

The second stage was not conducted with the students as it was a usability test on the functions of the system and students have mostly attended the classes as mere listener; their interaction was extremely limited. For this reason, a small focus group usability testing was conducted with 7 participants. Among 7 participants, there were 5 female and 2 male participants. The participants were chosen carefully considering

certain aspects. Gender of the participants was not an elective issue, but age and their experience with BigBlueButton and technologies in general were the sampling matters.

There were three types of participans: user, first-time user and observant. Users were the instructors from YTU SFL and had experience with the system; first-time users were the participants who had never seen or used BBB until this usability test and observant participant is a person who had never used the system for himself but watched and helped a user of the system. Among the participants of the first two groups, age and tech-savviness were regarded as key issues. There was only one Baby Boomer participant in the first-time-user group, but not in the existing-users group because none of the instructors that could be regarded as members of the Baby Boomer generation responded to call for the study.

Among 7 participants, 3 of them had previous experiences with BBB web conferencing system and have been actively using the system for teaching purposes. Of these 3 BBB user participants, 1 participant had little or no interest in new technologies and belonged to Generation X; 1 participant had some interest in technologies but mostly for social media use, belonged to Generation Y and the last BBB-user participant belonged to Generation Y and had interest in online tools and distance education with some experience.

Among the remaining 4 participants, 3 of them had never seen BBB web conferencing system before, 1 participant had indirect and very little interaction with the system while helping a user from his family. Among 3 unexperienced participants, 1 participant, as mentioned before, belonged to the Baby Boomers generation, was a retired teacher with very little use of technologiy; 1 participant belonged to Generation X and was keen on new technologies, and the last participant of these 3 belonged to Generation Y and was an instructor at another university using a different kind of web conferencing system for distance education, was not very avid technology user but was interested in educational technologies. The 7th participant with little experience on BBB system was working as an IT consultant and web designer and had advanced skills with web tools. He belonged to Generation X.

1.4. Limitations

The study aims to achieve an effective UX and Usability study; however, there are certain limitations to this study which hinder it from being a complete UX Design process. It is important to understand that this study is of exploratory nature and has limited time, user profile, opportunities to reach to various participants due to the pandemic and does not have any financial support to conduct different usability testing methods such as eye-tracking that could have been very useful for in-depth analysis and quantitative results. The focus of this study is limited to Yıldız Technical University School of Foreign Languages students and instructors for ease of accessibility in a limited period of time although the system has users worldwide and the new user situation is not limited to Turkey or YTU. It is highly probable that if the study were to be conducted more variety of users from different backgrounds, technology use and generation cohorts, the insights would show better correlation between the generation cohorts and user experience results of the system.

The time limitation stems from the fact that COVID-19 is a recent and unexpected event and the study took turn towards this issue because the original study required face-to-face research process, which became impossible due to pandemic measures. The original topic was also related to UX design and analysis of a system, which allowed quick adaptation.

Although the study aims to conduct a UX study with usability testing methods, since it is not a study that is financially supported, the testing methods that can be employed for the sake of this study are quite limited.

2. LITERATURE REVIEW

One of the greatest challenges that technology has brought into our lives is the constant need to understand and keep up with the countless changes within society. Each generation lead their lives familiar with a change, but still alien to another that is yet to come or has just taken over the world. With "globalization" phenomenon brought up by technological advances and of course, the Internet, things have lost their purpose to be one that is unique, existing in the moment at that place and nowhere else. It is now possible to contact anyone, anywhere, watch any show aired on any spot of the world simultaneously, attend a lecture of a professor at a campus that is kilometers away while enjoying the comfort of home, and most importantly reach infinite sources of information.

The way people learn and obtain any kind of information has dramatically changed; it is often one click away. You do not have to go through the pages of a traditional cookbook for a recipe since you can find the same, or maybe even a better one on the internet within seconds, so why should you bother obtaining the book in the first place anyway? Why should one attend a physical class when it is possible to get even a diploma attending online courses? The same question applies to foreign language acquisition process: why sit and try to learn in a class full of non-native speakers, including probably the instructor too, from a printed dull book when you can enjoy the language in many different ways online, from native speakers of the languages to interactive websites, applications and games?

Developments in technology have already provided great many opportunities for learners and teachers of foreign language. The new "globalized, interconnected world" of today has been lifting the boundaries between the users of the language and learners one by one. Today, language learning does not necessarily pass through classes conducted by an instructor or text books. Learners can simply obtain authentic up-to-date materials while engaging with other speakers of the target language.

> "The rapid development of the networked computer in recent years has brought at least two changes to language learning. Firstly, a great many documents are produced and distributed in

> English on the Internet every day, which, in turn, has speeded up the role of English as a global language in many fields both online and offline. Secondly, the capability of the networked computer opened up new opportunities of learning English" [1].

Nevertheless, the physical classroom under the guidance of an instructor still remains to be one of and maybe still the most preferred way of learning a foreign language. To further understand the cause behind this preference and the impacts of networked technology on learning and teaching processes, it is necessary to see it from a wider angle.

> "Education is a universal human activity with a long history and a future directed ambition. It is culturally situated and allocated at global, international and local levels. Thus, as an essential human activity, the educational phenomenon is interlaced with societal structures and human activities, governed by political ideologies, expressed as different values in laws, curricula, course, handbooks, examinations and teaching practices. At the same time, it is also true that values in the laws, practices and artefacts of formal education evolve in different ways in different parts of the world" [2].

Educational institutions have gone a myriad of changes all throughout the history, from Industrial Revolution to information technology revolution and the change is constant. Once learning was incorporated in an era of apprenticeship, then became associated with schooling[3]. Schooling, as well as apprenticeship, have not lost their importance in learning; however, with information technologies, learning is evolving as with the youth itself. Emphasis has shifted from "teaching" to "learning."

Today, we are living in the age of transformation where everything is supposed to evolve and there is an infinite data flow in and out of our lives within networked society. It is, now, not a surprise that with limitless information around, to keep ourselves constantly up-to-date, we need to adapt and open space for the new. "Our culture today has become as much a culture of learning as it is a culture of forgetting in order to clear the ground for new things to replace the old ones. Learning is now more or less understood as a life-long process"[4].

2.1. Paradigm Shift Regarding ESL/EFL Context

In general, paradigm shifts in 20th century were seen as a part of a larger shift from positivism to post-positivism. To be more specific; the emphasis, with the new

[1] Christina Olin-Scheller, Patrik Wikström, "Literacies on Web. Co-Production of Literary Texts on Fan Fiction Sites", *Interactive Media Use and Youth: Learning, Knowledge Exchange and Behavior,* ed. Elza Dunkels, Gun-Marie Franberg, Camilla Hallgren (Hershey: IGI Global, 2011): 67.
[2] Gun-Marie Franberg, Elze Dunkels, Camilla Hallgren, "Youth and Contemporary Learning", *Interactive Media Use and Youth: Learning, Knowledge Exchange and Behavior,* ed. Elza Dunkels, Gun-Marie Franberg, Camilla Hallgren (Hershey: IGI Global, 2011): 1.
[3] **ibid**, 2.
[4] **ibid**, 2.

paradigms, shifted towards contextualization, wholeness rather than parts, integration, focusing on understanding while putting the knowledge of everyone, average participant into consideration, appreciating diversity and focusing on the process as well as the product[5].

In ESL/EFL context, this shift can be described as moving away from behaviorist psychology and structural linguistics toward cognitive and socio-cognitive psychology and more contextualized, meaning based views of language[6]. Structural language teaching perspectives viewed SLL as habit formation and embodied a systematic approach to learning content according to learning objectives with techniques such as practice and drilling[7]. Cognitive perspective, on the other hand, defines SLL as a cognitive process of generating and transforming knowledge. In this perspective, a certain degree of learner control is an essential aspect of effective learning environment[8].

Most recently, the constructive perspective has gained popularity where learning is not just a private and individual activity happening in one's head, but rather socially constructed phenomenon occurring through social interactions. It emphasizes "an information rich and socially meaningful learning environment, in which a variety of interaction, communication and collaboration can take place, so that language instruction can help learners function in an authentic discourse community outside classrooms"[9].

There is another paradigm shift pattern proposed by Jacobs and Farrell. In their article, they suggest eight changes that has taken place so far:

"1. Learner autonomy
2. Cooperative Learning
3. Curricular integration
4. Focus on meaning
5. Diversity
6. Thinking skills

[5] George M. Jacobs, Thomas S. C. Farrell, "Paradigm Shift: Understanding and Implementing Change in Second Language Education", *TESL-EJ*. vol:5 issue:1. http://www.kyoto-su.ac.jp/information/teslej/ej17/toc.html [December 2019].
[6] **ibid**, 8.
[7] C.J. Lim, S. Lee, "Pedagogical Usability Checklist for ESL/EFL E-learning Websites", *Journal of Convergence Information Technology*, vol. 2 issue. 3 (2007): 69.
[8] **ibid**, 69.
[9] **ibid**, 70.

7. Alternative Assessment
8. Teachers as co-learners"[10].

The first change has occurred in terms of "learner autonomy", which means learners taking the responsibility of their own learning in some ways. This change suggests that learners should not only be able study, but also be able to collaborate with their peers in order to move away from the dependence to the teacher in class[11].

The second change suggested is "cooperative learning" which indicates that group activities have become more common in ESL/EFL context. It is a way of enhancing learner autonomy while integrating collaborative skill sets.

Curricular integration is one of the important changes suggested. In curricular integration, the idea is that various subject areas should be presented and taught with links, deeper purposes and interconnectivity. Students should be able to build links in between subjects. "For instance, if students are to study 19th century, in history class they study key elements, while in literature class they read literature of the period and analyze. Thus, students do not get the information isolated from its context"[12].

Focusing on meaning is mentioned as the fourth change. When information is meaningful, it is easy to remember. This change is closely linked to neo-millenials. In brief, in an era of forgetting, the only way to learn is though connecting, creating connections and giving meaning to the information.

Diversity, on the other hand, may refer to both multiple intelligences and different backgrounds of the learners in classroom environment. Handling professionally and taking advantage of those differences without discriminating are a hard but fruitful tasks[13].

Another change is the thinking skills change by which the desired change is allowing students to apply higher order thinking skills, also known as critical and creative thinking skills. It requires connection to the wider world.

The seventh change, alternative assessment is one that needs particular attention. It means there are attempts to drift away from fill-in-the-blanks, true-false statements towards mirroring-real-life conditions, production involving thinking skills mentioned above.

[10] **ibid**, 10.
[11] **ibid**, 10.
[12] **ibid**, 14
[13] **ibid**, 16.

Finally, the last change that SLL has been through is transforming teachers to co-learners. This change suggests that teachers should no longer be patrolling, patronizing or just data providing medium. They should instead be actively involved in the learning quest of the students. Teachers should be fellow learners among students, a kind of facilitator maybe.

However, there is a new paradigm shift that is foreseen, which is "fusion". As the name suggests, it is the blend of all the changes mentioned above and more. These eight changes and overall paradigm shift have not been fully prominent in SLL. There may be many reasons behind, but most importantly; change happens gradually and moreover, practices and artifacts of formal education evolve in different ways in different parts of the world due to societal structures, human interactivities, governed by political ideologies, different values and teaching practices.

2.2. Clash of Generations

2.2.1. A New Type of Learner: Neomillennials

Changes in society and technologies have brought about a new generation, born into the era of the Internet, with innate abilities to utilize the existing and emergent technologies. "Net Generation" or often referred to as "Neo millennials", are young people born after the 1995[14]. The previous generation, adults of today, a.k.a. "millennials" are claimed to rapidly develop new competencies in multitasking with emergent technologies, building up a whole host of digital literacies[15]. Neo-millenials, however, are far more tech-savvy than millennials and any generation before.

To further understand and analyze neo millennials, it is important to understand the four major cohorts in the literature. For this purpose, Guven Ordun and Asli Akun summarizes the cohorts as below:

> "As generally accepted in the literature four major cohorts exist: Veterans were born between 1920 and 1945; Baby Boomers between 1946 and 1964; Generation X members were born between 1965 and 1980 and Generation Y between 1981 and 2000. Each generation has its own characteristics due to different economic, social, and political world events of their times. Great Depression and World War II in veteran's generation, Civil Rights Movements and Cold War in baby boomers' generation, Challenger explosion and Fall of Berlin Wall in Xers generation, and intense use of computers and multiculturalism in Y generation are among the striking events of their times (Zemke, et al., 2000). Regarding the general characteristics of

[14] M.A. Gabriel, S.Wiebe, R.J. MacDonald, "Net Generation Expectations for Technology-mediated Learning at the University Level", *M-ICTE Conference: Research, Reflections and Innovations in Integrating ICT in Education*, 2009, Lisbon.

[15] Gregory MacKinnon, "Preparing Preservice Teachers to Integrate Technology: A Longtitudinal Study", *The International Journal of Technology, Knowledge and Society*, vol. 6, i. 5. (2010): 79.

> Millennial generation, the most striking is that they are globally connected through Internet and social media (Ordun, 2015)" [16].

The generation born after 1995 has many other names: "Generation Z, net-generation, digital deneration or digital natives" which all somehow suggest their innate and deep connection to the technologies. Some of the most important attributes have been listed by Barbara Combes as below:

Table 2.1.: Characteristics of Generation Z

Characteristics	**Attributes**
Independent learners	Increased access to information -> a greater knowledge base -> independence and the ability to question and confront information (Tapscott, 1998)
Strong views	Preoccupied with free expression and have strong views, a result of being exposed to a lot of information on the Internet (Tapscott, 1998)
Digital literacy & visual learners	Know what they want and have greater digital literacy skills (Skiba, 2003, Oblinger & Oblinger, 2005). Intuitive visual communicator, have strong visual-spatial skills and readily integrate the virtual with the physical world (network literacy) (Oblinger & Oblinger, 2005)
Experimental learners & multitaskers	Learn by discovery, investigation and experience which enables them to retain information and use it in innovative ways, and they are comfortable multi-tasking using a range of technologies (Skiba, 2003, Dorman, 2000, Oblinger & Oblinger, 2005)
Sophisticated information skills	Since the Net Generation work and play in an environment where trust, authentication and the authority of information is fluid, they develop sophisticated information skills to enable them to secure authenticity (Dorman, 2000)
Socially inclusive	Connectivity and social engagement using technologies is very important to this generation of users. Global connectivity allows the Net Generation to communicate with a broad range of users and exposes them to a wide range of ideas and cultural differences, thus leading to a more socially inclusive outlook (Tapscott, 1998, Dorman, 2000)

Adapted from Barbara Combes, "Techno Savvy or Techno Oriented: Who are the Net Generation?", *Asia-Pacific Conference on Library & Information Education & Practice, 3-6 April 2006,* (Singapore: Nanyang Technological University, 2006): 402.

"What we are facing today is an increasing complexity of knowledge mediation (NSF 2008). New technological tools for learning, communicating, collaborating, information gathering and production are introduced to us nearly every day"[17]. This

[16] Guven Ordun, Asli Akun, "Personality Characteristics and Emotional Intelligence Levenls of Millenials: A study in Turkish Context", *Journal of Economic and Social Studies*¸vol. 6 i. 1 (Spring 2015): 130

[17] Franberg et al, **ibid**, 4.

ever-growing information flood makes it really difficult for its users to keep up with it. One has to be almost always connected, updated and memorization is now out of context as the era can be marked as forgetting era. The flood is so powerful that, it is hard to focus on one thing, grasp and memorize it isolated from its millions of branches. That is the reason why "learning curve" is more important than ever.

"Learning curve" is a term first described by Herman Ebbinghaus in 1800s to characterize memory and memorization. As a result of his experiments, he discovered that things that are connected to one another are more easily remembered together[18]. Although it is a very old term, it highlights the problem with the society of today. As with the new technological tools for learning, communicating, collaborating, information gathering and production on a global scale, everything that is read, heard, created are doomed to be forgotten because new, upgraded ones take its place soon. To remember, one needs to associate it with another information, connect the dots and make it meaningful. Besides why remember anything at all if the information can be re-accessed at anytime, anywhere with mobile technologies? People no longer memorize the birth dates, phone numbers because information is in their pocket, available 24/7. Therefore, the most common characteristic of neo-millennials is that they do not have to memorize any information. Learning is no longer associated with memorization, but making connections to make it meaningful.

Neo-millennials, however, "learn" based on "seeking, sieving, and synthesizing, rather than on assimilating a single 'validated' source of knowledge as from books, television, or a professor's lectures"[19]. They are independent learners and the Internet is the limitless information resource, always up-to-date and providing endless connections on the subject matter. Learner is not bound to the lecturer or the only 'precious' course book at hand with repetitive task and already out-of-date contexts. World Wide Web is both the lecturer and the source. Moreover, as mentioned before, neo millennials need connections to learn, that is why they need to create those connections, search for the information by themselves, and finally by synthesizing, they achieve the meaningful learning.

> "First class students of the net generation expect their professors to give explicit directions on how information gathered from the Internet will lead to other kinds of learning activities. While students appreciate the speed, convenience, and ease by which information can be accessed ("Wikipedia is like Jesus"), they are also aware of the abundance of available information, and are looking for direction on how to sort, order, critique, and represent that information to best

[18] Franberg et al, **ibid**, 3.
[19] Chris Dede, "Planning for Neomillenial Learning Styles", *Educause Quarterly*, i.1 (2005): 7.

> learn course material and complete course assignments. Net generation students have a healthy skepticism of Internet resources, and while they appreciate how critical reading of online material does fine-tune content-evaluative skills, it is learning activities which require further use of information gathered that students are most interested in" [20].

Although this generation has to struggle with the abundance of information, they grow with strong digital literacy skills to cope with this flood. They are capable of authenticating the information gathered. These competencies bring the self-confidence and strong ideas and they are not afraid to express them. They value their own ideas and they feel the urge to share it with the world through their social media accounts. As mentioned in Combes' table, "connectivity and social engagement using technologies is very important to this generation of users. Global connectivity allows the Net Generation to communicate with a broad range of users and exposes them to a wide range of ideas and cultural differences, thus leading to a more socially inclusive outlook" [21].

One important thing about neo millennials is that they like multitasking and are very good at it. They are not afraid of using different technologies simultaneously, they can focus on all easily. As a result, they expect their environment to be appropriate for multitasking, as well. They do not like to focus only on one media, for example an article without visuals or any other connections. It is way too difficult and dull for them to focus and later remember it. To achieve remembering, they need connections, multiple sources, visuals or maybe audio assistance.

Overall, Neo millennials have a very Internet-based learning style, and it is not a surprise that educational institutions, teachers and market, which are trying to appeal to this new generation is struggling to adapt.

> "To empower students requires that teachers re-imagine traditional learning. While technologically savvy, net generation learners were still not framing some traditional academic activities in ways consistent with their expectations for technology use. For example, good writers were still described 1000 as those who could compose a long academic paper and receive high marks. Notions of influence, agency, and audience did not match their technological understandings. Blogs, online video sites, and social networking sites did not count as sites of agency or ways to influence public opinion on an academic issue. To help students become more than consumers of technology and give them more agency and influence in a Web 2.0 environment, new teaching approaches will need to be categorically different from current practice and move beyond initial efforts of implementing technology in old fashioned ways"[22].

It is clear that in the globalized and networked world, this new generation are evolving together with their peers, however, it would be unrealistic to assume that each

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[20] Gabriel et al, **ibid**, 999.
[21] Cited by Barbara Combes, "Techno Savvy or Techno Oriented: Who are the Net Generation?", *Asia-Pacific Conference on Library & Information Education & Practice, 3-6 April 2006,* (Singapore: Nanyang Technological University, 2006): 402.
[22] Gabriel et al, **ibid**, 999-1000.

society has the chance to evolve with them. Politics, economies and many other factors affect the course of change in societies, and most importantly in education institutions. Some adapt, some open new paths while some others hinder the change.

2.2.2. Neo-millennials in Turkey

Dr. Çiğdem Aytekin and Doç. Dr. Cem Sefa Sütçü conducted a research called "New Media and Net Generation: Sample of Turkey", by which they aimed to analyze the Net Generation in the context of Turkey. In this paper, they analyzed this generation's mobile device usage and discussed the results with statistical analysis. To further understand the Net Generation in Turkey, these data provide helpful information. Aytekin and Sütçü conducted this research among 707 university students, most of whom were between 18 to 25 and there was not any significant dominance in gender[23].

One of the most significant data presented on this research for this study is that 84,16% of these 707 students were users of smartphone and 4 main purposes why students utilized mobile devices were determined as follows: communication, entertainment, research and business. Among these four purposes, communication stands out with 81,3%. Unless business related purpose is taken into consideration, there is not a single mention of educational use of the mobile devices. The lack of detail makes it difficult to assume that education is included. However, considering that this research was conducted in 2012, in 7 years of time this number might have dramatically increased.

Another important data provided is that about 33% of these students regard mobile communication expenses as compulsory consumption, just like nutritional expenses. It is not a surprise that mobile technologies have become indispensable part of society, but comparing to mobile technologies the basic needs may indicate how connected the society has become. Especially the new generation, in other words the digital natives in Turkey, mostly find it difficult to comprehend a world without technologies, more specifically their mobile devices.

In a 2014 study "The Contribution of Social Media on Obtaining Information and Self-improvement, and a Fieldwork on High-school Students", authors analyze the information gathering habits of high school students, and the results show that

[23] Çiğdem Aytekin, Cem Sefa Sütçü, "Yeni Medya ve Ağ Nesli: Türkiye Örneği", *The Journal of Marmara Social Research*, no. 3 (2012): 6.

participants prefer internet as the primary and the most frequently used information source by 74,3%, followed by online encyclopedias with 53,4% and 45,1% by Facebook, which are all online resources. According to the data, this frequency rate falls to 35,2% when it comes to the books and to 31,3% with teachers. These data are gathered in 2014 when Facebook was the most popular social media tool, and it is highly probable that the rate for use of the Internet as the main information gathering tool is much higher today than 6 years ago [24].

One of the most recent data on digital habits is provided by Wearesocial.com's annual "Global Digital Report". In the Digital Report of Turkey of 2019, it is stated that 63% of the population are active social media user and 53% are mobile social media users. The smart phone users' percentage reach up to 77%. The daily time spent on average using the Internet is 7 hours 15 minutes while the average time spent on social media is 2 hours 46 minutes. Google.com is the web site with the most traffic followed by YouTube.com. Instagram, on the other hand, take the second place following YouTube as social media platform with users up to 84% [25].

With the advances in mobile technologies and the increased accessibility of the Internet globally and locally, many things including the preferences of the new generation have changed. Facebook no longer seems to appeal to this generation as much as it did in the past. Instead Instagram and YouTube have taken over the world. According to the data of Digital Report of 2019, in Turkey, while the quarter-on-quarter growth of Facebook is on the fall by 2,3%, Instagram is on the growth by 2,7% [26].

Today, as mobile services provide larger amounts of the Internet for smaller prices, and some even provide free access to certain online social media platforms, people depend mostly on their mobile devices for most of their online activities. The report

[24] Fatma Kamiloğlu, Özge U. Yurttaş, "Sosyal Medyanın Bilgi Edinme ve Kişisel Gelişim Sürecine Katkısı ve Lise Öğrencileri Üzerine Bir Alan Çalışması", *GÜ İleti-ş-im Dergisi*, no.21 (2014): 142.
[25] Simon Kemp, "Digital 2019: Turkey", *Global Digital Report 2019*, https://datareportal.com/reports/digital-2019-turkey [January 30, 2020].
[26] **ibid.**

provides quite useful data on mobile activity preferences of the users in Turkey as can be seen below:

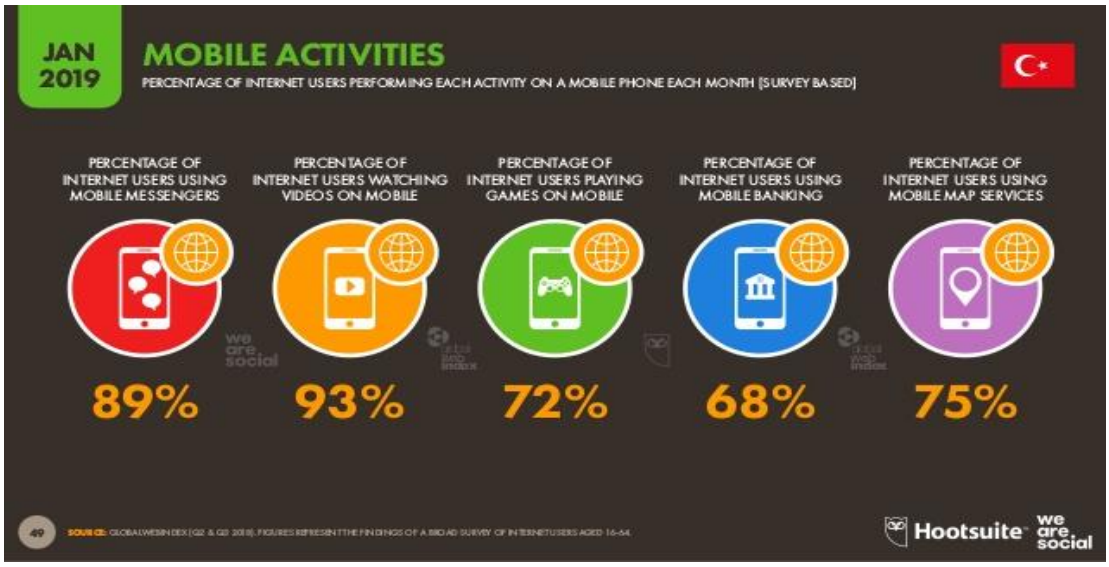

Figure 2.1: Digital 2019 Turkey: Mobile Activities

Simon Kemp, "Digital 2019 Turkey", Datareportal, https://datareportal.com/reports/digital-2019-turkey [January 31, 2019].

Finally, as one of the most recent research on the social media habits of the Z Generation in Turkey, Dursun Can Coşkun's study provides very useful data. The research is conducted on 50 students born in or after 2000. According to the data provided in the survey, the primarily preferred tool for the Internet connection among the participants is mobile devices with 90,4%. When their social media use is analyzed, it is seen that Instagram has an overwhelming dominance and 58,7% of the students say that they use Instagram every day. YouTube is the second most preferred social media application on daily basis. It is also noted that the majority of the students spend four to six hours daily on social media[27].

The most significant part of the research is regarding the motivation of the students for social media use. According to the data, 46,7% of the students regard social media as a need for modern human. Interestingly, while 68,7% of the participants agree that social media allow them to acquire new information, only 31,6% of them find it useful for their education life and 21,3% find it useless for educational purposes. An overwhelming 33,1% stands indecisive. 43,5%, on the other hand, disagree with the question that claims social media promotes academic success[28].

[27] Dursun Can Coşkun, "Z Kuşağı Mensubu Öğrencilerin Sosyal Medya Kullanım Alışkanlıkları" (MA Thesis, Beykent University Social Sciences Faculty, 2019), 74.
[28] **ibid**, 79.

Apparently, social media is a very important part of the lives of this generation and they not only use it for communicational purposes, but also accept that it is a social medium for learning something new. Notwithstanding, they do not necessarily relate learning to education, or in other words, they do not believe that social media is useful for their academic life. Learning is not necessarily academic; it is more than that, something more related to daily errands around or specific needs, hobbies or curiosities.

Overall, regarding all the data provided above from different researches conducted in different years, it is clear to see that Turkey has a vast young social media user population who seem to regard mobile technologies, social media platforms and the Internet as an indispensable part of their lives and use them mainly to communicate and have fun. They somewhat see these tools as tools of learning, but not necessarily as tools of education. The most valuable conclusion to draw from these researches for this study might be their activities on mobile devices: they are quite fond of messaging services, like to watch videos a lot and are into gaming, which are all adaptable to language learning environment.

2.2.3. Teachers of Generation Z

Determining and analyzing the language instructors and teachers are not as easy as analyzing a generation of learners. One lecturer may come across many different generations during his or her teaching years. What is more, most schools' academic boards would probably include teachers from different generations. It is highly possible that many higher education language schools today have instructors belonging to the Baby Boomers, X and Y generations working side by side. The generations theory assumes that people born in a certain period of time into certain group share common characteristics and attitudes as a result of social and economic events of the time before. In the mentioned teachers' context, The Baby Boomers, the generation born between 1943-1960, are identified with their link to stable families, desire to change, post-war hope for peace and most importantly television. They are strongly influenced by television[29]. Generation X, born between 1960-1980, are the first generation to have a personal computer and join the virtual world. They, unlike

[29] Carmen Sonia Duse, Dan-Maniu Duse, "The Teacher of the Generation Z" *Edu World 2016 - 7th International Conference, 4-5 November 2016* (Pitesti: 2016): 692.

the former generations, value free time and self [30]. Generation Y (1980s-1994), on the other hand, are the generation that grew up in a society driven by technology, but they are not digital natives like Generation Z[31]. They have adopted the technology and adapted their lives to it. Generation Z, however, do not know a world without technology and the Internet.

Carmen Sonia Duse and Dan-Maniu Duse summarizes the characteristics of the teachers of these generations as follows:

Table 2.2: Generations and Their Characteristics

The Baby Boomers	Generation X	Generation Y
- becomes more flexible in terms of authority, traditions and hierarchical structure; - begin to accept innovation in teaching; - believes that technology and innovation requires a learning process; - emphasizes teamwork; - believes he has all the rights and still considers himself very important in ensuring the success of students; - there appears a need for the autonomy of the students so that some rights are given to the students, opinions are encouraged, but only those who do not scandalize social norms; - the focus is still on the reproduction of knowledge and the interpretations of the pupils are accepted rarely; - women are encouraged to build their career and their access to higher education increases spectacular; - although the discipline in schools still has authority notes, the views of the students are accepted; - the teacher is still seen as a model for the younger generation; - TV starts to be "part of the life"; - the keyword is "optimism	- the teacher figure loses from the aura of authority; - appreciates diversity, innovation being rather an opportunity than a challenge; - take into account change, the innovation being the pillars of their existence; - they appreciate activities, which have a clearly personal gain; - there is a calm acceptance of authority without being impressed by it or by socio-professional titles; - they often ask questions like "you we really have to do things this way"? - There is a great technical competence regarding the use of technology in students, which implicitly leads to the idea of its existence for teachers; - the belief, that there must be a balance between work and family life, is often noticed and they often see education as a third option; - they often manifest themselves with skepticism towards important things, even the future; - students are flexible and motivated and they need teachers to take advantage of these features in teaching and assessment; - teachers prefer teaching rather than research (J. Scott, 2006)	- they have a strong relationship with technology as social environment; - there is a great academic pressure on them; - they are capable of absorbing a large number of materials and information; - they see school linked to technology and its lack could result in the disappearance of the learning motivation. Hence the need for a very well trained teacher in the coordination of the introduction of technology in teaching-learning and evaluation process (M-learning); - formality should not exist in the classroom; - the speech of the teacher requires clarity, and the biggest asset it can have, is the quality to create meaning / significance in the eyes of the students or for them to discover - they are characterized by the idea that "if it has not been created, I can do it "; - the keyword is "realism"

[30] **ibid**, 692.
[31] **ibid**, 692.

	- the keyword is "skepticism"	

Adapted from Carmen Sonia Duse, Dan-Maniu Duse, "The Teacher of the Generation Z" *Edu World 2016 - 7th International Conference, 4-5 November 2016* (Pitesti: 2016): 694-695.

With each generation, their proficiency in technology increases, and the preferences of the teachers change. While the Baby Boomer teachers regard themselves as the main source of information and the center of learning, the focus shifts with the upcoming generations. Student autonomy and interpretation are not favorable for The Baby Boomers; students have some rights, but they cannot pass their predestined boundaries. With Generation Z, teachers begin to lose their authority, they are open to innovation, there is use of computer technologies to some degree, but not common within the generation. Teachers are still the center of the classroom.

Generation Y, on the other hand, are the most educated generation for they have large amounts of materials, resources and tools to learn and to teach. Therefore, academic pressure is quite high on them. They believe that technology should be integrated into the learning environment of the students and teachers should utilize them efficiently, otherwise the learning motivation of the students might disappear. They value games, interactive tools, but unlike Generation Z, they are not digital natives. This is the generation that is usually called "digital immigrants". Mark Pensky defines digital immigrants as "those of us who were not born into the digital world but have, at some later point in our lives, become fascinated by and adopted many or most aspects of the new technology"[32]. This generation was not born into the computer technology, but most of them have been using personal computers, laptops and smart devices throughout their lives.

Regarding Generation Z "[s]ome authors describe this phenomenon as 'a fish doesn't know it is wet'. The younger generations are surrounded in what the older generation call technology, it is not salient or remarkable to them. It is ordinary and largely invisible" say Shelley Kinash, Kayleen Wood and Diana Knight on their article[33]. Although Generation X and Y, and some of the Baby Boomers are acquainted with technology, and Generation Y have spent most of their lives utilizing it, they are aware that it is something to learn, unlike the Net Generation, who do not know a

[32] Marc Prensky, "Digital Natives, Digital Immigrants", *CrossCurrents: Cultures, Communities, Technologies,* ed. Kristine L. Blair, Jen Almjeld, Robin M. Murphy (Boston: Wadsworth Cengage Learning 2014): 46.

[33] Shelly Kinash, Kayleen Wood, Diana Knight, "Digital Immigrant Teachers and Digital Native Students: What Happens to Teaching?", *Educational Technology Solutions* no. 54, (2013): 58.

world without it. Therefore, it might be right to assume that the elder generation teachers have to learn and adopt themselves constantly to the technology use within and outside classroom to be able to survive in the new order of the Generation Z, if they really want to approach them and be effective.

However, one thing that is surely challenging is to keep all those generations of lecturers on the same page, in the same level of actuality -methodology, pedagogy and technology wise. Of course, most institutions provide countless in service trainings, conferences and seminars aiming to achieve this optimum situation, yet it would be unrealistic to assume that all language teachers and instructors come with the same readiness and attitude towards technology use within and out of the classroom.

Ofer Zur and Azzia Walker divide digital immigrants into three categories in their essay according to their attitudes towards technology: avoiders, reluctant adopters and enthusiastic adopters. Avoiders are the ones who "prefer a lifestyle that leaves them technology-free or with minimal technology. […] They do not tweet or Facebook, and what is highly illustrative for this group is that they do not see much value in these activities"[34]. Avoiders depend their teaching mostly on books, pen and paper. Utilizing technology within classroom, let alone integrating completely to learning process is often seen scary. Not limited to, but often the Baby Boomer teachers tend to be among this group as they are the ones most distant to the common use of technologies.

Reluctant adopters, on the other hand, are the ones who "realize technology is a part of today's world and they try to engage with it, but it feels alien and unintuitive. This group is widely diverse and probably includes most of the digital immigrant group"[35]. Although in the essay the authors proceed to explain reluctant adopters as people with a basic cell phone and very limited technology use, today the situation is a bit different since WhatsApp has replaced direct messaging and not having a smart phone and a social media account seem like things even today's avoiders would not do. As most of the technological devices and social media platforms are codependent and definitely have become indispensable parts of our era, even the elder generations had to adapt themselves to some of them to their lives.

[34] Ofer Zur, Azzia Walker, "On Digital Immigrants and Digital Natives: How the Digital Divide Affects Families, Educational Institutions, and the Workplace" *Zur Institute - Online Publication*, http://www.zurinstitute.com/digital_divide.html, 2011: 2. [January 18, 2020].
[35] **ibid**, 2.

The last category is the one that is closest to the digital natives: the enthusiastic adopters. They are "the digital immigrants who have the potential to keep up with natives, due to their ease, capacity, and interest in using technology"[36]. The teacher members of this group tend to be the developers of educational technologies, find various tools to integrate into their teaching and believe that teaching from book and aiming only to keep up with a syllabus are ineffective and should be avoided. This group see the value of technology and do their best to make use of it.

Today, all these generations and different groups of teachers are dealing with a generation that were born into and knows nothing but technologies. Despite their many differences and different preferences, almost all these elder generations of teachers are trying to adapt their teaching and themselves to the needs of Generation Z and to technology.

2.3. Distance Education

Christou, Ktoridou and Zafar describe distance education as "teaching methods and technologies utilized to deliver course content that is distributed to students who are not located at the same physical space" [37].Distance education can be conducted "synchronously", meaning the classes would be held at the same time and all the students and instructors would attend the classes; and "asynchronously", meaning that recorded sessions could be watched later and would not require simultaneous attendance. The education is distributed using web 2.0 tools. Those tools provide interactive environment where the components of classroom interactions can be mimicked.

[36] **ibid**, 2.
[37] Charalambos S. Christou, Despo Ktoridou, Zarimov Zafar, "A Cost-Effective Computer Supported Collaborative Learning for Online Education", 2016 IEEE Global Engineering Education Conference (EDUCON), 10-13 April 2016 (Abu Dhabi, UAE, 2016): 1138.

2.4. Usability vs User Experience Design

Interaction Design Foundation defines usability as follows: "Usability is part of the broader term "user experience" and refers to the ease of access and/or use of a product or website. A design is not usable or unusable *per se*; its features, together with the context of the user (what the user wants to do with it and the user's environment), determine its level of usability" [38]. The terms "user experience" and "usability" have often been confused for both terms have been used to define the process of designing a good human-centered desing, yet usability was the primarily used concept. As later Human-Computer Interaction (HCI) has become "more concerned with understanding, designing for, and evaluating a wider range of user experience aspects", the term "User Experience Design" came about[39].

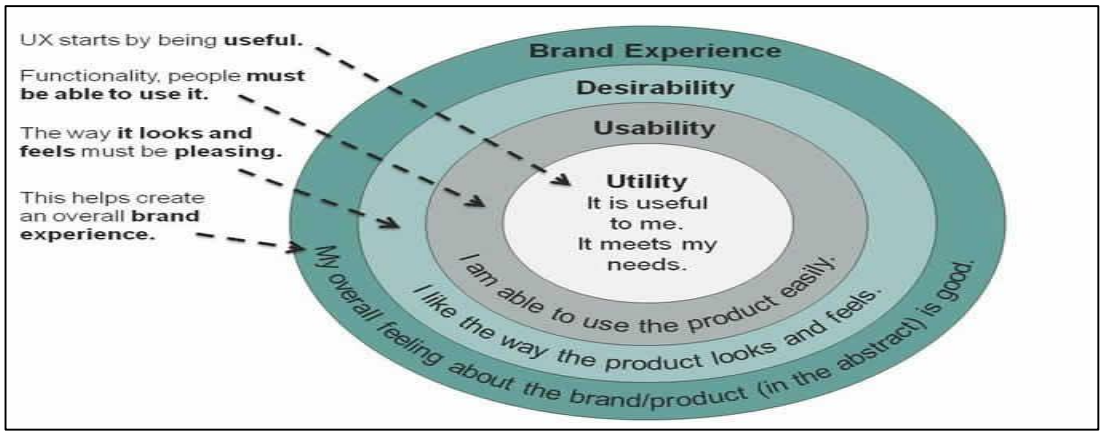

Figure 2.2: User Experience Design vs Usability

Richard Nilsson, "Usability vs User Experience (UX)", NeoSpot.se, http://www.neospot.se/usability-vs-user-experience/ [January 15, 2010].

Regarding the difference between these two terms, Interaction Design Foundation states: "although user experience design (UX Design) and usability were once used interchangeably, we must now understand that usability provides an important contribution to UX; however, it's not the whole of the experience. We can accurately measure usability"[40].

[38] "What is Usability?", Interaction Design Foundation, https://www.interaction-design.org/literature/topics/usability [May 2, 2020].
[39] Yvonne Rogers, Helen Sharp, Jennifer Preece, *Interaction Design*, 3rd edt (West Sussex: John wiley & Sons Ltd, 2013), 19.
[40] Mads Soegaad, "Usability: A part of the User Experience", Interaction Design Foundation, https://www.interaction-design.org/literature/article/usability-a-part-of-the-user-experience [May 2020].

Usability is an inner part of UX Design. "[It] applies to all aspects of a system with which a human might interact, including installation and maintenance procedures[41]". and mainly deals with six main attributes that should be achieved in a good design; learnability, efficiency, memorability, errors and satisfaction. Nielsen explains these attributes as below:

> "• Learnability: The system should be easy to learn so that the user can rapidly start getting some work done with the system.
> • Efficiency: The system should be efficient to use, so that once the user has learned the system, a high level of productivity is possible.
> • Memorability: The system should be easy to remember, so that the casual user is able to return to the system after some period of not having used it, without having to learn everything all over again.
> • Errors: The system should have a low error rate, so that users make few errors during the use of the system, and so that if they do make errors they can easily recover from them. Further, catastrophic errors must not occur.
> • Satisfaction: The system should be pleasant to use, so that users are subjectively satisfied when using it; they like it. Each of these usability attributes will be discussed further in the following sections"[42].

Usability analysis is a necessity for improved user experience. In digitalized world as interfaces gain the upmost importance, to provide the user a natural, effective and satisfying user experience, usability attributes mentioned above and heuristics play significant role. Measuring the usability provides both qualitative and quantitative results. "The extent to which a product can be used by specific users to achieve specific goals with effectiveness, efficiency and satisfaction in a specified context of use" is defined as "usability" by the official ISO 9241-11[43]. For a product, or in our context an interface to be regarded usable, the "specific user and goal" are important parts of the process[44].

What makes an interface usable then? According to Interaction Design Foundation a usable interface should have three main outcomes; it should be easy to become familiar with and use it effectively, to achieve their objectives and to recall the user interface and how to use on subsequent visits[45]. Unless these outcomes are achieved, the product is regarded to have poor usability, which means it may result in errors that can lead to several types of risks, for example, inconvenience resulting from not achieving a goal or achieving the wrong goal, incurring unexpected costs, or physical injury[46].

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[41] Jakob Nielsen, *Usability Engineering*, (California: Academic Press, 1993), 25.
[42] **ibid**, 26.
[43] "Usability of consumer products and products for public use – Part 2: Summative Test Method", ISO, https://www.iso.org/obp/ui/#iso:std:iso:ts:20282:-2:ed-2:v1:en [April 23, 2020]
[44] **ibid**.
[45] Soegaad, **ibid**.
[46] ISO, **ibid**.

Why usability testing is important is another important question. If a product has poor usability, it may cause the user to complain or probably abandon the product. If users cannot navigate in the interface, cannot achieve the offered outcomes from it, cannot understand the language used or cannot undo or notice the mistakes they make, they would not like to spend their time on it. "There's no such thing as a user reading a website manual or otherwise spending much time trying to figure out an interface. There are plenty of other websites available; leaving is the first line of defense when users encounter a difficulty" says Jakob Nielsen[47].

Usability testing is actually a complete process starting from the very beginning, the wireframes, to the final product, and it should be applied at each process thoroughly. In this study's case, however, it would be misleading to assume that a complete usability test can be conducted for the product, BigBlueButton web conferencing system, has already been in use for a long time. The aim of this study is to provide a post-use experience to provide feedback and reflect the new and a-same-purpose group of users' experience on the system. According to UX Research expert Susan Farrell, the right answer to the question "when should user research be conducted?" varies, but overall she says that user research should be done at whatever stage the research is at that moment. The earlier the research, the more impact the findings will have on the product, and most of it should be done at the early stage of the research, but it is also important to conduct the research at each and every stage of the process[48]. Considering this statement, it would be right to assume that this research done on BigBlueButton after the system has been used by the participants and while it is being used all over the world would still make sense and give valuable data, maybe for future improvements within the system. For example, the interface, interactivity level, adaptability to mobile devices could be improved under the light of the new data. There's something useful to learn in every single stage of any reasonable project plan, and each research step will increase the value of your product more than the cost of the research.

Jakob Nielsen suggests a "1-step-plan" for usability testing as a start:

[47] Jakob Nielsen, "Usability 101: Introduction to Usability", NNGroup, https://www.nngroup.com/articles/usability-101-introduction-to-usability/ [April, 2020].
[48] Susan Farrell, "UX Research Cheat Sheet", NNGroup, https://www.nngroup.com/articles/usability-101-introduction-to-usability/ [April 20, 2020].

> "Pick one of your existing user interfaces. Subject it to a simple user test by defining some typical test tasks, getting hold of a few potential customers who have not used the system before, and observing them as they try performing the tasks with the system (without any help or interference from you). If no usability problems are found, then be happy that you have been lucky. In the more likely case that problems are found, you already have your first usability project defined" [49].

In this study's case, there is an existing system, which is BigBlueButton web conferencing system and there are users who have not used the system before, Yıldız Technical University School of Foreign Languages instructors and students. This study aims to observe them using the system and performing the tasks to understand the "usability" aspect of the system.

However, "quantitative" usability testing seems, and even though it is a sub-section of UX design, UX is more about the user's perception, feelings and attitudes towards the product. "It includes the functional scope, product brand, psychological expectation, and actual emotional feeling. These are indispensable parts of the user experience" says Summer Ye to explain the difference between two terms[50]. For UX analysis, users' emotional resonance is as important as their interactive actions within the process. While usability testing allows the researcher to have concrete data, UX adds the subjective feedback component. With usability testing, the aim is to understand how well the tasks provided to the user can be achieved with little or no error; on the other hand, UX is a "consequence of the presentation, functionality, system performance, interactive behavior, and assistive capabilities of the interactive system. It includes all aspects of usability and desirability of a product, system or service from the user's perspective"[51].

According to Rogers, Sharp and Preece, while the purpose of usability is to provide the interaction designer with concrete means of assessing various aspects of an interactive product and the user experience, UX is concerned about how a system

[49] Nielsen, 1993, 22.
[50] Summer Ye, "The Ultimate Guide - Difference Between Usability and User Experience", Mockplus, https://www.mockplus.com/blog/post/difference-between-usability-and-user-experience [April 21, 2020].
[51] Philip Lew, Luis Olsina, Li Zhang, "Quality, Quality in Use, Actual Usability and User Experience as Key Drivers for Web Application Evaluation", *Web Engineering: 10th International conference, ICWE 2010, 5-9 July, 2010* (Sydney: Springer): 222.

feels to a user[52]. While designing for user experience, both of them play crucial part and create a complete experience when accomplished together.

2.5. User Experience Design Process

There are many different approaches towards the stages of user experience research. While some resources define it a 5-step process, some divide the steps up to 7 stages, and the order of stages can be different as well. However, almost all of them agree on one thing: user experience design process is definitely not a linear process and understanding the user is its key element no matter which stage is utilized when and defined how. In fact, in order to achieve a good user experience, all the steps should be repetitively applied whenever necessary from beginning to end product.

According to Andreas Komninos, a UX design process typically follows five basic phases which are listed as follows: empathise with the users, define the problem, ideate, prototype and test[53]. At Medium.com, the stages are categorized as research, empathize, create, test and develop[54]. François Bouniq-Mercier, a lead UX designer, defines the stages in his infographic of UX process as "discover, define, ideate, prototype and evaluate" (see Figure 2.3). Overall, the design process starts with understanding the user, whether it is called research, understanding, defining or empathizing stage. The order of the stages might also change, yet more or less they focus on the same idea. For this study, Mercier's stages will be regarded as the basis for further explaination.

[52] Rogers et al, **ibid**, 23.
[53] Andreas Komnios, "7 UX Deliverables: What will I be making as a UX designer?", Interaction Design Foundation, https://www.interaction-design.org/literature/article/7-ux-deliverables-what-will-i-be-making-as-a-ux-designer [April 2020].
[54] Fen, "UX/UI Design Process", Medium, https://medium.com/nyc-design/ux-ui-design-process-for-beginner-753952bb2241 [April 21, 2020]

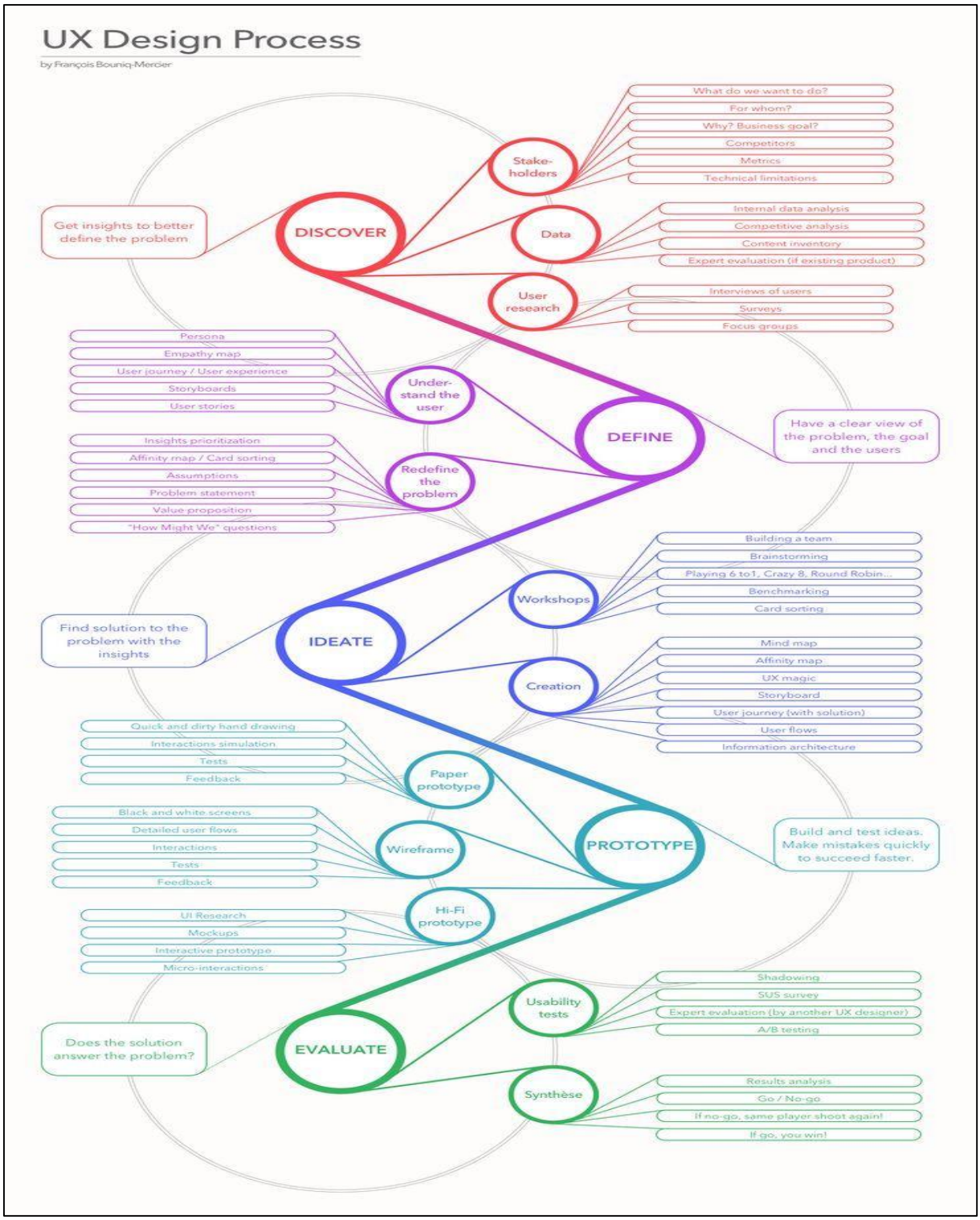

Figure 2.3: UX Design Process Infographic

François Bouniq-Mercier, "UX Design Process Infographic", http://hotar.diyardent.com/image.php?id=583360 [April 21, 2020].

The stages and the process can be clearly seen in the figure 2.3 above; each stage has its own components and methods. It does not mean that each of these methods should be used to complete a user experience design process, but using as many as needed is the best way to achieve the desired result. The stages of UX with sub-components will be explained in detail in this study with reference to figure 2.3.

2.5.1. Discovery stage

Mercier includes user research, data analysis and stake holders in this stage and considers them as the main components for better defining the problem. In this stage, it is important to consider for whom, what, why and against what competitors the design process will be held and what the limitations are to understand the design's stake holders. Gathering important internal data and analyzing the competititon is also necessary. However, perhaps the most important component of this stage is the user analysis since UX is almost all about the user.

2.5.1.1. User Research

A good design needs good user research. In this stage of the design, there are different methods to conduct a valuable research. The aim is to look into the needs of the design and why the design is needed. This stage is sometimes called understanding stage as a design usually provides a solution or ease to a problem and to provide that solution, the problem or the need should be understood clearly[55].

Research stage can be done by doing intensive literature and data research, making interviews, surveys or observations. They play an important role in understanding the user demographics and their needs. They also allow the researchers to foresee probable challenges and solution methods. During this stage one or more data gathering techniques can be implemented. The more techniques are combined and implemented, the less biased the research would be; however, a careful planning is the key issue. If planned thoroughly, even one single research can provide all the data required.

[55] Saadia Minhas, "User Experience Design Process", UX Planet, https://uxplanet.org/user-experience-design-process-d91df1a45916 [April 28, 2020]

2.5.1.1.1. Interviews

There are three main techniques for data gathering according to Rogers, Sharp and Preece: interviews, questionnaires and observation, each of which has various methods within itself[56].

Interviews are divided into four main types as open-ended, structured, semi-structured and group interviews. All types of interviews require the researcher to conduct the sessions by asking questions to the users. Which method should be applied depends on the purpose of the interview.

"Unstructured interviews" are basically loose conversations with the participant around a subject. "Questions posed by the interviewer are open, meaning that there is no particular expectation about the format or content of the answer" but the conversation can deepen while trying to explore the opinions of the participant[57]. While this kind of research provides deep and rich data, the data gathered should be interpreted and the process is challenging and time-consuming.

"Structured interviews" are similar to unstructured interviews, but the previous have pre-determined open-ended questions with unstructured answers. In structured interviews "questions need to be short and clearly worded, and they are typically closed questions, which means that they require an answer from a predetermined set of option"[58].

"Semi-structured interviews", on the other hand, have a hybrid structure from the previous two types, in which the sessions start with pre-determined questions and proceeds to depth of the issue with some open ended questions. The aim is to "probe the interviewee to say more until no new relevant information is forthcoming"[59].

Finally, the fourth type of research stated is "focus groups". The previous types of interviews mentioned are usually one-on-one interviews; however, focus groups are, as the name suggests, conducted in groups and there is not an interviewer but a facilitator or a moderator who leads the discussion. As Rogers, Sharp and Preece say

[56] Rogers et al, **ibid**, 222.
[57] Rogers et al, **ibid**, 229
[58] Rogers et al, **ibid**, 229.
[59] Rogers et al, **ibid**, 230.

“individuals develop opinions within a social context by talking with others, which means that this approach is more appropriate for investigating community issues rather than individual experiences”[60].

2.5.1.1.2. Questionnaires

Questionnaires are one of the most commonly used methods of data gathering in academic and productional researches. This type of data gathering allows the researchers to gather information from many people in a short period of time. The question types vary in themselves from open-ended questions to controlled questions.

According to Rogers, Sharp and Preece, preparing questions for the questionnaire can be challenging for the the interviewer is not there to explain the question as the sessions is written. Questions, therefore, should be as clear and comprehensive as possible[61].

Today, thanks to the Internet, questionnaires can be delivered to the target interviewee online and in a very short time large numbers of data can be collected simultaneously. Questionnaires are good tools for gathering demographic information of the target group as well as their attitude towards the product. Another benefit of online questionnaires is that the data collected from the answers are often automatically formed, which saves a lot of time for the interviewers from putting in each questionnaire paper’s answers one by one to get a result to analyze and comment on. Some platforms, such as Google Forms, provide question types in a ready format and allow the interviewer to later check or change the typos, which is not possible with paper-based questionnaires. Notwithstanding, they are environmentally friendly.

In the case of this research, online questionnaires have been choosen as the main data gathering tool due the the current situation of quarantine. To prepare the online questionnaire, Google Forms has been used and with links, the questionnaires have been delivered to both the instructors and the students instantly.

2.5.1.1.3. Observations

Observations are useful techniques in trying to understand the user and the situation a design aims to benefit. It can be done at any stage of a UX process, can be conducted directly or indirectly in a controlled environment.

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[60] Rogers et al, **ibid**, 232.
[61] Rogers et al, **ibid**, 238.

In “direct observation”, researcher is in the field or the environment of the user observing tasks being accomplished in a context. This technique allows researcher to gather natural data, yet it is also possible that there will be overwhelming data flow, especially if not carefully conducted. In direct observation, “sometimes the observation is carried out by trained observers who record their findings and report them back to the design team, and sometimes the observation is carried out by or with member of the design team”[62]. To be able to achieve the challenging task of direct observation and gathering only relevant data, Rogers, Sharp and Preece suggests researchers to create a framework to follow. The framework they suggest requires the researchers to regard questions concerning the space, actors, activities done (tasks), objects, acts, events, time, goals and feelings about the design. If observers conducted their observation within the limit of some or may be all of these frames, the resulting data would be more efficient and satisfying.

According to the degree of involvement, an observer can be called a “passive observer” or a “participant observer”. A passive observer, as the name suggests, does not involve in any part of the process, while a participant observer becomes an insider. Both degrees have their benefits and counterbacks, like not being accepted to group or community as an insider or not being able to avoid interfering to the process. Therefore, in either case, careful planning is an obligatory stage[63]. There are also “ethnography” studies, during which mostly direct observation is done. It is quoted from Bell that “ethnographic methods are a way of uncovering people’s real desires, of getting insight into their lives and following their own stories and interests; knowing these things allows products to be designed that fit ‘intuitively’ into people’s lives”[64].

There are also direct observations in controlled environments. These observations are usually conducted in laboratories, but there might be other options such as portable laboratories to avoid challenges for the participants. The method of questioning and observing is quite the same with direct observation in the natural environment. In both cases, gathering data only by observing is a difficult task to accomplish, especially if the aim is to gather emotional data from the participant. There are some methods of acquiring inner feelings, attitudes and emotions of the participants. The “think-aloud technique” is one of them, during which the participant

[62] Rogers et al, **ibid**, 365.
[63] Rogers et al, **ibid**, 252.
[64] Rogers et al, **ibid**, 252.

reflects his/her feelings and thoughts aloud without interruption of the observer while trying to do the tasks given.

"Indirect observation", on the other hand, is helpful when the circumstances are not appropriate for any other method of direct observation. To be able to conduct an indirect observation, "diary writing" and "interaction logs" are suggested by Rogers, Sharp and Preece. Diary writing method requires the participants to write their activities on a journal by also reflecting their inner feelings and ideas towards the actions. Diaries are easy to follow and cost effective. Interactive logs are done by softwares installed to the participant's computer that record every action done to complete the task. It provides an objective result. However, this method lacks the reflections of the participants on the issue. Indirect observation's biggest benefit is that participants are not disturbed throughout the process.

Table 2.3: Overview of Data Gathering Techniques and Their Use

Technique	**Good for**	**Kind of data**	**Advantages**	**Disadvantages**
Interviews	Exploring issues	Some quantitative but mostly qualitative	Interviewer can guide interviewee if necessary. Encourages contact between developers and users.	Time-consuming Artificial environment may intimidate interviewee
Focus groups	Collecting multiple viewpoints	Some quantitive but mostly qualitative	Highlight areas of consensus and conflict. Encourages contact between developers and users.	Possibility of dominant characters
Questionnaries	Answering specific questions	Quantitive and qualitative	Can reach many people with low resource	The design in crucial. Response rate might be low. Responses may not be what you want.
Direct observation in the field	Understanding context of user activity	Mostly qualitative	Observing actual work gives insight that other techniques can't give	Very time-consuming. Huge amounts of data.
Direct observation in a controlled environment	Capturing the detail of what individuals do	Quantitative and qualitative	Can focus on he details of a task without interruption	Results may have limited use in the normal environment because the conditions were artificial.
Indirect observation	Observing users without	Quantitive (logging) and	Users don't get distracted by the	A large amount of quantitative data

	disturbing their activity; data captured automatically	qualitative (diary)	data gathering; automatic recording means that it can extend over long periods of time	needs tool support to analyze (logging); patiricipants' memories may exaggerate diary)

Adapted from Yvonne Rogers, Helen Sharp, Jennifer Preece, *Interaction Design*, 3rd ed (West Sussex: John wiley & Sons Ltd, March 2013), 261.

2.5.2. Defining stage

User experience design is all about understanding the user, therefore empatising is an issue that should be given upmost importance. It allows the designer to understand what user wants and might want in the future. "Empathic research reveals the deeper needs and root causes, which, if addressed correctly, may profoundly change the project we're investigating" say Dam and Teo in their article called "Design thinking: Getting Started with Empaty" [65]. Dam and Teo accept empatise as the first stage of design thinking which is followed by define, ideate, prototype and test. During this stage, designer's role is defined as "gain[ing] an empathic understanding of the people you are designing for and the problem you are trying to solve[66]". Mercier, on the other hand, calls this stage "defining" stage and after gathering necessary data about the user, in this stage the user, goal and the problem needs to be explained and defined for a clear understanding, which is possible by interpreting and empathizing the research data[67].

During this stage, the information previously gathered is put together, analyzed and synthesized into assumptions to define the problem clearly and in a concrete way. Sarah Gibbons in her article explains that "in UX, empathy enables us to understand not only our users' immediate frustrations, but also their hopes, fears, abilities, limitations, reasoning, and goals. It allows us to dig deep into our understanding of the user and create solutions that will not only solve a need, but effectively improve our users' lives by removing unnecessary pain or friction. Instead of just designing an accessible website, practicing empathy is using a screen reader, blindfolded, in order to complete a task on your own website"[68].

[65] Rikke Friis Dam, Teo Yu Siang, "Design Thinking: Getting Started with Empathy", Interaction Design Foundation, https://www.interaction-design.org/literature/article/design-thinking-getting-started-with-empathy [April21, 2020]
[66] **ibid**.
[67] François Bouniq-Mercier, "UX Design Process", http://hotar.diyardent.com/image.php?id=583360
[68] Sarah Gibbons, "Symphaty vs. Empathy in UX", NNGroup, https://www.nngroup.com/articles/sympathy-vs-empathy-ux/ [April 21, 2020]

In order to be able to achive empathy in UX design, the data acquired from the user research should always be considered. To interpret and define that information, there are a few techniques that can be implemented together or on their own depending on the design's needs. Some of these techniques are empathy maps, personas, user journeys and storyboards.

2.5.2.1. Personas

"Personas" are most commonly used methods of defining and empathizing with user. They are "rich descriptions of typical users of the product under development that the designer can focus on and design the product for"[69]. They represent who might be the potential users or targeted users of a certain product, their habits, needs based on the assumptions of the designer. They are not real people but the representations of them. Even though some fictional information might be added to the profiles, they are not idealistic but realistic. Persona profiles are composed in relation with the product they are created for, they show possible users' probable purposes of using that product.

> "Usually, a persona is presented in a one or two-page document (like the one you can see in the example below). Such 1–2-page descriptions include behavior patterns, goals, skills, attitudes, and background information, as well as the environment in which a persona operates. Designers usually add a few fictional personal details in a description to make the persona a realistic character (e.g. quotes of real users), as well as context-specific details (for example, for a banking app it makes sense to include a persona's financial sophistication and major expenses) "[70].

Creating reliable and realistic personas is important for the credibility of the design, therefore personas should be based on the data gathered from the user research. That is the reason why research process is taken as the very first stage of a good design in this study. According to Usability.gov, an effective persona represents a major user group, express and focus on the major needs and expectations of the most important user groups, gives a clear picture of the user's expectations and how they are likely to use the site, describe real people with backgrounds, goals and values[71]. Here is an example of a good persona by Nick Babich:

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[69] Rogers et al, **ibid**, 360.
[70] Nick Babich, "Putting Personas to Work in UX Design: what They Are and Why They're Important", AdobeBlog, https://theblog.adobe.com/putting-personas-to-work-in-ux-design-what-they-are-and-why-theyre-important/ [April 21, 2020].
[71] "Personas", Usability, https://www.usability.gov/how-to-and-tools/methods/personas.html [April 21, 2020].

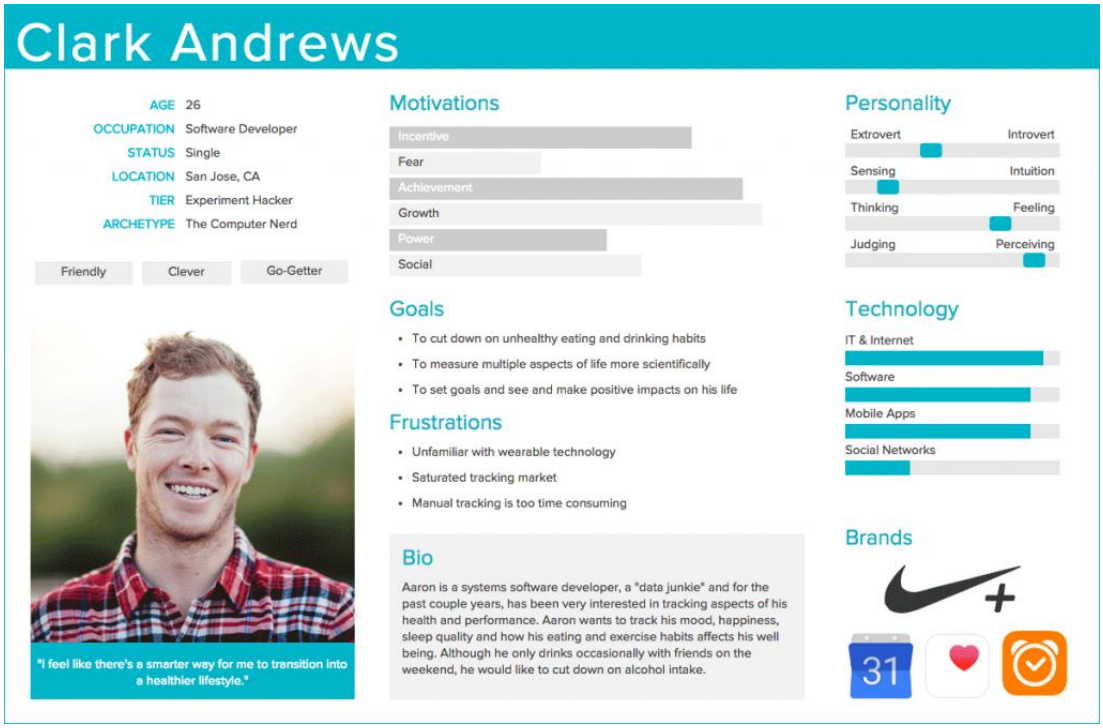

Figure 2.4: A Persona Example

Nick Babich, "“Putting Personas to Work in UX Design: What They Are and Why They’re Important”, AdobeBlog, https://theblog.adobe.com/putting-personas-to-work-in-ux-design-what-they-are-and-why-theyre-important/ [April 21, 2020].

As mentioned before, empathy is the key issue of a good user experience design and personas are especially useful for empatising with possible users. Designer takes the data gathered, analyzes and by interpreting the data, forms realistic personas for the product. This whole process is empatising at its core. Thanks to personas, designer also can help other stakeholders to empatise with the end user and see a clear picture of who is going to really use the product with what needs.

Nick Babich also suggest that personas help designers shape product strategy by providing a deep user behavior and needs understanding, which in return allows product teams to prioritize feature requests, settle arguments around design decisions and create a collaborative work[72].

According to Lene Nielsen, a specialist in personas, there are four perspectives in creating personas: goal directed, role-based, engaging and fictional personas. The goal-directed persona is created based on the user research conducted earlier ad later on they are condensed into final personas. Lene Nielsen suggests that “a persona is defined by its personal, practical, and company-oriented goals as well as by the

[72] Babich, **ibid**.

relationship with the product to be designed, the emotions of the persona when using the product, and the goals of the persona in using the product (hence Goal-Directed)[73].

Role-based personas are massively data driven personas which can communicate the most important knowledge about the users and thereby support the design process[74]. They focus on the probable users's roles in the organization.
The engaging personas are created with stories which help the designer and stakeholders gain insight about the user. "The purpose of the engaging perspective is to move from designers seeing the user as a stereotype with whom they are unable to identify and whose life they cannot envision, to designers actively involving themselves in the lives of the personas." says Nielsen[75]. These personas are preferred as they focus on the whole person, not just the behaviors. They include guessing the users' future behaviors and attitudes towards the product and this process require immensive amounts of data about the user. The fiction-based personas, on the other hand, are mere products of empathetic approach of the designer on the user.

There are other types of personas as well, but all in all, personas help the empathetic process of the design. There are a few things that every type of persona should have: a fictional name; a photo; occupational information; demographics; behaviors and attitudes; needs; personality; pain points and skills.

2.5.2.2. Empathy Maps

An empathy map is overall visualizing what is known about the user. Empathy maps are visuals with four sections analyzing the user. Those sections are what user says, thinks, does and feels. All together they form an overview about a certain type of persona. Empathy maps can be single user empathy map or multiple user empathy maps depending on the purpose of the research.

[73] Lene Nielsen, "30. Personas", *The Encyclopedia of Huma-Computer Interaction, 2nd Ed.* , Interaction Design Foundation, https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/personas.
[74] **ibid**.
[75] **ibid**.

Sarah Gibbons, in her article for NNGroup.com defines the “says” part as the vocal thoughts of the user expressed during user studies. They are usually direct quotes from the user. The “thinks” quadrant requires empaty of the designer as it is the part where the unspoken thoughts of the user are guessed. The “does” quadrant deals with the actions of the user. (Figure 2.4)

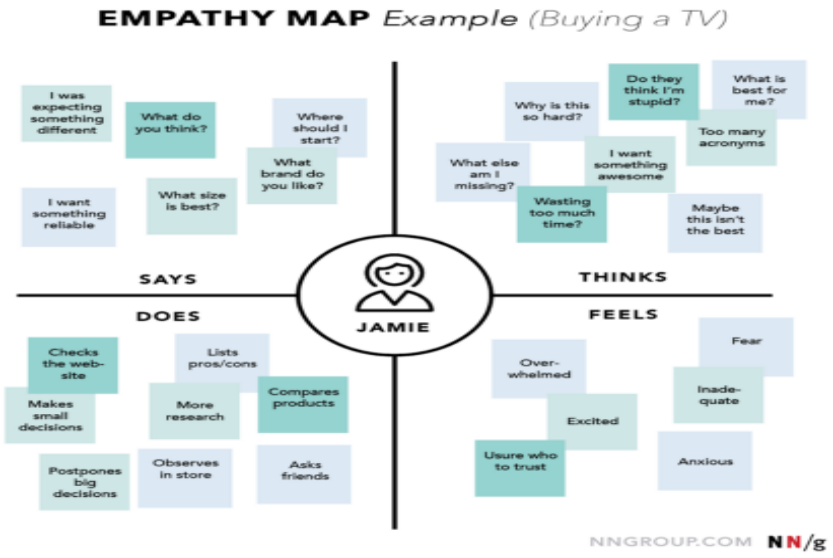

Figure 2.5: Empathy Map Example

Sarah Gibbons, “Empathy Mapping: The First Step into Design Thinking” NNgroup.com, https://www.nngroup.com/articles/empathy-mapping/ [January 14, 2018].

Regarding the previous researches, what information about the user actions we have and what the user would do in that case are some points to be regarded. The “feels” quadrant deals with the emotional state of the user. How does the user feel doing the actions or using the product? Designers should ask these questions to themselves to understand the user better in empathy mapping.

The benefits of empaty mapping is that it creates a vast understanding of the user based on the data and allows the designer to show the attitudes of the user to the stakeholders and colleagues clearly.

2.5.2.3. Storyboards

A storyboard is series of images depicting a story, in UX case the product’s story. It chronogically tells the process of products important stages. With storyboards it is easier to communicate with stakeholders and other colleagues. It empathises with the user and presumes how they may interact with the product. While preparing a

storyboard, designer has to think like the user, so it is possible to say that storyboards helps designer to understand the motivation of the users.

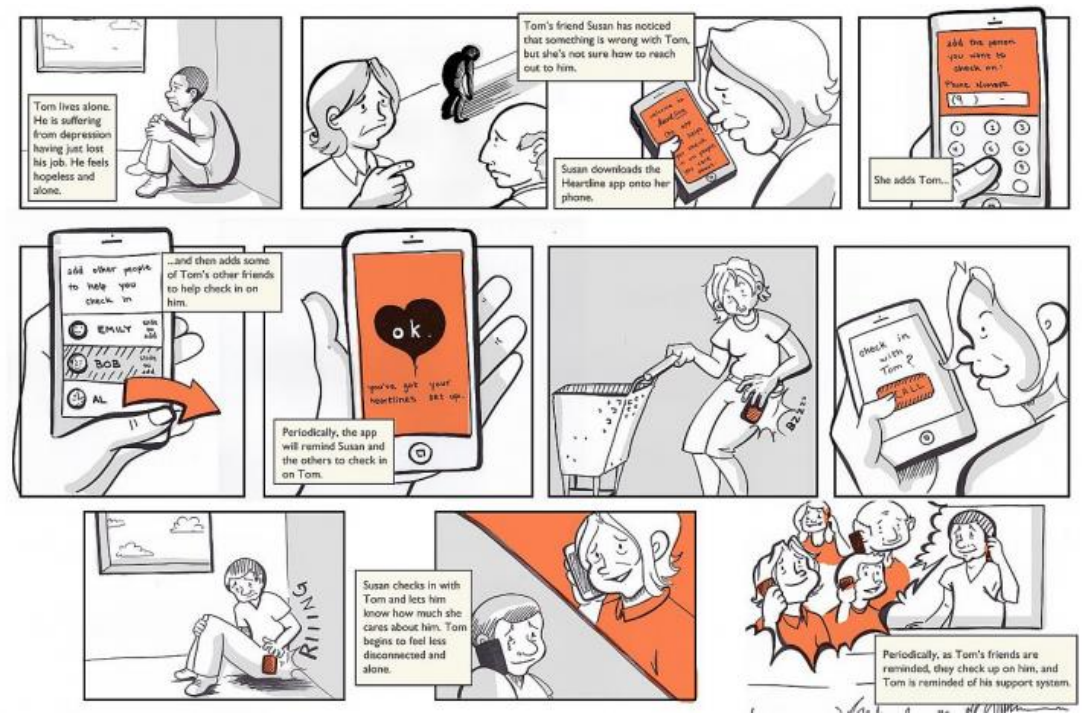

Figure 2.6: A Storyboard Example

Luca Morovian, "UX Storyboard Creation: A Complete Guide for Beginners", *UXStudio.com*, https://uxstudioteam.com/ux-blog/ux-storyboard/ [Mart 12, 2019].

According to Rachel Krause's article on storyboards, there are three common storyboard elements which are listed as a specific scenario, visual and corresponding captions. Scenarios are user stories, the roles that a persona corresponds to. Visuals are the images that detail the story and give a concrete idea about how it flows. Finally captions describe user's actions, environment, and so on[76]. Storyboards are linear images that follow a chronological order. They should be simple, clear and to the point. They begin by introducing the characters and the situation, show the problem and the solution and end with a clear outcome[77].

[76] Rachel Krause, "Storyboards Help Visualize UX Ideas", NNGroup, https://www.nngroup.com/articles/storyboards-visualize-ideas/ , [April 20, 2020].

[77] Nor Sanavongsay, "Visual Storytelling in UX with Storyboards", Workday Design, https://medium.com/workday-design/visual-storytelling-in-ux-with-storyboards-d58214dedfac, [April 22, 2020].

2.5.2.4. User Journeys

Nick Babich defines user journey as "visualization of the process that a person goes through in order to accomplish a goal"[78]. User journeys deal with what happens while the user is using the product. To be able to create an effective user journey, persona, scenario and context studies should be completed first so that a realistic user journey can be created. It is usually composed of several steps in a chronological order.

Babich claims that there are certain elements that should be included in user journeys which are as follows: a title summarizing the journey (e.g. 'Purchasing an electronic device in the e-commerce store'); a picture of the persona the journey relates to; a series of steps; an illustration of what's happening in the step; the persona's emotional state at each step. Its difference from storyboards is that storyboards can be used as a tool to enrich user journey study.

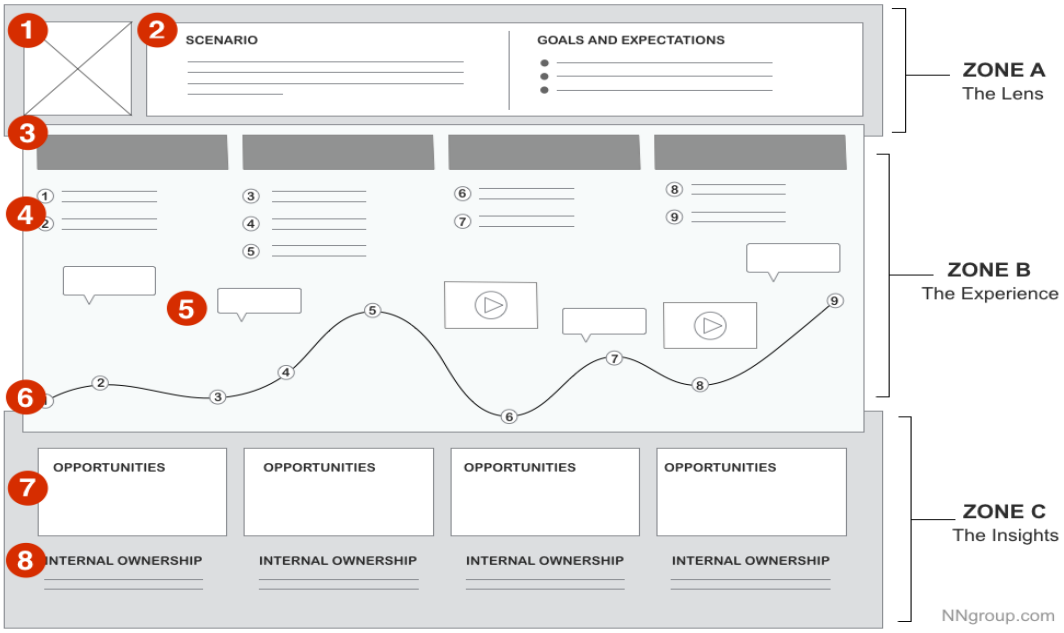

Figure 2.7: A User Journey Scheme Example

Nick Babich, "A Beginner's Guide to User Journey Mapping" UXPlanet, https://uxplanet.org/a-beginners-guide-to-user-journey-mapping-bd914f4c517c [February 21, 2019].

User journeys are just diagrams that are supposed to be filled with the information gathered before persona studies. (Figure 2.6) To be able to find the best product for the user, this journey is created to help prepare for ideation stage. The steps

[78] Nick Babich, "Why All UX Designers Should Be Creating User Journeys, and Here's How to Make One", Adobe Blog, https://theblog.adobe.com/why-all-ux-designers-should-be-creating-user-journeys-and-heres-how-to-make-one/, [April 21, 2020].

of user journey mapping begin with choosing a scope. Later, personas are created with the help of earlier research data, scenario is predefined and with the help of empathy mapping, users' expectations, feelings and thoughts are recorded. List of main points is determined and with the help of storyboards, journey is sketched. It is also very important to check your understanding of user expectations at different stages throughout the process.

2.5.3. Ideation Stage

Ideation is the third stage of the UX design process and the data gathered at research stage and the maps created and interpreted at empathy stage begin to flourish and it is the time to generate new ideas upon them. Aurora Halsey defines ideation as "the process of generating a broad set of ideas on a given topic, with no attempt to judge or evaluate them"[79]. She also says that "while the eventual goal of ideation is a high-quality design that solves a specified problem, the focus of ideation is quantity instead of quality"[80].

Ideation part is where designer, keeping in mind all the previous data gathering and empathy studies, comes up with as many ideas as possible. Therefore, brainstorming is one of the most commonly used methods of this stage. Whether conducted in groups or alone, face to face or remotely, it is basically a process of controlled stream of consciousness where ideas are not evaluated and there is no judgement, but they are recorded in different ways varying from pen and pencil to technologies. It is the stage where solutions are brought up, so the more ideas developed, the better it is. According to Emiliy Stevens, "the main aim of an ideation session is to uncover and explore new angles and avenues—to think outside the box"[81].

A good ideation process asks the right questions, collects different opinions and approaches from other parties and team members, unveils new and unexpected

[79] Aurora Harley, "Ideation for Everyday Design Challenges", NNGroup, https://www.nngroup.com/articles/ux-ideation/, [April 21, 2020].
[80] **ibid**.
[81] Emily Stevens, "What is Ideation in Design Thinking? A Guide to the Most Important Ideation Techniques", Career Foundry, https://careerfoundry.com/en/blog/ux-design/what-is-ideation-in-design-thinking/, [April 21, 2020].

areas of innovation, benefits from variety and tries to find the different and original solution to the problem presented.

Some techniques of ideation other than brainstorming are analogies, bodystorming, brainwalking, brainwriting, gamestorming, challenging assumptions, mind mapping and reverse thinking. To give a clear idea about what ideation exactly is, the most common ones will be explained briefly.

"Analogies" are done by finding resemblances between your product or process with another object or concept in terms of function and trying to develop some solution ideas from that resemblance. It is basically comparison of objects in a constructive way. It allows the designer to look at the situation and the problem from a different angle.

"Bodystorming" is taking the problem to be solved and making it a physical experience. This way the problem becomes more concrete and as it also becomes a total physical interaction, it might provide different solution ideas that would not be possible to come up with otherwise.

"Brainwriting" is similar to brainstorming, it is also a controlled stream of consciousness regarding the problem. The difference is that it is written, as the name suggests. "Instead of verbally sharing ideas, participants write down their ideas before passing them on to someone else. The next person reads these ideas and adds their own, and so the process continues until each person's ideas have done a full rotation" explains Stevens[82]. In "brainwalking", on the other hand, the participants move within the room for the creation process. This technique is like a mixure of brainwriting and bodystorming. From station to station, participants pass by writing their ideas.

"Gamestorming" is a popular technique with wide range of options. It might also be called gamification and its idea is based on "creat[ing] a participation parity with a recipe of their own: a game board, supplies, an agreed upon goal and instructions for play[83]. Gamestorming technique reguires the team to participate in a focus motivated game or create a game applying for your context to brainstorm about

[82] **ibid.**

[83] Dave Mastronardi, "Gamestorming: A Toolkit for Meeting", Coda, https://coda.io/@dave-mastronardi/gamestorming-a-toolkit-for-meetings [April 20, 2020].

the problem's solution. It is not only interactive and fun, but also a productive process of ideation.

"Challenging assumptions" technique is actually breaking the assumptions in one's mind about the problem to create better assumptions that will help solve the problem. It begins with helping the subject to realize their assumptions might be flowed and a different scenario might be possible, then working on the assumptions to create the desired result. In design process, the assumptions about the problem are the key point to break down and refute.

"Mindmapping" is an organized and effective way of getting the idea out of your brain onto the paper to enhance and elaborate on. Mindmaps start from a center general context that the design dwells upon and branches out to details related to the center. Each brach can split into more detailed branches. They are like real maps, roads linked to each other leading to a center. There are useful ways of putting out all the ideas in one's mind and then organizing them into meaningful and logical schemes.

There are many other techniques for ideation stage and during the design process, researchers can utilize as many of them as they need. They help creating solution ideas for the users that were empathetically created in the previous stage that was developed depending on the data driven from the first stage's research results.

2.5.4. Prototype

"Put simply, a prototype is a scaled-down version of your product; a simulation or sample version which enables you to test your ideas and designs before investing time and money into actually developing the product. So, if you're designing an app, you might create a digital prototype and test it on real users before handing it off to the developers" says Emily stevens in her article[84]. Prototype process is where the results of ideations stage, the ideas gathered there are turned into an end product that the target user might desire or need. Prototypes might be real objects or just like in this study's case, might be interactive digital tools.

[84] Emily Stevens, "Step Four in the Design Thinking Process: Yout Complete Introduction to Prototyping", Career Foundry, https://careerfoundry.com/en/blog/ux-design/design-thinking-stage-four-prototyping/, [April 21,2020].

According to Stevens' article, there are four different types of prototype and they vary according to the following items: form, fidelity, interactivity and lifecycle.

> **"Form:** Is it a hand-drawn prototype, or a digital one? Is it for mobile or desktop?
> **Fidelity:** How detailed and polished is the prototype? You'll often hear the terms high-fidelity and low-fidelity in relation to prototypes.
> **Interactivity:** How functional is the prototype? Can the user click on it or interact with it, or is it view-only?
> **Lifecycle:** Is the prototype a quick, disposable version that will be replaced with a new and improved version? Or is it a more enduring creation that can be built and improved upon, potentially ending up as the final product"[85]?

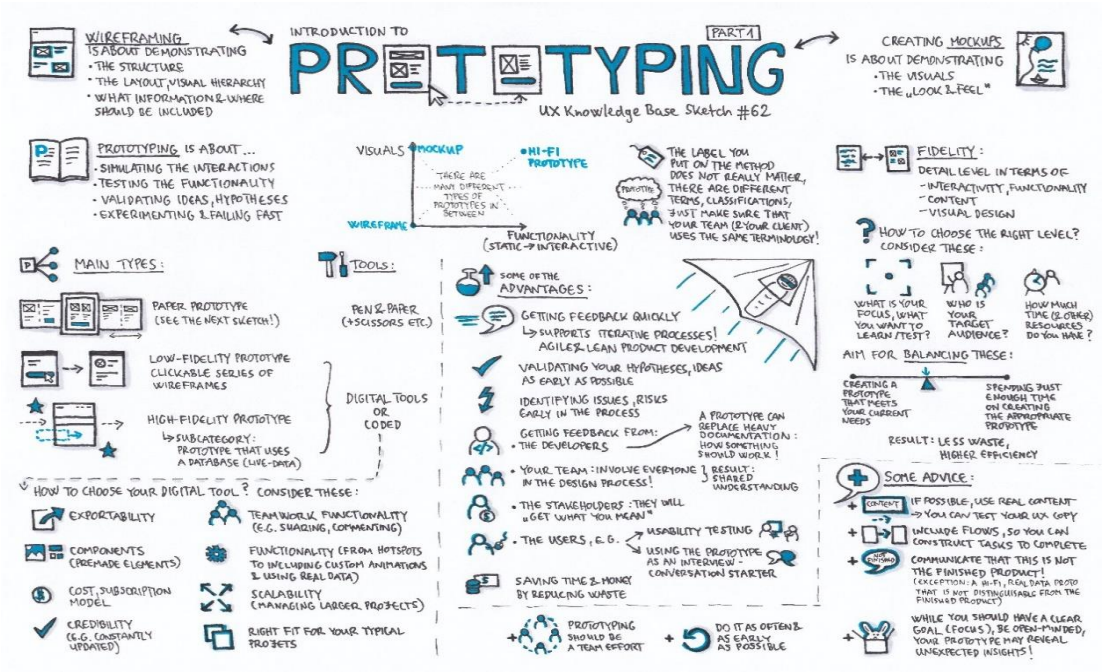

Figure 2.8: Prototyping Stage Sketch

Krisztina Szerovay, "Prototyping - Part 1" UX Knowledge Base",
https://uxknowledgebase.com/prototyping-part-1-e7d606cde30b [June 19,2018]

Prototypes are the tangible forms of the ideas that have been created until this stage. They can be paperbased or digital, but what they are is actually primitive models of the end product. If the end product is an application, prototype might be a pilot app that is not presented to the market or users.

According to Dam and Teo, some of the main purposes of prototypes are exploring problems, ideas and experimenting on them, learning and understanding the

[85] **ibid**.

Dynamics of a problem by engaging with them, using it, testing to gain better insight and sell new ideas, inspire others in the market with your creative thinking[86].

Prototype, since it is the product in its early stage, allows the researcher to get valuable feedback at an early stage as well as allowing the researcher to test the ideas as ealy as possible. Creating mockups, wireframing are some techniques related to this stage.

2.5.5. Evaluate

Evaluation stage is the final stage of the UX design process and it includes one of the most important processes of the whole research: user testing. User testing is "testing your prototype on real users"[87]. This is the designers chance to finally let the solution created or the product meet the real user and to see how it works, how the user interacts with it. In this sage, the designer sees if the product or solution works, whether there are flaws in it and should be improved. This stage provides valuable quantitative and qualitative data to the designer.

User testing is also known as usability testing or UX testing. All the stages of UX design process are important, yet user testing stage is important on another level. "Evaluation is integral to the design process" say Rogers, Sharp and Preece; "evaluators collect information about users' or potential users' experiences when interacting with a prototype, a computer system, a component of a computer system, an application, or a design artifact such as a screen sketch. They do this in order to improve its design"[88]. The companies have good reasons to invest in user testing since it helps them to save money and time while creating a successful end result. Besides, if the solution fails at this stage, it is better since the loss would be much less than when put into use.

In usability testing, there are usually laboratories or living labs where usability tests and experiments are conducted meanwhile observing the participant. These settings allow facilitators to have control over what users do.

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[86] Rikke Friis Dam, Teo Yu Siang, "Design Thinking: Get Started with Prototyping", Interaction Design Foundation, https://www.interaction-design.org/literature/article/design-thinking-get-started-with-prototyping, [March, 2020].
[87] Emily Stevens, "User Testing: A Guide to Sptep 5 of the Design Thinking Process", Career Foundry, https://careerfoundry.com/en/blog/ux-design/user-testing-design-thinking/, [April 21, 2020].
[88] Rogers et al, **ibid**, 433.

The main elements of a usability test are facilitator, the task and the participant. Kate Moran describes the usability testing stage as "the facilitator administers tasks to the participant. As the participant performs these tasks, the facilitator observes the participant's behavior and listens for feedback. The facilitator may also ask follow up questions to elicit detail from the participant"[89].

Rogers, Sharp and Preece differentiate evaluation as follows: "when evaluations are done during design to check that a product continues to meet users' needs they are known as *formative evaluations*. […] Evaluations that are done to assess the success of a finished product are known as *summative evaluations*"[90]. It shows that evaluation does not have to be done at only a certain point.

2.5.5.1. Usability Testing

Hotjat.com defines usability testing as "getting real people to interact with a website, app, or other product you have built and observing their behavior and reactions to it"[91]. Nowadays usability testing sessions are often conducted remotely, but building laboratories for this purpose is also quite common, yet more costly. In a standart usability testing session, facilitators give certain tasks to the participants and observe them perform those tasks while recording the errors the participant does and the challenges faced. The performance of tasks may be recorded to a video or with a software.

Usability testing provides accurate and impartial results about the user's experience and before spending a lot of money and before it is too late, it allows you to test the product and improve or correct the errors. Many companies, just because they try to save money by avoiding the UX process end up spending a lot of money to correct the errors after the product has been launched.

The purpose of this testing is that it tries to evaluate the effectiveness of the system by asking questions to understand if it is easy to learn, aesthetically pleasing; tries to see the efficiency; accuracy (whether it works as if promises to) and user friendliness (whether it is self-explanatory or require a previous training).

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[89] Kate Moran, "Usability Testing 101", NNGroup, https://www.nngroup.com/articles/usability-testing-101/, [April, 2020].
[90] Rogers et al, **ibid**, 437.
[91] "A Beginner's Guide to Usability Testing", Hotjar, https://www.hotjar.com/usability-testing/, [May 14, 2020].

The number of subjects required for the test varies depending on the needs of the research; however, as Yuna Orsini, referring to Nielsen's user curve (Figure 2.8), suggests a 5-tester sample is the optimal size since 90% of the most important insights are gathered this way and it saves time. Besides after the 5th tester, the answers and feedbacks tend to be the same[92].

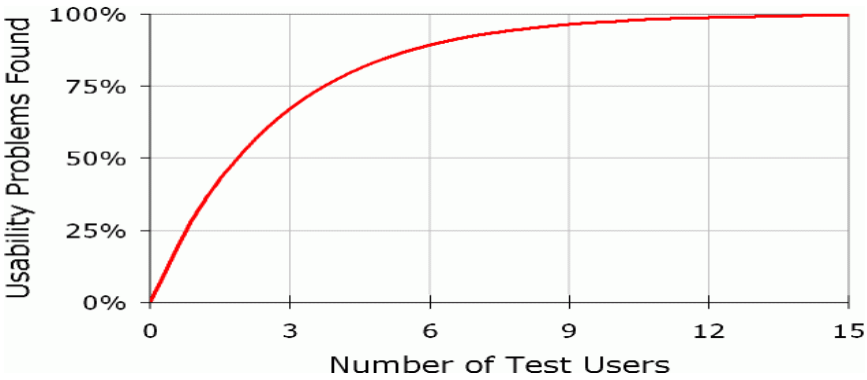

Figure 2.9: Nielsen's User and Problem Curve

Jakob Nielsen, "Why You Only Need to Test 5 Users", *NNGroup.com*, https://www.nngroup.com/articles/why-you-only-need-to-test-with-5-users/ [March 18, 2000].

To recruit the participants, Orsini suggests drawing the participants from your own acquintances to save time and money and also have a quick start. However, in a more professional case, it is possible to work with companies that recruit users for you.

Testing stage occurs in three steps, pre, while and post. Each stage has its own requirements. First, the participant is introduced to the test, the test begins and the facilitator gives the tasks with clear and contextual questions like "now you are the lecturer of the lesson and you would like to take the presenter role to begin your lesson…" and during the task performance, task achievement is carefully observed by the facilitator: blocks, hesitations, comments, movements and important details are noted down. Recording the session with the consent of the participant may be helpful at this stage.

According to an article by Nick Babich, there are top seven usability testing methods which are guerilla testing, lab using testing, unmoderated remote usability testing, contextual inquiry, phone interview, card sorting and session recording[93]. Of course, there are many other methods developed, and sometimes the same method is

[92] Yuna Orsini, "UX Design: How to Conduct Usability Testing", Medium, https://medium.com/poool-stories/ux-design-how-to-conduct-usability-testing-4c420d451537, [April 19, 2020].
[93] Nick Babich, "Top 7 Usability Testing Methods", Adobe, https://xd.adobe.com/ideas/process/user-testing/top-7-usability-testing-methods/, [April 21, 2020].

named differently. For example, there are qualitative and quantitative testing, natural-settings involving users testing, controlled settings involving users testing, any settings not involving users testing, remote and in-person testing and so on. Quantitative evaluation tries to gather information about how people use the product and what they feel, quantitative evaluation cares about metrics that provide information about the user experience. "Remote usability tests" are time and cost efficient for they do not require a specific place or arranged lab for that purpose.

Remote usability tests also divide into two as "moderated" and "unmoderated" tests; the former one works just like in-person tests where there is a facilitator. The facilitator tells the participant to perform the task and in the mean time the facilitator observes the pariticipant. Usually the facilitator observes the participant through a screen-sharing platform. At "unmoderated remote usability tests", the participant is alone during the test time and tries to perform the tasks previously written to him or her. In this process, there is no facilitator-participant interaction. The testing tool delivers the task instructions and any follow-up questions. After the participant completes her test, the researcher receives a recording of the session, along with metrics like task success[94].

2.5.5.1.1. Guerilla Testing

In guerilla testing (also known as hallway usability testing), the facilitator goes to a public place and starts asking questions about the product. It is a very fast and easy method of acquiring feedback. It is not a formal user testing; therefore, it does not completely fulfill the need. The facilitator goes to the scene with pre-planned questions, picks potential participants, before beginning the tests, gets basic and relevant dermographic information, asks the task questions and captures the feedback.

To be able to do an effective guerilla testing, scenario should be as simple as possible and clear instructions and good listening skills are really important. It is also very important to consider if this type of testing really fits the research, for they cannot replace the formal usability tests.

[94] Moran, **ibid**,

2.5.5.1.2. Lab Usability Testing

For this kind of testing, a special lab environment is required. In this testing process, the participant's ability to complete the tasks is measured and observed. The lab is designed only for this purpose and "depending on the system that is evaluated, the user sits in front of a personal computer or stands in front of the systems interface, alongside a facilitator who gives the user tasks to perform. Behind a one-way mirror, a number of observers watch the interaction"[95]. The lab tests are conducted by User Centric Design experts and key stakeholders participate as observers to understand the customer experience. The lab is usually composed of one-way mirrored rooms that allows the participant to perform the test without being disturbed by the observers[96].

Nick Babich says that "lab usability testing works best when you need to have in-depth information on how real users interact with your product and what issues they face. It will help you investigate the reasoning behind user behavior"[97]. It is a qualitative method and require trained moderators. It is a much more formal and professional way of conducting usability testing compared to guerilla testing, although it is costlier and more time consuming.

2.5.5.1.3. Unmoderated Remote Usability Testing (URUT)

Unmoderated remote usability testing (URUT) is a very time and cost efficient method of usability testing without forsaking the formality of the process. There is no need for a moderator to facilitate the process and the participant performs the tasks in his or her natural environment without interruption. According to the article on URUT at Interaction Design Foundation's website, "data is captured from URUT in one of two ways. The first is via click-stream and in this instance URUT often resembles a survey and captures quantitative data for researchers. The second is via video and will provide a more qualitative insight into user behavior"[98].

This method is best for testing applications, websites, interfaces and it enables the automated collection of quantitative, qualitative, and behavioral feedback from

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[95] "Usability Lab", Wikipedia.com, https://en.wikipedia.org/wiki/Usability_lab, [April 19, 2020]

[96] Avinash Kaushik, "Lab Usability Testing: what, Why, How Much", Occam's Razor, https://www.kaushik.net/avinash/lab-usability-testing-what-why-how-much/ [April 19, 2020].

[97] Babich, "Top 7".

[98] "Unmoderated Remote Usability Testing (URUT) - Every Step You Take, We Won't Be Watching You", Interaction Design Foundation, https://www.interaction-design.org/literature/article/unmoderated-remote-usability-testing-urut-every-step-you-take-we-won-t-be-watching-you [April 19, 2020].

participants in their own natural environment using their own computer or device[99]. For all the process is remotely done but also digitally recorded, the data collection is quite easy.

The benefits of this method begin with providing large amounts of data from many different users synchronously. It also allows the test to reach distances, participants can be anywhere in the world but still can perform the tasks. It is also quite cheap and since it does not require a specially designed lab, it saves a lot of money. However, one important drawback of this method is that it "does not go deep into a test participant's reasoning. That's why it's not recommended to use unmoderated remote testing as a first usability testing method" [100].

2.5.5.1.4. Contextual Inquiry

Contextual inquiry is a method where the objective is to understand the context of the product. It is based on direct participant observation in the user's surroundings. Erol Basusta suggests that by direct observation can identify which designs or workflow strategies are problematic, and what heuristic solutions more experienced users have implemented to work around them[101].

In the contextual inquiry, the facilitator gets the chance to see the natural environment where the product is used and therefore come up with assumptions and solutions to better implement to that environment by gathering ideas and information from that environment. In this process, the participants are asked some questions and then left to work in their own environment while the facilitator is observing.

Compared to laboratory usability testing, this process provides more realistic data as it is the natural environment of the user. Besides, the facilitator gets the chance to see the product being used in different environments. There are four principles of contextual inquiry according to Interaction Design Foundation's article:

> **"Context** – as you might expect, the interview must take place in the context of use. Typically, this has been in a workplace or home environment but with the advent of mobile internet – contextual interviews may now take place in a wider range of settings and scenarios. The research observes the use of the product and talks to the user about what has happened in the observed session. They may also explore previous interactions which are not observed at the time.

[99] Ann Rochanayon, "A Comprehensive Guide to Remote Unmoderated Usability Testing", Userzoom, https://www.userzoom.com/blog/how-to-design-a-remote-unmoderated-usability-test/ [April 22, 2020]
[100] Babich, "Top 7".
[101] Erol Basusta, "Contextual Inquiry: Observing How Users Interact with systems and Workflows", Usertesting, https://www.usertesting.com/blog/contextual-inquiry [April 21, 2020].

Partnership – there is a need for the user and researcher to form a collaborative partnership to understand what the user is doing and why. In general, a contextual interview will shift from observing to discussing what happened in rapid shifts throughout the interview.
Mutual interpretation – the researcher will explain their conclusions and interpretations with the user throughout the interview. The user is free to correct or expand on the researcher's interpretations.
Focus – the researcher must keep the interview focused on the topics which need to be explored to provide useful data for the improvement project's scope. They may ask the user to perform specific tasks if they are to be examined specifically in the project brief" [102].

Despite being a method with realistic results, the biggest flaw of this method is that it heavily relies on the qualitative data. If research needs a more quantitative data, then this means another method of testing will have to be done after this research.

2.5.5.1.5. Phone Interview

This method is one of the most commonly used remote usability testing way. It is helpful when the participants are spread all over the world and meeting in person is not possible. It requires careful planning and a trained moderator with excellent communication skills[103].

2.5.5.1.6. Card Sorting

Card sorting is a good method to understand the user's mindset and build nicely organized websites. It is a process where participants are provided with cards of topics from content within the product and then asked to categorize them. It is an effective method for developing the user interface or interactive tools.

The card sorting process begins with choosing set of topics which include 40 to 80 items that represent the main content on the site. Later, the participant is given shuffled cards to sort out into meaningful categories. Once sorted, the participant is asked to name each category, which allows the facilitator to understand the mental model of the user. The facilitator asks the participant to explain their thought process while creating the groups. This process is repeated with different users up to 20 to detect patterns and create a meaningful scheme[104].

Card sorting can be open or closed, moderated or unmoderated, paper or digital depending on the needs of the research. "Open card sorting*"* means cards are open and participants sort them out; "closed card sorting", on the other hand, means user is

[102] "Contextual Interviews and How to Handle Them", Interaction Design Foundation, https://www.interaction-design.org/literature/article/contextual-interviews-and-how-to-handle-them [April 21, 2020].
[103] Babich, "Top 7".
[104] Katie Sherwin, "Card Sorting: Uncover Users' Mental Models for Better Information Architecture", NNGroup, https://www.nngroup.com/articles/card-sorting-definition/ [April 22, 2020].

supposed to sort the cards according to the predetermined categories. In closed card sorting there is not a stage that user names the category. “Moderated card sorting” means the facilitator asks questions during the sorting process to gain data about the thought process of the user whereas “unmoderated card sorting” means no contact with the facilitator. “Paper” and “digital card sorting” methods are as their name suggests; the former method is the traditional way of sorting paper cards which are piled on the table and the digital card sorting method uses some sort of software mimicking categorizing experience. Digital platform records the answers and gathers data more quickly.

Card sorting, no matter how it is conducted, is a popular and useful way of understanding the user mindset. Babich says that card sorting is great when you want to optimize your product’s information architecture. It allows the design to get useful feedback about navigation on the site[105].

2.5.5.1.7. Session Recording

Session recording is one of the most useful and easiest ways of understanding user’s natural movements on an interactive platform. In this method, as Parhum Khoshbakht suggests, digital tools record user behaviour from session starting in a landing page until session terminates in an exit page of site or application**.** Session record tools will definitely answer the important question: ‘What is happening in my product’[106]?

With session recording, it is possible to track mouse movements, scrolls, taps, interaction behaviors, and many more actions that the user does while interacting with the product. It is a good way of seeing the flaws on the interface as well.

One problem that might occur is that “these recorded sessions can lack context and whilst in some cases, it might be obvious why a user is getting stuck, you won't always know what they are looking for or what they are thinking, so be careful about attributing causes”[107]. Even though it is a very useful method, its lacking context may leave the researcher with data that does not mean anything.

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[105] Babich, “Top 7”.
[106] Parhum Khoshbakht, “2 Important Steps in Session Recording Analysis”, UX Collective, https://uxdesign.cc/3-important-steps-in-session-recording-analysis-49b104461dfa [April 20, 2020].
[107] “Session Recordings”, Uxdesigntemplates, https://uxdesigntemplates.com/evidence/method/visitor-recordings [April 24, 2020].

2.6. Nielsen's Heuristics

Heuristic evaluation is analyzing an interface according to a set of principles that every interface should have. These set of principles make the evaluation more concrete, understandable and solveable. Jakob Nielsen suggests 10 general principles for interaction design which are called heuristics. Those principles are accepted rules of a good interaction design. Analyzing and evaluating an interaction design through those principles mean comparing it to the usability principles.

This evaluation process requires expert knowledge to approach the product wisely. Therefore, it is costly to hire experts to find and call on.

Nielsen explains the process as follows: "Heuristic evaluation is performed by having each individual evaluator inspect the interface alone. Only after all evaluations have been completed are the evaluators allowed to communicate and have their findings aggregated. This procedure is important in order to ensure independent and unbiased evaluations from each evaluator"[108].

The difference between user testing and heuristic evaluation is that user testing requires the facilitators comments on the participant's actions. Heuristic evaluation, on the other hand, this interpretation responsibility belongs to the expert and the obsever only needs evaluator's comments[109].

According to Nielsen, an interaction design is successful if it has following features: visibility of system status; match between system and the real world; user control and freedom; consistency and standards; error prevention; recognition rather than recall; flexibility and efficiency of use; aesthetic and minimalist design; help users recognize, diagnose, and recover from errors; help and documentation. The system should always keep user informed about the status, and the language should not be too complicated or technical for the user to understand and perform any task. It should also allow error correction and user control, but it also should prevent the errors by sending messages or feedback to the user immediately or beforehand. The product should be easy to remember, which means that at each use the user should be able to easily perform the tasks from memory without hesitation.

[108] Nielsen, 1993, 157.
[109] **ibid,** 157.

2.7. Distance Learning Solutions In Turkey And At YTU Amid Covid-19 Pandemic of 2020

Through the end of 2019, the world came across a lethal virus called "COVID-19" or "Coronavirus" as commonly referred by the public, which began spreading from Wuhan, China to all over the world. The virus spread so quickly all over the world that many countries, including Turkey, had to take serious precautions, but most important and the immediate precaution taken was social distancing. In a very short span of time, schools were closed and most of the educational activities had to be suspended- until a further notice. Most university students returned to their homes all around the country to spend an unknown period of time social distancing in quarantine.

In the context of Turkish higher education, initial step taken to help measures against COVID-19 was to suspend any kind of educational activities for three weeks beginning on 16th of March[110]. Later, it was announced on 18th March 2020 that the schools with existing infrastructure for distance education would begin distance education on 23th March through digital facilities. For other higher education instutitions not capable of offering distance education, following announcement was made by Prof. M. A. Yekta Saraç in the name of Council of Higher Education (YÖK): "As for the universities that are not capable of offering distance education, the pool of open course materials, which we have created in a short period of time, will be opened to all universities on March 23"[111].

While some higher education institutions with better existing preparations quickly transferred their whole education to distance learning, many others, including Yıldız Technical University, had to adapt their existing digital systems to the whole and academic cycle to the distance education system in a very short amount of time, without much in-service training or practice time to get used to it. Unfortunately, this shortage of adaptation time eventually brought about serious concerns and confusion

[110] "Information Note On Coronavirus (Covid-19): 1", Council of Higher Education (YÖK), https://www.yok.gov.tr/en/Sayfalar/news/2020/Information-Note-on-Coronavirus-Covid-19-1.aspx [March 2020].

[111] Prof. M. A. Yekta Saraç, "Press Release", Council of Higher Education (YÖK), https://www.yok.gov.tr/en/Sayfalar/news/2020/Sarac-made-a-statement-on-the-distance-education.aspx [March 18, 2020].

among the instructors and the students along with systematical problems, that would have to be solved during the process.

At Yıldız Technical University, an announcement with the following message was made on the official announcements page of the institution:

> "The University has resumed its Spring Term courses on 23 Mar 2020 via distance education as a trial. Within this period, Distance Education Center and IT Department have worked in close coordination to identify problems in the system and solved them, the system now runs effectively. Distance education activities at our university will essentially be carried out, only academics can access the system. The students will participate online classroom through the link sent to their Yildiz extension email addresses after the academics open an online classroom on the system.
>
> As of 23 Mar 2020, YTU moved courses online for English Preparatory School, Undergraduate, MSc and PhD students through www.onlinekampus.yildiz.edu.tr (This applies to all of the theoretical parts of the distance education courses and the application parts which can be carried out online at the computers) "[112].

The system mentioned above is an open source web conferencing system for online learning called BigBlueButton. As it was announced, the lessons were supposed to initiate on 23rd March 2020 and all classes and instructors were going to do their lessons simultaneously on the platform abiding by the lesson hours. To adapt themselves to the system, both instructors and students were given a demo class to practice and to learn how to conduct a lesson on the system. After a very short demo period, the platform was launched; however, due to high load of SFL users trying to reach the platform simultaneously, the system collapsed and an urgent need of separate servers assigned only for SFL users became a necessity to allow them conduct their lessons. Eventually, the servers were established and 2019-2020 Academic Year Spring Term was resumed.

The system has been in use since then, both students and the instructors gained valuable experience through it. Some of the instructors and students might have never come across this system or sort before, while some, perhaps due to their personal or professional interest or some kind of necessity, might have used such. For those who were not much experienced on these kind of systems or technologies, adapting to this new influx of technology use must have been stressful.

The main purpose of this study has been to understand and look at the usability and the user experience aspects of this new digital experience from the students' and the lecturers' perspective while looking into the generation cohorts in accordance with it.

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[112] "2019-2020 Academic Year Spring Semester Announcement", YTU, http://www.yildiz.edu.tr/headlines/281/2019-2020-Academic-Year-Spring-Semester- [March 2020].

2.7.1. BigBlueButton Web Conferencing Systems

BigBlueButton is a web conferencing system developed for distance education. Its main goal is stated as "providing remote students a high-quality online learning experience"[113]. It is an open source system, providing synchronous and asynchronous learning environment. BigBlueButton (BBB) has been in use since 2007 and aims primarily to serve for the following purposes: online office hours, tutorials, distance courses, meetings.

With BBB, students and instructors are able to chat through video, audio and text without a limit on the participants or cameras that can be opened. Students and teachers can see and hear the teacher and interact though whiteboard option provided. The whiteboard option can be used solely by the presenter or can be shared with the students during the course. The presenter can upload a presentation using any Microsoft Office software or PDF files, and project it on the screen of both the presenter and students, upon which both parties can write and take notes. The presenter mode can be shared between the instructors and the students, meaning that within the same course duration without the need to log out and in, students can take the presenter role from the intsructor and give their own presentations.

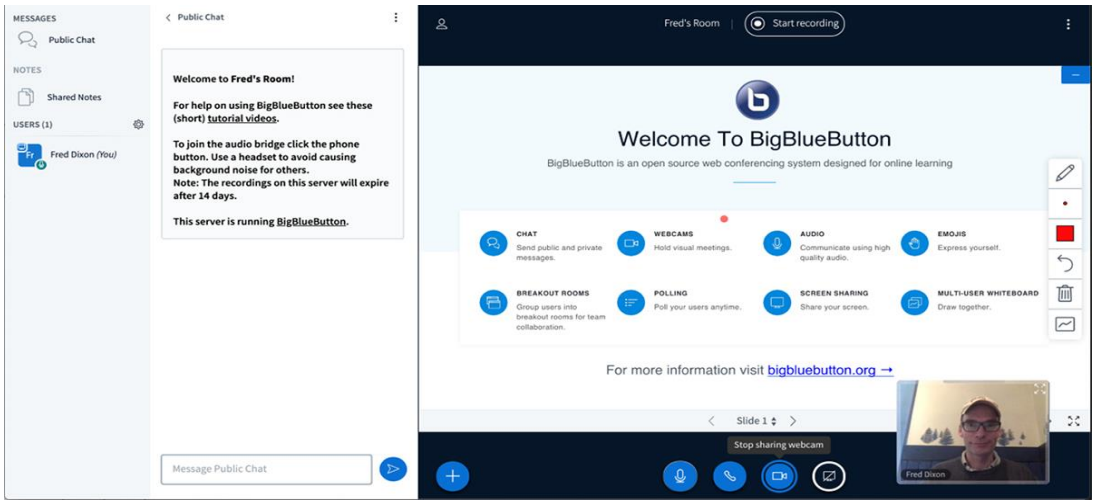

Figure 2.10: BigBlueButton Web Conferencing System Interface

Joseph Mathieu, "Pandemic Leads to Big Jump in Global Downloads of Carleton's BigBlueButton", Carleton Newsroom, https://newsroom.carleton.ca/story/pandemic-bigbluebutton-downloads/ [May, 2020].

There are also additional features like creating rooms for group studies where groups are not distracted by the common class discussions; polls for interview or test

[113] "About", BigBlueButton, https://bigbluebutton.org/about/ [April 15, 2020].

questions to enhance interaction, external video presentation chance through which presenter can share videos from online platforms such as YouTube; and most importantly screen sharing feature which allows the presenter to directly mirror his or her computers screen, a second screen, an open sofware or a tab from a browser.

To be able to use this platform, participants do not need to download any software. They can join the lessons though their browsers from their computers or mobile devices. They can use the video and audio options, but they might also choose to attend the sessions only as listeners. On other occasions, the presenter might moderate the classes by muting the participants, one by one or all together.

COVID-19 and the urgent need to shift to distance learning tools created a huge demand on the platforms like BBB. According to Joseph Mathieu's article on BBB, in the first week of April 2020, the software was downloaded 17,000 times within 48 hours[114].

Mathieu states that "through the online community forums, people experienced with BigBlueButton helped new first-time users to set up their own servers for schools all over the world"[115]. Since 2007, BBB seems to have improved a lot and its community of international developers seem to be open to any improvement idea that might come from its users.

BBB is also complimented on its use of multiple security mechanics, which has been a point of criticism recently for some other web conferencing systems. Richer Sutherland explains the security protocole:

> "If BigBlueButton is installed on a server with a TLS certificate, it encrypts all content sent from the server to the web browser. For audio, video, and screen sharing, WebRTC libraries transmit real-time protocol packets (RTP) over user datagram protocol (UDP) via Datagram Transport Layer Security (DTLS), and media packets are encrypted using Secure Real-Time Protocol (see SRTP). This all adds up to a high level of built-in security for your streams.You can also set a room access code for each session and require moderator approval of new students"[116].

There are many other web conferencing tools that has gained popularity with COVID-19 precautions. As well as many great comments about BBB, there has been criticism as well. One of the concerns mentioned on the forums has been regarding its requirement of flash and Java. One user called James D'Annibale commented that this

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[114] Joseph Mathieu, "Pandemic Leads to Big Jump in Global Downloads of Carleton's BigBlueButton", Carleton Newsroom, https://newsroom.carleton.ca/story/pandemic-bigbluebutton-downloads/ [May, 2020].

[115] **ibid**.

[116] Richard Sutherland, "BigBlueButton Review", Techradar, https://www.techradar.com/reviews/bigbluebutton [April 21, 2020].

Java and Flash requirement caused problems with student uses. He also added that BBB was not mobile friendly; however, considering that the comment was posted on November 14th,2018, the problem might not exist anymore[117].

[117] "Big Blue Button vs. Zoom" Canvas, https://community.canvaslms.com/thread/23643-big-blue-button-vs-zoom [May 21, 2020].

3. METHODOLOGY

The main goal of this study has been to conduct a user experience and usability study on BigBlueButton web conferencing systems. To be able to achieve this goal, exploratory studies were conducted. The studies provided both qualitative and quantitative data.

The study begins with literature review on generations cohorts; relationship between education, technology and generations; the process of distance education amid COVID-19 pandemic; user experience and usability testing terms and BigBlueButton Web Conferencing System. For that purpose, books, online and print articles, online databases, dissertations were analyzed and synthesized. The thorough literature review conducted prepared the base for user research and UX/Usability testing process.

The first stage of the study was actualized by conducting a questionnaire study. The aim of this stage is to understand the user profile of Yıldız Technical University School of Foreign Languages considering their technology habits in relation with their generation attributes. The questionnaire was prepared and delivered online through Google Forms. Upon gathering data, user personas were created to better understand the needs of the system. The purpose of this stage was to understand different types of users and how their preferences relate to their generational traits.

The second part of the study was conducted with a small focus group which was composed of real participants reflecting the personas. With the participants, a remote usability testing was conducted. During this stage, Nielsen's usability heuristics was taken as reference. The sessions were conducted through the demo platform of BigBlueButton that was provided to Yıldız Technical University's academic circle to train themselves for the system before the beginning of distance education period. The participants' screens were observed through AnyDesk software, which is a quick download material that allows facilitators to connect to participants' computers remotely. The sessions were recorded using a camera. Throughout the sessions, participants were given simple tasks to perform and during the process their comments and actions were also recorded by the observer.

Finally, through questionnaire, attitudes and opinions of the actual users of BBB from Yıldız Technical University were gathered for better understanding of the complete user experience.

The questions that this study aimed to answer has been:

Q1: To what extend technology savviness of the instructors and students affect their approach and use effectiveness of distance education platform?

Q2: To what extend does the provided platform answer the needs of the specific new users?

Q3: What could possible improvement suggestions be after a thorough UX and usability analysis?

3.1. Data Gathering Methods

3.1.1. Questionnaires

3.1.2. Demographics Questionnaire

The first and the third stages of the study were actualized by conducting a questionnaire study. The aim of the first stage questionnaire is to understand the user profile of Yıldız Technical University School of Foreign Languages considering their technology habits in relation with their generation attributes. The questionnaire was prepared and delivered online through Google Forms. Upon gathering data, user personas have been created to better understand the needs of the system. The purpose of this stage has been to understand different types of users and how their preferences relate to their generational traits.

3.1.3. Post-use Questionnaire

The final stage of the study actually had to be realized together with user demographics questionnaire due to time limitations. The questionnaire was delivered to YTU SFL instructors and students at the third week of their distance education experience with BigBlueButton. Until the questionnaire was sent, they had some experience by actively using the system to do their lessons; therefore, they could provide real user experience feedbacks regarding the system.

Through the online questionnaire, participants were asked the questions in Appendix 3. The purpose of the feedback questionnaire was to assess how satisfied they are with their experience with the BigBlueButton Web Conferencing System.
In the Questionnaire, first there were questions based on a Likert scale of 5 responses: Stongly disagree; disagree; neutral; agree; strongly agree. The instructors and the students were asked different questions as their interaction with the system differed.

The instructors evaluated the system answering the questions created based on usability heuristic principles of Jakob Nielsen. The principles are explained by NNGroup.com as "visibility of system status," which means the system should always keep its users informed about what is going on with messages, feedbacks and warnings withing reasonable time; "match between system and the real world"; which means the system should take advange of users' habitual movements, habits, language and concepts that they are familiar with to create an authentic experience; "user control and freedom"; meaning there should always be emergency exits from the mistakes, the mistakes should not create undesirable consequences, undo and redo should be an option; "consistency and standards"; meaning there should be some standarts of language, for example, if an icon has a general standardized use, it should not be used for a different purpose in the system; "error prevention", messages to prevent error that shows up on time are necessary; "recognition rather than recall", which means object, actions and options should be visible so that the user do not have to remember many actions to complete a task; "flexibility and efficiency of use", the users should be able to speed up their actions by simple options provided to them; "aesthetic and minimalist design", suggesting that the functions that are not user by the users should be removed for simpler design; "recovery", meaning error messages should be in plain language and should indicate solution; and finally "help and documentation", meaning there should be sources of help that users can apply to whenever necessary[118].

The system was evaluated in terms of these heuristics in the questionnaire. In the second part of the questionnaire, the participants were asked to select feelings from a pool of feelings to describe their experience. Finally, at the final section of the questionnaire, open-ended questions were directed to the participants to have their comments about the system.

[118] Jakob Nielsen, "10 Usability Heuristics for User Interface Design", NNGroup, https://www.nngroup.com/articles/ten-usability-heuristics/ [April 28, 2020].

3.1.4. Controlled Remote Usability Testing

For the remote usability testing process of the study, online test sessions were realized at predetermind times with selected participants. Before the session began, the participants were instructed to download AnyDesk software for remote desktop accessibility and were requested to attend the demo class of BigBlueButton through “https://sanalsinif5.yildiz.edu.tr/test.html”. Once they attended the demo class with their microphone on, they were given brief information about BigBlueButton and the test they were about the participate. Their consent was taken for recording of the sessions. When the session began the tasks in Appendix 3 were given to them.

As the participants were trying to do the tasks, their actions were observed through AnyDesk and they were asked to think aloud and comment on the process. Their comments were noted as well as being recorded on the video of the session.

4. DATA ANALYSIS

4.1. Demographics of Instructors of YTU SFL

After all the responses were gathered and categorizations have been done, the following demographic information was gathered:

Table 4.1: Demographics Data of Instructors of YTU SFL

	Participants	Number	%
Gender	Female Male NG	21 4	84 16
Birth year:	1946-1964 1965-1984 1985-1994 1995-2012	- 18 7 -	- 72 28 -
Education:	Bachelor's Degree Master's Degree PhD	13 10 2	52 40 8
Teaching years as English Instructor	0-5 years 6-10 years 11-15 years 16-20 years 21-30 years	3 5 4 6 7	12 20 16 24 28
Family's monthly income (tl)	Less than 2500 2500-5000 5001-7500 7501-10,000 10,000+	- 1 12 3 9	- 4 48 12 36
Devices owned	Laptop A desktop computer Tablet Smart phone Non-smart phone Webcam Tv Smart tv Digital drawing tablet Interactive pen Smart watch Smart home appliences Game console	23 8 14 25 1 8 10 16 3 3 7 7 5	92 32 56 100 1 32 40 64 12 12 28 28 20

Internet connection preferences	Wi-Fi Never Rarely Often Frequently Always Mobile Data Never Rarely Often Frequently Always	 - - 2 12 11 - 4 3 5 12	
Wi-fi connection Quality	NA Poor Average Good Excellent	- 2 5 13 5	- 8 20 52 20
Mobile Connection Quality	NA Poor Average Good Excellent	- - 7 10 8	- - 28 40 32
Mobile Data limit	Up to 1 GB 1-3 GB 4-7 GB 8-10 GB 11-15 GB More than 15 GB	- 1 5 9 3 7	- 4 20 36 12 12
Time spent on the Internet daily	0 – 1 hours 2 – 4 hours 5 – 7 hours More than 7 hours	1 11 10 3	4 44 40 12
Online learning Experience	Yes No	12 13	48 52
Online Teaching Experience	Yes No	4 21	16 84

4.2. Demographics of Students of YTU SFL

The demographic data collected from the answers of 302 students are as below:

Table 4.2: Demographics Data of Students of YTU SFL

	Participant	Number	Percentage
Age	17-22 23-28 29-34 35+	284 9 2 4	94,9 3,2 0,6 1,3
Gender	Female	153	50,7

	Male NG	144 5	47,7 1,7
Technological devices owned	Laptop Desktop Computer Tablet Smart phone Webcam TV Smart TV Digital drawing tablet Interactive pen Smart watch Smart home appliances other	209 78 64 286 46 186 51 3 3 22 38 20	69,2 25,8 21,2 84,7 15,2 61,6 16,9 1 1 7,3 12,6 6,6
Internet Connection	Wi-Fi Never Rarely Often Frequently Always Mobile Data Never Rarely Often Frequently Always	 8 52 118 73 39 9 13 27 116 134	
Time spent on the Internet daily	0-1 hours 2-4 hours 5-7 hours More than 8 hours	7 71 139 84	2,3 23,6 46,2 27,9
Wi-Fi Quality	NA Poor Average Good Excellent	22 62 111 89 18	7,3 20,5 36,8 29,5 6
Mobile Data Quality	NA Poor Average Good Excellent	6 52 107 108 29	2 17,2 35,4 35,8 9,6
Monthly Mobile Data Limit	Up to 1 GB 1-3 GB 4-7 GB 8-10 GB 11-15 GB More than 15 GB	5 46 68 66 57 60	1,7 15,2 22,5 21,9 18,9 19,9
Monthly allowance	Less than 500 500-1000	126 117	42 39

	1000-1500 1500-2000 2000+	29 17 11	9,7 17 11
Family's monthly income	Less than 2500 2500-5000 5001-7500 7501-10,000 10,000+	58 126 64 28 26	19,2 41,7 21,2 9,3 8,6

4.3. Findings

4.3.1. Findings of Instructor Questionnaire

As previously mentioned, many instructors did not participate in the research, so some information for assumed different participants could not meet the expected participants. There were also questions regarding the activities that the participants do using technological devices and their social media habits. For the activites question, the data shows that majority of the participants rarely watch TV. In contrast, 19 of 25 participants admit using streaming services like Netflix and 16 of 25 participants say they watch videos on the Internet to entertain themselves. PC or Console gaming participants are very few, only 6 people admit playing PC or console games. Number of mobile gamers is less than PC/Console games with 4 people playing mobile games. Most of them use the Internet to listen to music, do online research, chat, receive and send e-mail and professional reasons. The number of participants who use social media is higher than the ones who use rarely to never, yet a great majority of participants say they never create content for social media platforms.

Regarding social media platforms usage, the data shows that Whatsapp is the most frequently used app among others, followed by Instagram and YouTube. Majority of participants say that they do not use Facebook, which is interesting as Facebook used to have overwhelming popularity all over the world up till a few years ago. Twitter usage seems like equally distributed among participants. Some of the apps have never been used by the participants.

There were also questions regarding the attitudes of the participants toward technology use and implementing technology into their classes or daily lives:

Table 4.3: Data Regarding Instuctors' Attitudes Towards Technology

	Instructors Q1	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
17	Technology helps me organize my work.	0	0	8	15	2
18	Using technology makes my subject matter more interesting.	0	1	3	18	3
19	Implementing technology in teaching saves time and effort.	0	7	5	8	4
20	Technology makes me much more productive.	0	2	7	14	2
21	Teaching with technology offers real advantages.	0	0	6	15	4
22	Technology can enhance students' learning.	0	1	3	16	5
23	I would rather do things by hand than using a new technology.	2	8	9	2	4
24	Technology will improve education.	0	0	6	16	3
25	Using new technologies do not scare me at all.	2	6	7	4	6
26	I do not like talking with others about new technologies.	6	10	7	2	0
27	I do not like using new technologies.	6	11	3	5	0
28	I like using technologies in teaching.	1	0	8	12	4
29	The Internet and technological devices are fast means of getting information.	0	0	1	10	14
30	I would like to learn more about new technologies.	0	0	3	14	8
31	I would like to take my teaching to online platforms.	1	4	13	3	4

32	I often get help from others to be able to use a technological device.	5	8	4	8	2
33	I avoid using technology if I can.	9	9	4	3	0

56% of participants say that they often integrate technology in their classes and 24% say they always use technology in their classes. About 68% of participants believe that technology helps them organize their work and 84% of them say that technology use in class makes their lessons more interesting, which data show that majority of participants have positive attitude towards technology use in their classes. However, when it comes to time and effort technology requires, 29,2 % believe that technology use in teaching does not help save time. 20,8% also feel indecisive about the issue. They mostly believe that technology use makes them more productive and offers advantages, and interestingly majority of them would prefer using technology to doing things by hand.

Majority of the participants accept the positive effect that technology has on students' learning and believe that it improves the quality of education, yet despite their positive attitude towards technology use, about 22% are scared of using new technologies. They almost unanimously accept that the Internet and technological devices are fast means of getting information and would like to learn more about technologies, so it means that they are only afraid of making mistakes with new technologies for the first use. One interesting fact is that; they seem indecisive about whether they would like to take their teaching to online platforms.

4.3.1.1.1. Findings According to Generations of Instructors

25 Instructors participated in this study, among these 25 instructors there were members of only two generations: Generation Y and X. Unfortunately, there were not any samples of The Baby Boomers Generation. Among these 25 instructors, 18 of them belonged to Generation X and 7 were Generation Y. (For comparison of data please see Table 6 and 7)

Regarding their preferences of technological devices, the most used devices by Generation Xers were laptop, tablet, smart phone and smart TV while for Generation Y in addition to these, desktop computers, smart watches and smart home appliances were also used. Regarding the technology related activities, Generation Xers seem to

prefer watching things from streaming services to regular TV watching; like listening to music and watching videos on the Internet; are users of social media; and they usually use the internet for research and professional purposes. They do not seem to like video gaming, neither mobile nor on console. Generation Y, on the other hand, are more into gaming, and the percentage of the Y'ers who play PC/console games is higher than X'ers. Generation X seem to be more into mobile gaming rather than console or PC games. For the number of Generation Y members are very few, the results do not provide much data regarding the comparison of the activities, yet it seems like Generation Y do almost all activities.

Generation X members seem to spend less time on the Internet on daily basis and have less mobile data limit compared to X'ers. Both groups are users of common social platforms like Instagram, Facebook, Twitter, YouTube and Whatsapp, but it seems that there are less Facebook users among Generation Y'ers and more Instagram and Pinterest users. Interestingly, Generation X seem to have more experience with online learning.

The data, due to lack of participants, do not show much difference between two generations and it is probable that the difference would be more visible if there were some true Baby Boomer Generation members.

Table 4.4: Instructors' Generational Data

		Generatin X					**Generation Y**				
Statements regarding technolgy preferences		**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
	Technology helps me organize my work.			7	11				1	4	2
	Using technology makes my subject matter more interesting.		1	3	14					4	3
	Implementing technology in teaching saves time and effort.		5	3	8	1		2	2		3
	Technology makes me much more productive.		2	6	10				1	4	2
	Teaching with technology offers real advantages.			6	11	1				4	3
	Technology can enhance students' learning.		1	3	13	1				3	4

	I would rather do things by hand than using a new technology.	1	5	7	2	3	1	3	2		1
	Technology will improve education.			6	12					4	3
	Using new technologies do not scare me at all.	2	6	6	3	2			1	1	5
	I do not like talking with others about new technologies.	2	8	6	2		4	2	1		
	I do not like using new technologies.	2	8	3	5		4	3			
	I like using technologies in teaching.		1	8	8	1				4	3
	The Internet and technological devices are fast means of getting information.			1	9	8				1	6
	I would like to learn more about new technologies.			2	11	4				3	4
	I would like to take my teaching to online platforms.	1	4	10	2	1			3	1	3
	I often get help from others to be able to use a technological device.	2	6	1	7	2	3	2	1	1	
	I avoid using technology if I can.	4	7	4	3		5	2			

The table above shows the responses of the instructors of YTU SFL to the questionnaire questions regarding their technology habits and preferences. Most of the responses seem to be similarly distributed to both groups, but there are also significant differences. Firstly, both generations believe that technology is very useful in organizing their work, making the lessons more interesting and saving time and effort during the lessons, they both believe in the benefits of technology. Surprisingly, Generation X seem slightly more positive towards technology rather than doing things by hand; however, there are more negative responses from X'ers to the statement "I would like to take my teaching to online platforms".

Generation Y member instructors seem to have more positive attitude towards future transition of education to online platforms and they like using technologies within class more than Generation X'ers. Moreover, Generation Y seem more open to new technologies while X'ers seem more indecisive about the issue. Generation Y are more open to using and learning new technologies, talking about them to others. One obvious and expected difference between two groups is that Generation X need more help regarding the use of a technological device when compared to Generation Y.

4.3.2. Findings of Student Questionnaire

The data gathered from the students show some important details that might provide some insight about advantages and disadvantages of distance learning process. As can be seen from the data above, great majority of students at YTU SFL belong to Generation Z. Therefore, the data driven here also provide insight about how well they match the characteristics of their generation.

To begin with, it is clear to see that almost all students own a smart phone and majority of them have a laptop. The use of desktop computers seems less which, when regarded in relation with their generation features, understandable as Generation Z depend mostly on smart phones for most of their digital activities. Regarding their activities using technology, watching TV and playing PC or console games hold less space in their lives compared to other online activities such as streaming music or movies online, watching videos on the net and social media use. These data are compatible with their high rate of smart phone ownage. 231 of 302 students say that they use social media quite frequently. On the other hand, the number of students who say they create content for social media platforms is quite low. Their frequency of technology use for education is stated as "sometimes" by majority of them, which shows that, unless required, technology's main purpose is to entertain themselves and communicate for them.

Some interesting data have been collected regarding their connection options and opportunities:

Table 4.5 : Data Regarding Students' Attitudes Towards Technology

		Kesinlikle katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle katılıyorum
16	Technology helps me organize my work.	18	27	85	127	43
17	Use of technology makes lessons more interesting.	16	16	37	148	84
18	Use of computer and the internet wastes time.	135	67	64	23	12
19	Using educational technology makes me more productive.	13	19	68	148	53
20	I often use the Internet to learn things.	2	8	16	163	112
21	The Internet and technological devices are the fastest means of obtaining information.	3	4	12	153	129
22	I like to follow new technologies.	3	22	49	150	75
23	I would like to be able to follow the courses online.	69	68	83	56	24
24	I can easily figure out the use of a new technological devices.	7	27	49	151	65
25	I try avoiding new technologies as much as possible.	91	153	37	17	1
26	I can teach others use of a technological device when necessary.	7	12	29	183	67
27	I can easily access an information on the Internet easily.	1	13	31	185	68

Interestingly, their primary source of the Internet connection is through Wi-Fi. 118 students say that they "sometimes" connect to internet through their mobile data, but about 250 students say they frequently-to-always use Wi-Fi for connection. As Net Generation, these data show how much they depend on Wi-Fi for their activities, and this might also be because the activities they do require high amounts of data.

About the quality of connection through Wi-Fi at home and their mobile connection, majority claim to have average Wi-Fi and mobile connection. Interestingly, 22 students say that they do not have any Wi-Fi connection at home and 62 students say they have poor connection. In terms of mobile connection quality, 6 students have none, 52 students have poor mobile connection. These data are

significant considering the current compulsory distance education requirements. It might even mean that those students cannot attend the lessons due to their having poor or no connection. About their monthly mobile data limit, 16,7% of students have less than 3 GB of mobile data; if any of those students lack Wi-Fi connection for any reason, following the online classes could create a problem. Besides, majority of these students, about 42%, have to get by with less than 500 tl monthly allowance and 19,2% of students' families live on less than minimum wage and 41,7% live on the verge of minimum wage. These data need to be put into consideration while evaluating the students' attitude and attendance to distance education.

The data regarding their social media use show that they mainly prefer Instagram, YouTube, Whatsapp; Facebook seems to have lost it popularity in this generation since majority of them say they never use Facebook. Twitter use rates are quite evenly distributed. Interestingly, TikTok, although it is one of the most popular applications of the last few years, has no popularity among this group.

When it comes to their attitude towards technology, they seem to believe in the effectiveness of using technology in their lives, education and within classes. 77,1% of them believe that technology makes the lessons more interesting and 67,2% say that using pc and the Internet during the lessons do not cause waste of time, on the contrary, most of them believe that technology use increases their productivity. An overwhelming number of them use the Internet as the fastest and primary way of obtaining information and they are keen on new technologies. Surprisingly, when it comes to following the lessons through distance education, 45,7% of them say they would not like to have their courses online, which might mean that no matter how tech-savvy they are, they like the physical class environment.

Data show that they are not afraid of using new technologies, in fact they are the ones who often teach others about the use of new technologies, which supports the claim of their being natives of technologies.

4.3.3. Personas

Upon gathering data, the following user personas have been created for the purpose of better usability testing process and UX analysis. These personas aim to reflect certain users, but they are not real people and the information are fictive. For the rest of the study, the focus will be on instructors as they are the ones actually using BBB with its functions currently. Student research has provided insightful data

on their demographic situations and connectivity. At the third stage of the process, student attitutes towards the system will be analyzed, but for the second part and the usability stage of the study, the focus will be on instructors; therefore, only the personas of the instructors will be created.

4.3.3.1. Persona 1: The Boomer

<table>
<tr>
<td>"Distance education has been the most distressing thing of all my
 
teaching years!"

Tansu Girgin
55 years-old
Married with 2 children
Organised – Family Oriented - Sensitive

-Instructor at YTU SFL for 28 years

-Bachelors Degree

-Fluent in English, French and German</td>
<td>Bio

Tansu is an instructor at YTU SFL. She has been working as an English Language Instructor for 30 years. She is a graduate of English Literature Department; thus, she likes reading a lot. She is a fast-paced reader. She is a graduate of French College, so she can speak French fluently. She likes teaching, but she would like to teach less hours than before. She likes travelling abroad, her favourite destination is Paris. She always travels with tours. She is a proud mother.</td>
<td>Goals – Interests

-To complete her lessons succesfully

-to cover teaching points in time.

-to be able to have real interaction with students

-not to feel the absence of whiteboard

Motivations

Simple looking page

Sense of accomplishment

Being safe at home

Fear of warning

Fear of being out-dated</td>
</tr>
<tr>
<td>Story
After COVID-19 precautions, she was relieved that she would stay home. Thought this would be 3-weeks pause, did not expect distance education to begin. Didn't like the idea of distance education, she had to get a lot of help from more knowledgeable colleagues and her son. She does not use all the functions of the system, only uses ppt files and reflect them by screen sharing. She does not open cam. When there is a connection problem, she waits until it is solved.</td>
<td>Frustrations

Connection problems

Losing the whole session

Having no students

Confusing buttons on the platform

Losing screen while reflecting a ppt file

Deadlines

Warnings are not clear, but scary</td>
<td>Technology

Smart phone:

☻ ☻ ☺ ☺ ☺

Laptop/ PC:

☻ ☻ ☺ ☺ ☺

Mobile Apps:

☻ ☺ ☺ ☺ ☺</td>
</tr>
</table>

Figure 4.1: Persona 1: The Boomer

Image of a Baby Boomer Woman, Pinterest, https://tr.pinterest.com/pin/203576845633341224/ [May 12, 2020].

4.3.3.2. Persona 2: The Digital Immigrant

<table>
<tr>
<td>"I am glad to be home."
 
Birkan Samsun
45 years-old
Married
Joyful – Extrovert - Nerdy
-Instructor at YTU SFL for 20 years
-PhD Degree
-Fluent in English</td>
<td>Bio
Birkan is a graduate of an ELT department. He is a keen follower of technological advancements. He spends most of his time on websites analyzing new technologies, watched YouTube review videos. He is into photography. He likes teaching, but like spending time for his hobbies more. He likes to travel. He also likes to play online games.</td>
<td>Goals – Interests
-To cover teaching points in time.
-to have more time for his hobbies.
-being at the comfort of home
Motivations
Can show videos and materials without moving between the board and the projector
Sense of being tech-savy
Being a home
Can interact with the materials</td>
</tr>
<tr>
<td>Story
When the news of distance education due to COVID-19 came, he did not panic. Actually he was relieved because he would spare more time to for his hobbies since he would not have to commute. He has some previous experience of distance education, so he was prepared.</td>
<td>Frustrations
Connection problems
Losing the whole session
Having no students
Not being able to undo errors
Not having audio connection
Deadlines
Group work is no option</td>
<td>Technology
Smart phone:
☻ ☻ ☻ ☻ ☻
Laptop/ PC:
☻ ☻ ☻ ☻ ☺
Mobile Apps:
☻ ☻ ☻ ☻ ☺</td>
</tr>
</table>

Figure 4.2: Persona 2: The Digital Immigrant

Image of a Middle-aged Male Lecturer, Freepik, https://www.freepik.com/free-photo/closeup-smiling-middle-aged-lecturer_1115584.htm [May 12, 2020].

4.3.3.3. Persona 3: The Generation Y'er

<table>
<tr>
<td>"Glad to be able to reconnect with my students."
 
Cansu Kibar
29 years-old
Single
Ambitious – Kind - Enthusiastic
-Instructor at YTU SFL for a year

-Masters Degree

-Fluent in English</td>
<td>Bio

Cansu is a new instructor at YTU. She has worked at a private college for two years. She is a graduate of ELT department and is interested in educational technologies. She often attends to ELT conferences and wants to have an academic career in ELT department. She is not expert in technologies, but form the conferences she has been to she knows educational technologies and softwares, likes to use them within her classes.</td>
<td>Goals – Interests

-To create a good impact on her students and the school by adapting well

-to implement more of online ELT tools to her classes.

-to be able to keep on teaching during these times

Motivations

Can implement the ELT web pages and softwares she knows without losing time

Sense of being a modern teacher

Can give and check the assignments online, no paper.</td>
</tr>
<tr>
<td>Story
She got very excited hearing the news of distance education. She believes this is a transition to flipped learning model, and will be a good chance for her career development. She can finally implement all the online tools that she leant at conferences.</td>
<td>Frustrations

Connection problems

Losing the students' interest

Students' attending the classes only as listeners

Lag problems with screen sharing

Deadlines

Can't play games with students</td>
<td>Technology
Smart phone:
☻ ☻ ☻ ☺☺
Laptop/ PC:
☻ ☻ ☻ ☺☺
Mobile Apps:
☻ ☻ ☻ ☻☺</td>
</tr>
</table>

Figure 4.3: Persona 3: The Generation Y'er

Image of a Young Teacher, CanStockpPhoto, https://www.canstockphoto.com/portrait-of-a-young-woman-teacher-in-8688300.html [May 12, 2020].

4.3.3.4. Persona 4: The Generation X'er

<table>
<tr>
<td>"This too will pass, until then we are good."

 

Didem Reyhan
38 years-old
Single
Witty – Chill - Naturalist

-Instructor at YTU SFL for 15 years

-Masters Degree

-Fluent in English, Spanish</td>
<td>Bio

Didem has been teaching at YTU since she first became a teacher. She likes her colleagues and school, most of her close friends are from YTU SFL. She likes going to school especially knowing that she will spend time with them. She has good communication with her students. She like nature, yoga and music. She doesn't have career goals, only wishes to keep on teaching with the same joy. She likes doing face time with ther friends at her free time. She is keen on YouTube videos, tutorials and onlince courses.</td>
<td>Goals – Interests

-Being able to resume teaching

-To cover the teaching points and curriculum

Motivations

Not losing contact with the students

Being able to drink her coffee while teaching

Can clearly see who really attends the lessons and interacts</td>
</tr>
<tr>
<td>Story
She got upset when she learnt that this staying home period would prolong and she would not be able to see her friends for a long time, but she was happy to be home safe. She didn't worry about online teaching as she was used to face time talking to her friends, but she can't use most of the components of the platform.</td>
<td>Frustrations

Connection problems

Students' attending the classes only as listeners

Losing face-to-face interaction

Not being able to study some skills like speaking

Can be very boring</td>
<td>Technology
Smart phone:
☻ ☻ ☻ ☺☺
Laptop/ PC:
☻ ☻ ☺ ☺ ☺
Mobile Apps:
☻ ☻☺ ☺ ☺</td>
</tr>
</table>

Figue 4.4: Persona 4: The Generation X'er

Photo by Daniil Kuzelev, Unsplash, https://unsplash.com/photos/AkGd_YB6Q2c [May 12, 2020].

4.3.4. Controlled Remote Usability Test

4.3.4.1. Participant Responses

4.3.4.1.1. First-Time User A (P1)

The first participant is a Generation Y member female who works as an instructor at a public university and has distance education experience, but with a different web conferencing system. She had never used BigBlueButton before, nor had she seen its interface, so she was a true user without previous introduction to the system. She is an enthusiastic teacher who would like to implement any beneficial method or tool to her classes to make her classes more appealing to her students, so she is open to new technologies, but her technology use level is not advanced.

When she was asked to take presenter, it took some time for her to find the button to take the presenter. She searched for the button at the settings menu on the top-right corner, settings button at the left user panel and dwelled on other buttons for pop-up definitions. After a while with some mistakes she accomplished the first task by clicking the plus icon at the left bottom of the presentation screen. She commented that the button was too hidden, it should have been somewhere visible at first glance with clear instructions. She said she had assumed plus icon referred to adding files. Since she had already discovered the plus button and had somewhat right expectation on its use, she easily accomplished the second task and uploaded a ppt file. During the process, she stated that the instructions at the upload screen were pleasing and guiding, especially the one suggesting pdf file for better performance. However, she found the upload time too long and restricting because if a wrong file is uploaded, the system does not let you understand or change it until it is completely uploaded or the user noticed the mistake from the file name only.

When she was asked to pick a tool to write on the presentation, she accomplished quickly, could navigate easily between tools, but she could not correct a wrong line she drew without erasing all the notes on the file or undoing the process one by one, which she found impractical. She liked the location of drawing tools.

She initially could not share her screen for she was using Safari as her browser; she had to switch to Chrome. Sharing her screen was not a problem. When she projected a ppt file, she lost the interface of BBB and lost control of the class, which she did not like and would not prefer. She admitted finding shared notes section very

useful and practical for the notes she would like to write and share with her students during the lessons. She was impressed by the variety of options provided by breakout rooms; she found it very democratic for the system allows users to form their own groups.

She tried muting and kicking a user from the session, failed at first few attempts. She said she did not want to click on the blue icons next to user names because she assumed they would open a private chat page. Overall, she found system satisfying, but also stated that the system needs improvement.

4.3.4.1.2. First-Time User B (P2)

The second non-user participant is a female who falls into The Baby Boomers category as of her birth year. She is a retired teacher and has very limited use of different technologies. She owns social media accounts only to follow family members and friends, uses technology only to communicate. She is afraid of making mistakes while using a new technology. She had never had any distance education experience and had never seen BBB interface.

When she was asked to take the presenter mode, surprisingly she accomplished the task very quicky by clicking on her name. She said she assumed it would be there because it was about herself as the user. She then turned on the camera quickly for the icon was visible and clear. When she was asked to upload a presentation, she had difficulty because she was not a very good user of even the Windows; she lacked basic knowledge of uploading a file. When she saw the command to drag a file, she could take the file from the desktop of her computer and drag there. After uploading the file, to turn to the presentation screen she clicked the back button of her browser which action caused her to be kicked out of the system. She was asked to write or draw on the file, the quickly found the icon and managed to draw on the file, but she could not find the right move to erase. When she was asked to share her screen, she dwelled on multiple users button. It took some time for her to figure out the button for screen sharing, and when her screen was shared, she lost control of the system. She could not manage to create breakout rooms, share a file with students and had difficulty in finding public chat part. When she was asked to redo some actions, she could remember the path, but with some hesitation.

4.3.4.1.3. First-Time User C (P3)

The thirt non-user participant is a Generation Y member male who had never had any distance education experience in his life and used BBB before. On the other hand, he is an avid user of technologies, likes to spend his time playing computer games, following online content related to new technologies and have skills, but is not an advanced user.

When he was asked to take the presenter mode, he first took the cursor to his name assuming it would be there, clicked on it and clicked on the user status because he thought presenter mode would be under it. Later he realized 'take the presenter' command right under that subsection. He tried to find the icon for uploading a file to present, dwelled on drawing tools, options sections and finally found the tool under plus icon, which he found uneasy. He said it was to hidden and the plus button did not mean anything. He easily dragged a file to upload but assumed dragging the file uploaded it automatically, so clicked on back button of his browser to go back to the presentation screen, which failed because the system kicked him out. He logged in again, uploaded a file and found the tools for drawing quite easily. However, he found the absence of erase button disturbing. He accomplished screen sharing, but he said that he loses the interface when he is using tab sharing and it is annoying that he cannot draw or write on share screen on the presentation page. She suggested that there should be a layer-like structure which allows the presenter to take notes whether the screen or a file is shared.

He stated that the icons were too scattered all over the interface and some important tools were hidden under vague icons. Important and functional tools should be on the presentation screen according to him. He did not like the fact that presenter cannot intervene with students' writings on the board during multiple whiteboard users mode unless the mode is turned off completely. He said public chat and shared notes sections resembled a lot to each other in terms of fuction, so he found having both pointless.

4.3.4.1.4. Existing User A (P4)

This participant is a Generation X female who has been working at Yıldız Technical University School of Foreign Languages Basic English Department for more than 20 years. She had no distance education experience prior to COVID-19

precautions. She does not like to try new technologies, prefers manual teaching mostly and if she has to, she prefers to complete the mission in the most direct and simplest way possible in terms of use of technology and online materials. However, these do not mean that she is technology illiterate. She has been using BBB since the beginning of spring term through distance education.

When she was asked to take presenter, though she was a user of the system for some time, she failed to accomplish the task at first few tries. She was afraid to make mistakes that she would not be able to undo. Eventually, she managed to do it by clicking on her user name. Later she tried uploading a document from her computer, but had some difficulties in finding the button. She tried different sections. The plus button was her last option. She said she used screen sharing option for her teaching and to present ppt files. When she uploaded the file, she could easily find the tools for drawing on it. She tried to share her screen, but she dwelled mostly on multiple whiteboard users icon assuming it suggested screen sharing. She can effectively use public chat section. She said she had never used breakout rooms functions, she could not find its command location and she found the options too confusing to use. She stated that the options and icons were oddly distributed on the interface.

Another issue she had with the system was with right/left click for options menu. She, habitually, right click to see the options section but the options she is looking for opens when she left clicks on the user name. She found this unnatural.

4.3.4.1.5. Existing User B (P5)

She has been working at YTU SFL for a few years, belongs to Generation Y and is an active social media user. She is an ambitious teacher who wants to attract the students' attention as much as possible. She is not particularly excellent in technology, but can use it well enough to accomplish her needs and maybe more. She had begun to use BBB for distance education together with the whole school and adapted easily to the system.

When she was asked to take the presenter, she did not reach for the plus button but instead she looked for a clear and visible button on the screen. Later she accomplished the task without any difficulty. She uploaded a document easily as it was a function she had been using, but she complains that uploading ppt files takes too much time and on the screen of upload she loses contact with her students. She finds upload screen icons confusing, she stated that they are misguiding. She does not like to use ppt files

on the system through file sharing because system converts ppt file and in the process loses the animations that allow the answers to show up after being clicked for. When she shares screen or opens a ppt file, she loses communication with her students, which is problematic. She complains that anyone can take presenter mode without permission or mute the presenter, she finds it too risky.

She said that there is no feedback or information regarding whether shared notes and public chat writings are visible in session recordings. "Raise hand" option does not have much fuction according to her. She does not like breakout rooms, she believes it is a failed option, she said she had tried it many times but all the time it was a fail. She likes the platform overall, but believes it needs improvement. She also suggests that there should be a question writing part for polls section.

4.3.4.1.6. Existing User C (P6)

She had worked at different universities, has been working at YTU SFL for 6 years. She is a member of Generation Y, likes new technologies but has moderate technology skills. She had had distance education experience long before COVID-19 through online courses, she even recorded lessons for distance education, but she had never used BBB until this term. She had been having her lessons through BBB since March 2020.

She easily took presenter mode without much hesitation by clicking her name on the user panel; however, she right clicked first as a habit mirrored from Windows usage. She could upload a file very easily, but uploading process takes too much time and she does not like the fact that she loses the contact with and focus of students. She believed uploading should be on a pop-up screen which could be minimized or does not block main screen. But she likes the function that allows students to download the presented material directly. She had difficulty in finding drawing tools, tried text tool, but she found it difficult and impractical to use. She believes the system requires some training. She does not like the fact that when students join with their microphone, it becomes difficult to understand them when they speak at the same time.

4.3.4.1.7. Observant User (P7)

This participant is a Generation X male who works as a freelance web developer and has advanced technology use. He had never used BBB before, but he

helped a family member use it; therefore, through indirect use, he had the chance to observe the system and obtain some information about it.

At first glance, he finds the system simple, appealing, well-constructed and useful. He likes the fact that the interface focuses on the presentation, not user cameras. He also appreciates that it is clear to see who connects with microphone or camera and when someone speaks, their username appears on presentation screen revealing the source of speech. He also regards the system's taking videos directly from video websites as a nice detail for there will not be loss of quality.

During the task stage, when he was asked to take the presenter, he had some difficulty and failed a few times. He stated that he felt the need for a back button that would allow him to undo the mistakes. He also said that there are no clear and visible error messages and warnings for the actions, so when you make a mistake, you either get kicked out of the system or you do not know that you made a mistake.

When he was asked to upload a file from the computer, he managed to do it, but he said that the buttons were too hidden and icons did not suggest their functions. They could be simple and visibly placed on the screen next to other icons. He managed to share his screen and share a ppt presentation, but he commented that when screen is shared, you lose the interface and with it, all the written communication, note writing section with the students, and he found this situation disturbing. He would prefer to be able to mark on the screen. Besides, he did not like the fact that it is impossible to use public chat and shared notes together without switching between them.

From a usability perspective he states that actions require too many steps hidden under icons, they should be visible and clear to be user friendly. Lack of error and warning messages is problematic according to him and he finally added that the common connection problem, which is related to the fact that school is using separate servers, could be solved by using clouds; this way there would be no connection loss or need to reboot all the system.

4.3.4.2. Findings of Remote Usability Test

Results of the second phase were acquired through the videos and direct observation notes taken as the participans were performing the given tasks. The analysis was done in three stages: careful observation of the videos to acquire quantitative data regarding the time spent to complete the task and the number of

errors; second, the participants verbal comments were analyzed and key points were recorded, and finally the findings and common comments were gathered for a constructive overview.

Overall findings show that there is often a direct correlation between the duration it takes for user to accomplish most of the task given and the familiarity with the system, but most often the correlation is vivid between the visibility of the button and completion of its function.

The first task to be completed was taking the presenter mode. This task was even new to the existing participants because when they log in to the system, system automatically accepts them as the presenter until presenting mode is taken by another user. Most of the participants completed this task in about 1 minute, surprisingly participant 2 with the least experience with technologies and no experience with the system completed the task in less than a minute and participant 4, a current user of the system took a little more than a minute to find the button. Participant 3 with technology interest and knowledge took the most time to complete task 1. The participants who could complete task in a short time clicked on their names on the user bar because they all assumed that if they wanted to take an action about themselves or assing a role to themselves, it should be done by clicking on their own name. The plus button, which is another and more direct option provided by the system to take the presenter was the most difficult one. Majority of the participants said it is too obscure and the icon does not suggest its function.

The second task was to upload a file from their own computer. Participant 2 completed the task in the longest amount of time, but it was not because she could not find the icon, but because she lacked necessary skills of uploading a document to a platform. Still, even though she managed to drag a file to open eventually, for the instructions on the upload screen did not lead her through more, she could not understand how to proceed to uploading the file. This was a recurrent problem with some other participants as well.

Participant 4, user of BBB, took 2:25 minutes to upload a file; participant 5 and 6 took about 1:60 minutes to upload a file. The most effective user of file uploading was user 5 who even knew how to allow students download the file directly from the presentation, but majority of the users, including user 5, complained that it takes too much time to upload and also participant 1 stated that while waiting that much time,

you do not even know if the file you uploaded is the correct file and you have to wait a lot of time again if the file is wrong.

Some of the participants, especially current users, stated that they did not like loosing the main screen and chat option while uploading a file because it felt like disconnection from the class and as it took too much time, they see it as a loss of time from the lesson. A suggestion on the matter was pop-up screen uploading during which the main screen would not be lost and uploading would continue on that pop-up screen.

Another important issue mentioned regarding file upload came from the users of the system. They stated that uploading a ppt file was impractical because in addition to taking too much time to upload, ppt file would lose its animations which would cause the ppt to show answers of the questions to show up after click. Without animations, students see questions with answers immediately, which create a problem. User participants stated that they and most of their colleagues try to overcome this problem by using screen sharing option to show their ppt presentations, but they said this leads to another major problem of losing control of the complete screen and public chat communication.

None of the participants had much problem with finding the tools for drawing or writing and complete the task under half a second. However, when they were asked to erase the marks they have put, they struggled because there were only two options: delete all or undo. They said they all looked for an eraser icon to pick and erase some part of their writing, but it was impossible. Besides the absence of missing eraser icon, current users of the system complained that when they share their screen, they lose drawing tools. They cannot mark anything on the screen as they did with presentations they uploaded. Participant 3 suggested that there should be a layer which would allow you to write and erase as you would do, perhaps with apps like Instagram story settings where you can write or erase anything on even videos.

When participants were asked to share their screen, all first-time users and the observant participant had difficulty in finding the right button. They either confused it with multiple whiteboard user icon as it also looks like screen and suggests a kind of screen sharing with other users, or they dwelled on settings of user section and general settings icon. The fact that screen sharing icon and multiple whiteboard user icons looked very much alike also created problem while trying to accomplish task 5, allowing other users to write something on the presentation. It is important to mention here that users of the system also complained about the fact that they lost whole screen

when they presented a ppt or tried to share a tab from their browser. Since they mostly use public chat to communicate with their students, the loss of whole screen becomes quite an important problem.

Trying to mute other users was relatively easy task, as user panel was obvious and participants had already dwelled on the functions of it while trying to take the presenter. However, creating breakout rooms was a troublesome issue. Participant 4, who is a BBB user, spent 2 minutes 45 seconds trying to figure out where the button is and still could not accomplish the task. First-time users managed to find the button in about 1:30 minutes, but they had to go through many other options sections before finding its place. The most important evaluation about breakout rooms came from a first time user and two current users. While first time user found the opportunity of assigning students by name or allowing them to choose their own team members very nice and democratic, existing users stated that it was very difficult to create rooms and make sure every student is in one room. Besides, when the rooms are created, the instructor loses the whole moderation unless joins the classes. To be able to present something on group's boards, the instructor has to attend each group and take the presenter to share a file, which is extremely time consuming.

When participants were asked to share a file with their students, only participant 6 could manage it by allowing the presented document to be downloaded. The rest of the participants expected it to be either from the plus button or shared notes. One of the points to mention is that, some participants felt the need to right click on the user name to open options bar, which did not create the intended result because options would open with left click. The right-click action is a habitual action stemming from Windows and the system does not benefit from user habits.

Overall, the problems and suggestions are summarized as below:

1. The buttons on the screen are scattered all around the interface and categorized under each other. The most needed tools such as take the presenter, share a file should be at one-click reach and on the screen, perhaps next to share screen icon. For better categorization of the menus, card-sorting technique could be utilized.
2. Better icon design is needed as the icons do not suggest their functions. Especially the plus icon seems problematic. Screen sharing icon and multiple whiteboard user icons are easily confused.

3. There is definitely a need for eraser tool that allows correction for single chosen drawing or text. The tools of writing should at all times be usable, even when a tab is open, since it is already impossible to control webpage from the interface's presentation screen. Layer idea could be useful.
4. File sharing menu should not cover the whole screen and ppt file convertion needs to be adjusted for it does not allow animation function.
5. Presenter should have control over breakout rooms at all times. When a student cannot join a room, the instructor should be able to re-add the student manually; the instructor should have the option to share the same presentation or screen and audio-reach options to be able to guide the group activities.
6. There should be a direct file sharing option and it is better if it is under shared notes section. While using shared notes, it would be better not to use public chat screen.
7. Other issues to mention: there is a serious need for undo button and warning/error messages in the system. There are some warning messages, but they are too small and do not seem related to the action. There should be direct pop-up messages that warn you before an important action like "Are you sure that you want to delete all the notes on the screen?". There is also no information regarding what is being recorded from the courses to be watched later. Shared notes and public chat are very actively used, but the instructors do not know if students watching them later will see those notes and messages or not.

4.3.5. Post-Use Questionnaire: User Evaluations and Comments

4.3.5.1. Findings of Instructors' Questionnaire

The responses of 25 instructors regarding their experience on BigBlueButton web conferencing systems are as below:

Table 4.6 : Post-Use Questionnaire Data of Instructors

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	The navigation language on the platform is easy to understand.		5	2	16	2
2	Reaching the log in page is easy.	1	4	7	10	3

3	I can create my classes on time.		6	4	13	2
4	The icons used in the platform makes using the platform easier.		4	11	9	1
5	The instruction language on the platform is very clear.		4	5	15	1
6	I can easily find how to upload a document to the platform.	1	5	5	13	1
7	I can easily upload any document from my computer.	1	8	6	8	2
8	I can easily share my own screen with the students.		5	4	13	3
9	I can easily find the tools to hand write or type.		5	4	13	3
10	When I upload a file from my computer, there isn't any delay.	4	15	3	3	0
11	When I share a screen or tab from by computer, there isn't any delay.		10	2	11	2
12	Shared notes section is very easy to use while teaching.	1	7	11	6	
13	Public chat allows me to effectively communicate with students.		1	2	17	5
14	I can easily create rooms for groups.	3	6	10	6	
15	I find it easy to visit group rooms to conduct my teaching.	6	5	13	1	
16	Creating rooms section allows me to observe and guide group activities as effectively as physical classroom.	8	4	11	2	
17	I can use flipbook on the platform very effectively.	5	5	7	7	1
18	Listening recordings from the flipbook play uninterruptedly.	5	9	6	4	1
19	Listening recordings shared from YouTube play uninterruptedly.	1	1	3	11	9
20	I can easily use the writing tool as if I am writing on a whiteboard.	9	11	4	1	
21	I do not feel the absence of physical classroom with this platform.	10	13	1		1
22	I can easily give feedback to the students on this platform.	3	11	6	3	2
23	The platform warns me when I make a mistake.	8	9	5	2	1
24	The platform provides me with adequate support messages while using it.	7	11	5	2	
25	The platform uses visual elements effectively to guide me.	3	8	8	5	1
26	I can easily find my way while using the platform.	1	3	11	9	1
27	I can always undo my mistakes.	1	11	10	2	1
28	I can easily remember how to use the platform at each log in.			5	17	3
29	The platform is appealing to look at.		11	5	8	1
30	Teaching on this platform allows me to spend less effort compared to teaching in a physical classroom.	7	9	4	4	1
31	I would prefer teaching in a physical classroom to distance education on this platform.		2	5	9	9

The compiled answers from the questionnaire (Appendix 4) indicate that more than 70% of participants think the language on the platform is easy to understand, and

80% believe that instructions are clear. It is seen that they find it easy to reach the log in page and can create their lessons on time. Regarding the icons used in the platform and how it effects its use, majority of participants remained neutral, which means they were indecisive whether the icons were helpful and clear or not. Depending on the data, it is possible to say that there is some match between the system and the real life of users, but there might be some problems regarding consistency and standards of the icons.

The data show that most of the participants find it easy to upload a document to the system; however, about 76% of them state that there is a delay in uploading the file. Most of them find it easy to share their screens with the students. The number of participants who find it easy to find and use tools is slightly more than those who seem neutral and the ones who find it difficult. A great majority of participants say that pen tool for writing is nothing like writing on a whiteboard.

The number of participants who seem neutral to the question whether they find shared notes section easy to use is higher than others which might either mean that most of the instructors are not aware of or do not use the shared notes section or perhaps they genuinely have no positive or negative feelings towards this section. The same assumption applies to the question regarding the easiness of creating rooms.

It is clear that majority of the participants enjoy the public chat option, but do not like creating rooms for groups. A great majority of the users, up to 52% stay neutral on the question "I find it easy to visit group rooms to conduct my teaching" which feeds the assumption that they may have never used it and therefore do not have any idea about it.

Regarding the use of flipbook through the platform, 40% of students find the system ineffective and listening recordings seem to create serious problem to them. On the other hand, 80% of the participant say that YouTube recordings play uninterruptedly through the system.

Most of the participants state that giving feedback to the students on the system is not easy. When it comes to the system's feedback on errors, 68% say that system does not warn them when they make a mistake, so they never know whether they make a mistake or not, nor they get enough support messages. However, they seem to find visuals somewhat helpful. One of the biggest problems mentioned before was regarding undoing the mistakes: only 12% of participants think that the system allows

them to undo their mistakes. It seems that visibility, error prevention and recovery principles are not very well recognized in the system.

Without opposition, majority of participants admit that it is easy to recognize what to do at the system at each log in, yet 48% say that the system is not so appealing to look at.

Most of the participants state that they have to spend much more effort compared to teaching in physical classroom and an overwhelming majority of them say that they would prefer their classes to distance education in general.

The participants were given a pool of feelings and were asked to define their feelings while teaching on BigBlueButton. The results show that the feelings rated highest are "stressed, lonely, excited, up-to-date, comfortable, overwhelmed, concerned, bored, annoyed and ridiculous": only three of the definitions are positive, which show that their experience is not so satisfying, but the positive votes for excited, up-to-date and comfortable indicate that they also enjoy working from home and perhaps getting involved in technologies is exciting for them and it creates a feeling of being up-to-date.

As the third part of the questionnaire, the participants were asked 4 open-ended questions to evaluate their attitude. Some of the comments on their biggest concern about using the platform were as follows: connection loss, lack of student motivation and interaction, absence of the students, having no prior training regarding the system, safety and being observed by the directorate. The pleasing things about the system, on the other hand are quite practical and not so system related: being home and safe and not wasting time by commuting to work.

4.3.5.1.1. Instructor Data Sorted According to Generation Cohorts

The data in the table below show the instructors' responses to the questions regarding their experience after they used the system for some time. The data is grouped into two categories according to the instructors' generations.

Table 4.7: Post-use Questionnaire Responses According to Generations

	Generation X					**Generation Y**				
	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**

The navigation language on the platform is easy to understand		4	1	12	1		1	1	4	1
Reaching the log in page is easy.	1	2	7	6	2		2		4	1
I can create my classes on time.		6	2	9	1			2	4	1
The icons used in the platform makes using the platform easier.		4	9	5				2	4	1
The instruction language on the platform is very clear.		4	4	10				1	5	1
I can easily find how to upload a document to the platform.	1	5	5	7					6	1
I can easily upload any document from my computer.	1	7	5	4	1		1	1	4	1
I can easily share my own screen with the students		5	3	8	2			1	5	1
I can easily find the tools to hand write or type.	2	4	6	5			1	2	3	1
When I upload a file from my computer, there isn't any delay.	2	12	2	2		2	3	1	1	
When I share a screen or tab from by computer, there isn't any delay.		6	2	9	1		4		2	1
Shared notes section is very easy to use while teaching.	1	6	9	2			1	2	4	
Public chat allows me to effectively communicate with students.		1	1	13	3			1	4	2
I can easily create rooms for groups.	3	5	9	1			1	1	5	
I find it easy to visit group rooms to conduct my teaching.	4	3	11			2	2	2	1	
Creating rooms section allows me to observe and guide group activities as effectively as physical classroom.	5	3	10			3	1	1	2	
I can use flipbook on the platform very effectively.	3	5	5	5		2		2	2	1
Listening recordings from the flipbook play uninterruptedly.	2	8	5	3		3	1	1	1	1
Listening recordings shared from YouTube play uninterruptedly.	1	1	3	8	5				3	4
I can easily use the writing tool as if I am writing on a whiteboard.	6	7	1	1	1	3	3	1		
I do not feel the absence of physical classroom with this platform.	8	8	1		1	2	5			
I can easily give feedback to the students on this platform.	2	10	4	1	1	1	1	2	2	1
The platform warns me when I make a mistake.	7	5	4	2		1	4	1		1
The platform provides me with adequate support messages while using it.	6	8	4			1	3	1	2	
The platform uses visual elements effectively to guide me.	3	6	6	3			2	2	2	1
I can easily find my way while using the platform.	1	3	11	3					6	1
I can always undo my mistakes	1	8	9				3	1	2	1
I can easily remember how to use the platform at each log in.			5	12	1				5	2

The platform is appealing to look at.		11	3	2				1	4	2
Teaching on this platform allows me to spend less effort compared to teaching in a physical classroom.	6	6	3	3		1	3	1	1	1
I would prefer teaching in a physical classroom to distance education on this platform.		1	2	6	9		1	3	3	

The responses from both group of intructors show similarities for most of the statements. They both find the navigation language, reaching the log in page easy; both seem to have not much problem sharing their screens. However, members of Generation X seem to have more problem with uploading files from their personal computers to the platform compared to Generation Y. In addition, members of Generation X do not seem as comfortable with using the drawing tools of BigBlueButton system as Y'ers. Towards the "shared notes" section, Generation Y have more positive attitude; the fact that most of the Generation X users responded to the question as "neutral" might be because most of them do not use or do not know how to use it. The situation seems different with "public chat" section, which seems to be used equally by both groups.

When it comes to creating breakout rooms, Generation Y members seem to be more active users of the section and have more positive attitude towards it. The number of participants who found breakout rooms' usage easy is only 1, and majority of them stayed neutral, which again suggest they may not be using that function of the system.

Both groups responded negatively to system's error prevention, they both disagree with the statements that say "the platform warns me when I make a mistake" and "the platform provides me with adequate support messages while using it". They also respond negatively to the statement "I can always undo my mistakes", which supports the other statement responses.

Generation X seem to be struggling with the visual elements of the system as most of the responses are negative. The next question regarding finding their way in the system easily, they stand neutral, which might be because they do not find visual elements useful, but language seems to be clear enough to guide them somehow.

It is obvious from their responses to the last two statements that most of the Generation X member participants spend a lot of time to adapt themselves to teaching with this system, even more than they did while teaching in a real classroom. The fact

that they have to put more effort into figuring out and using the system correlate with their technology preferences and habits data presented at Table 4.5.

4.3.5.2. Findings of Students' Questionnaire

For student questionnaire, the questions were prepared in Turkish to achieve better understanding and results (Appendix 5). The number of questions asked to students were fewer than instructors' because students did not have to use most of the functions of the system during Basic English Department classes.

Table 4.8: Post-Use Questionnaire Data of the Students

		Kesinlikle katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle katılıyorum
1	The navigation language used by the system is quite understandable.	37	36	61	137	61
2	It is very easy to access the login page.	58	29	44	126	33
3	I can attend the classes on time.	69	67	48	86	21
4	The icons used makes it easy to use the system.	36	33	90	113	19
5	I can easily communicate with my friends and instructors via Public Chat.	31	24	30	158	48
6	Attending the classes with microphone makes the lessons more interesting.	63	63	64	65	36
7	I do not feel the absense of a real classroom using the system.	189	56	26	6	11
8	The system warns me when I make a mistake.	64	96	92	30	6
9	The system uses visual elements to guide me.	39	68	93	68	18
10	I is very easy to figüre out how to use the system.	32	18	60	140	38
11	I can easily undo my mistakes.	41	75	120	33	18
12	I can easily remember the use of the system at each login.	20	15	32	166	53
13	Following the screen shared by my teacher makes it easy for me to learn.	38	40	51	129	29
14	Distance education allows me to keep my attention on the lesson longer.	146	58	49	24	11
15	I prefer physically being together with my friends to distance education.	35	16	16	51	169
16	It is easier to follow the materials on the screen.	105	71	58	41	11
17	It is very useful to work in breakout rooms during distance education.	73	49	130	22	7

18	It is very easy to communicate with my teacher during distance education.	44	51	81	89	21
19	The distance learning screen looks boring in appearance.	13	36	61	85	90
20	Learning with distance education is more tiring than learning in the classroom.	14	43	37	75	119
21	I would prefer the classroom environment to distance education.	14	5	17	60	192
22	I see distance education as a waste of time.	29	45	63	57	92
23	I would like to continue my education with distance education.	167	50	41	16	12

One of the questions that both participant groups answered was regarding the navigation and instruction language of the system. Just like the instructors, majority of the students found the language clear and understandable. 55,8% said that it was easy to reach log in page, yet majority of the students claimed that they could not attend the classes on time. It is possible that they have misinterpreted the question assuming that it refers to the time of the lessons and how early they are (lessons begin at 9 a.m. sharp).

Regarding the icons, although majority of the students considered them to be useful and clear, 30,9% stayed neutral, which might mean that they could not decide. An overwhelming majority of the students found public chat section easy and effective, which is a valuable feedback regarding that most of the students cannot interact with anything but public chat due to connectivity and data limit problems. Notwithstanding, more than 40% of students reported negatively on joining the lessons with microphone. Another assumption regarding the issue might be that students, even within the classes, do not like talking at all and might have found it distressing to talk online either.

54,1% of students think that the system does not warn them when they make a mistake and 40,4% state that they cannot easily undo their mistakes. However, 41,8% of students also remained neutral regarding the question, but it might also mean that students do not interact with the system at all, so there is not much that they can do wrong and undo later.

Most of the students stated that system use is easy to figure out and at each log in they can recognize its use easily. They, however, stated that once the lessons start, it is not easy to follow the lessons with full attention. Only 12,1% said that they can focus on the lesson longer with distance education system and only 18,1% found it

easy to follow the materials from the screen. Still, regarding the visual aspects and aesthetics of the system, most of the students found the screen appealing to look at.

It is clear regarding both instructor and student responses that breakout rooms are not much used and practical to use. 46,3% of students stayed neutral about the use of it, more than 30% did not find them beneficial.

It seems that students strongly feel the absence of a real classroom environment with 65,6% saying they "strongly disagree" to "I do not feel the absence of a real classroom". 67,3% of students find distance education more energy consuming and tiring and more than half of them see it also a waste of time. Only 9,8% of students said they would like to continue their education with distance education in the future.

When it comes to the feelings of the students, students mostly said that the system and distance education makes them feel "annoyed, uncomfortable, lonely, concerned". The next adjective with the most rating was "comfortable" though. It seems the students are having hard time to adapt to distance education and the system.

At the third stage of the questionnaire, they provided answers to open-ended questions. Some of the comments on their biggest concerns using the system were:

1. When the servers break down they lose the lesson.
2. They have serious concerns regarding the exams, they do not trust the education unless it is given face-to-face.
3. They are concerned about not having connection, not having the necessary technological equipments to follow the lessons.
4. Some of them are afraid of leaving their microphone or webcam open. One of them is afraid of seeing him/herself on the screen.
5. They may not focus on the lesson since there is not much activity and interaction.
6. They are afraid of the effects of lacking sincerity.
7. Not being able to reach to recordings of earlier sessions is a big concern.
8. Making a mistake while using the system and not being able to undo it

To the question asking about the positive aspects of the system, even though most of them said "none", there were some valuable and constructive feedback. One student found being able to see and check if he/she is heard through microphone with a visual warning useful. Some of them are happy that they can still somehow go on with their lessons. Being at home, using technology effectively and purposefully,

being able to follow the screen as if watching the teacher using whiteboard were regarded as positive aspects of the system. One student liked the fact that the file presented can be made downloadable. They think that having the theoretical lessons was satisfying through the system. Another student commented that public chat section allows very quick interaction with the class, the sound quality through microphone is good and having private chat is good for better class-like environment.

5. DISCUSSION

Difficult times require immediate solutions and as a response to YOK decision on resuming the education through distance education during the fight with COVID-19, Yıldız Technical University came up with BigBlueButton web conferencing systems as a solution. The initial stage of adaptation had to be quick, perhaps too quick to adapt, but eventually the system started to run. The main concern of this study was regarding how well different generations would react to this immediate solution and adapt to it and to what rate the system would support the adaptation which is related to the rate of its usability.

Because the system's ultimate goal was to be useful to educational institutions, in this new learning environment it seemed convenient to evaluate the system from the perspective of a new and crowded user profile which included members from different generations. The system was evaluated through three stages, following user experience research design principles. First user research and literature research was conducted, the second stage was remote usability testing stage which was conducted with focus group, the final stage is post-use feedback with the real users. In the final two stages, Jakob Nielsen's usability heuristic principles were taken into consideration.

5.1. Discussion of User Demographics

Through demographic questionnaire and literature review regarding generation cohorts, valuable insight for the YTU SFL instructors and students as new users of BigBlueButton web conferencing systems has been gained. The focus group study provided further information on how selected participants represent the characteristics and technology skills of the study's target group (YTU SFL instructors and students). The following sections will analyze these components in detail.

5.1.1. YTU SFL Students

The participants of the first stage were categorized into two main groups as the instructors and the students. The student groups' ages vary mainly from 19 to 28, though there were a few elder students. They are the students of Yıldız Technical University School of Foreing Languages, had the fall semester of 2019-2020 education year at school with their friends and since the end of March 2020, they had to keep on their education through distance education. They are, according to their birth years, members of Generation Z, which is regarded as tech-savvy and digital native generation.

The data gathered show that they are an internet dependent group with majority of them spending 5 to 7 hours on the internet on a daily basis, and a great many of them even spending more than 8 hours; however, the data show that their connectivity quality is not that good. The are struggling with average wi-fi connection and mobile data connection, they do not seem to have much mobile data limit either. These data make sense when compared to their own monthly allowance and their familys' income data, as most of the students' families live on an income between 2500 to 5000 tl, which is where minimum wage limit stands. They use smartphones to do most of the tasks in their lives and they spend most of their time on social media accounts.

Considering the generation cohorts, as they belong to digital natives' generation, they are expected to better handle the distance education experience and have more positive feedback in return, yet the data gathered show quite the contrary as most of their feedback show that they do not find distance education satisfying and would definitely prefer physical classroom environment. Overall, they do not seem to have any serious problem with the system, they like its appearance and ease of use and the few problems they suggest are usually related to connection problems and being unable to undo the mistakes. They, maybe as they spend most of their times on social media, find chatting and especially private chat option very beneficial an easy to use.

5.1.2. YTU SFL Instructors

Among more than 100 instructors of YTU SFL, only 25 instructors took part in the research, and most of them belonged to the same age groups; therefore, the data gathered had to focus on certain generations: Generation X and Y.

Considering the data gathered from the user research and usability testing together, instructors belonging to Generation Y seem more technology confident than the ones belonging to Generations X although none can be regarded as tech-savvy. All the instructors use smartphones and the rate of laptop owners is also very high. They mostly depend on their mobile connection and they seem to have much better connectivity compared to students. This result seems to correlate with the income levels data. They seem to spend as much time on the internet as the students, but definitely not more than them.

The generations cohorts seem to relate to their proficiency level in using the system as the usability testing and the questionnaires suggest. The members of Generation Y seemed more adapted and proficient while using the system; they could complete the tasks more easily and with confidence. Their feedback on the problematic areas of the system were more constructive and clear. On the other hand, participants from Generation X had more trouble handling the tasks if they were not personally interested in technologies. It seems like Generation Y members are truly digital immigrants: they are not excellent but they are willing to try and use the system and can use it effectively to some degree.

5.2. Discussion of Usability Heuristics and Data Gathered

The data gathered from both post-use questionnaires and remote usability tests are discussed in this section to better understand and show the flaws and accomplishments of BigBlueButton web conferencing system. For this purpose, Jakob Nielsen's "10 Usability Heuristics" have been used to categorize discussion points[119]. The discussion is done considering all participants' responses; however, student responses' effect on the discussions are limited for their interaction with the system is limited and therefore could not give feedback on many issues regarding the use of the system.

5.2.1. Visibility of System Status

The data gathered from all types of participants through the post-task questionnaire and remote usability testing show that visibility of the system status was one of the most commented issues. It is clear that the system lacks feedback and

[119] Nielsen, "10 Usability".

information to keep users aware of what is going on. User and participant comments show that they do not know if their session is actually being recorded, which parts of the screen is being recorded, when the instructor is not using the screen, they do not know what is going on. The system does not provide feedback about the accomplished tasks or the errors. There are some messages that appear on the right corner but they appear at the same place in the same way with uploaded feedbacks, so they are not attention grabbing.

The system clearly needs more feedback on the actions. There are some good examples of feedback provided by the system such as audio testing session, the voice saying “you are now muted”, but for more critical actions like taking the presenter, erasing the notes, quitting the session the feedback and error messages are very little.

5.2.2. Match Between the System and the Real World

The system seems to use the everyday language of the users because questionnaire comments on the navigation and instructions language were very positive. The users and participants find them clear and simple. However, the icons do not seem to use concepts familiar to users. There occurred a serious need for an eraser, which is a very important part of both teaching environment and computer usage. The categories in the pop-up menus are reported to be confusing and irrelevant. There should be a more logical order and categorization of the buttons and sections and for this purpose card sorting usability testing method can be utilized. Besides, most participants habitually right clicked to open menu on buttons, which is a habit from regular computer use. The system can adapt this habit for ease of use.

5.2.3. User Control and Freedom

Users need urgency exits and recovery from the mistakes and unwanted situations. The BBB system seems to seriously lack those features. Being able to undo a mistake sets a sense of freedom and they become less afraid to use the system again. Most of the instructors reported that they are afraid of making mistakes because they cannot simply undo it. There is not even an erase button to remove unwanted actions from the screen. When they upload a wrong file, they cannot undo it until the file is completely uploaded and when they end session by mistake, they cannot resume it which results in the loss of the whole session.

The system needs exit, undo and eraser buttons for better control provided to the user, which would help the users, especially the ones who are less confident with technologies to become more eager to use it.

5.2.4. Consistency and Standarts

Just like the match between the system, it is important to follow the standards, whether they are written or not. The system seems to have failed to some degree to accomplish this with its icon design. Some icons, for example the screen sharing button, plus button and multiple whiteboard users' sections, do not seem to deliver their function's message to the users. The users assume those icons to do something else or, as it was experienced with multiple whiteboard user icon, they do not understand its fuction without further explaination.

5.2.5. Error Prevention

Through all the discussions it had been clear that the system does not provide error prevention messages. Error messages usually show up only after some time a mistake is made. There is a need for user confirmation for some actions like taking the presenter, muting all the participants or ending the session. If a user cannot understand the error he or she makes and cannot get a message with possible solution options, it is more likely that they will stop using the system or that function all together. Therefore, error prevention messages need update and improvements for better user experience.

5.2.6. Recognition Rather than Recall

One other principle that the system accomplishes well is allowing its users to recognize the use of the system rather having to remember process of tasks. The simple looking interface and some buttons that are visible on the screen allow users to easily accomplish their tasks at each log in. Some sections, like plus button and options under that menu create confusion, but overall this is one of the area that satisfy its users.

5.2.7. Flexibility and Efficiency of Use

These are accelators that help advanced users to fasten up their pace or make things more easily, like Ctrl+Z for undo or select all button. The system has a mute-all button and make the presentation downloadable which would save some time from

sending a file separately through e-mail. However, there is not many accelerators or shortcuts for the actions. Still, users did not give any negative feedback, which might suggest that the user profile the study focuses on may not be that advanced, or perhaps the system does not need advanced users and accelerators.

5.2.8. Aesthetics and Minimalist Design

It is one of the issues that the system gained appreciation for from the participants; the navigation language and the overall look of the page is simple, but sub sections seem a bit contrary to the idea. For a minimal design, tasks should be accomplishable with one or at most two clicks. The system, for some actions, needs a set of actions and that does not correlate with minimalistic approach of the system.

5.2.9. Error Recognition and Recovery

BigBlueButton web conferencing system lacks error recognition, prevention and recovery tools and messages and it is an important flaw of the system. Let alone being expressed in a plain language with some solution suggestions, most often the system does not provide any feedback. When a user clicks on ‘take the presenter’ button, the system allows the user without asking if that person really wants to do that action. During the lessons, this might end up with the instructors losing the presenter mode because a student might take it by mistake while trying to figure out its function. Sometimes users can mute all users by mistake, and again there are not any warnings regarding that.

Another example of lacking error recognition and recovery is clearing the notes taken on the board. When the presenter clicks on the dustbin icon on the right corner, all the messages written on the board are cleared and cannot be undone. Users also may have problem with logout because usually when users want to leave a page, they simply click the x button. However, when they want to upload a file, the whole page is covered with upload page and when they want to return to the presentation screen without uploading, they habitually click x button and lose all the screen without any warning. These and such lack of warnings show that error recognition and recovery are important issues for a well-functioning and satisfying system with better user experience since these flaws might exhaust the user.

5.2.10. Help and Documentation

After some problems that prevented the lessons from being completed, there arised a need for an IT support to help users of YTU SFL to overcome problems that could occur. The system itself does not provide much support and communication regarding the issues in itself; on the other hand, the systems' webpage and team provide support to a level. Before the system use was initiated, an introductory guide was delivered to its users and demo platform was provided to practice, which might be considered as support. However, there is a need for support while using the system, perhaps a search bar to find an action in case a user cannot find the tool or button to make an action such as creating breakout rooms or taking the presenter. A live support would also be beneficial if possible.

6. CONCLUSION & SUGGESTIONS

This study's aim has been to see to what extend a user, without previous training and much guidance, could figure out how to use BigBlueButton web conferencing system even if he or she was someone without much experience with technologies. The reason behind this mission is based on the fact that Yıldız Technical University School of Foreign Languages instructors and students had to adapt themselves to the system within 2-3 days of time without previous online teaching experience due to COVID-19 precautions.

Based on the knowledge acquired from the usability testing and user experience evaluations, there occurred many usability issues with BigBlueButton web conferencing system. Most issues manifested themselves in all user profiles from The Baby Boomer Generation to Generation Z. The insights gained provide important data for the features that require a better design for better user experience.

6.1. Discussion Regarding Generations

One of the greatest challenges that technology has brought into our lives is the constant need to understand and keep up with the countless changes within the society. Each generation lead their lives familiar with a change, but still alien to another that is yet to come or has just taken over the world. With "globalization" phenomenon brought up by technological advances and of course, the Internet, things have lost their purpose to be one that is unique, existing in the moment at that place and nowhere else. It is now possible to contact anyone, anywhere, watch any show aired on any spot of the world simultaneously, attend a lecture of a professor at a campus that is kilometers away while enjoying the comfort of home, and most importantly reach infinite sources of information.

Developments in technology have already provided great many opportunities for learners and teachers. The new "globalized, interconnected world" of today has been lifting the boundaries between the learners and the teachers. Indeed, even before COVID-19, learning did not necessarily pass only through classes conducted by a teacher on text books. Learners could simply obtain authentic up-to-date materials or attend courses world-wide.

Today, there is a generation that call themselves after a web conferencing system that is nowadays used primarily and popularly for distance education and there are generations of teachers trying to adapt themselves to distance education. Moreover, it is suggested that this pandemic will probably create a new generation called COVID-19 Generation or Coronnials that is yet to be defined, but will probably be even more adapted to screens and not learning in a classroom environments[120]. The Boomers may not be their teachers, but Generation Y and X'er definitely have to adapt themselves even more to teaching online to be prepared for the upcoming generation. Therefore, it would be wise to accept the transition and try to make the most of it by training ourselves right now.

Although the study aimed at analyzing 3 generations of instructors, only two generations of instructors participated in the questionnaires, which were Generation X and Generation Y (Appendix 6-7). Both generations, despite not being digital natives, are supposed to be more comfortable with using technologies compared to The Baby Boomers depending on the literature review regarding generation cohorts and their characteristics. However, the data obtained through the questionnaires do not show much difference regarding their technology use. The only major difference has been that Generation X members would more probably avoid using new technologies if they can while Generation Y seem to enjoy figuring out the use of new technologies. (see Table 4.4)

When Generation Z is compared to these two generations, the data show that Generation Z are more social media dependent generation. The expectation of this study has been to see how tech-savvy Generation Z are; however, the data have

[120] Anri Ichimura, "Meet the 'Coronnials,' the New Generation of Babies Born During and After COVID-19", Esquiremag, https://www.esquiremag.ph/life/health-and-fitness/coronnials-pandemic-babies-a00304-20200417 [May 17,2020]

provided nothing much significant regarding the issue. On the contrary, they have stated that they regard distance education as a waste of time and would prefer being in class. One interesting fact regarding Generation Z of Yıldız Technical University School of Foreign Languages was that their familys' income levels are not so high and they do not have good connection to the Internet, which might be a reason why they do not enjoy distance education much. It was expected that Generation Z would prefer learning online because they, theoretically and according to the data driven from the questionnaire of this study, spend more time on the internet and looking at a screen compared to other generations; however, their statements saying that they lose their concentration very easily while trying to follow the lessons on BigBlueButton show that it is not the screen factor that attracts the attention of these students but the interactivity factor. The more interactive an application gets, the more they would like to use it.

Generation Z is a social media generation, and their most preferred choices are Instagram and YouTube currently; therefore, to be able to appeal to this generation, the interactivity methods of these platforms could be guiding. One proof for this is that students stated that they enjoy the private chat option provided to them with BBB system, which option is very much alike messenger or direct messaging systems of the social media platforms.

Although the data of Generation Z students of YTU SFL and Generation Z characteristics do not match as much as expected, the literature review done and data gathered regarding Generation Z of Turkey and student data correlate. The report states that this generation uses technologies mostly for communication and entertaintment; prefer YouTube and Instagram as main social media platforms; spend a lot of time with their mobile devices, but still do not regard technology as main tools of education. (see 2.2.2)

On the other hand, the literature regarding generations of teachers highly match with the data results, except for the fact that there were no Baby Boomer participants of questionnaire studies. Yet the data gathered from one Baby Boomer participant of usability testing stage correlate with the fact that The Baby Boomers are more afraid of using technological tools and making mistakes, and are not very good at using them. It requires more effort for them to accomplish tasks. The Baby Boomer participant (first time user B (P2)) had trouble with uploading a file to the system because she did not know how to upload anything on a computer and had not tried such an action

before. She could not manage to complete some of the tasks like creating breakout rooms and using screen sharing and stated that she was afraid of making mistakes. (see 4.3.4.2.2.) As Ofer Zur and Azzia Walker suggests, there are three categories of digital immigrants and those are "avoiders, reluctant adopters and enthusiastic adopters"[121].

It is clear that The Baby Boomers are true avoiders, and it is perhaps the reason why this study had no Baby Boomer questionnaire participant as the questionnaire was conducted through online platforms. If the questionnaire was delivered on paper to the instructors, it is probable that the rate of attendance and variety within would be different and would include more Baby Boomer generation instructors. Generation X and Y, although they do not show much difference from each other according to the data retrieved, may be categorized as reluctand adopters and enthusiastic adopters subsequently.

Four personas created at 4.3.3. are actually based on the data acquired from questionnaires and literature review and each represent a significant user type. The first persona is a representation of the Baby Boomer generation and is an avoider. The character is created based on assumptions and is totally fictive, but still manages to represent the Baby Boomer user of the system as can be seen with the participant 2 of usability testing. Persona 2 is actually a representation of Generation X with personal interest in technologies, in other terms persona 2 is an enthusiastic user although he is not a Generation Y or Z member. It is seen with Participant 3 and Participant 7 of usability testing stage that this persona accomplishes its purpose as representing possible users of the system. Persona 3 is another example of enthusiastic user, but this time the character is a Generation Y member. Participant 5 and 6 match well with this persona type as both are avid users of the system and members of Generation Y. The final persona represents reluctant adopter user of Generation X and matches well with participant 4, who is also a member of Generation X, but not into using technology. She could even slightly fall into avoiders' category.

The personas are an important part of a good user experience design and to be able to select and later understand the participants of the usability testing stage.

[121] Zur et al, **ibid,** 2.

6.2. Discussions Regarding BigblueButton and Its Usability

The BigBlueButton web conferencing system has been very helpful in resuming the education from where we left off in times of COVID-19 pandemic just like many web conferencing platforms and apps. It is a well developed system with certain flaws that can be improved in the light of carefully conducted UX analysis.

The system overall accomplishes to provide what it promises: simultaneous online education. The interface is clean and minimal and the system provides different options to the user, such as integrating videos from other online platforms and using the files of your own system, yet the system lacks some of the important functions that users need to have better user experience.

According to the usability testing and questionnaire results, there seems to be three main issues to be considered to be able to improve the system: error prevention, visibility of system status and match between system and the real world. Firstly, BBB system requires clearly constructed and appering-on-time error prevention messages with solution suggestions, such as “Would you like to proceed?”. These messages should be clearly visible and easy to differentiate from other components of the screen. During the usability testing stage, the importance of error prevention messages have been mentioned by most participants: Participant 1 commented that she could not notice if she made a mistake while uploading a file until it was too late; participant 2 got kicked out of the system while trying to go back from upload screen; participant 3, while trying to upload a file from his computer dragged the file to the screen and got kicked out of the system without warning and he did not like the fact that he cannot erase single item on the board; participant 4 stated that she was afraid of making mistakes while using the system fearing that she would not be able to undo them;P5 did not like the fact that students can take the presenter mode easily with one click without warning; participant 7 insisted that there is a serious need for back button to undo mistakes or simply to go back from the action. As can be seen, the system lacks error prevention and error correction messages and ways.

Secondly, visibility of the system status should be improved because the users do not seem to know what they are doing, if it is working or not. They would like to know if their session is being completely recorded or only the presentation screen is recorded. The users would like to be more informed by the system. Participant 5 stated that she does not know if shared notes or public chat is also visible in lesson recordings

and it is important to know this since most of the conversation with the students go through there. Participant 1 had difficulty figuring out that share screen mode does not work with Safari browser, and there were no messages regarding that to prevent the loss of time.

Finally, the system icons and actions should be improved to better match the user habits and contexts that come natural to them. Icon design is one of the main problems; plus icon, screen sharing and multiple whiteboard users icons do not suggest their purpose and confuse the users. Most of the participants struggled with identifying the icons of the system. Participant 1 had trouble locating take presenter icon and did not expect it to be under plus icon; participant 2 could not differentiate between screen share and multiple whiteboard user button despite the pop-up instructions; participant 3 stated that the icons were scattered all around the screen making it difficult to focus and find them quickly.

6.3. Suggestions

Depending on the data acquired from the stages of the study, the following suggestions can be made for researchers and developers.

6.3.1. Suggestions for Researchers

All the studies conducted thoughout this study was of an exploratory nature and further studies with better UX and usability testing opportunities could provide deeper data with quantitative and qualitative results. Moreover, this study focused on a certain small group of users, and if the study could be conducted with more users with different demographic backgrounds, it could provide more insightful and significant data.

There were certain obstacles of this study, and due to those obstacles, the data gathered are very limited. First of all, the study was conducted during COVID-19 precautionary lock down period and due to this fact certain type of user (The Baby Boomers) could not be reached effectively. For a better analysis of generation cohorts and their responses to the system, it is very important that detailed data should be acquired form this group as well. Besides, the usability testing could be done more efficiently if other more technical but costly usability testing methods could be used. To accomplish this, financial support is necessary, so for future in depth reseach

processes it might be useful to consider having financial and technical support for the study.

The study shows that there are many components that affect user experience. Further studies could be conducted to include the system and the user experience in relation with the facilities and opportunities of the school because the system requires servers and some of the bigger problems experienced later, but not included in this research were due to server issues. The issue of servers and connection problems affect user experience negatively even though they are not directly related to the system interface. They are a part of human-computer interaction, though.

6.3.2. Suggestions for Developers

The system is not limited to one type of user. It aims to appeal to different users all over the world. The purpose of users taken into consideration in this study is very specific and perhaps too specific to be taken into consideration to change the whole system; however, the results seem applicable to all kinds of users. For example, the error prevention absence should be a problem to all users, whether new or old.

BigBlueButton is appealing to look at with its minimal design, but the icon design and placement seems problematic according to data obtained from participants. A new and clear graphic design for icons could be considered and for better categorization of the buttons, card sorting usability testing methods could be useful because it allows the facilitator to understand possible users' mindset. Moreover, some important icons like "take presenter" and "upload a file" should be more visibly placed.

BigBlueButton lacks error prevention and recovery and it is a serious issue that could bother any type of user. For this, some working examples like Windows' error messages could be taken as example and inspiration. The system should provide clear warnings before some important actions such as taking the presenter mode. In addition, there is a need for undo and eraser buttons, the system should allow the user to undo the selected mistake.

The system cannot apply whiteboard screen options such as drawing to shared screen mode, which causes the user to leave home screen to be able to show the tab selected or the ppt presentation. This problem can be avoided by creating a layer system upon which anything could be written or erased. Instagram provides a good example of this with its stories option. When a user takes a video to post on his or her

story, he or she can draw on or erase some parts of the drawn message even on the video. Just like layers in Photoshop programme, there could be a layered screen which allows the presenter to go on teaching by drawing and highlighting on the screen even if screen share more is being user.

The system can provide some accelerators for advanced users such as Ctrl+Z to undo some action or Ctrl+select for selecting specific users. This way, it becomes more appealing to the knowing users and the system does not lose the user.

The system should provide preview of recorded sessions to the presents to help them understand what is visible in the recordings. This allows the presenter to focus on that aspect of the system for more effective recordings of the lessons and the students who would watch the recordings later would have no problem understanding the lesson.

Finally, to be able to appeal to Generation Z, the system should provide more interaction and entertaintment options. Of course, it is not a must as the system aims to achieve only educational goal; however, Generation Z have created and will create most of the student profile in the near future and it is possible that they might lose their interest to the system. Some platforms provide filters and mask options, avatars and such entertaintment options to the users for a more fun experience. The filters and avatars could be useful to provide a sense of disguise and confidence to use their microphone or cameras to the students. The system could look for ideas from most preferred social media apps and their techniques.

6.4. Comments and Assumptions

Implementing technologies into classroom up to some degree is something that can be achieved with some practice by many instructors with or without much technology savviness since most of the teaching would still be manual; however, taking all the teaching process onto an online platform and abandoning the comfort of classroom and face-to-face interaction are serious issues to be concerned about.

The transition to educational technologies and technology as the ultimate tool of education was expected to be gradual until COVID-19, but it was still expected because the new generation, the Generation Z needed this change. To be able to attract their students' attention and be able to teach them more effectively, teachers needed this change. However, the data gathered in this study show that the sudden change

caught many unprepared and caused stress and concerns. Even the Generation Z students seem uncomfortable with the sudden change according to their comments to post-use questionnaire.

Even though this sudden change made all generations uncomfortable, some generations got effected negatively more than the others. Josie Cox states that "as the world of work around us changes, older generations can become fearful of a loss of professional identity and the prospect of not being able to keep track of digital developments. Arguably COVID-19 is proving to be the greatest catalyst for rapid change in the workplace we've ever seen. Keeping up won't necessarily be easy for anyone"[122]. Notwithstanding, the generation cohorts suggest that the most naturally-nervous generation about the use of new technologies is the Baby Boomers.

The Baby Boomers could avoid using new technology as much as possible. Considering that Generation Z is regarded as digital native, chronologically and theoratically speaking it is possible to claim that Boomers are digital aliens. It would, of course, be unwise to assume that all Boomer generation has the same attitude towards technology use; however, among last four generations, they are the most technology avoiding group of them all. Still, with COVID-19, when all interaction seems to be dependant on technological devices, the Boomer generation probably has had to stop avoiding technology and start using it more. Rober Glazer states that "many Boomers will likely try many technology-enabled services for the first time, including grocery delivery, direct-to-consumer goods and in-home subscription entertainment"[123].

The Boomer instructors who had to adapt themselves to the distance education and therefore technology more than before, are perhaps gaining confidence and practicality during this period. "As Baby Boomers grow more accustomed to this new way of staying in touch and socializing, they are likely to find it a comfortable and convenient way to connect with those they care about and continue using these

[122] Josie Cox, "Gen Z, Millennials and Co: Why COVID-19 Makes It More Important Than Ever for Companies to Understand the Multigenerational Workforce", *Forbes,* https://www.forbes.com/sites/josiecox/2020/04/28/genz-millennials-coronavirus-covid-19-boomers-multigenerational-challenge/#5b4ebca97acc [May 12, 2020]

[123] Robert Glazer, "COVID-19 Will Permanently Change the Way Every Generation Lives – Here's How", *Forbes,* https://www.forbes.com/sites/robertglazer/2020/04/01/covid-19-will-permanently-change-the-way-every-generation-lives-heres-how/#708bfbc7493b [May 1, 2020]

platforms" says Glazer and he might be right[124]. It is probable that the Boomer teachers will develop liking to distance education systems and wish not to commute to work every day and teach from the comfort of their homes.

The Generation X, on the other hand, are not that far away from technology use. They like innovation; however, their skeptical nature might have caused them to question their place, the situation and the need to adapt to change more than ever during COVID-19. "Many Gen-Xers will likely come out of all this thinking long and hard about what they really want to be doing for the remaining few chapters of their life" says Glazer[125]. Though the current data show that they still prefer classroom teaching to distance teaching, as Generation X value free time and self, they might develop liking to distance education during COVID-19. One thing is certain that distance education saves a lot of time from commuting to work, extra time spent at the school for extra-curricular or curricular activities. They might even consider career changes towards online teaching. Robert Glazer assumes that Gen-Xers could look to new and different ways to offer their expertise and talent, likely a safe distance from the battlefield and this field could be the Internet[126].

Generation Y or in other words Millenials are the digital immigrants who are keen users of the technologies, but are not born into it. During COVID-19, Millenials do not seem to have had much difficulty adapting their lives to technology as their response to most statements seem positive compared to Generation X's responses (see table 4.7). They are the generation of vast resources that are quickly accessible through the Internet, and for the teachers of Generation Y, teaching online may mean more resources at hand. This generation's teachers usually "see school linked to technology and its lack could result in the disappearance of the learning motivation"[127], so with distance education, they can finally adapt their teaching completely to technology and the Internet and most importantly, they are the ones closest in age to Net Generation, which means they can appeal to their students more than ever.

Finally, there is Generation Z, or Net Generation. They are the students of COVID-19 period. They are the generation that had to leave their classes and start learning from their computers compulsorily. "Teenagers have jokingly referred to

[124] **ibid**.
[125] **ibid.**
[126] **ibid.**
[127] Duse and Duse, 694-695.

themselves as “Zoomers” online for years; now the name is literal. Overnight, Zoom has become a primary social platform for millions of people, a lot of them high school and college students, as those institutions move to online learning” say Lorenz, Griffith and Isaac[128].

This generation should be adapting the change around them as they have already been using the technology and the Internet as their primary source of communication and now the education is also included completely in it. However, the data and their comments do not suggest the same. According to table 4.8, they are doing well with the system and do not have much difficulty while using it; however, they do not seem to like this situation as most of them agreed on the statement “I see distance education as a waste of time.”, “I would prefer the classroom environment to distance education.” and “I would like to continue my education with distance education.” (Table 4.8) Some of the assumptions about why they did not like distance education are listed below:

1. They might have connectivity problems, which might hinder them from attending the lessons.
2. They might have socio-economical or other problems that affect their education at home.
3. They might not have developed liking to the system and the interface.
4. Since they have experience with classroom teaching and had friends at school, they might find distance learning isolation from them all.
5. They might be having problems with the sudden transition.
6. Perhaps their technology savviness is not appealed in the right ways, as they seem to be actually natives of social media and like to use the Internet for communication and entertaintment purposes, but the system has none of the component of those fields other than chat part.

It is not only the teachers’ duty to be prepared for today’s and the next generation, software developers, companies, instutitions are to be ready to be able to appeal to them. This study shows that the Generation Z is enthusiastic users of social media and their main purpose is to communicate and have fun. Just like the social media

[128] Taylor Lorenz, Griffith, E., Isaac, M. “We Live in Zoom Now”. *The New York Times.* https://www.nytimes.com/2020/03/17/style/zoom-parties-coronavirus-memes.html [May 20, 2020].

platforms do, the educational material developers should know their users better to succeed. When it comes to knowing your user, nothing provides better insight regarding the user than a well-designed UX analysis.

This study has been conducted because as a group of users, we have had experience with BigBlueButton and it is possible that we might use the system in the future again. During our use, we have encountered some problems that effected our teaching and motivation for continuing. BigBlueButton is a good system that helped us during the troubled times to be able to go on with our education; however, it needs improvements for better teacher and student experience.

This study's main purpose has been to provide data regarding the experience of its new users and help the system to be improved for better future user experience. We are a part of change now, and the change is still not over. For this reason, any improvement suggestion should be valuable for better experience and sustainability.

It is important to remember that BigBlueButton has begun to be used widely at our school due to a crisis time and it would be wrong to assume that schools, teachers and students were ready to adapt themselves to distance education experience at once. Many schools all around Turkey still lack a good Wi-fi network, there are many students who are struggling with serious financial difficulties and can hardly afford simple devices only to keep themselved adapted and connected to their world. The system needs to improve itself to appeal to its larger user profile, but it is also important not to forget that without equal opportunities, it would be wrong to expect the participation of all with great enthusiasm. Change does not happen at once, but this pandemic could provide a great push toward a more technology and internet oriented education system in the future.

REFERENCES

"2019-2020 Academic Year Spring Semester Announcement". YTU. http://www.yildiz.edu.tr/headlines/281/2019-2020-Academic-Year-Spring-Semester- [March 2020].

"A Beginner's Guide to Usability Testing", Hotjar. https://www.hotjar.com/usability-testing/, [May 14, 2020].

"About". BigBlueButton. https://bigbluebutton.org/about/ [April 15,2020].

Aytekin, Çiğdem, Cem Sefa Sütçü. "Yeni Medya ve Ağ Nesli: Türkiye Örneği". *The Journal of Marmara Social Research.* no. 3, 2012: 1-13.

Babich, Nick. "Putting Personas to Work in UX Design: what They Are and Why They're Important", Adobe Blog. https://theblog.adobe.com/putting-personas-to-work-in-ux-design-what-they-are-and-why-theyre-important/ [April 21, 2020].

_____. "Why All UX Designers Should Be Creating User Journeys, and Here's How to Make One", Adobe Blog. https://theblog.adobe.com/why-all-ux-designers-should-be-creating-user-journeys-and-heres-how-to-make-one/, [April 21, 2020].

_____. "Top 7 Usability Testing Methods", Adobe. https://xd.adobe.com/ideas/process/user-testing/top-7-usability-testing-methods/, [April 21, 2020].

Basust, Erol. "Contextual Inquiry: Observing How Users Interact with systems and Workflows", Usertesting. https://www.usertesting.com/blog/contextual-inquiry [April 22, 2020].

"Big Blue Button vs. Zoom". Canvas. https://community.canvaslms.com/thread/23643-big-blue-button-vs-zoom [May 21, 2020].

Bouniq-Mercier, François. "UX Design Process", http://hotar.diyardent.com/image.php?id=583360 [April 21, 2020].

Christou, Charalambos S., Despo Ktoridou, Zarimov Zafar. "A Cost-Effective Computer Supported Collaborative Learning for Online Education", *2016 IEEE Global Engineering Education Conference (EDUCON), 10-13 April 2016*. Abu Dhabi: UAE, 2016: 1138-1144.

Combes, Barbara. “Techno Savvy or Techno Oriented: Who are the Net Generation?”, *Asia-Pacific Conference on Library & Information Education & Practice, 3-6 April 2006.* Singapore: Nanyang Technological University, 2006: 401-408.

“Contextual Interviews and How to Handle Them”, Interaction Design Foundation. https://www.interaction-design.org/literature/article/contextual-interviews-and-how-to-handle-them [April 21, 2020].

Coşkun, Dursun Can. “Z Kuşağı Mensubu Öğrencilerin Sosyal Medya Kullanım Alışkanlıkları”. MA Thesis. Beykent University Social Sciences Faculty, 2019.

Cox, Josie. “Gen Z, Millennials and Co: Why COVID-19 Makes It More Important Than Ever for Companies to Understand the Multigenerational Workforce”. *Forbes.* https://www.forbes.com/sites/josiecox/2020/04/28/genz-millennials-coronavirus-covid-19-boomers-multigenerational-challenge/#5b4ebca97acc [May 12, 2020].

Dam, Rikke Friis, Teo Yu Siang. “Design Thinking: Getting Started with Empathy”, Interaction Design Foundation. https://www.interaction-design.org/literature/article/design-thinking-getting-started-with-empathy [April 21, 2020].

_____. “Design Thinking: Get Started with Prototyping”, Interaction Design Foundation. https://www.interaction-design.org/literature/article/design-thinking-get-started-with-prototyping, [March, 2020].

Daniil Kuzelev, Unsplash, https://unsplash.com/photos/AkGd_YB6Q2c [May 12, 2020].

Dede, Chris. “Planning for Neomillenial Learning Styles”, Educause Quarterly, issue.1, 2005: 7-12.

Duse, Carmen Sonia, Dan-Maniu Duşe. “The Teacher of the Generation Z”. *Edu World 2016 - 7th International Conference, 4-5 November 2016.* Pitesti: 2016: 690-697.

Farrell, Susan. “UX Research Cheat Sheet”, NNGroup, https://www.nngroup.com/articles/usability-101-introduction-to-usability/ [April 20, 2020].

Fen. “UX/UI Design Process”, Medium. https://medium.com/nyc-design/ux-ui-design-process-for-beginner-753952bb2241 [April 21, 2020].

Franberg, Gun-Marie, Elze Dunkels, Camilla Hallgren. “Youth and Contemporary Learning”, *Interactive Media Use and Youth: Learning, Knowledge Exchange and Behavior,* ed. Elza Dunkels, Gun-Marie Franberg, Camilla Hallgren (Hershey: IGI Global, 2011): 1-13.

Gabriel, M.A., S.Wiebe, R.J. MacDonald. “Net Generation Expectations for Technology-mediated Learning at the University Level”, *M-ICTE*

Conference: Research, Reflections and Innovations in Integrating ICT in Education, Lisbon: 2009: 996-1000.

Gibbons, Sarah. "Symphaty vs. Empathy in UX", NNGroup. https://www.nngroup.com/articles/sympathy-vs-empathy-ux/ [April 21, 2020].

Glazer, Robert. "COVID-19 Will Permanently Change the Way Every Generation Lives – Here's How". *Forbes*. https://www.forbes.com/sites/robertglazer/2020/04/01/covid-19-will-permanently-change-the-way-every-generation-lives-heres-how/#708bfbc7493b [May 1, 2020].

Harley, Aurora. "Ideation for Everyday Design Challenges", NNGroup. https://www.nngroup.com/articles/ux-ideation/, [April 21, 2020].

Ichimura, A. "Meet the 'Coronnials,' the New Generation of Babies Born During and After COVID-19". Esquiremag. https://www.esquiremag.ph/life/health-and-fitness/coronnials-pandemic-babies-a00304-20200417 [May 17,2020].

Image of a Baby Boomer Woman, Pinterest, https://tr.pinterest.com/pin/203576845633341224/ [May 12, 2020].

Image of a Middle-aged Male Lecturer, Freepik, https://www.freepik.com/free-photo/closeup-smiling-middle-aged-lecturer_1115584.htm [May 12, 2020].

Image of a Young Teacher, CanStockpPhoto, https://www.canstockphoto.com/portrait-of-a-young-woman-teacher-in-8688300.html [May 12, 2020].

"Information Note On Coronavirus (Covid-19): 1". Council of Higher Education (YÖK). https://www.yok.gov.tr/en/Sayfalar/news/2020/Information-Note-on-Coronavirus-Covid-19-1.aspx [March 2020].

Jacobs, George M., Thomas S. C. Farrell. "Paradigm Shift: Understanding and Implementing Change in Second Language Education", *TESL-EJ*. Vol.5 issue.1. http://www.kyoto-su.ac.jp/information/teslej/ej17/toc.html [December 2019].

Kamiloğlu, Fatma, Özge U. Yurttaş. "Sosyal Medyanın Bilgi Edinme ve Kişisel Gelişim Sürecine Katkısı ve Lise Öğrencileri Üzerine Bir Alan Çalışması", *GÜ İleti-ş-im Dergisi,* n.21, 2014: 129-150.

Kaushik, Avinash. "Lab Usability Testing: What, Why, How Much", Occam's Razor. https://www.kaushik.net/avinash/lab-usability-testing-what-why-how-much/ [April 19, 2020].

Kemp, Simon. "Digital 2019: Turkey", Global Digital Report 2019. https://datareportal.com/reports/digital-2019-turkey [January 30, 2020].

Kinash, Shelly, Kayleen Wood, Diana Knight. “Digital Immigrant Teachers and Digital Native Students: What Happens to Teaching?”. *Educational Technology Solutions.* No. 54, 2013: 59-58.

Khoshbakht, Parhum. “2 Important Steps in Session Recording Analysis”, UX Collective. https://uxdesign.cc/3-important-steps-in-session-recording-analysis-49b104461dfa [April 20, 2020].

Krause, Rachel. “Storyboards Help Visualize UX Ideas”, NNGroup.com. https://www.nngroup.com/articles/storyboards-visualize-ideas/ , [April 20, 2020].

Komnios, Andreas. “7 UX Deliverables: What will I be making as a UX designer?”, Interaction Design Foundation. https://www.interaction-design.org/literature/article/7-ux-deliverables-what-will-i-be-making-as-a-ux-designer [April 2020].

Lew, Philip, Luis Olsina, Li Zhang. “Quality, Quality in Use, Actual Usability and User Experience as Key Drivers for Web Application Evaluation”, *Web Engineering: 10th International Conference, ICWE 2010, 5-9 July, 2010.* Sydney: Springer,2010: 218-232.

Lim, C.J., S. Lee. “Pedagogical Usability Checklist for ESL/EFL E-learning Websites”, *Journal of Convergence Information Technology*, vol. 2 issue. 3 (2007): 67-76.

Lorenz, T., Griffith, E., Isaac, M. “We Live in Zoom Now”. *The New York Times.* https://www.nytimes.com/2020/03/17/style/zoom-parties-coronavirus-memes.html [May 20, 2020].

MacKinnon, Gregory. “Preparing Preservice Teachers to Integrate Technology: A Longtitudinal Study”, *The International Journal of Technology, Knowledge and Society,* vol. 6, i. 5, 2010: 79-85.

Mastronardi, Dave. “Gamestorming: A Toolkit for Meeting”, Coda. https://coda.io/@dave-mastronardi/gamestorming-a-toolkit-for-meetings [April 20, 2020].

Mathieu, Joseph. “Pandemic Leads to Big Jump in Global Downloads of Carleton’s BigBlueButton”. Carleton Newsroom. https://newsroom.carleton.ca/story/pandemic-bigbluebutton-downloads/ [May, 2020].

Minhas, Saadia. “User Experience Design Process”, UX Planet. https://uxplanet.org/user-experience-design-process-d91df1a45916 [April 28 2020].

Moran, Kate. “Usability Testing 101”, NNGroup. https://www.nngroup.com/articles/usability-testing-101/, [April, 2020].

Nielsen, Jakob. *Usability Engineering*. California: Academic Press, 1993.

_____. "Usability 101: Introduction to Usability", NNGroup. https://www.nngroup.com/articles/usability-101-introduction-to-usability/ [April, 2020].

_____. "10 Usability Heuristics for User Interface Design". NNGroup. https://www.nngroup.com/articles/ten-usability-heuristics/ [April 28, 2020].

Nielsen, Lene. "30. Personas", *The Encyclopedia of Human-Computer Interaction, 2nd Ed.* , Interaction Design Foundation, https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/personas.

Olin-Scheller, Christina, Patrik Wikström. "Literacies on Web. Co-Production of Literary Texts on Fan Fiction Sites", *Interactive Media Use and Youth: Learning, Knowledge Exchange and Behavior,* Elza Dunkels, Gun-Marie Franberg, Camilla Hallgren (ed.), Hershey: IGI Global, 2011: 65-79.

Ordun, Guven, Asli Akun. "Personality Characteristics and Emotional Intelligence Levels of Millenials: A study in Turkish Context", *Journal of Economic and Social Studies*¸Vol. 6 i. 1 2015: 125-148.

Orsini, Yuna. "UX Design: How to Conduct Usability Testing", Medium. https://medium.com/poool-stories/ux-design-how-to-conduct-usability-testing-4c420d451537, [April 19, 2020].

"Personas", Usability. https://www.usability.gov/how-to-and-tools/methods/personas.html [April 21, 2020].

Prensky, Marc. "Digital Natives, Digital Immigrants". *CrossCurrents: Cultures, Communities, Technologies*.ed. Kristine L. Blair, Jen Almjeld, Robin M. Murphy. Boston: Wadsworth Cengage Learning, 2014: 45-51.

Rochanayon, Ann. "A Comprehensive Guide to Remote Unmoderated Usability Testing", Userzoom. https://www.userzoom.com/blog/how-to-design-a-remote-unmoderated-usability-test/ [April 22, 2020].

Rogers, Yvonne, Helen sharp, Jennifer Preece. *Interaction Design*. 3rd ed. West Sussex: John Wiley & Sons Ltd, 2013.

Sanavongsay, Nor. "Visual Storytelling in UX with Storyboards", Workday Design. https://medium.com/workday-design/visual-storytelling-in-ux-with-storyboards-d58214dedfac, [April 22, 2020].

Saraç, M.A. Yekta, Prof. "Press Release**",** Council of Higher Education (YÖK). https://www.yok.gov.tr/en/Sayfalar/news/2020/Sarac-made-a-statement-on-the-distance-education.aspx [March 18, 2020].

"Session Recordings", Uxdesigntemplates.com. https://uxdesigntemplates.com/evidence/method/visitor-recordings [April 24, 2020].

Sherwin, Katie. "Card Sorting: Uncover Users' Mental Models for Better Information Architecture", NNGroup. https://www.nngroup.com/articles/card-sorting-definition/ [April 22, 2020].

Soegaad, Mads. "Usability: A part of the User Experience", Interaction Design Foundation. https://www.interaction-design.org/literature/article/usability-a-part-of-the-user-experience [May 2020].

Stevens, Emily. "What is Ideation in Design Thinking? A Guide to the Most Important Ideation Techniques", Career Foundry. https://careerfoundry.com/en/blog/ux-design/what-is-ideation-in-design-thinking/, [April 21, 2020].

_____. "Step Four in the Design Thinking Process: Your Complete Introduction to Prototyping", Career Foundry. https://careerfoundry.com/en/blog/ux-design/design-thinking-stage-four-prototyping/, [April 21, 2020].

_____. "User Testing: A Guide to Sptep 5 of the Design Thinking Process", Career Foundry. https://careerfoundry.com/en/blog/ux-design/user-testing-design-thinking/, [April 21, 2020].

Sutherland, Richard. "BigBlueButton Review". Techradar.pro. https://www.techradar.com/reviews/bigbluebutton [April 21, 2020].

"Unmoderated Remote Usability Testing (URUT) - Every Step You Take, We Won't Be Watching You", Interaction Design Foundation. https://www.interaction-design.org/literature/article/unmoderated-remote-usability-testing-urut-every-step-you-take-we-won-t-be-watching-you [April 19, 2020].

"Usability of consumer products and products for public use – Part 2: Summative Test Method", ISO. https://www.iso.org/obp/ui/#iso:std:iso:ts:20282:-2:ed-2:v1:en [April 23, 2020].

"Usability Lab", Wikipedia. https://en.wikipedia.org/wiki/Usability_lab, [April 19, 2020].

"What is Usability?", Interaction Design Foundation, https://www.interaction-design.org/literature/topics/usability [May 2, 2020].

Ye, Summer. "The Ultimate Guide - Difference Between Usability and User Experience", Mockplus. https://www.mockplus.com/blog/post/difference-between-usability-and-user-experience [April 21, 2020].

Zur, Ofer, Azzia Walker. "On Digital Immigrants and Digital Natives: How the Digital Divide Affects Families, Educational Institutions, and the Workplace". *Zur Institute - Online Publication.*

http://www.zurinstitute.com/digital_divide.html 2011: 1-13. [January 18, 2020].

APPENDIX

Appendix 1. Demographic Questionnaire of the YTU SFL Instructors

Evaluating User Experience (UX) of Lecturers' on Distance Education Platform of Yıldız Technical University for Language Teaching at School of Foreign Languages

Dear Colleague,

This study is being conducted by Damla Tezel Yalkut as a part of her thesis study for Yıldız Technical University Art and Design Faculty, Interactive Media Design MA Program. She is also currently working as a lecturer at Yıldız Technical University School of Foreign Languages Basic English Department.

The aim of this study is to evaluate the user experience (UX) of EFL instructors and the students of YTU School of Foreign Languages on the newly introduced distance education platform used for conducting language courses.

User Experience Design aims to help designers see the needs and feelings of the users from and towards the interactive tool to create a better and a more natural design. The aim of this study is to understand how users of this platform feel about the platform while using it, looking at it, trying to do a task through it, more specifically, how good it is to use, right down to the small details, such as how quickly the curser responds to the actual movement or how well platform integrates other pages or platforms. Therefore, there are no "correct" or "false" answers for this questionnaire.

Your responses will be kept confidential and will not be used for any other purposes other than this particular master's thesis. You are free to participate and you are also free to withdraw any time you may wish. If you wish so, your responses will be removed from the study. This study is particularly interested in your personal opinion. Please give your answers sincerely, as only this will guarantee the success of the investigation.

Researcher: Ins. Damla Tezel Yalkut
Yıldız Technical
university
School of Foreign
Languages Basic English
Department
damlatezel@gmail.com

Background Information

1. Born in ( ) 1946 – 1964 ( )1965 – 1984 ( )1985 – 1994 ( )1995 – 2012

2. Gender ( ) Female ( )Male ( )Prefer not to say

3. Education (please indicate the final degree you gained)

( ) Bachelor's Degree ( ) Master's Degree ( ) PhD Degree

4. How many years have you been working as an English Instructor?

( ) 0-5 years ( )6-10 years ( )11-15 years ( ) 16-20 years ( )21-30 years

5. Your family's average monthly income

( ) less than 2500 ( ) 2500-5000 ( ) 5001-7500 ( ) 7501-10.000 tl ( ) 10.000+

6. Which of the following devices do you own?

- [ ] laptop
- [ ] a desktop computer
- [ ] tablet
- [ ] smart phone
- [ ] non-smart phone
- [ ] webcam
- [ ] tv
- [ ] smart tv
- [ ] digital drawing tablet
- [ ] interactive pen (e.g. apple pen)
- [ ] smart watch
- [ ] smart home appliances
- [ ] game console (PS, xbox...etc)

Diğer: [ ] _____

7. How often do you do the following activities?

Her satırda yalnızca bir şıkkı işaretleyin.

	Never	Rarely	Sometimes	Often	Always
Watching TV	◯	◯	◯	◯	◯
PC/ Console Gaming	◯	◯	◯	◯	◯
Listening to music	◯	◯	◯	◯	◯
Mobile Gaming	◯	◯	◯	◯	◯
Using streaming services (e.g. Netflix)	◯	◯	◯	◯	◯
Watching videos on the Internet	◯	◯	◯	◯	◯
Online research	◯	◯	◯	◯	◯
Online studying	◯	◯	◯	◯	◯
Chatting	◯	◯	◯	◯	◯
Video Calling	◯	◯	◯	◯	◯
Using social media	◯	◯	◯	◯	◯
Creating content for social platforms	◯	◯	◯	◯	◯
e-mail checking,writing	◯	◯	◯	◯	◯
Professional requirements	◯	◯	◯	◯	◯

8. You connect to the Internet via...

Her satırda yalnızca birşıkkı işaretleyin.

	Never	Rarely	Often	Frequently	Always
Mobile Data	◯	◯	◯	◯	◯
Wi-Fi	◯	◯	◯	◯	◯

9. How good is your Wi-Fi connection at home? *

( ) Not Available ( ) Poor ( ) Average ( ) Good ( ) Excellent

10. How good is your mobile connection?

( ) Not Available ( ) Poor ( ) Average ( ) Good ( ) Excellent

11. Your mobile data limit is

( )up to 1 GB ( )1-3 GB ( )4-7 GB ( )8-10 GB ( )11-15 GB ( ) more than 15 GB

12. How much time do you spend on the Internet on average daily?

( )1-2 hours ( )2-4 hours ( )4-6 hours ( ) more than 7 hours

13. How often do you use the following social media platforms?

Her satırda yalnızca bir şıkkı işaretleyin.

	never	occasionally	sometimes	often	always
Instagram	◯	◯	◯	◯	◯
Facebook	◯	◯	◯	◯	◯
Twitter	◯	◯	◯	◯	◯
YouTube	◯	◯	◯	◯	◯
WhatsApp	◯	◯	◯	◯	◯
TikTok	◯	◯	◯	◯	◯
Snapchat	◯	◯	◯	◯	◯
Skype	◯	◯	◯	◯	◯
Viber	◯	◯	◯	◯	◯
Pinterest	◯	◯	◯	◯	◯
Tumblr	◯	◯	◯	◯	◯
LinkedIn	◯	◯	◯	◯	◯
Vine	◯	◯	◯	◯	◯
Discord	◯	◯	◯	◯	◯
Other	◯	◯	◯	◯	◯

14. Have you ever had online learning experience before? ( ) Yes ( ) No

15. Have you ever had online teaching experience before? ( ) Yes ( ) No

16. How often do you integrate technology in your classes?

( ) Never ( ) Occasionally ( ) Sometimes ( ) Often ( ) Always

		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
17	Technology helps me organize my work.					
18	Using technology makes my subject matter more interesting.					

19	Implementing technology in teaching saves time and effort.					
20	Technology makes me much more productive.					
21	Teaching with technology offers real advantages.					
22	Technology can enhance students' learning.					
23	I would rather do things by hand than using a new technology.					
24	Technology will improve education.					
25	Using new technologies do not scare me at all.					
26	I do not like talking with others about new technologies.					
27	I do not like using new technologies.					
28	I like using technologies in teaching.					
29	The Internet and technological devices are fast means of getting information.					
30	I would like to learn more about new technologies.					
31	I would like to take my teaching to online platforms.					
32	I often get help from others to be able to use a technological device.					
33	I avoid using technology if I can.					

Appendix 2. Demographic Questionnaire of the YTU SFL Students

Yıldız Teknik Üniversitesi UZEM Tarafından Sağlanan Uzaktan Eğitim Sistemi'ne Dair YTU Yabancı Diller Yüksekokulu Öğrencileri'nin Kullanıcı Deneyimlerinin (UX) İncelemesi

Değerli Öğrencimiz,

Bu anket, Yıldız Teknik Üniversitesi, Yabancı Diller Yüksekokulu, Temel İngilizce Bölümü Öğretim Görevlisi Damla Tezel Yalkut tarafından Sanat Tasarım Fakültesi İnteraktif Medya Yüksek Lisans tezi için hazırlanmıştır.

Tezin amacı, Covid-19 salgını nedeniyle evde kalma tedbirlerini uygulanırken YÖK kararı ile eğitimin de kaldığı yerden devam edebilmesi amacıyla başlatılması ön görülen ve sizlere üniversitemizin Uzaktan Eğitim Merkezi (UZEM) tarafından sağlanan online eğitim sistemini kullanıcılar, yani sizlerin ve akademisyenlerimizin gözünden değerlendirmektir.
Anket için doğru ya da yanlış cevap yoktur ve katılımınız gönüllülük esasına bağlıdır.
Cevaplarınız tamamen gizli tutulacaktır.
Bu çalışmaya katkılarınız ve samimi cevaplarınız için şimdiden teşekkür ederim.

Araştırmacı: Öğr. Gör. Damla Tezel Yalkut
Yıldız Teknik Üniversitesi
Yabancı Diller Yüksekokulu
Temel İngilizce Bölümü
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1. Yaşınız? _____

2. Cinsiyet ( ) Kadın ( )Erkek ( )Belirtmemeyi tercih ederim.

3. Lütfen sahip olduğunuz cihazları işaretleyiniz. Birden fazla kutucuğu işaretleyebilirsiniz.

( ) laptop ( ) Masaüstü bilgisayar ( ) tablet ( ) akıllı telefon

( ) webcam ( ) televizyon ( ) smart tv ( ) dijital çizim tableti

( ) interaktif kalem (apple pen gibi) ( ) akıllı saat ( ) akıllı ev cihazları

( ) diğer

4. Aşağıdaki aktiviteleri ne sıklıkla yapıyorsunuz?

Her satırda yalnızca bir şıkkı işaretleyin.

	hiç	nadiren	bazen	sıklıkla	her zaman
Televizyon seyretmek	◯	◯	◯	◯	◯
PC/Konsol oyunu oynamak	◯	◯	◯	◯	◯
Netten müzik dinlemek	◯	◯	◯	◯	◯
Netflix gibi araçlardan dizi/film seyretmek	◯	◯	◯	◯	◯
Videolar izlemek	◯	◯	◯	◯	◯
Araştırma yapmak	◯	◯	◯	◯	◯
Eğitim amaçlı kullanmak	◯	◯	◯	◯	◯
Sohbet	◯	◯	◯	◯	◯
Videolu görüşme	◯	◯	◯	◯	◯
Sosyal medya kullanımı	◯	◯	◯	◯	◯
Sosyal Medya için içerik oluşturmak	◯	◯	◯	◯	◯
e-mail	◯	◯	◯	◯	◯
iş amaçlı	◯	◯	◯	◯	◯

5. İnternete hangi ağ ile ne sıklıkla bağlanıyorsunuz?

Her satırda yalnızca birşıkkı işaretleyin.

	Asla	Nadiren	Bazen	Sıklıkla	Her zaman
Mobil Veri	◯	◯	◯	◯	◯
Wi-Fi	◯	◯	◯	◯	◯

6. İnternette günde ortalama ne kadar zaman geçiriyorsunuz?

( )0-1 saat ( )2-4 saat ( )5-7 saat ( ) 8 saatten fazla

7. Evde Wi-fi bağlantınızın hızı ne kadar iyi?

( ) Bağlantı yok ( ) Kötü ( ) Ortalama ( ) İyi ( ) Mükemmel

8. Mobil bağlantı kaliteniz ne kadar iyi?

( ) Bağlantı yok ( ) Kötü ( ) Ortalama ( ) İyi ( ) Mükemmel

9. Aylık mobil veri limitiniz

( ) 1 GB’dan az

( )1-3 GB

( )4-7 GB

( )8-10 GB

( )11-15 GB

( ) 15 GB’dan fazla

10. Aylık harçlığınız

( ) 500 tl’den az

( )500-1000tl

( )1000-1500tl

( )1500-2000tl

( )2000tl’den fazla

11. Ailenizin aylık ortalama geliri

( )2500 tl’den az

( )2500-5000tl

( )5001-7500tl

( )7501-10.000tl

( )10.000tl’den fazla

12. Teknolojiyi ne sıklıkla eğitim amaçlı kullanıyorsunuz?

( ) asla ( ) nadiren ( ) bazen ( ) sıklıkla ( ) her zaman

13. Daha önce uzaktan eğitim deneyiminiz oldu mu? ( ) Evet ( ) Hayır

14. Daha önce bir sosyal mecra için içerik oluşturdunuz mu? ( ) Evet ( ) Hayır

15. Aşağıdaki sosyal mecraların hangilerini ne sıklıkla kullanıyorsunuz?

Her satırda yalnızca bir şıkkı işaretleyin.

	asla	nadiren	bazen	sıklıkla	her zaman
Instagram	◯	◯	◯	◯	◯
Facebook	◯	◯	◯	◯	◯
Twitter	◯	◯	◯	◯	◯
YouTube	◯	◯	◯	◯	◯
WhatsApp	◯	◯	◯	◯	◯
TikTok	◯	◯	◯	◯	◯
Snapchat	◯	◯	◯	◯	◯
Skype	◯	◯	◯	◯	◯
Viber	◯	◯	◯	◯	◯
Pinterest	◯	◯	◯	◯	◯
Tumblr	◯	◯	◯	◯	◯
LinkedIn	◯	◯	◯	◯	◯
Vine	◯	◯	◯	◯	◯
Discord	◯	◯	◯	◯	◯
Diğer	◯	◯	◯	◯	◯

		Kesinlikle katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle katılıyorum

16	Teknoloji, eğitim hayatımı organize etmemde yardımcı olur					
17	Teknolojinin sınıfta kullanılması dersleri daha ilgi çekici hale getirir.					
18	Derste bilgisayar ve internet kullanmak zaman kaybı yaratır.					
19	Eğitim amaçlı teknolojiyi kullanmak beni daha üretken hale getirir.					
20	Bir şeyleri öğrenmek için sık sık internete başvururum.					
21	İnternet ve teknolojik aletler bilgi edinmenin en hızlı yollarıdır.					
22	Yeni teknolojileri takip etmeyi severim.					
23	Dersleri internet üzerinden takip edebilmeyi isterim.					
24	Yeni bir teknolojik araçla karşılaştığımda kullanımını kolayca çözebilirim.					
25	Mümkün olduğunca yeni teknolojileri denemekten kaçınırım.					
26	Başkalarına gerektiğinde teknolojik cihazların kullanımını anlatırım.					
27	İnternette aradığım bilgiye kolayca erişirim.					

Appendix 3. Controlled Remote Usability Testing Tasks:

When the session began, the following tast directions were given to the participants:

1. To begin the teaching session, please take the presenter mode.
2. Please upload an existing file in either pdf or ppt (powerpoint) format to present to your students.
3. Please try to draw, write or highlight something on the presentation.
4. Please delete something you drew on the presentation.
5. Please allow other users to write on the presentation.
6. Please share your computer's screen with the students.
7. While you are sharing your screen, open a ppt file to present.
8. Try muting other participants.
9. Please create breakout rooms.
10. Try sending a pdf file to your participants.
11. Try to find a way of communicating with your students without camera or audio.
12. Log out of the system by ending the session.

Appendix 4. Post-use Questionnaire for YTU SFL Instructors

User Experience Analysis on UZEM's Distance Education Platform

This part of the questionnaire aims to evaluate your feelings and attitude towards UZEM's Distance Education Platform provided by BigBlueButton Web Conferencing System.

		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1	The navigation language on the platform is easy to understand.					
2	Reaching the log in page is easy.					
3	I can create my classes on time.					
4	The icons used in the platform makes using the platform easier.					
5	The instruction language on the platform is very clear.					
6	I can easily find how to upload a document to the platform.					
7	I can easily upload any document from my computer.					
8	I can easily share my own screen with the students.					
9	I can easily find the tools to hand write or type.					
10	When I upload a file from my computer, there isn't any delay.					
11	When I share a screen or tab from by computer, there isn't any delay.					
12	Shared notes section is very easy to use while teaching.					
13	Public chat allows me to effectively communicate with students.					
14	I can easily create rooms for groups.					
15	I find it easy to visit group rooms to conduct my teaching.					
16	Creating rooms section allows me to observe and guide					

	group activities as effectively as physical classroom.					
17	I can use flipbook on the platform very effectively.					
18	Listening recordings from the flipbook play uninterruptedly.					
19	Listening recordings shared from YouTube play uninterruptedly.					
20	I can easily use the writing tool as if I am writing on a whiteboard.					
21	I do not feel the absence of physical classroom with this platform.					
22	I can easily give feedback to the students on this platform.					
23	The platform warns me when I make a mistake.					
24	The platform provides me with adequate support messages while using it.					
25	The platform uses visual elements effectively to guide me.					
26	I can easily find my way while using the platform.					
27	I can always undo my mistakes.					
28	I can easily remember how to use the platform at each log in.					
29	The platform is appealing to look at.					
30	Teaching on this platform allows me to spend less effort compared to teaching in a physical classroom.					
31	I would prefer teaching in a physical classroom to distance education on this platform.					

32. While teaching on this platform, I feel... (You can choose more than one option.)

( ) safe ( ) exposed ( ) annoyed ( ) pleased ( ) comfortable

( ) lonely ( ) ridiculous ( ) concerned ( ) hopeful ( ) excited

( ) bored ( ) overwhelmed ( ) disappointed ( ) hesitant

( ) insecure ( ) powerful ( ) powerless ( ) uneasy ( ) stressed

( ) relaxed ( ) out-of-date ( ) up-to-date

34. What is your biggest concern about using this platform?

35. What is the most pleasing thing about using this platform?

36. What is the most distressing/worst thing about using this platform?

37. Do you have any other comments about the platform?

Thank you for your kind responses. Your contribution to this study is very much appreciated.

Ins. Damla Tezel Yalkut

Appendix 5. Post-Use Questionnaire for YTU SFL Students

UZEM'in Uzaktan Eğitim Sistemi Üzerine Deneyimleriniz

Bu bölümdeki sorular yakın zamanda deneyimlemeye başladığınız uzaktan öğrenim platformuna yöneliktir.

		Kesinlikle katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle katılıyorum
1	Sistemin bizi yönlendirmek için kullandığı dil oldukça anlaşılır.					
2	Sisteme giriş sayfasına ulaşmak oldukça kolay.					
3	Derslere zamanında katılabiliyorum.					
4	Sistemde kullanılan ikonlar kullanımı kolaylaştırıyor.					
5	Public Chat kısmı ile arkadşalarım ve öğretmenim ile kolayca iletişim kurabiliyorum.					
6	Derslere mikrofon ile katılmak dersi ilgi çekici kılıyor					
7	Gerçek bir sınıfın eksikliğini sistem sayesinde hissetmiyorum.					
8	Sistem hata yaptığımda beni uyarıyor.					
9	Sistem beni yönlendirmek için görsel öğelerden faydalanıyor.					
10	Sistemin kullanımını çözmek oldukça kolay.					
11	Sistemde hatalarımı kolayca geri alabilirim.					
12	Her girişimde sistemin kullanım şeklini kolaylıkla hatırlayabilirim.					
13	Öğretmenimin paylaştığı ekranı takip etmek öğrenmemi kolaylaştırıyor.					
14	Uzaktan eğitim dikkatimi daha uzun süre derste tutmamı sağlıyor.					
15	Arkadaşlarımla yan yana olayı uzaktan eğitime tercih ederim.					
16	Materyalleri ekrandan takip etmek daha kolay.					

17	Uzaktan eğitim esnasında grup odalarında çalışmak oldukça faydalı oluyor.					
18	Öğretmenim ile uzaktan eğitim esnasında iletişim kurmak oldukça kolay.					
19	Uzaktan eğitim ekranı görünüm olarak sıkıcı geliyor.					
20	Uzaktan eğitim ile öğrenmek sınıfta öğrenmekten daha çok yorucu.					
21	Sınıf ortamını uzaktan eğitime tercih ederdim.					
22	Uzaktan eğitimi zaman kaybı olarak görüyorum.					
23	Eğitimime uzaktan eğitim ile devam etmek isterim.					

24. UZEM'in Uzaktan Eğitim Sistemi'nde eğitim görmek bana ..... hissettiriyor. (Birden fazla seçenek işaretleyebilirsiniz.)

( ) güvende ( ) rahatsız ( ) sinir bozucu ( ) memnun ( ) rahat

( ) yalnız ( ) gülünç ( ) endişeli ( ) çağdaş

25. Bu sistemi kullanırken yaşadığınız en büyük endişeniz nedir?

26. Sistemin sizce en tatmin edici özelliği nedir?

27. Sistemin sizce en rahatsız edici özelliği nedir?

28. Sistem hakkında eklemek istediğiniz bir şey varsa lütfen yazınız.

Bu çalışmaya katkılarınız için içtenlikle teşekkür ederim.

Öğr. Gör. Damla Tezel Yalkut

Appendix 6. Demographic Data **of** Generations**: Gen. X**

		Generation X (64-84)				
Items owned	Laptop	16				64
	Desktop Computer	6				24
	Tablet	10				40
	Smart Phone	17				68
	Non-Smart Phone	1				4
	Webcam	5				20
	TV	8				32
	Smart tv	10				40
	Digital drawing tablet	2				8
	Interactive pen	2				8
	Smart watch	3				12
	Smart home appliances	3				12
	Game console	2				8
Activities		never	rarely	sometimes	often	always
	Watching TV		8	3	4	3
	PC/ Console Gaming	15			2	1
	Listening to music			5	6	7
	Mobile Gaming	11	5		1	1
	Using streaming services (e.g. Netflix)		4	2	6	6
	Watching videos on the Internet		1	6	5	6
	Online research	1	1	5	6	5
	Online studying	1	5	8	2	2
	Chatting	2	5	3	6	2
	Video Calling		6	9	3	
	Using social media	1	5	1	7	4
	Creating content for social platforms	12	4		2	
	e-mail checking,writing			5	7	6
	Professional requirements	1	1	7	4	5
mobile data limit	1-3 GB	1				
	4-7 GB	5				
	8-10 GB	7				
	more than 15 GB	5				
Time spent on the Internet	0-1 hour	1				
	2-4 hours	10				
	4-6 hours	6				
	more than 7 hours	1				

		Never	Occasionally	Sometimes	Often	Always
Social Media Use	Instagram	4		1	10	3
	Facebook	8	2	2	5	1
	Twitter	5	4	4	1	3
	YouTube		1	4	7	6
	WhatsApp				6	12
	TikTok	17	1			
	Snapchat	16	2			
	Skype	8	9	1		
	Viber	18				
	Pinterest	11	5	1		1
	Tumblr	16	2			
	LinkedIn	13	3	1	1	
	Vine	18				
	Discord	16	2			

		yes	no
	Online Learning Experience	8	10
	Online Teaching Experience	3	15

Appendix 7. Demographic Data of Generations: Gen. Y

		Generation Y (85-94)				
Items owned	Laptop	7				
	Desktop Computer	7				
	Tablet	4				
	Smart Phone	7				
	Non-Smart Phone	-				
	Webcam	3				
	TV	1				
	Smart tv	6				
	Digital drawing tablet	1				
	Interactive pen	1				
	Smart watch	4				
	Smart home appliances	4				
	Game console	3				
Activities		never	rarely	sometimes	often	always
	Watching TV		1	5	1	
	PC/ Console Gaming	4		1	1	1
	Listening to music	1			3	3
	Mobile Gaming	3	2		2	
	Using streaming services (e.g. Netflix)				3	4
	Watching videos on the Internet		1	1	3	2
	Online research			1	3	3
	Online studying		1	2	2	2
	Chatting		1		2	4
	Video Calling		3	3		1
	Using social media				3	4
	Creating content for social platforms	2	1	3		1
	e-mail checking,writing				2	5
	Professional requirements				3	4
mobile data limit	1-3 GB					
	8-10 GB	2				
	11-15 GB	3				
	more than 15 GB	2				
Time spent on	0-1 hour					
	2-4 hours	1				
	4-6 hours	4				

	more than 7 hours	2				
		Never	Occasionally	Sometimes	Often	Always
Social Media Use	Instagram				4	3
	Facebook	2	3	2		
	Twitter	3			3	1
	YouTube			2	4	1
	WhatsApp				1	6
	TikTok	7				
	Snapchat	7				
	Skype	3	4			
	Viber	7				
	Pinterest	3	1		3	
	Tumblr	7				
	LinkedIn	1	2	4		
	Vine	7				
	Discord	6	1			
		yes			no	
	Online Learning Experience	4			3	
	Online Teaching Experience	1			6	

CURRICULUM VITAE

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