

To My Grandmother

THE INFLUENCE OF USING QR CODES AS AN INFORMATION
DELIVERY METHOD TO INCREASE USER ENGAGEMENT IN
EXHIBITION SPACES

The Graduate School of Economics and Social Sciences
of
İhsan Doğramacı Bilkent University

by

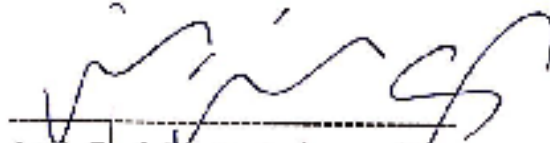
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June 2019

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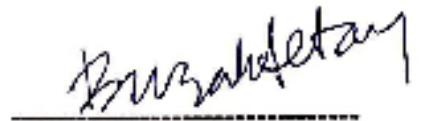
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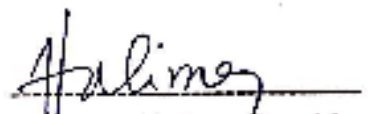
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ABSTRACT

THE INFLUENCE OF USING QR CODES AS AN INFORMATION DELIVERY METHOD TO INCREASE USER ENGAGEMENT IN EXHIBITION SPACES

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The use of QR codes as an information delivery method and its' effects on visitor engagement in exhibition spaces is investigated in the present thesis. The use of QR codes as an information delivery method and its' resulting effects on visitor engagement in terms of visitors' experiences of learning and social interaction are examined. Moreover, if younger people are more likely to use QR codes in comparison to middle-aged participants is studied during the study. A field experiment that applied the analysis of the timing data and questionnaire was conducted with 63 participants in two different conditions at an art gallery. The control condition consisted of traditional information labels with an informative text while the experiment condition consisted of information labels with a QR code directing visitors to a designed website of artworks' explanations. The results of the study are expected to construct a basis on implementing the QR code technology in exhibition environments to improve visitors' interaction level with exhibited objects.

Keywords: Exhibition Spaces, Information Delivery Methods, QR Codes, Visitor Attention, Visitor Engagement

ÖZET

SERGİ ALANLARINDA BİLGİ AKTARIMI YAPILIRKEN KARE KOD KULLANIMININ ZİYARETÇİ KATILIMI ÜZERİNDEKİ ETKİLERİ

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Tezde bilgi aktarımı yöntemi olarak kare (QR) kodlarının kullanımını ve bunun sergi alanlarında ziyaretçi katılımı üzerindeki etkilerini incelenmektedir. Çalışma aynı zamanda kare kodlarının kullanımını ve bunun ziyaretçilerin öğrenme ve sosyal etkileşim deneyimleri üzerindeki etkilerin incelenmektedir. Ayrıca, gençlerin yaşlı ziyaretçilere kıyasla kare kodlarını kullanma olasılığının daha yüksek olup olmadığı araştırılmaktadır. Bir sanat galerisinde iki farklı döngüde 63 katılımcı ile zaman verilerinin ve anketlerin analizini yapan bir saha deneyi gerçekleştirildi. İlk döngü, bilgilendirici bir metin içeren geleneksel bilgi etiketlerinden oluşurken, ikinci döngü, ziyaretçileri bir kare kod aracılığıyla sanat eseri açıklamalarının yer aldığı web sitesine yönlendiren bilgi etiketlerinden oluşmaktaydı. Çalışmanın sonuçlarının, ziyaretçilerin sergi objeleriyle etkileşim seviyesini arttırmak amacıyla kare kod teknolojisinden faydalanmanın sergi alanlarında uygulanmasına yönelik bir temel oluşturması beklenmektedir.

Anahtar Kelimeler: Bilgi Aktarımı Yöntemleri, Kare (QR) Kodlar, Sergi Alanları, Ziyaretçi Dikkati, Ziyaretçi Katılımı

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CHAPTER 1

INTRODUCTION

Over the years, museum curators and gallery managers have been concerned with increasing their visitors' engagement in exhibition spaces. To achieve this goal, researchers studied the factors affecting attracting and holding visitor attention; visitors' engagement level is influenced by visitor and exhibit characteristics (Falk, Koran Jr., Dierking, & Dreblow, 1985). First, visitor factors are demographic characteristics (Bitgood, 2002) and visitor profiles (Dean, 1994; Hooper-Greenhill, 1999; Serrell, 1996). Second, exhibit factors can be divided into exhibit characteristics (Borun & Dritsas, 1997), information delivery methods (vom Lehn, 2006) and exhibit label design (Bitgood, 1989; Chang, 2006a; Serrell, 1983). These factors play a critical role in understanding visitors' behavior. Considering these factors affect visitors' engagement in exhibition spaces.

Regarding visitor and exhibit factors, massive expansion of mobile digital technologies leads museum and gallery administrations to find new interactive ways of presenting their collections to their visitors. QR codes are one of these mobile digital technologies that provide an innovative way of delivering information. QR codes are two-dimensional barcodes created for delivering digital information. QR codes have become very popular in recent years because they deliver a wide range of data at a sufficient speed. Also, any user having a smartphone can reach the information by scanning the QR code to obtain the information through a link to a website (Shin, Jung, & Chang, 2012). In addition, QR codes are a cost-effective alternative of mobile digital technologies compared to other media tools. While QR codes are widely used across the world within the marketing sector (Demir, Kaynak, & Demir, 2015), the use of QR codes is gradually expanding in cultural life and museums (Chivarov, Ivanova, Radev, & Buzov, 2013). The use of QR codes as an information delivery method can improve visitor engagement by supporting their learning experience. Moreover, QR codes can facilitate and enrich communication between the visitors and exhibit objects by offering additional data such as graphics, audio, and, video, etc.

1.1. Aims and Hypotheses of the Study

Previous studies done on the use of QR codes in museums and galleries focused on implementing QR codes in an institution and surveying the participants (Schultz, 2013). There is little information in the literature investigating the use of QR codes as an information delivery method and its' resulting effects on visitor engagement (Pérez-Sanagustín, Parra, Verdugo,

García-Galleguillos, & Nussbaum, 2016). Also, a lack of comparative studies is another gap in the literature.

To fill the gap in the literature, the main purpose of this thesis is to explore “How does using QR Codes as an information delivery method influence user engagement in exhibition spaces?” The first Hypothesis of the study is “Using QR Codes as an information delivery method is positively correlated with user engagement in exhibition spaces.” The study aimed to discover if the QR codes influence visitor engagement by compare the viewing time of traditional information labels with informative text and QR code implemented information labels. Moreover, the influence of using QR codes for delivering information to visitors’ learning experience will be studied. The effects of implementing a communication tool for visitors to interact with each other will be examined in terms of the relationship between social interaction and visitor engagement. In addition, the exhibit label factors and its’ affects on visitor engagement will be studied.

The second aim of the study is to investigate “How are younger people more likely to use QR codes in exhibition spaces?” The second Hypothesis is “Younger people are more likely to use QR Codes in exhibition spaces.” According to the previous studies, mostly young people use QR codes because it requires a smartphone and knowledge on how to use the QR codes (Schultz 2013). Moreover, younger adults adapt to these new technologies easier than middle-aged participants (as cited in Schultz, 2013). Therefore, the study aims to explore the reactions of middle-aged

participants, and their degree of adaptiveness to the QR code technology. Also, another aim of the study is to compare the preference levels of designer and non-designer participants while they are using the QR codes. Last, the exhibit viewing times of participants with different nationality groups will be compared to understand the influence of nationality on using QR codes.

1.2. Structure of the Thesis

This thesis consists of six chapters. The first chapter is introductory to the thesis and the aims of the study. The issue will be presented with the key elements that are going to be discussed in the further chapters in accordance with previous studies. Lastly, Hypothesis 1 and Hypothesis 2 is presented.

The second chapter will cover previous literature on visitor engagement in exhibition spaces and QR codes. First, visitor engagement will be explained in terms of two categories. These categories are the factors affecting visitor engagement and defining the measures of visitor attention. Secondly, a brief explanation of QR codes will be done followed by the examination of previous QR code studies in museums.

In the third chapter methodology of the thesis will be explained firstly by stating the approach of the study. The procedure of the thesis will be covered. The procedure of the study will indicate the pilot study, participants and experiment place, analysis of the exhibit objects, and analysis of the

information delivery methods. Last, measurement and instruments of the method will be justified.

In the fourth chapter, the results of the study will be explained. The demographic characteristics of the participants will be studied. Moreover, the analysis of the timing data and survey data will be covered under the analysis of quantitative data. The analysis of the qualitative data will be evaluated.

In the fifth chapter, a discussion of the findings will be done in accordance with the previous literature presented in the second chapter. In the sixth chapter, the limitations and conclusions about the study will be done. Last, suggestions for further studies will be proposed.

CHAPTER 2

LITERATURE REVIEW

Museums and exhibition spaces present artworks to visitors for their self-education and satisfaction. Visitor studies have an important role to understand visitor behavior and engagement in an exhibition environment. Researchers and museum curators have long been investigating visitor engagement in terms of two categories:

- Factors affecting visitor engagement and
- Measures of visitor attention, which will be covered to explain visitor engagement in exhibition spaces.

2.1. The Factors Affecting Visitor Engagement

Previous studies have demonstrated that visitor, environmental, and exhibit factors influence visitor engagement (Falk et al., 1985). To answer the research question mentioned previously, this review will only be focusing on visitor and exhibit factors. First, visitor factors will be studied to investigate the relationship between visitor factors and visitor engagement. Second, exhibit factors will be studied under two subcategories of information delivery methods and exhibit labels to understand the exhibit characteristics that are affecting visitor engagement in exhibition spaces.

2.1.1. Visitor Factors

Visitor factors influence visitor engagement in exhibition spaces. Research conducted regarding this issue covered various visitor factors such as visitor characteristics, learning, and social interaction.

2.1.1.1. Visitor Characteristics

Visitor satisfaction is related to visitors' expectations and needs. These variables are formed by visitor characteristics and profiles. Demographic characteristics affect visitors' engagement in exhibition spaces. Visitor variables affecting the visitor behavior are characteristics of age, gender, education level, profession, and nationality (Bitgood, 2002). In general, museum visitors are more likely to be in upper education and income groups, younger than the population and more active in different social groups (Hood, 1983). Koran and Koran (1983) stated that adult males seem to cover more elements in a shorter range of time while adult females focus attention to one

object and linger longer.

Visitor profiles influence visitor engagement in exhibition spaces. According to the characteristics of the visitors, researchers identified three different categories of visitor profiles (Dean, 1994; Hooper-Greenhill, 1999; Serrell, 1996). Hooper-Greenhill identified a number of profiles according to visitors' physical and social characteristics. These groups are families, educational groups, tourists, leisure learners, elderly and people with visual auditory, mobility or learning disabilities (Hooper-Greenhill, 1999).

Dean (1994) categorizes visitor profiles into three types. According to his study these are casual visitors, cursory visitors, and learners. Casual visitors are identified as 'people who rush' which describes the visitors who do not pay much attention to exhibit objects. Cursory visitors are identified as 'people who stroll' which describes the visitors who are more stimulant to the exhibit objects but still do not pay much attention to read labels and are not actively engaged with the exhibit objects. Learners are identified as 'people who study' which describes those who spend most of their time reading the labels, closely examining the exhibit objects and absorbing all the information available for them during their visit. These characteristics can differ according to prior experiences and education levels of visitors (Dean, 1994).

Serrell (1996) generated a similar categorization of visitor profiles with Dean (1994). She argues that there are three types of profiles as the transient, the sampler, and the methodical viewers. However, Serrell (1996) suggested that

grouping visitors' profiles is not a subjective and useful method for conducting visitor studies. To measure visitor engagement, it is more sufficient to learn the average time spent at the exhibition environment.

Finally, in addition to visitor characteristics and profiles, leisure values are key factors affecting visitor engagement in exhibition spaces. According to Hood (1983), visitors decide on how they satisfy their leisure experience including their museum visits. There are different attributes affecting visitors' decisions on how they use their leisure time. These attributes are learning, social interaction, actively participating, having new experiences and feeling comfortable in ease of use while experiencing new activities. Learning and social interaction will further be explained in the following sections while actively participating, having new experiences and ease of use when experiencing new activities will be covered in exhibit factors chapter.

2.1.1.2. Learning

For the purpose of increasing visitor engagement, museums should provide multiple experiences to their visitors such as emotional and aesthetic delight, learning and sociability (Ahmad, Abbas, Yusof, & Mohd.Taib, 2015). Museum curators see the role of the museums evolving from only presenting exhibit objects to multi-functional facilities. Besides their other functions, museums are now seen as important sources of information and educational spaces (Othman, 2012).

Museums and exhibition spaces offer learning and educational leisure to their visitors enabling visitor satisfaction and engagement correlated with the experience of learning (Ahmad, Abbas, Yusof & Mohd.Taib, 2015). This chapter will cover the factors affecting visitors' learning experience.

Perry (2012) studied the visitor learning to have an understanding of visitor engagement through factors affecting their learning experience. She discovered six motivation types that exhibit and information delivery methods need to fulfill to enhance visitors' engagement in learning. These affect visitors' engagement and determine the outcomes of their behavior (Figure 1). According to the visitor-learning scheme, motivations influence visitor engagement and key factors of the visitor engagement shape visitor behavior outcomes. Table 1 explains the effects of motivation types to visitor behavior in terms of their learning activity.

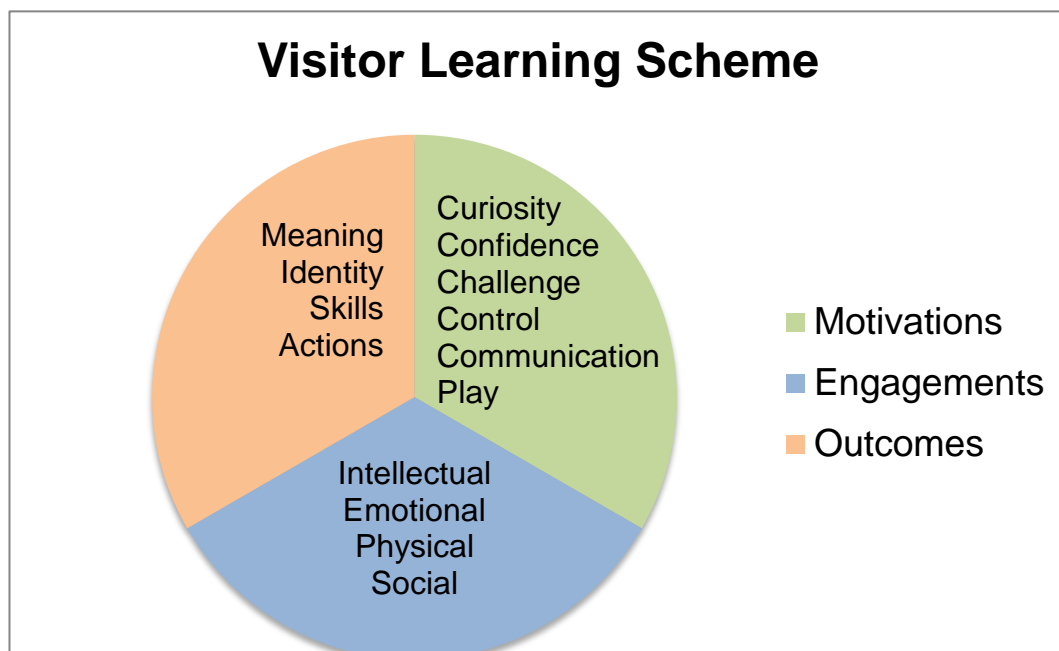


Figure 1. Illustration of the Selinda Model of Visitor Learning (Created by Görel, 2019) Source: Ahmad, Abbas, Yusof & Mohd. Taib. (2015); Perry (2012).

Table 1. Detailed Examination of Selinda Model of Visitor Learning (Created by Görel, 2019)

Types of Motivation	Engagement	Behavior of Visitors
1.Curiosity	Intellectual	Curiosity of visitors towards the information being delivered
2.Confidence	Emotional	The feeling of achieving something because of the learning activity
3.Challenge	Emotional	A degree of challenge in learning new things
4.Control	Physical	Having the power to control the environment
5.Communication	Social	Encouraging social interaction and group discussions among other visitors
6.Play	Social	Playfulness, ability to engage imagination

Sources: Perry (2012); Ahmad, Abbas, Yusof & Mohd. Taib. (2015).

Visitors' active learning is enhanced by the technology integrated information delivery methods (Othman, 2012). Mobile digital technologies provide various information delivery techniques to enable new forms of interactions among visitors and exhibit objects (Heath & vom Lehn, 2008). These could support a learning environment where users are given alternative ways to explore exhibit objects that suit their preferences (Othman, Petrie, & Power, 2013). According to Heath & Lehn, visitors participation is directly related to various forms of information being delivered in exhibition spaces (Heath & vom Lehn, 2008). They argue that computer-based interactive exhibitions and information delivery techniques enhance visitor engagement and increase

learning through interactivity.

2.1.1.3. Social Interaction

Museum visitation becomes a social experience. Therefore, exhibitions often influence group discussions and social interaction. There is research indicating a relationship between social interaction and visitor engagement in exhibition spaces (Bitgood, 2002; vom Lehn, 2006; Sandifer, 1997). Bitgood (2002) states that the majority of visitors visit exhibitions with their friends or families. According to Sandifer (1997), family members visiting exhibition together are engaged with the exhibits more than non-family visitors. Vom Lehn (2006) found that visitors share their experience with their companions while visiting an exhibition through verbal and bodily actions. These interactions affect how visitors experience the exhibition and how they examine the exhibit elements. Group visitors attend to museum experience as a social unit (Goulding, 2000). Vom Lehn (2006) suggests to the designers and curators that while interpretation of resources such as exhibit labels, touch-screens or any other additional information delivery methods, social interaction should be taken into consideration. As a result of the previous studies, sociability is a key factor for increasing visitor engagement.

2.1.2. Exhibit Factors

Exhibit objects are the main factors affecting attracting and holding times and visitors' attention in exhibition spaces. In this section, exhibit factors, exhibit characteristics, information delivery methods and exhibit labels will be examined.

Previous research established that exhibit characteristics affect visitor engagement. For example, static, soundless and small objects hold visitors' attention to a smaller degree (Bitgood, 2002; Borun & Dritsas, 1997; Melton, 1972; Bitgood, Patterson & Benefield, 1988; Peart, 1984; Sandifer, 2003; Serrell, 1997; Serrell, 2002). On the other hand, moving (Melton, 1972) large (Bitgood, Patterson, & Benefield, 1988) and sound emitting (Peart, 1984) exhibits hold visitors' attention in a greater degree. Sandifer (2003) claims that interactive exhibits increase the average time per exhibit spent by visitors.

Bitgood (2002) examined exhibit characteristics to find their relationship to visitor engagement. He found that salience, and distinctiveness of an exhibit object influences the visitor attention. Exhibit object's degree of salience increases its' noticeability. Isolation, size, contrast with setting background, multi-sensory characteristics, lighting, line of sight placement are the exhibit object's characteristics of distinctiveness.

Borun & Dritsas (1997) proposed seven exhibit characteristics that attract and hold visitor attention (see Table 2). These characteristics influence visitor engagement and promote their learning activity.

Table 2. Exhibit Characteristics (Created by Görel, 2019)

Exhibit Characteristics	Explanations
1.Multisided	Visitors can cluster around the exhibits
2.Multiuser	Exhibits allow visitors to interact
3.Accessible	Comfortably used by all of the visitors regardless of their age, sex, and abilities
4.Multioutcome	Observations and outcomes encourage group discussions
5.Multimodal	Provide different learning methods and a variety of knowledge
6.Readable	Easy to read
7.Relevant	Satisfy new cognitive links to visitors knowledge

Source: Borun & Dritsas (1997)

2.1.3. Information Delivery in Exhibition Spaces

The museum experience is enhanced by the quality and quantity of the learning activity as was previously mentioned. Learning is correlated with the methods of information delivery methods and exhibit label characteristics. In this section of the review, these two sub-categories will be examined.

2.1.3.1. Information Delivery Methods

According to vom Lehn (2006), in order to facilitate collaborative engagement with exhibit objects, information delivery methods such as exhibit labels, text panels as well as technological devices play a critical role on engaging visitors' attention. These materials should be integrated into the exhibition spaces to enhance visitor engagement.

Russell (1994) states that museums should provide meaningful and enjoyable experiences to facilitate learning. Following this, museums have started to study additional ways of delivering information and offer different kinds of learning activities to their visitors. In this way, museums have created a variety of learning experiences that could satisfy different visitor profiles (see Chapter 2.1.1.1).

Othman (2012) claims that enjoyment, creativity, and inspiration are important features of information delivery methods. Therefore, using mobile digital technologies as an information delivery method may provoke creative and innovative thoughts during visitors' museum experience. Othman (2012) claims that the integration of technology into learning methods is affects visitors' problem-solving abilities and creative thought.

2.1.3.2. Exhibit Labels

Behavior related to exhibit labels is a significant variable for measuring visitor engagement and learning in exhibition spaces. Exhibit labels play a critical role in visitors' cognitive learning. According to Gutwill (2006), exhibit labels

offer different perspectives, challenge assumptions, and provide explanations. Chang (2006) remarks that exhibit labels are fundamental learning tools in museum and exhibition spaces. It is essential to examine visitors' behavior on reading exhibit labels, because labels may create different learning results (Chang, 2006). Therefore, label development has been an important concern of the researchers in the past years (Bitgood, 1989). Researchers and museum curators have been studying exhibit labels to understand their relationship to visitor engagement. There are different approaches to exhibit label studies. Exhibit labels are examined in two focus points to understand its' relationship with visitor engagement (Bitgood, 1989; Bitgood, 1991; Bitgood, 2000; Bitgood, 2002; Chang, 2006; Serrell, 1983). The first approach is defining exhibit label characteristics for designing effective exhibit labels. In the second one, researchers studied the relationship between visitors' label reading behavior with visitor attention. In the following pages we will examine these two focus areas according to the related literature.

2.1.3.2.1. Factors Influencing Label Reading

Bitgood (1989) studied the parameters of effective label design. He offered 16 major empirical factors that influence visitors' label reading behavior. Definitions and suggestions about these empirical factors are explained in Table 3.

Table 3. Empirical Factors Influencing Label Reading (Created by Görel, 2019)

Factors	Definitions	Suggestions
1.Label Length	<ul style="list-style-type: none"> • Number of words, sentences, and lines 	<ul style="list-style-type: none"> • Visitors prefer to read short labels. • Visitors' number of stops is higher if the text on the label is shorter
2.Label Placement: Vertical Position	<ul style="list-style-type: none"> • Placement of labels in accordance with the floor height 	<ul style="list-style-type: none"> • Visitors do not seem to notice labels placed above eye level • Studies suggest to place labels 122-167 cm above ground level
3. Label Placement: Relational Position	<ul style="list-style-type: none"> • Labels' relationship with other labels, objects, and architectural elements as entrances, exits, circulation paths 	<ul style="list-style-type: none"> • Labels should be within the visitors' line of sight • Labels should be placed near the exhibits and easily accessed • Labels close to exits receive low attention
4.Size of Letters and Graphics	<ul style="list-style-type: none"> • Size of the texts and graphics on the labels 	<ul style="list-style-type: none"> • Larger letters draw more attention
5.Density of Labels	<ul style="list-style-type: none"> • The number of labels placed on the exhibiton space 	<ul style="list-style-type: none"> • High density of labels is associated with a low probability of viewing

Table 3. (Cont'd)

6. Figure-Ground Contrast	<ul style="list-style-type: none">• Figure-ground contrast between lettering and label background color	<ul style="list-style-type: none">• There should be sufficient contrast between lettering and label background color
7. Subject Matter	<ul style="list-style-type: none">• Content and grammar of the text	<ul style="list-style-type: none">• The text should not be too technical• Human interest can be increased by the use of a good style of language
8. Cueing	<ul style="list-style-type: none">• Written instructions or signs	<ul style="list-style-type: none">• Cueing can stimulate visitors' attention
9. Movement	<ul style="list-style-type: none">• Movement in labels	<ul style="list-style-type: none">• Movement can attract visitors'
10. Multi-Sensory Inputs	<ul style="list-style-type: none">• Sensory inputs added to labels	<ul style="list-style-type: none">• Sensory inputs such as sound and touch increases visitor attention
11. Manipulative Stimuli	<ul style="list-style-type: none">• Label designs that provokes manipulative stimulation	<ul style="list-style-type: none">• Flip labels can be used to attract visitors' attention
12. Color	<ul style="list-style-type: none">• Interpretation of color into text or label background	<ul style="list-style-type: none">• Not enough studies found in the literature
13. Diagrams, Illustrations and Photographs	<ul style="list-style-type: none">• Interpretation of diagrams, illustrations and photographs to exhibit labels	<ul style="list-style-type: none">• Such interpretation does not have an universally enhancing effect• Visuals placed on the labels can distract visitors' attention
14. Typography	<ul style="list-style-type: none">• Style, arrangement, and appearance of the text	<ul style="list-style-type: none">• Line length, spacing, and justification are important aspects

Table 3. (Cont'd)

15. Ambiguous Coding	<ul style="list-style-type: none">• Coding system for visualizing exhibits	<ul style="list-style-type: none">• Visitors may have difficulty understanding a particular coding system
16. Size of the Label's Background	<ul style="list-style-type: none">• Label's background size	<ul style="list-style-type: none">• Can be useful if there are many objects that are visually competing with each other

Source: Bitgood (1989); Serrell (1983).

2.1.3.2.2. Exhibit Label Design

Bitgood (1991) proposed three categories of visitor attention that help designers and museum curators to produce more effective exhibit labels.

These components are: knowing your audience, capturing their attention, and holding their attention.

Knowing your audience is the first key factor for creating effective labels in exhibition spaces. Psychological and physiological components need to be clarified to understand audiences' behavior. These components affect visitors' reactions to exhibits. Therefore, Bitgood (1991) suggests that designers should consider them while designing exhibit labels. Bitgood (1991) categorizes them into eight categories (see Figure 2). First, one of the psychological factors is to understand what types of experiences satisfy visitor experiences. The visitor experience is multi-dimensional that consists of four constituents which are cognitive, affective, sensory-perceptual and behavioral experiences. Cognitive experiences influence intellectual stimuli.

Affective constituents are reflected through excitement and satisfaction. Sensory-perceptual experiences occur by the sights, sounds and tactile cues. Psychomotor movements are defined as behavioral experiences that include physical interaction with exhibits. Bitgood (1990) suggests that providing more than one experience to visitors enhance visitor engagement. Visitors can have a hard time recalling the information learned from labels. Bitgood (1991) defines this situation as a cognitive limitation. To eliminate these effects, exhibit labels could be organized in a manner that information is meaningful to visitors. While moving through an environment visitors are most likely to see the objects that fall within their visual field (Bitgood, Benefield, Patterson, 1990), which is referred to as the line of sight placement. Visitors should not give additional effort to find exhibit labels (Bitgood, 1991). Label tags should be placed accordingly to the principles of the line of sight placement. Visitors' decisions of reading or not reading the labels are affected by the cost-benefit principle. It is positively correlated with visitors' interest level in that particular subject area (Bitgood, 1991). When there are too many simultaneous stimulus inputs, visitors have a hard time processing information that is called information overload; therefore, the amount of information delivered to visitors should be carefully decided (Bitgood, 1991). Bitgood (1991) suggests that exhibit labels' content and design should consider visitor preconceptions. Seventh, people visit museums and exhibition spaces for different motivations such as learning something new, social interaction and challenge of new experiences. According to Bitgood (1991), designers should keep in mind these complex motivations for visiting and design effective labels accordingly. Finally, the

human visual system has different limitations (Bitgood, 1991). For instance, middle-aged participants can have visual acuity and lighting level problems. Therefore, the visual system should be designed according to the needs of all visitors.

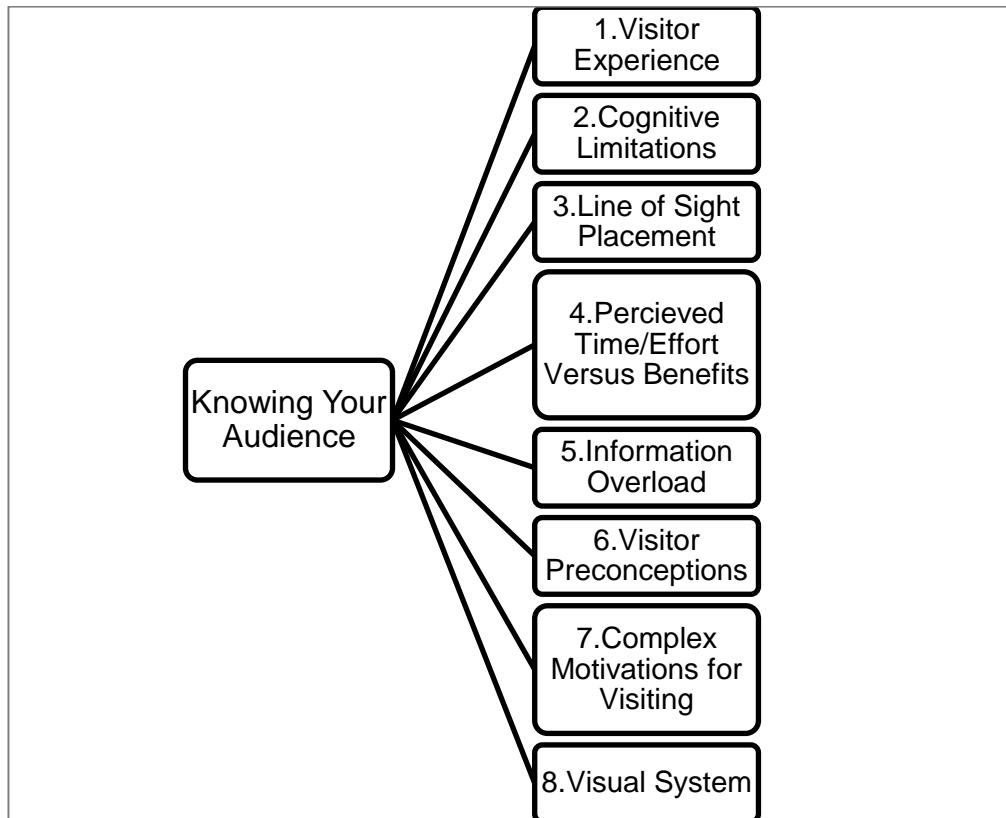


Figure 2. Illustration of the Process of Attention, Knowing Your Audience
(Created by Görel, 2019) Source: Bitgood, (1991).

Capture their attention is the second key factor for creating effective labels in exhibition spaces. Physical characteristics of the labels help capture visitors' attention. Bitgood (1991) examine six characteristics of exhibit labels that influence visitor engagement (see Figure 3). Parallel to the line of sight placement explained in the previous section, label placement is essential for capturing visitors' attention. According to Bitgood (1991) visitors are more

likely to read the labels placed next to the exhibits that require minimum eye movement. According to the researchers (Borun & Miller, 1980; Bitgood, 1998) label length is another variable that influences visitor engagement in exhibition spaces. Shorter labels are more likely to be read than longer labels; texts with less than 75 words have a higher chance of reading (Bitgood, 1991). Moreover, as it is mentioned in the previous section interest levels and perceived time/effort versus benefits affect visitors' motivation to read longer labels. Letter sizes should be easily read from the points that visitors' stop to review the exhibit objects (Bitgood, 1991). According to a study (Bitgood, et al., 1986), the number of readers increased to 15 percent when the font sizes are raised from 18 to 36 point at the exhibit labels. On the other hand, when the font sizes are too large they can compete with the rest of the exhibit objects. Therefore, while designing exhibit labels; font sizes should be carefully considered. Moreover, designers should eliminate glare, shadows and low levels of light that affects the contrast between letters and backgrounds (Bitgood, 1991). Fifth, Bitgood, et al., (1986) states that proximity of labels to objects is important for two major factors. It is important to have labels close to the related exhibit objects to minimize the misunderstandings. Also, the same explanation applies to the label placement principles. Visitors are more likely to read exhibit labels when they provide minimum physical effort for reading the texts. The density of visual stimuli is the last variable that affects capturing audience attention. According to various studies (Bitgood, 1991; Melton, 1935) if labels' visual density is a higher amount of attention given to each exhibit object decreases. If there are too many labels placed in one exhibition space, labels start to compete

with each other and also with the exhibit objects (Bitgood, 1991).

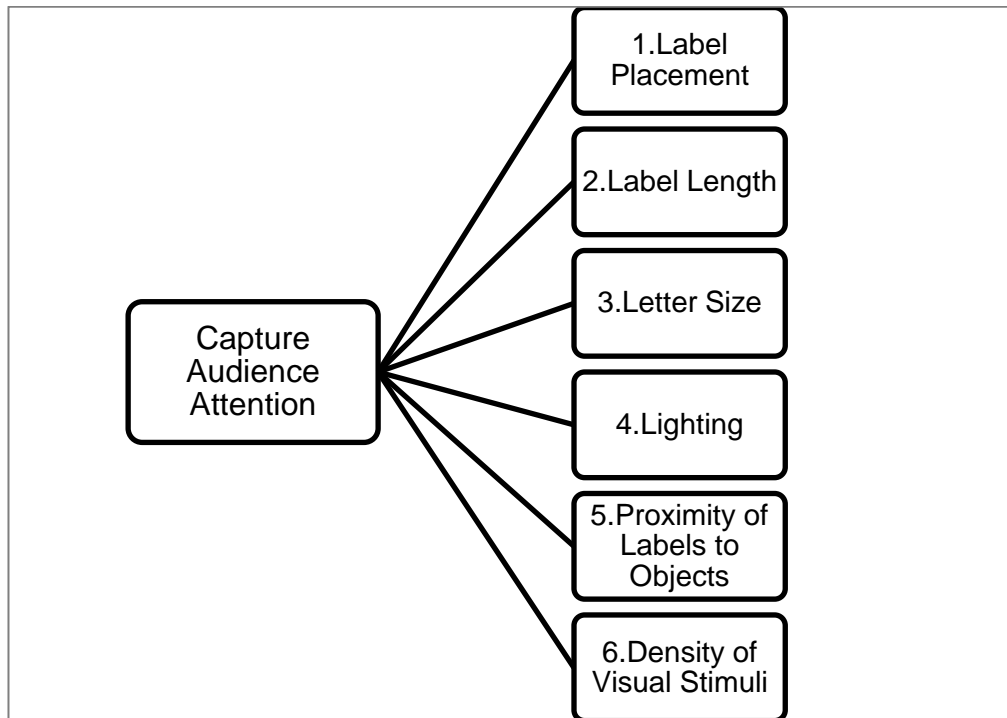


Figure 3. Illustration of the Process of Attention, Capture Audience Attention
(Created by Görel, 2019) Source: Bitgood, (1991).

Hold audience attention is the third key factor for creating effective labels in exhibition spaces. In the previous section factors affecting to capture visitor attention were explained. After capturing audience attention there are 9 sets of variables that enable holding audience attention (see Figure 4). Firstly, the legibility of the text should be considered while creating exhibit labels. There is a lack of studies in this field. However, researchers find a correlation between perceived legibility of text and the parameters such as contrast, letter typography and different typefaces (as cited in Bitgood, 1991). Secondly, visitor interests affect holding audience attention. To have an opinion about visitor interests, museum curators can observe their visitors behavior and prepare questionnaires. Thirdly, audience involvement can be

increased by the label content (Bitgood, 1991). Fourthly, clear language contributes to retaining audience attention. Clear and non-technical language helps visitors to engage with exhibits better than texts with technical words and jargons (Bitgood, 1991). Fifthly, interactivity affects visitor engagement in exhibition spaces. Adding questions and graphics to the labels increase the level of engagement. Sixthly, visitor misconceptions about the subject matter can be eliminated by the use of exhibit labels (Bitgood, 1991). Seventhly, label content should be parallel with the information about the exhibit objects. Eighthly, parallel to the information given under *capture audience attention (label placement, label length and letter size)* physical organization of the labels influence visitor engagement. According to the researchers, there are three different ways of organizing a text (Screven, 1986). Information mapping is a text writing method that enables grouping the text in different visual categories by using visual cues, indentations, diagrams, bold or italic characters and colors (Screven, 1986). Assigning different sizes and weights for primary and secondary texts can affect readability and ability to focus (as cited in Bitgood, 1991). Layering is the second technique used for organizing a text. In order to enable visitors to select the information that they interested in, designers can divide the information into different layers. The last method is to bullet the information to make it easy for visitors to attain information. Ninthly, the exhibition environment should reduce distracting sights and sounds to reduce competing stimuli because visitors often get easily disturbed while reading exhibit labels (Bitgood, 1991).

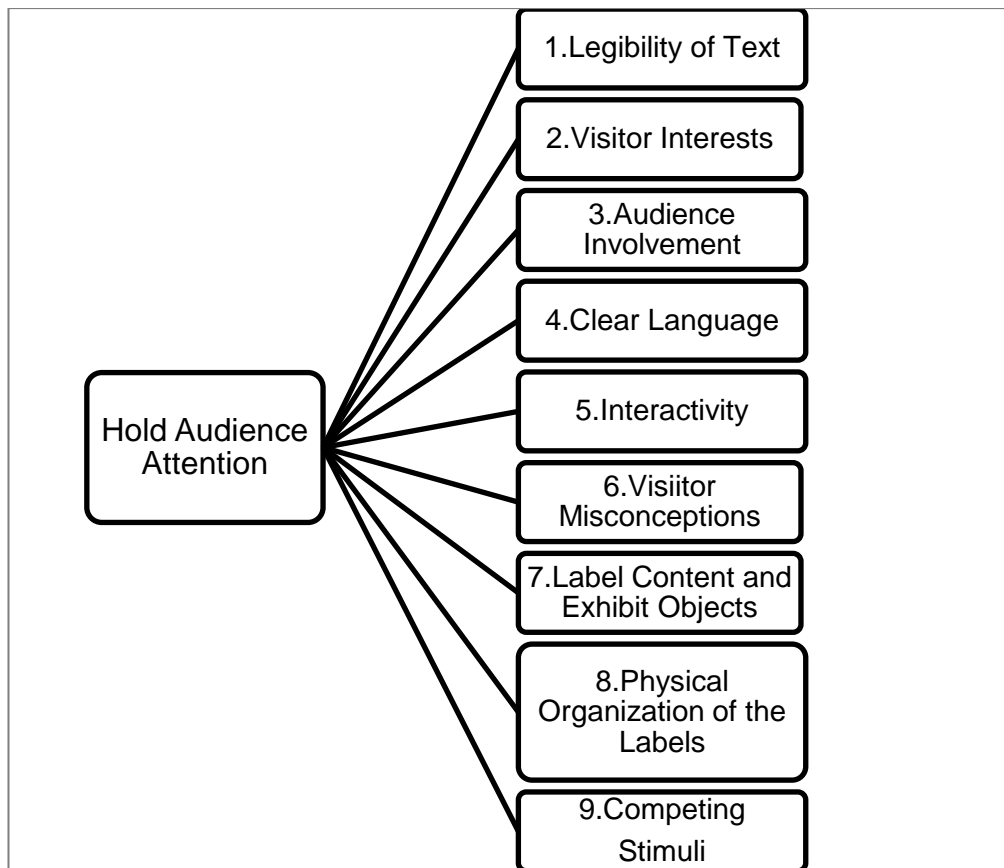


Figure 4. Illustration of the Process of Attention, Hold Audience Attention
(Created by Görel, 2019) Source: Bitgood, (1991).

2.1.3.2.3. Process of Attention

Bitgood (2000) studied the process of attention and its' relationship between designing interpretive labels. The process of attention is consists of three elements. These are the principle of selectivity, motivated focusing, and limited capacity. Attention is selective (Bitgood, 2000). Visitors selectively focus on one thing at a time. Selectivity is affected by different factors of the distinctiveness of a label. These factors are listed in Figure 5. Detailed information about these factors can be found in the previous section of the review.

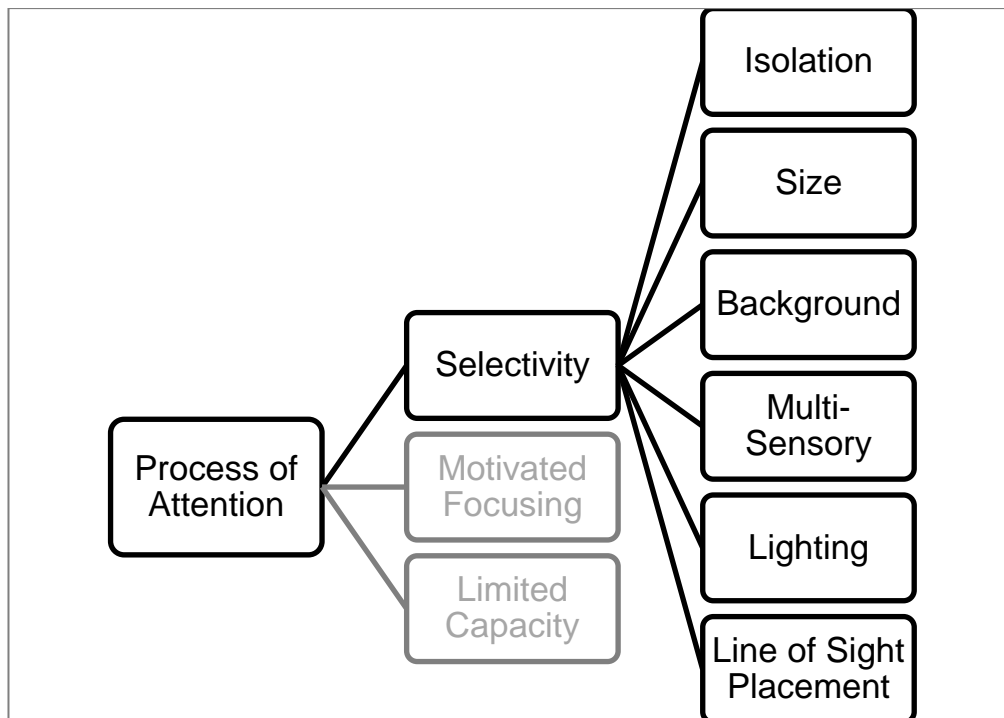


Figure 5. Illustration of the Process of Attention, Selectivity (Created by Görel, 2019) Source: Bitgood, (2000).

The process of attention requires motivated focusing. According to Bitgood (2000), perceived effort, cognitive-emotional arousal and distractions are three parameters affecting visitors' motivated focusing (see Figure 6). In this review, we will be focusing on cognitive-emotional arousal. Cognitive-emotional arousal can be increased by provoking interest and thought (Bitgood, 2000). Different factors affect the motivation of visitors according to cognitive-emotional arousal model (see Figure 7). First, the phrasing of labels influences visitor attention (Gutwill, 2006). Rand (1990) suggests that asking questions rather than only delivering facts about the exhibits increase visitor engagement. Researchers (Gutwill, 2006; Hohenstein & Tran, 2007) investigated the relationship between the use of questions in exhibit labels and visitor engagement. Both studies indicate that type of phrasing

influences visitors' actions but the overall time spent at the exhibition space is not increased. Gutwill (2006) adds that the result of the case study suggests using both questions and explanations in the labels than only having informative texts. Second, challenging the visitors can result in increasing their engagement with the exhibit labels (Bitgood, 2000). For instance, giving a task can stimulate visitors to solve a problem or achieve accomplishment that may result in higher engagement with the exhibit objects. Third, Robinson et al. (1928) found that giving handouts with explanations and additional material related to the exhibits increased visitors' total time spent at the museums and the engagement with the artworks. Fourth, labels can be designed in different formats such as graphic panels with text blocks, flip labels, and self or visitor activated auditory labels, etc. Bitgood (2000) claims that the design of the label format affects visitor engagement. Bradburne (2002) studied different label types such as textual, authority, observation, and games to generate a taxonomic inventory. However, he did not study the relationship between exhibit label types and visitor behaviors. Therefore, there is a lack of studies on how different exhibit label designs influence visitor engagement. Bitgood (2000) suggests that while designing alternative exhibit labels designers can indicate instructions on what to do or what to look for to enable misconceptions. Last, as mentioned previously, social interaction is a key factor affecting visitor engagement with exhibits (Bitgood, 2000). Social interaction can be provided by the design of the interpretive labels. Moreover, labels can enable interactive communication among visitors. The design of the labels should consider how visitors can exchange ideas and knowledge and how the

design of the labels can motivate visitors to share comments. Designers should search for new ways to deliver knowledge while motivating visitors to interact with each other.

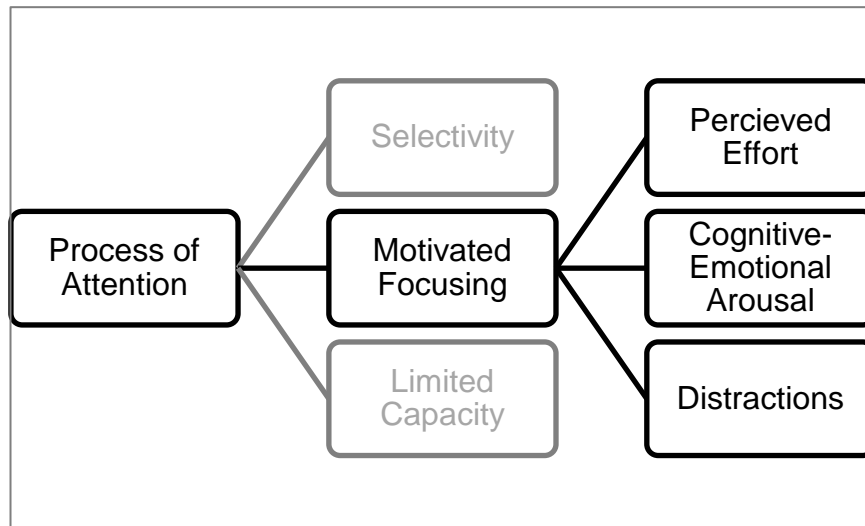


Figure 6. Illustration of the Process of Attention, Motivated Focusing
(Created by Görel, 2019) Source: Bitgood, (2000).

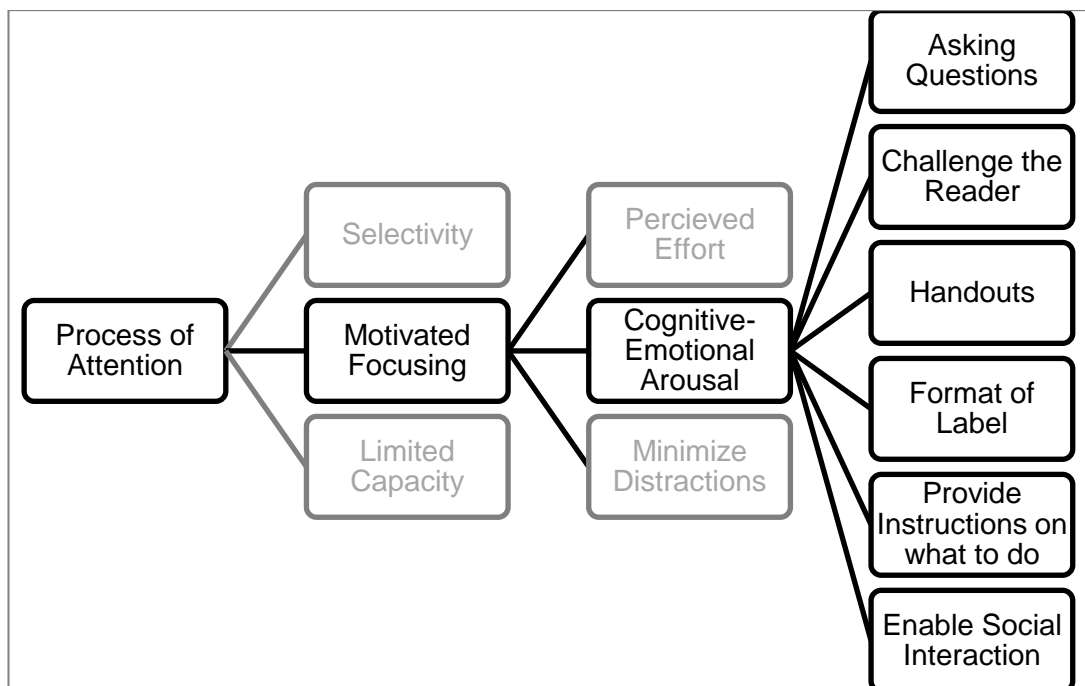


Figure 7. Illustration of the Process of Attention, Motivated Focusing
(Created by Görel, 2019) Source: Bitgood, (2000).

Finally, resources of attention have a limited capacity (Bitgood, 2000).

Resources of attention decrease when the effort is expanded. To retain and renew resources of attention; principles of cognitive-emotional arousal can be applied to the exhibit labels.

2.1.3.2.4. Label Reading Behaviors

Researchers, studied visitors' label reading behaviors according to social content and found three types of visitor behavior in terms of reading exhibit labels: not seen to be reading, brief glances at a text, and attentive reading (Chang, 2006; McManus, 1989). Visitor group types, duration of visitors visit, and how the text on the label is read influence visitors' label reading behavior (Chang, 2006). For instance, visitors who examine labels in groups are observed to have one member of the group read the text for his/her companions. According to the same research, exhibit labels encourage group members for group discussions (Chang, 2006) In short, analyzing visitors' label reading behavior clarifies how visitors engage with the exhibit labels and hereby with the exhibit objects.

Other studies remark the importance of the labels according to the differences in visitors' conversations among others in the presence of the exhibit labels (Hohenstein & Tran, 2007). McManus (1989) studied the visitors' reading behaviors and found that visitors who seemed not paying attention to the exhibit labels appeared to have conversations with their companions about the texts written on the exhibit labels.

2.2. Defining Measures of Visitor Attention

Previously we have studied visitor and exhibit factors that are affecting the visitor engagement. Review will explore how visitor engagement can be identified and how visitor attention is measured. Museum curators and educators have long been investigating visitor attention because it is a critical factor in understanding and measuring visitor learning and visitor engagement in exhibition spaces (Wittlin, 1968; Shettel, 1973, cited in Koran & Koran, 1983). Exhibit objects and exhibit labels need to attract and hold visitor attention in order to provide information. This process begins with attracting visitors' attention to provide visual contact with the objects. After having visual contact, visitors' will began to engage with the artworks actively. In the following sections visual contact and active engagement, and measures of visitor attention will be explained to have a deep understanding of defining measures of visitor attention.

2.2.1. Visual Contact and Active Engagement

To understand the degree of engagement, Peponis et al. (2004) studied visual contact, and active engagement. While visiting museums and other exhibition spaces visitors view or detect an exhibit element. Visual contact is formed when a visitor browses to the exhibit element, while visitor stops and examines the exhibit content during active engagement (Güler, 2009; Peponis, Dalton, Wineman, & Dalton, 2004).

According to Nehamov (1971) and Danilov (1979), museums are multidimensional spaces. Therefore, visitors' attention is quickly disturbed by different environmental factors. Visitors' mostly have trouble focusing and keeping their attention on exhibit objects (Koran & Koran, 1983); complexity of static exhibits form attention directing elements that are more essential for learning and maintaining active engagement.

Visitors visually contact with most of the elements until something tempts them to stop and actively engage with a particular exhibit object (Bicknell & Mann, 1992). Visitors mostly spend less time in an exhibition space than designers and curators predicted (Serrell, 1997). Research indicates that (Bicknell & Mann, 1992; Serrell, 1997) exhibit elements often receive less than 50 percent of active engagement in an exhibition environment.

Moreover, an average visitor spends less than thirty seconds for visually contacting with an exhibited object (Koran & Koran, 1983). Serrell (1997) states that a visitor can cover an area of 28 square meters per minute on average of an exhibition area. Furthermore, a successful speed for covering a 28 square meter of an exhibition area can be done averagely per minute (Serrel, 1996). Visitors that make more stops and move slowly in the exhibition space are more engaged than visitors who move quickly from one object to another (Serrell, 1997). Visitors that make more stops are actively engaged with the exhibit objects because they examine more objects at an exhibition area. Last, visitors that examine the exhibits, read the exhibit labels and have discussions with companions are actively engaged with the exhibit elements (Serrell, 1997).

2.2.2. Measures of Association

Time-based statistics are used for measuring visitor engagement in exhibition spaces. Time has been used as a powerful measure for visitor attention (as cited in Sandifer, 2003). Prior knowledge focused on mainly three statistical measures for visitor attention (Sandifer, 2003). These measures of association are defined below:

- Holding Power (HP)

Holding power is the ratio (averaged over visitors) spent at an exhibition space to review the exhibit objects, read the exhibit labels, and make sense of the key points of the exhibition (Sandifer, 2003). Holding power can be calculated through finding the mean of total time spent at an exhibition space by visitors.

- Average Holding Time (AHT)

Average Holding Time is defined as the average time that a visitor spends at an exhibit. Average holding time measures the duration of active engagement (Sandifer, 2003). According to Sandifer (2003, p.131) average holding time is calculated by the formula presented below:

$$AHT = \text{Total time spent at the exhibit by engaged visitors} / \text{Total number of engaged visitors}$$

Average holding time is deferred according to the characteristics of the exhibit elements, the number of exhibit objects and the content of the exhibition. However, Sandifer (2003) found that 36 seconds to 1 minute is the average holding time of %35 of the exhibit elements. Average holding time has no upper or lower limits, but Sandifer (2003) concluded in his study that limits of holding time varies between 0.2 to 5.9 minutes.

- Attracting Power (AP)

“Attracting power is typically defined as the percentage (fraction) of visitors who stop at a given exhibit for a minimum amount of time (e.g., 5 seconds)” (Sandifer, 2003: 122). According to Sandifer (2003, p.131) attracting power is calculated by the formula presented below:

$$AP = \text{Number of visitors who became engaged with the exhibit} / \text{Total number of visitors who enter the exhibition}$$

All of these measures of association presented above can be examined per visitor or per exhibit. Mean, median or distribution of measures can be calculated respectively for all visitors and exhibits (Sandifer, 2003).

2.3. QR Codes

As was previously mentioned, there are a variety of ways to deliver information in exhibition spaces. The information related to exhibit objects could be delivered by exhibit labels and text panels as well as technological devices. Developments in digital technologies and the availability of technology mediums lead museums to integrate these systems into information delivery methods. There are different forms of digital technologies that can be used for delivering information about the exhibit objects. These are; quick response (QR) codes, radio frequency identification tags (RFID), personal digital assistant (PDA) system, touch screen devices, virtual reality (VR) applications, etc. To answer the research question of “How does using QR Codes as an information delivery method influence user engagement in exhibition spaces?” QR codes and QR code studies done in museums will be examined in the next chapters.

2.3.1. What are the Quick Response (QR) Codes?

“A QR code is a type of matrix bar code or two-dimensional code designed to be read by smartphones.” (Shin, Jung & Chang, 2012, para. 1) Example of a QR code can be seen in Figure 8. Black modules inside the code enable users to connect to a website. The information can be a text, image, sign, URL or any other alternative media. QR codes are interactive methods because a QR code’s basic feature is responsive interaction (Shin et al., 2012). QR codes are an effective way of delivering information because they have sufficient speed to transfer data. A person can easily access a data no matter how many times a QR code is scanned. Also, using QR codes

enables users to have total control of the information delivery activity. Lastly, QR codes offer interactive and cost-effective experiences to their users.



Figure 8. Example of a QR Code, accessed from https://upload.wikimedia.org/wikipedia/commons/d/d0/QR_code_for_mobile_English_Wikipedia.svg

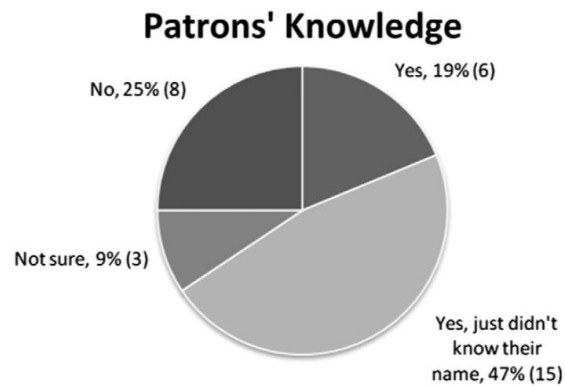
Research for measuring the usage level of QR codes is mostly done for the marketing sector. Demir et al. (2015) conducted a study for measuring the usage level of QR codes for mobile marketing among college students in a private collage located in Turkey. According to the survey results, more than 80 percent of the students recognized the QR codes but only half of the students had used a QR code before the study (Demir et al., 2015). Demir et al. (2015) state that the main usage of the QR codes is in marketing. Also, QR codes are often used for accessing additional information such as graphics, videos, audio, etc. Moreover, women students are more interested in QR codes than men. The study concluded that the current interest in QR codes is low because of the recognition level. However, the possibility of using the codes is higher because of the adaptation levels of QR codes among college students in the near future (Demir et al., 2015).

2.3.2. QR Code Studies in Museums

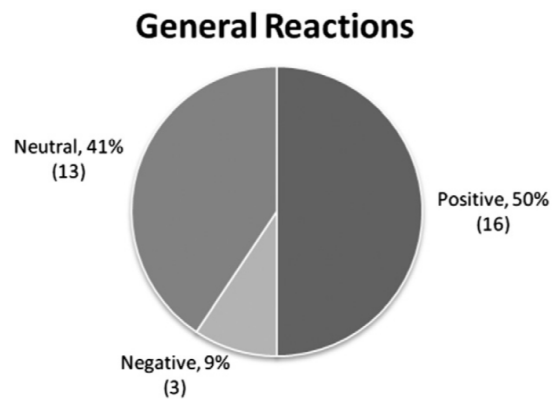
Museums and curators are increasingly looking for new digital technologies to better serve their visitors. Developments in digital technologies and the availability of technology media lead museums to integrate these systems into their information delivery methods. There are different forms of digital technologies that can be used for delivering information about the exhibits. QR codes are new alternative tools for delivering information. In response to the increased use of QR codes for a marketing tool, museums are starting to use this technology in exhibition spaces. Therefore, there are limited numbers of studies investigating the use of QR codes in museums. This section of the review will focus on previous QR code studies in museums.

Schultz (2013) conducted a study to investigate patrons' and staff members' perceptions and expectations about using QR codes in museums and libraries. The study took place in the Museum of Inuit Art and Ryerson University Library. Both of the institutions have recently added the use of QR codes in different areas. In the Museum of Inuit Art, QR codes were used at one exhibition hall beside a couple of artworks. There was written information about the exhibits but QR codes directed the visitors to additional information about exhibits such as a link to a video or a map. Also, museum patrons placed a QR code connecting their visitors to a link to the museum's social media accounts at the entrance of the museum. Schultz collected data from interviews with patrons and staff members. At each institution, 12 staff members and 16 patrons were interviewed (Schultz, 2013). There are three themes according to the results. First, most of the patrons and staff members

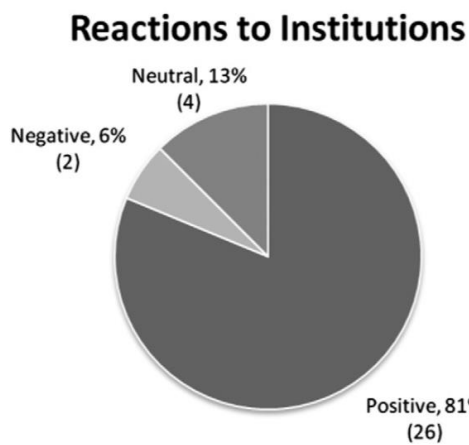
(approximately 54%) suppose that mostly younger people use QR codes because it requires a smartphone. Second, most of the participants (approximately 54%) think that QR codes provide information with a sufficient speed but it is a one-way communication tool. However, some staff members indicate that QR codes could be used to start a conversation and interaction between visitors, artists, and patrons (Schultz, 2013). Last, most of the participants think that QR codes can be used to personalize their visit to museums (Schultz, 2013). Figure 9 indicate bar charts for patrons' knowledge, general reactions, and reactions to institutions about QR codes. These data applies to both the Museum of Inuit Art and Ryerson University Library.



(a)



(b)



(c)

Figure 9 (a) Patrons' (observed not using QR codes) Knowledge about

(b) General Reactions about the use of QR codes

(c) Reactions to Institutions Adapted from "A case study on the appropriateness of using quick response (QR) codes in libraries and museums" by M. K. Schultz, 2013, *Library and information science research*, 35(3), p.211.

Chivarov et al., (2013) studied the implementation process of using QR codes as an interactive presentation of the exhibits in the museums. Researchers prepared a guideline and suggestions for forming an information delivery system using QR codes in museums. Chivarov et al., (2013) studied this process by explaining the technology and implementation process. Technology part gives explanations about QR generators, QR readers, how the system works, and the connection to the Internet. The first step of producing a QR code is using a QR generator program (Chivarov et al., 2013). An URL, text, picture or any other media can be used to generate a QR code. There are different alternatives to QR generator programs (see Figure 10).



Figure 10. Example of a QR Generator Web Page Adapted from “Interactive presentation of the exhibits in the museums using mobile digital technologies” by Chivarov et al., 2013, *IFAC proceedings volumes*, Vol. 46

After generating a QR code there are three factors required to successfully decode it. These requirements are having a mobile device, having a QR reader application on the mobile device, and having an internet connection (Chivarov et al., 2013). After fulfilling all of the requirements explained above, the system is ready to be explored by the user. The user will open the QR reader application. The QR code will be scanned through the camera of the user's mobile device. After scanning the code, the user will be automatically directed to the assigned multimedia page (webpage, video, text, picture, etc.).

Above, the technology needed for decoding a QR code is explained. To implement this technology to create interactive presentations of the exhibit objects, it is necessary to perform several scientific tasks (Chivarov et al., 2013). Firstly, the exhibit objects will be selected. Secondly, researchers will gather scientific information about the exhibits. According to Chivarov et al., information can cover past and current research about the selected items, dating, function, origin, and meaning of the artifacts. After preparing the text, it can be translated into several languages. Thirdly, the digital library will be created. This library can be constituted of related images and graphic reconstructions about the exhibit objects. Fourthly, prepared texts and graphic elements will be gathered in a web portal of the museum. The design and organization of the web portal are very important. Designers should keep in mind that the portal should be easy to use, thematically oriented, and comprehensive (Chivarov et al., 2013). The final step is preparing information label cards with QR codes and placing the labels next to the related exhibits.

Chivarov et al. (2013) suggest that an informatory text can be placed at the entrance of the museum explaining how visitors will use their mobile devices to use the QR codes. According to Chivarov et al. (2013) expected results of such a study has a high potential transferring knowledge and modernizing the presentation of the museum exhibition. Moreover, this media will attract the attention of a new range of visitors and will create a possibility for communication among visitors on site and also after leaving the museum. Last but not least, this new technology will enhance the opportunity to educate museum visitors in a new, exciting, and engaging way (Chivarov et al., 2013).

Pérez-Sanagustín, Parra, Verdugo, García-Galleguillos, & Nussbaum (2016) conducted a study to investigate the use of QR codes to deliver information and its' effects on visitor engagement. The study consisted of 2 groups and took place at Kew Public Garden Museum with 200 participants. During the first group, researchers compared using a QR code vs video screen (Figure 11 & 12) to deliver information. As a result of the first group, there is a greater consumption of textual content among the visitors rather than using the QR code (Pérez-Sanagustín et al., 2016). Figure 12 shows that QR codes only offer an additional video about the exhibits. In Figure 13 video is implemented to the label by the use of a screen. Therefore, visitors prefer to use screen & paper to gain information because of the ease of use. The second group compared delivering information by the use of One-Way QR and Two-way QR codes. One-Way QR codes enable visitors to only gain information about the exhibits while Two-way QR codes allowed visitors to

share comments with each other. This additional social aspect to the QR codes had a positive effect on the time spent at exhibition space by the visitors (Pérez-Sanagustín et al., 2016). The study concluded that further studies can investigate the usage of QR codes in different age groups. Finally, additional research can be done in museum environments.



Figure 11. QR code Label Panel



Figure 12. Screen Label Panel Adapted from “Using QR codes to increase user engagement in museum-like spaces” by Pérez-Sanagustín et al., 2016, *Computers in human behavior*, 60, 73-85, p. 77.

Studies presented above (Chivarov et al., 2013; Pérez-Sanagustín et al., 2016; Schultz, 2013) indicate that QR codes offer great potential of transferring knowledge to museum visitors about exhibit objects. QR codes are cost-effective and easy to use. Also, they deliver a wide range of media such as text, video, graphics, photographs, audio, etc. Moreover, using QR codes will provide an opportunity to improve visitors' experience while achieving institutional goals.

CHAPTER 3

METHODOLOGY

During the study, we aim to explore “How does using QR codes as an information delivery method influence user engagement in exhibition spaces?” Regarding this research topic, there is a limited number of studies done comparing the visitor engagement level while using traditional exhibit labels versus new methods of information delivery such as QR codes (Pérez-Sanagustín et al., 2016; Schultz, 2013). Also, there are limited studies investigating the use of QR codes as an information delivery method and its’ relationship between enhancing visitors’ level of learning and social interaction in exhibition spaces. In addition, this study examines the influence of exhibit label characteristics to visitors’ label reading behavior. Therefore, the approach of this study is to analyze the use of QR codes for delivering information and its’ resulting effects on visitor engagement in exhibition spaces.

Another aim of this study is to find an answer to “How are younger people more likely to use QR codes in exhibition spaces?” According to a study, mostly younger people use QR codes because it requires a smartphone (Schultz, 2013). Regarding this research question, the present study aims to discover middle-aged visitors’ engagement level with the exhibits while delivering the information with QR codes in exhibition spaces.

To answer the research questions experimental research has been selected as the method of the study. Experimentation is explained as, recording observations, quantitative and qualitative data in defined conditions and followed by the examination of the data by statistical analysis to discover the existence of significant relationships (Nesselroade & Cattell, 2013, cited in Cash, Stanković, & Štorga, 2016). This type of study provides the best control over the variables. In this study, control and experiment conditions (Figure 13) are controlled variables to test visitor engagement level. During control condition, information tags with only written information are placed, while during experiment condition information tags with QR codes were placed among the exhibit objects. Different sample groups in different time periods participated in both conditions at the same exhibition place with the same exhibits. The experiment was followed by the measurement and result parts as explained in the Methodology Scheme (Figure 13). During the research, mixed methods will be used to analyze the level of visitor engagement. Timing data and data from questionnaires will be collected as quantitative and qualitative data.

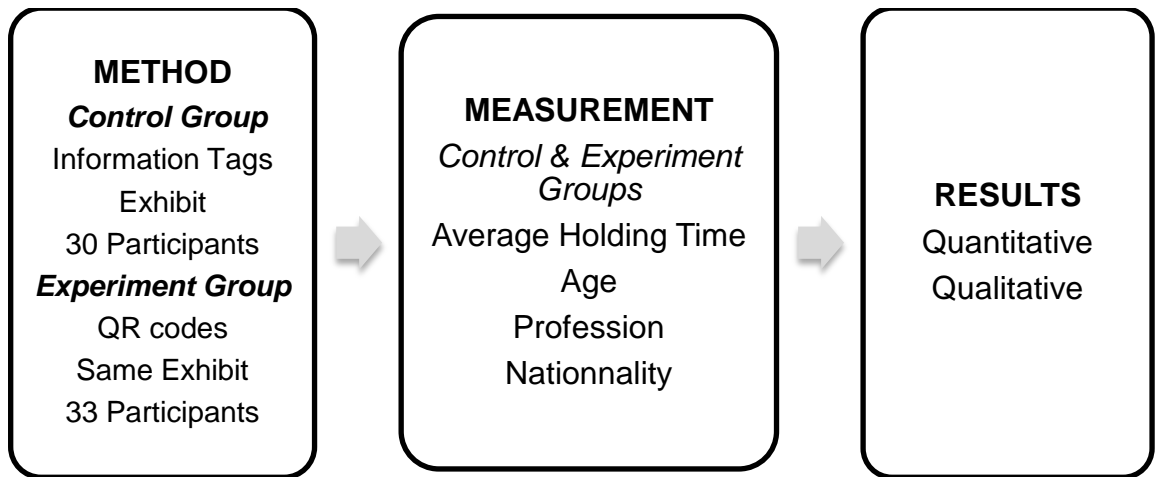


Figure 13. Methodology Scheme

This section covers the procedure, measurement, and instruments of the study. Pilot study, participants, setting of the experiment, analysis of the exhibit objects, and analysis of the information delivery methods will form the procedure section.

3.1. Procedure

A pilot study was conducted before the experiment to test the independent variables of the study. The experiment place was observed during the pilot study to understand the visitors' circulation path. The website was designed to examine the online platform which is planned to use for creating the website. Moreover, the QR code generator was tested for constituting the QR codes. Also, the design and placement of the information labels were examined. After the pilot study, the experiment took place at Bilkent University Library Art Gallery and proceeded for one week. The selected exhibition was "Artist Friends: Selected works from the Alev-Kenan Eratalay collection". Participants who entered to the gallery for the purpose of visiting

the exhibition were informed about the experiment and voluntarily participated in the experiment.

3.1.1. Sample

Sixty-three (31 women and 32 men, with a mean age of 28.4) visitors participated in the study by visiting the exhibition of “Artist Friends: Selected works from the Alev-Kenan Eratalay collection” and completing a questionnaire at Bilkent University Library Art Gallery. Participants were not personally asked to participate in the study because of the concerns about obtrusiveness. Therefore, visitors participated on their own when they entered to the exhibition space.

Visitors are expected to participate voluntarily to eliminate the degree of obtrusiveness. After they decide to participate in the study they were informed about the experiment and how to use the QR codes. Participants were expected to vary in age, gender, nationality, and profession. According to our second hypothesis, younger people are more likely to use QR codes in exhibition spaces. To test the hypothesis sampling groups should be vary in age. According to Koran and Koran (1983), adult men cover more elements in a shorter range of time while adult women focus attention to one object and linger longer. The research aims to compare women and men participants’ mean total time spent viewing the exhibit objects. Therefore, the number of female and male participants should be equally distributed. Bilkent University students and academics are formed of different nationalities. Therefore, the average holding time values of participants from different nationalities can be compared. Last, profession is another variable to test in

this research. Design educated participants are expected to have differences of perception than non-designer professions. According to researchers, designers react to environmental factors in perceptual terms whereas non-designers react to environment in associational terms (Rapoport, 1982, cited in Devlin, 1990). Designer and non-designer professions will be expected to participate in the study to find if there is a significant relationship on preference to use QR codes and belonging to a designer profession and non-designer profession.

3.1.2. Setting of the Experiment

The experiment took place at Bilkent University Library Art Gallery. The exhibition hall is placed on the first basement floor of the Bilkent University Library. Figure 14 demonstrates the relationship of the art gallery with the entrance and the vertical circulation.

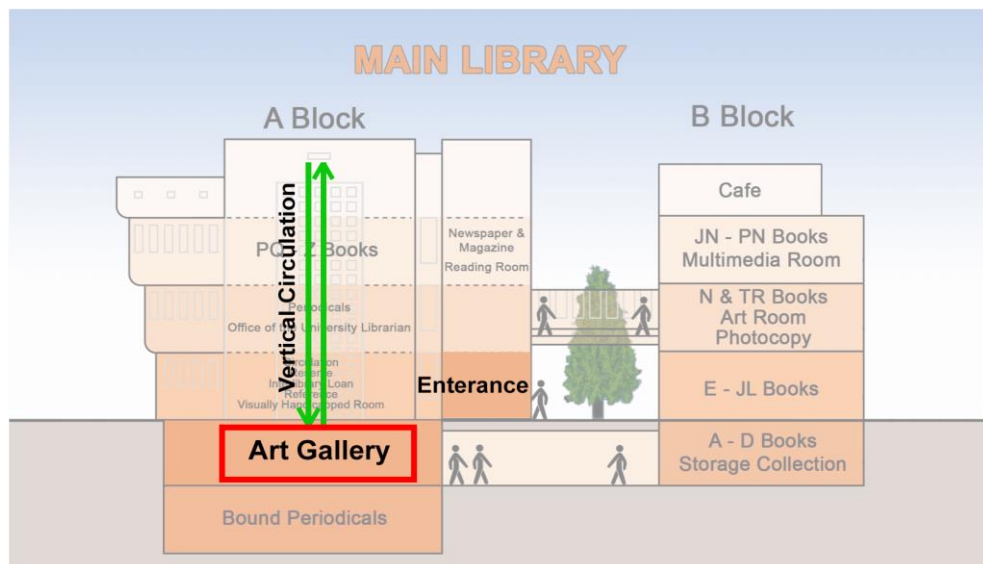


Figure 14. Elevation of the Bilkent University Library Art Gallery in Ankara,

Turkey in which exhibition will take place, accessed from

<https://library.bilkent.edu.tr/plan/>

Figure 15 shows the ground floor plan of the art gallery in which the experiment took place. The exhibition hall has a semicircular shape plan. Vertical circulation is placed around the exhibition hall connecting the basement floor to the entrance of the library. Both of the corridors were connected to the special book storage collection rooms located at the first basement floor. Additionally, study rooms are located at the first basement floor. Therefore, the art gallery is in the middle of a heavy circulation path. The exhibition hall has two doors (number 1 and 2) both used for entrance and exit. According to the pilot study, most of the visitors enter and exit the gallery by using the door 2. Because, the corridor is connected to the B Block of the library where study rooms are located (Figure 15). Therefore, most of the visitors start reviewing the exhibit objects from 2 continue until 1 and finish the semicircle by exiting from 2. Lastly, the exhibition wall is shown in Figure 15 with the red dotted line.

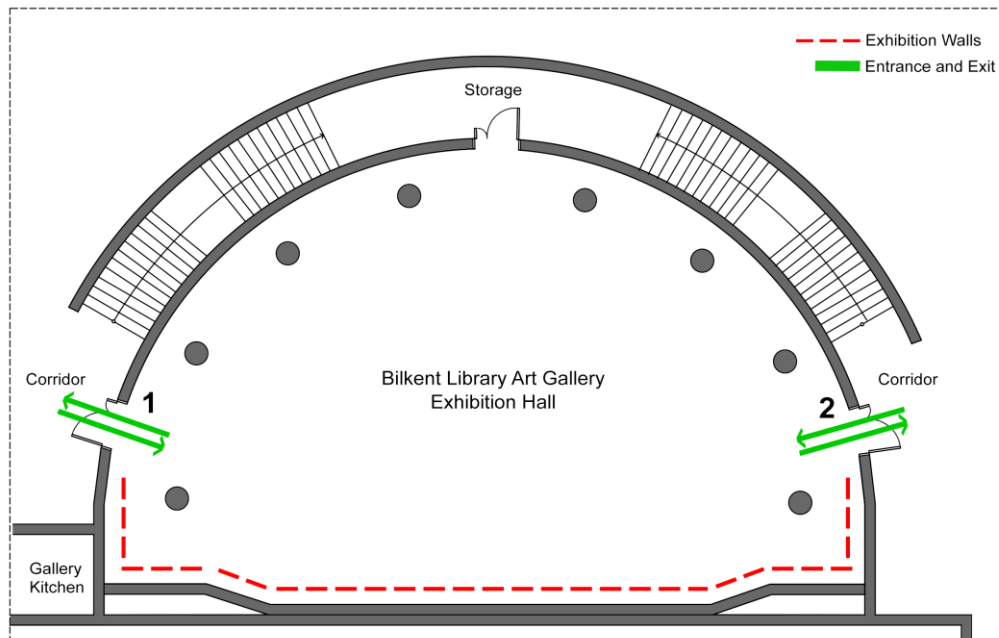


Figure 15. Ground Floor Plan of the Bilkent University Library Art Gallery in Ankara, Turkey in which exhibition will take place (Görel, 2019)

The physical, social, and cultural site can be chosen as the setting of a research (Given, 2008). Bilkent University Library Art Gallery was chosen as the physical setting of the experiment (Figure 16). Visitors' engagement level and behavior will be studied in a natural environment. The only manipulated variable of the research will be the information delivery methods. Therefore, setting of the experiment will be different during both conditions. During control condition, information was written on the exhibit labels. During experiment condition, exhibit labels delivered the information with QR codes. Information delivery methods will be analyzed in Chapter 3.1.5.



Figure 16. The Physical Setting of the Experiment During Control Condition

The timing data and analysis of visitor behavior obtained from the video recordings. Bilkent University Library Art Gallery did not contain a video camera located at the exhibition hall. Therefore, videos are recorded with the help of a laptop camera. A laptop is chosen as the video equipment to minimize visitor distractions. The view of the camera can be seen by the screenshot of the video recording (Figure 17). The angle is provided with the help of a wide-angle lens. Lastly, participants are informed about the recording procedure with the help of a warning note placed at the entrance of the gallery because of the ethical concerns.

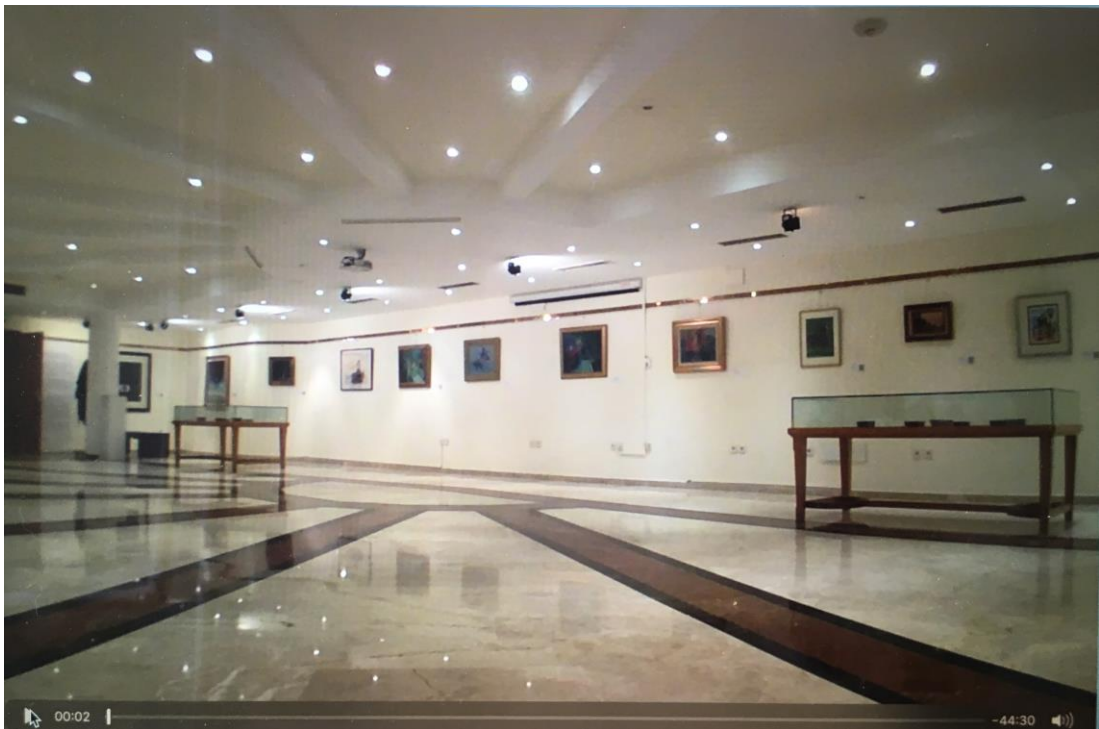


Figure 17. A Screenshot Of The Video Recording During Experiment Condition

3.1.3. Pilot Study

The pilot study took place at Bilkent University Library Art Gallery on 28 November 2018. The chosen exhibition was *Sema Ilgaz Temel* oil painting. Participants were Bilkent University students, academic members and library administration. *Sema Ilgaz Temel* exhibition consisted of 28 artworks. However, the pilot study was conducted with 11 artworks to eliminate the entrance-exit effect. These artworks were selected starting from the entrance of the gallery and continued along the left wall (Figure 18). The left wall was selected because visitors enter from that side of the gallery. During the pilot study, only experiment condition was conducted to test how the method will be applied to the experiment.



Figure 18. Pilot Study Setting

Information about the exhibits were gathered to prepare the website after selecting the exhibit objects. Information about the related artworks was studied and expanded with the help of the information board. After preparing the texts, we started designing the website. The website was created by using an online platform named *Squarespace*. This platform enables users to

choose a template and arrange it according to their needs. The *Home* page is designed to give information about the name of the artist, the name of the gallery, and the dates of the exhibition (Figure 19). The *Work* page consisted of the painting collection (Figure 20). When selecting the particular painting, the website directed the user to the information page of the paintings (Figure 21).

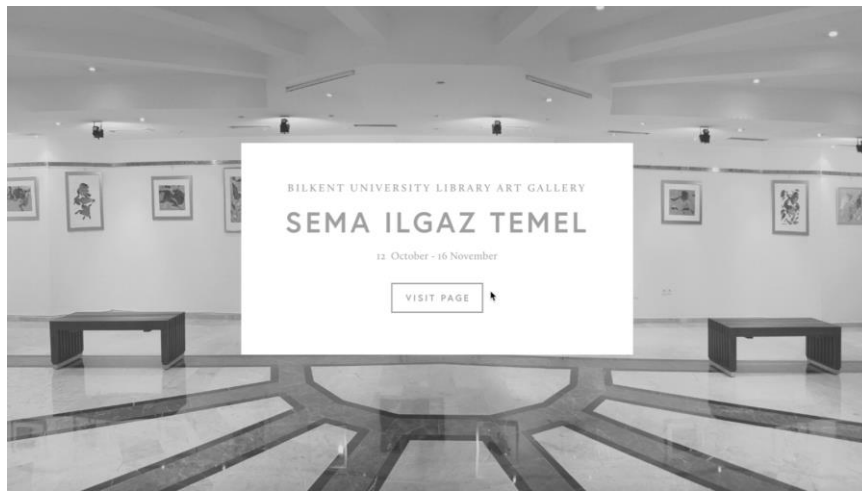


Figure 19. Home Page of the Website

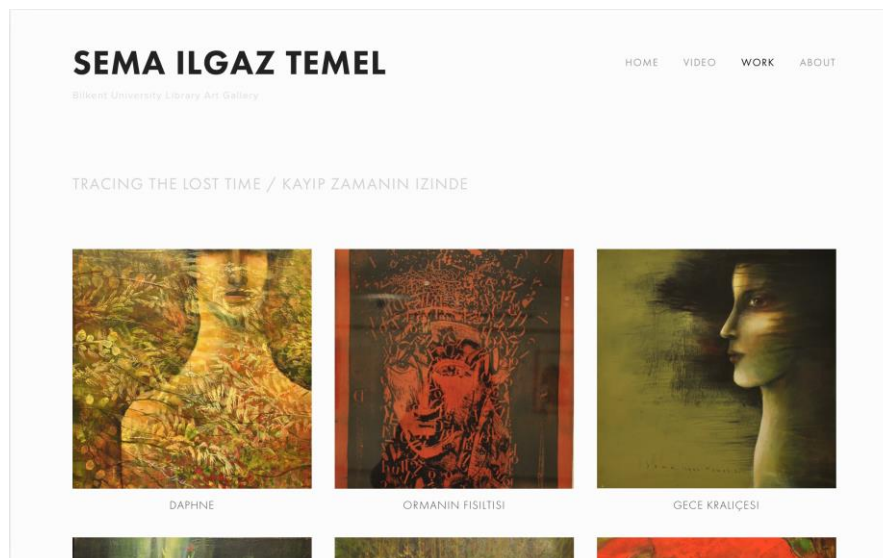


Figure 20. The Website Page Containing the Artists' Works



Figure 21. Example of an Information Page about the Artworks



Figure 22. Appearance of the Website from Mobile Devices



Figure 23. The Video Page

The museum experience is enhanced by the interpretation of social interaction. Visitor engagement is positively associated with social interaction (Bitgood, 2002; Sandifer, 1997; vom Lehn, 2006). Museums could initiate group discussions to increase visitor engagement. Therefore, a platform was added to the website enabling visitors to interact with each other. The page has a video of the collection of the artists' works and *comment* and *share* buttons are added under the video (Figure 23) enabling visitors to start a conversation. This section was added to the website during the pilot study to test if visitors start conversation between each for developing engagement even they leave the exhibition hall. However, none of the participants commented on the website because they did not noticed the comment section under the *Video* page.

After creating the website, links to the information pages were converted to QR codes with the help of online website named *The QR Code Generator*. Information labels designed after generating the QR codes. Information labels contained the name of the artist, name of the painting, name of the collection, date of manufacture, the technique of the painting, measurements of the canvas, and the QR codes (Figure 24a). Moreover, visitors informed through the indicated sentence on information labels stating that they can scan the QR code for gaining more information. This statement highlighted with red to provoke manipulative stimulation (Bitgood, 1989; Serrell, 1983). The last step before conducting the pilot study was to place the exhibit labels (Figure 24b). Information labels were placed 160 cm above ground level as suggested by the previous researchers (Bitgood, 1989; Serrell, 1983).



Figure 24 (a) Information Label Design

(b) Placement of the Information Label

Ten visitors participated in the pilot study. The participants were informed about the study and how to use the QR codes. After they started viewing the artworks, timing data were collected with the help of a chronometer. When the participants finished viewing the artworks they filled a questionnaire. We decided to use video recordings instead of chronometer to examine visitors' behavior because before the pilot study, the method of the research was to compare the mean total time spent reviewing selected objects with time spent reading the information board. However, participants gained information through the QR codes instead of reading the information board. Therefore, the method was revised (see Chapter 3.1). Some of the participants mentioned that the height of the exhibit labels was positioned in a level that made the participants uncomfortable for reading. Therefore, height of the exhibit labels was revised to 120 cm.

3.1.4. Analysis of the Exhibit Objects

This chapter covers the analysis and the physical characteristics of the exhibit objects. The study was conducted during the exhibition of "Artist Friends: Selected works from the Alev-Kenan Eratalay collection". Alev and Kenan Eratalay are private collectors of oil paintings, prints, and charcoal drawings based in Turkey. This exhibition was chosen specifically because it was a group exhibition because the information load is heavier. Alev-Kenan Eratalay collection exhibition includes seven different artists' works. These artists are Adnan Turani, Fernand Leger, Kayıhan Keskinok, Sarkis Erganian, Burhan Doğançay, Fikri Cantürk, and Avni Arbaş. Except for

Sarkis Erganian and Fernand Leger, all of the artists are well-known painters in Turkey. They contributed to the Republic period concept art.

The information load of the exhibit objects positively correlated with the artists' background. This collection was specifically selected because the informative range of the artworks is greater when the exhibition consists of a mixed collection. Artists' composition techniques, color palette, and the characteristics of the selected exhibit objects from Alev-Kenan Eratalay collection are studied to prepare the informative texts. Information about the artworks was prepared both in English and Turkish.

- Physical Characteristic of the Exhibit Objects

Eleven paintings exhibited during the experiment. All of the exhibit objects are rectangular shaped and painted on canvas. The exhibit objects show variance in sizes in the range of maximum 68x78 cm to a minimum of 27x17 cm. Exhibit objects can be found in Appendix B.

3.1.5. Analysis of the Information Delivery Methods

The experiment consisted of two different information delivery methods. During control condition, exhibit labels with texts are used while during experiment condition information is delivered by the QR codes placed at the information labels. This chapter consists of two sub-categories. Exhibit labels of control condition and exhibit labels of experiment condition will be studied. Firstly, analysis of label size, label length, typeface characteristics, and label placement for exhibit labels used during both groups. Secondly, multi-

sensory characteristics, cueing, use of color, manipulative stimuli, and use of graphics during experiment group will be presented.

3.1.5.1. Exhibit Labels of Control Condition

The label size is one of the empirical factors influencing label reading (Bitgood, 1989 & Serrell, 1983). The label length, line length, and the spacing should be easy to read from the visitors' standing point. Therefore, the label size is decided to be 15x15cm. Avenir Book is used as the font of the text because the style and appearance of the text are simple and readable. The name of the artist is written in **Bold** and the font size is 18. The name of the exhibit object, production year, the name of the collection, technique and the sizes of the canvas are indicated with a font size of 13. Moreover, the name of the collection is indicated in *italic* because it is the only constant information in all of the labels. Last, the background color is selected as white while the text is in black to have sufficient contrast between lettering and label background color. Figure 25 illustrates the analysis of the exhibit label used during control group.

Name of the Artist Bold- 15 pt	— Fernand Leger
Information about the exhibit object 13 pt	— Kompozisyon, 1994 — <i>Alev-Kenan Eratalay Koleksiyonu</i> — Tuval üzeri Yağlıboya, 24x31cm
The main text in Turkish 12 pt 80 words	— Leger, Kübist nesnelerin kırılma stilini geometrik bir yorum ile çalışmalarına yansıtmaktadır. Ayrıca, sanatçı illüzyon unsuru olarak kullandığı üç boyutluluğa olan ilgisini korumaktadır. Leger, insanlar ve makineler arasındaki uyumu ve bağlantıyı ifade etmek için insan benzeri robot figürlerini tanımlamak için silindirik geometriler kullanmaktadır. Kaos, gürültü ve kentsel mekanlardaki yeni teknolojiyi ifade etmek için parlak ve ana renklere tablolarında yer vermektedir. Bunun yanı sıra, soyut nesnelere ve imgelerle bir hareket duygusu yaratmaktadır.
The main text in English 12 pt 80 words	— <i>Leger accepted the Cubist style of fracturing objects in a geometrical interpretation. Also, the artist maintained an interest in the three-dimensionality as an element of illusion. Leger used cylindrical to describe human-like robotic figures in order to express a harmony and connection between humans and machines. In order to express chaos, noise and new technology of the urban spaces he used brilliant primary colors. In the compositions he created a sense of movement with abstract objects and images.</i>

15cm

—15cm—

Figure 25. Analysis of the Exhibit Label Used During Control Condition



Figure 26. Example of Label Placement

Placement of labels in accordance with the floor height is another variable affecting visitors' label reading (Bitgood, 1989 & Serrell, 1983). Smithsonian guidelines for accessible exhibition design (2000) suggest that wall labels placed between 122 cm and 167 above ground level. Labels should be placed near the exhibit objects to access information easily and to eliminate the confusion of belonging. However, during the pilot study participants' commented that the information labels were placed too high making them uncomfortable to read. Therefore, exhibit labels were placed at 120cm above ground level to eliminate this issue (Figure 26).

3.1.5.2. Exhibit Labels of Experiment Condition

Exhibit labels of experiment condition are examined under two categories. These categories are website design and QR codes. The content of the website will be explained followed by studying the design of the exhibit labels with QR codes.

3.1.5.2.1. Website Design

The process of designing the website is the same as explained in the pilot study. Therefore, the procedure of creating the website is followed as mentioned in Chapter 3.2.1. 7 different website pages (for each artist) were created to form the *Artists* page (Figure 27). Each page consisted of the name of the artist, informative texts about the artists and exhibit objects, and other examples of artists' works (Figure 28). The informative text is the same as the text used during control condition. Additional examples of artists' works are added to the website.

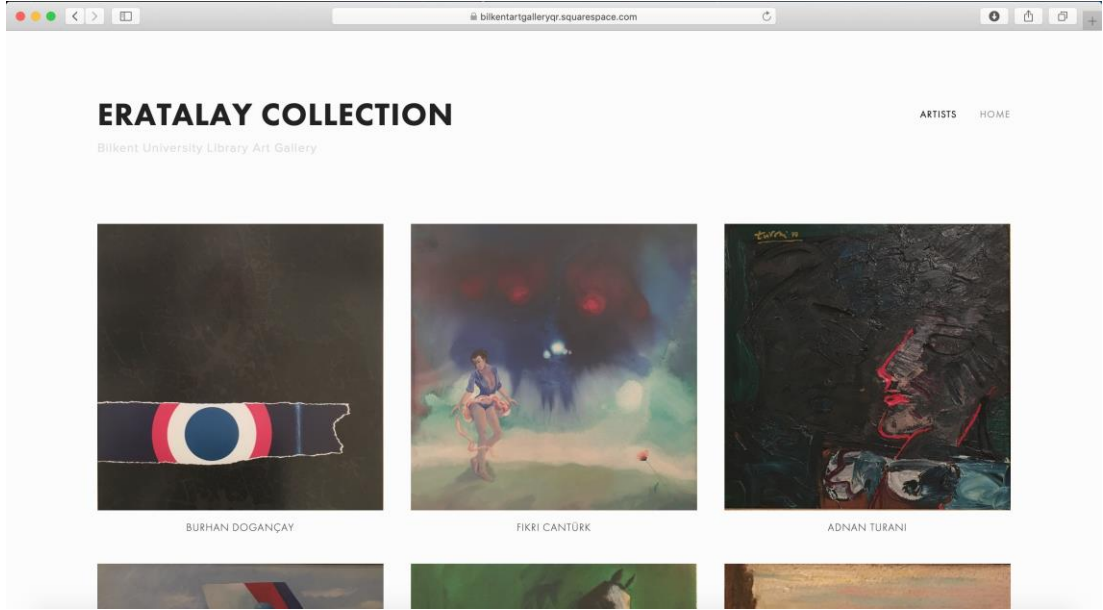


Figure 27. Artists Page on the Website

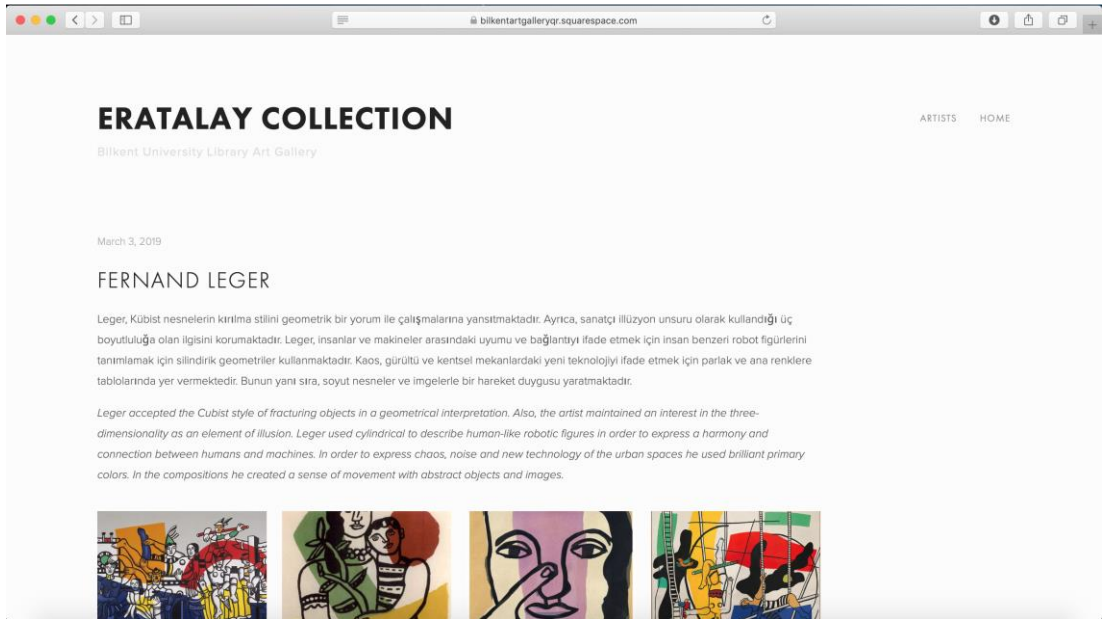


Figure 28. Example of an Information Page About the Artworks

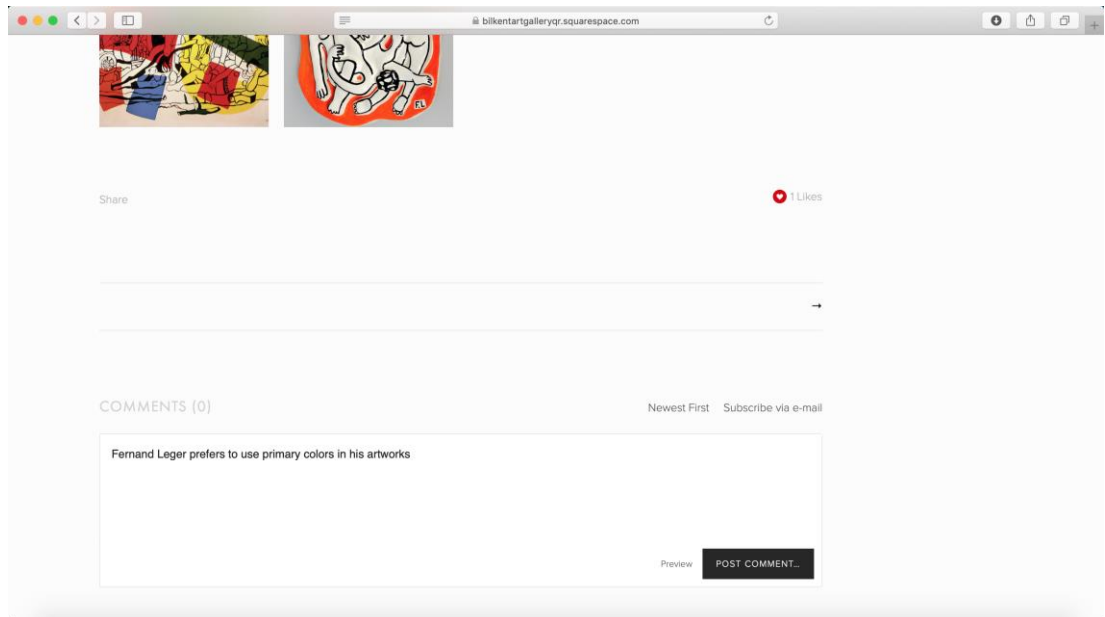


Figure 29. Example of Comment Section on the Information Page

According to the results of the pilot study, implementation of the comment section is changed. During the experiment, comment section is added under all of the artists' pages (Figure 29). Visitors will notice the comment section and want to share their opinions about the exhibit objects according to the expected results of the study.

3.1.5.2.2. QR Codes

After designing the website, QR codes are generated for each artwork. The same procedure is followed as the pilot study while converting the links of the pages to QR codes (see Chapter 3.2.1).

Information labels were designed after generating the QR codes (Figure 30). Label size is decreased to 15x7cm because the main text is delivered through the QR codes. Letter sizes, typefaces, and organization of the label are the same as the exhibit labels designed for control group. QR code barcode is added on the right side of the exhibit label. The barcode's size is large enough to easily decoded by smartphones. According to the researchers, written instructions or signs (cueing) can stimulate visitor attention to a greater degree (Bitgood, 1989; Serrell, 1983). Therefore, written instructions about how to gain more information about the exhibits are added under the QR code. Cueing is supported with the interpretation of color to catch audiences' attention. Indifferent than control condition, labels are placed at 120cm above ground level during experiment condition.



Figure 30. Analysis of the Exhibit Label Used During Experiment Condition

3.2. Measurement

During the experiment, data was collected through unobtrusive observation and questionnaires. The unobtrusive observation consists of recording participants' visit by a laptop computer's camera. Recordings will be used to obtain the timing data and behavior analysis of the participants. Analysis of the timing data will be done according to the previous studies on measures of visitor attention. According to Sandifer (2003), visitor engagement is focused on three measures of association. These measures of association are Average Holding Time, Holding Power, and Attracting Power. Average holding time is the average time spent at an exhibition space by the engaged visitors. Average holding time will be calculated after each group to compare visitor engagement. Experiment group participants will be informed about how the system works for decoding the QR codes. This process will not be included to the average holding time values. After the experiment, SPSS software will be used to compare the timing data. The timing data will be entered into the software and independent sample Kolmogorov Smirnov Normality test will be applied to test if the data is normally distributed in two populations. If the data is normally distributed, independent sample t-test will be applied to compare the means of the timing data. If the data is nonparametric, Mann-Whitney U test will be applied to test the null hypothesis. In addition to the timing data, visitors' behavior during the experiment will be analyzed. Visitors' verbal and bodily actions will be studied to understand the level of engagement. Moreover, attitudes of visitors with companions will be examined to understand the relationship between social interaction and visitor engagement. Last, the website will be used to analyze

if visitors choose to interact with others by using the comment section.

According to the results, we will see if there is a significant relationship in visitor engagement level while using QR codes as an information delivery method in exhibition spaces.

3.3. Instruments

After the experiment, participants voluntarily fill out a questionnaire. There will be two different questionnaires for each group. Questionnaires will consist of 3 sections. In the first section data about demographic characteristics of the participants were collected. These demographic characteristics are; age, gender, education level, profession, and nationality. In the second section, the participants will be asked to rate questions using a 5-point rating scale (1=*strongly disagree*, 5=*strongly agree*). First nine questions are common in both questionnaires. These questions will be about the information delivery methods, accessibility, amount of text used as informative, readability of the text, interaction level, and intellectual stimulation, etc. During the control group, the total number of questions in the questionnaire will be 10. The second questionnaire will ask additional questions about the QR codes, the website, and their functions. The last section will include open-ended questions for evaluating visitors' overall satisfaction about the exhibition. During the experiment group, the total number of questions in the questionnaire will be 15. Moreover, the participants can add additional comments about the information tags and the QR codes. The questionnaires for both groups can be found in Appendix A.

CHAPTER 4

RESULTS

4.1. Descriptive Statistics

According to the demographic information gained through the questionnaires, age of 76.2% of the participants' ranged from 18 to 35 ($M = 22.54$, $SD = 3.72$) while 23.8% of them are aged 35 to 60 ($M = 47.27$, $SD = 6.628$) considering all participants. During control group, a minimum of 18 and a maximum of 56 ($M = 29.43$, $SD = 11.72$) were the participants' age. During experiment group, a minimum of 16 and a maximum of 52 ($M = 27.51$, $SD = 11.46$) were the participants' age. 4.8% of the participants have a high school diploma, 66.7% have a bachelor diploma, and 28.6% have a postgraduate degree. Participants' profession shows a high degree of variance. For instance, 15.9% of the participants are the administrative staff of the library,

15.9% of the participants are engineers, and 20.6% is architect and interior architects. Percentages of other professions are lower. Therefore, the data were regrouped according to designer and non-designer professions. 25.4% of the participants belong to the designer profession while 74.6% of them belong to the non-designer profession. 85.7% of the participants were Turkish while 14.3% are Iranian, Russian, Pakistani, English, American, Lebanese, and Albanian. Lastly, 47.6% of the visitors participated during control group (group no QR) while 52.4% participated during experiment group (group QR). Table 4 summarizes the frequencies and percentages of the demographic characteristics of the participants.

Table 4. Demographic Characteristics of Participants

Characteristics	Category	Total Frequency	No QR Freq.	QR Freq.
1.Age	18 to 35	48	22	26
	35 to 60	15	8	7
2.Gender	Female	31	18	13
	Male	32	12	20
3.Education Level	High School	3	0	3
	University	42	17	25
	Master & PhD	18	13	5
4.Profession	Designer	16	11	5
	Non-designer	47	19	28
5.Nationality	Turkish	54	26	28
	Other	9	4	5
6.Group Type	Control (No QR)	30	-	-
	Experiment (QR)	33	-	-

4.2. Analysis of the Quantitative Data

Timing data and survey data were collected as quantitative data during the experiment. In this chapter quantitative data will be analyzed.

4.2.1. Timing Data

4.2.1.1. Tests of Normality

By analyzing the video recordings, viewing duration of the participants was collected during the experiment. Viewing durations for each condition were collected as the timing data in seconds. Collected data were converted into the SPSS software, after which tests of normality were conducted.

Table 5. Tests of Normality

Sig.	Kolmogorov-Smirnov ^a			Shapiro-Wilk			
	Group Type	Statistic	df	Sig.	Statistic	df	
Per second	No QR	.147	30	.098	.966	30	.428
	QR	.197	33	.002	.848	33	.000

Note. a = Lilliefors Significance Correction. Reject the null hypothesis if $p < 0.05$.

As reported by the researchers, Kolmogorov-Smirnov test is preferred if the sample size is greater than 50 to measure the normality (Shapiro & Wilk, 1965; Shapiro, Wilk, & Chen, 1968). Two different significance levels were found for each group (Table 5). According to the results, Group No QR is normally distributed (sig. = .098, $p < 0.05$) while Group QR is not normally

distributed (sig. = .002, $p < 0.05$).

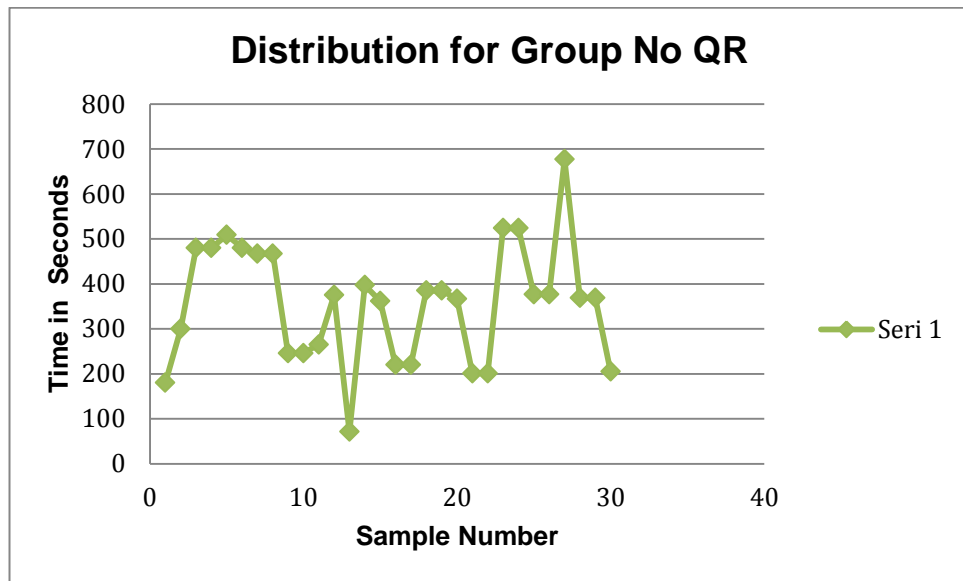


Figure 31. Distribution for Group No QR

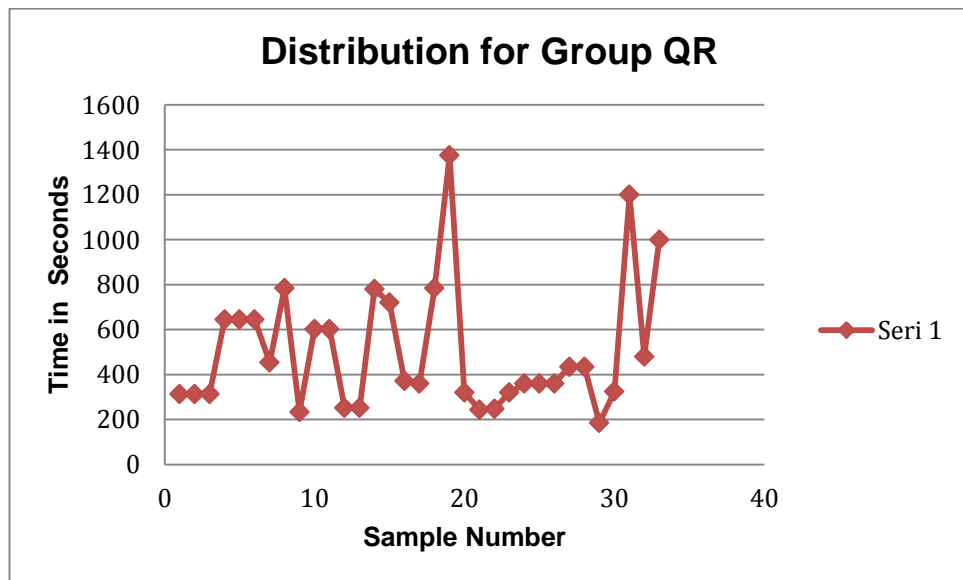


Figure 32. Distribution for Group QR

Above are distribution graphics for Group No QR and Group QR (Figure 31 & Figure 32). Time spent for viewing exhibit objects and the sample number can be followed through the distribution graphics. Also, outlier values can be detected by the graphics for both groups. Moreover, extreme values also can

be found in Table 6. There are the highest and lowest case values for both groups. For instance, the highest value for viewing the exhibit objects is 677 seconds while the lowest value for viewing the exhibit objects is 71 during control group. Moreover, the highest value for viewing the exhibit objects is 1375 seconds while the lowest value for viewing the exhibit objects is 185 seconds during experiment group.

Table 6. Extreme Values of Time Spent During Each Group

Value	Group Type		Case Number		
Per second	No QR	Highest	1	27	677
			2	23	524
			3	24	524
			4	5	509
			5	3	480 ^a
	QR	Lowest	1	13	71
			2	1	180
			3	22	201
			4	21	201
			5	30	205
Per second	QR	Highest	1	49	1375
			2	61	1200
			3	63	1000
			4	38	784
			5	48	784
	QR	Lowest	1	59	185
			2	39	234
			3	51	244
			4	52	248
			5	43	252 ^b

Note. a = Only a partial list of cases with the value 480 are shown in the table of upper extremes. b = Only a partial list of cases with the value 252 are shown in the table of lower extremes.

We can conclude that the timing data are nonparametric based on the normality tests and distribution graphics. Therefore, nonparametric tests for independent samples will be calculated.

4.2.1.2. Nonparametric Tests for Independent Samples

Nonparametric tests for independent samples were run to compare the mean values of the timing data for both groups. Mann Whitney-U Test is the nonparametric test for independent samples (Table 7). According to the results, we retain the null hypothesis (sig = .90, .112 $p < 0.05$). As a result of the Mann Whitney-U Test, timing data indicated that using QR Codes as an information delivery method is positively correlated with user engagement in exhibition spaces.

Table 7. Mann Whitney-U Test for Testing Significance Levels

Null Hypothesis	Test	Sig.	Decision
1. The medians of per second are the same across categories of group type 1.	Independent-Samples Median Test	.895	Retain the null hypothesis
2. The distribution of per second is the same across categories of group type 2.	Independent-Samples Mann-Whitney U Test	.112	Retain the null hypothesis

Note. Asymptotic significances are displayed. The significance level is .05.

4.2.1.3. Average Holding Time (AHT)

According to Sandifer (2003) average holding time is the average time spent on viewing the key objects of the exhibits by engaged visitors. Average holding time measures active engagement. Average holding time can be calculated with the formula presented below:

$$AHT = \frac{\text{Total time spent at the exhibit by engaged visitors}}{\text{Total number of engaged visitors}}$$

Total time spent viewing 11 exhibit objects by each participant were collected after the experiment. These data were converted to average holding time (AHT) values for each group. Mean of Average Holding time Values can be found at Table 8.

Table 8. Average Holding Time Values for Each Group

Average Holding Time (AHT)				
Deviation	Group Type	N	Mean	Std.
Per second	No QR	30	357.53	133.179
	QR	33	506.69	285.264

As a result, participants of experiment group spent more time ($M = 506.69$, $SD = 285.264$) viewing the exhibit objects than participants of control group ($M = 357.53$, $SD = 133.179$). As expected (Hypothesis 1) using QR codes as an information delivery method increases visitor engagement in exhibition

spaces.

4.2.2. Survey Data

4.2.2.1. Reliability Analysis

In this section of the chapter, reliability analysis of the survey questions will be examined. According to Nunnally (1978, p. 245) instruments used in research preferred to have reliability value (Cronbach's alpha) of .70 or better. Survey data were entered to the SPSS software to test the reliability statistics. First, Cronbach's alpha value was .278 when the reliability tests are done with 10 questions asked during control group (Table 9). After excluding question 1, 2, and 10 Cronbach's alpha value became close to .70 when (Table 10). Second, the Cronbach's alpha value was .784 when the reliability tests are done with 15 questions asked during experiment group (Table 9). Cronbach's alpha value became .791 when excluding question 1 (Table 10). In the light of the results, questions 1, 2, and 10 of control group questionnaire, and question 1 of experiment group questionnaire are out of scope and not related with the rest of the survey questions.

Table 9. Reliability Analysis for Survey Data

Reliability Statistics				
Items	Group Type	N	Cronbach's Alpha	N of
Cases	No QR	30	.278	10
	QR	33	.784	15

Table 10. Corrected Reliability Analysis for Survey Data

Reliability Statistics				
Items	Group Type	N	Cronbach's Alpha	N of
Cases	No QR	30	.683	7
	QR	33	.791	14

4.2.2.2. Survey Results

The participants were asked to rate questions using a 5-point rating scale (1=*strongly disagree*, 5=*strongly agree*) during the second section of the questionnaire. These questions can be found in the Appendix A. In this chapter, survey results of the second section will be examined under two categories. These categories are group type and age groups.

4.2.2.2.1. Group Type

Group no QR will be referred to as control group while group QR will be referred to as experiment group. During both groups, approximately 50.0% of the participants found the text easy to read. Participants of 50.0% during control group and 69.7% of experiment group strongly agree that the information was easy to access. There was a significant difference in the answers to the question asking about if the information delivery method provided intellectual stimulation. According to the results of control group, 23.3% of the participants were neutral while 23.0% of them agreed. On the other hand, 80% of the participant of experiment group strongly agreed that

QR codes provided intellectual stimulation. Moreover, 87.9% of the experiment group participants were comfortable using their mobile devices and 81.8% of them had no trouble using QR codes. Also, 78.8% of the experiment group participants strongly agreed that the website was easy to use. However, 21.2% of them disagreed that they often used QR codes. Lastly, 42.4% of the experiment group participants agreed that they felt good about the idea of interacting with other visitors using the comment section but 45.5% of them strongly disagreed that they shared comments.

4.2.2.2.2. Age Groups

One of the expected results of the study was that younger people are more likely to use QR Codes in exhibition spaces (Hypothesis 2). According to the survey results, 73.3% of participants aged 35 to 60 strongly agreed that QR codes increased their interaction with artworks while this ratio was 47.9% for participants aged 18 to 35. 53.3% of the participants aged 35 to 60 strongly agreed that they remember the information presented while only 22.9% of the participants aged 18 to 35 agreed. 73.3% of the participants aged 35 to 60 strongly agreed that QR codes provided intellectual stimulation while 37.5% of the participants aged 18 to 35 strongly agreed. Moreover, all of the participants aged 35 to 60 strongly agree that they had no trouble using QR codes while 76.9% of the participants aged 18 to 35 strongly agreed. Lastly, 80% of the participants aged 35 to 60 older, strongly agreed that sharing comments was a good idea for interacting with others while 38.5% of the participants aged 18 to 35 agreed.

4.3. Analysis of the Qualitative Data

Qualitative methods are widely used during many types of research. There is a variety of ways to analyze qualitative data. During present study thematic analysis will be used to identify patterns and themes from the qualitative data (Maguire & Delahunt, 2017). The main purpose of the thematic analysis is to form themes by implementing codes and keywords (Braun & Clarke, 2013) to understand the important issues participants mentioned during the experiment.

During the experiment, participants were asked to fill out a questionnaire. The last section of the survey included open-ended questions. This section enabled visitors to add comments about the experiment for both groups. Comment section consisted of two different questions. The survey questions can be found in Table 11.

Table 11. Open-ended Questions for Each Questionnaire

No QR	1. Please add any additional comments about the information tags 2. Evaluate your overall satisfaction with information tags
QR	3. Please state reason(s) why you scanned the QR codes 4. Evaluate your overall satisfaction with the QR codes in this exhibition

Participants' answers to the open-ended questions were gathered and the data were transformed into understandable and manageable form. This is referred to as packing data process (Krathwohl, 1998). The data were examined to find the codes and keywords that participants mentioned in the comment section. Sticky notes were used in an attempt to search for relationships in the qualitative data. The data were organized separately with two different colors for differentiating the group types. The data of control group was added with pink sticky notes while experiment group was added with yellow sticky notes. The data gathered from the participants' answers to the open-ended questions were grouped under 11 themes. These main themes are listed as context, accessibility, text, size, placement, interaction, usefulness, learning, format, engagement, and technology. After the coding process, another researcher followed the same procedure to match the coded data. According to the results, engagement and interaction groups were combined under interaction because the items were found to be intersecting.

After the coding process, data were analyzed to construct an explanation. Figure 33 explains the distribution of themes according to group type and quantity of participants that mentioned these keywords in the comment section. In accordance with the chart, participants only mentioned about learning, technology, and format during experiment group. On the contrary, participants added comments about the placement of the information labels during control group. During Control group, 30% of the participants commented on the context of the information labels. During experiment

group, 51.5% of the participants commented on the accessibility of the information tags. This chapter will continue with a deep examination of the comments of the participants in accordance with coded data.

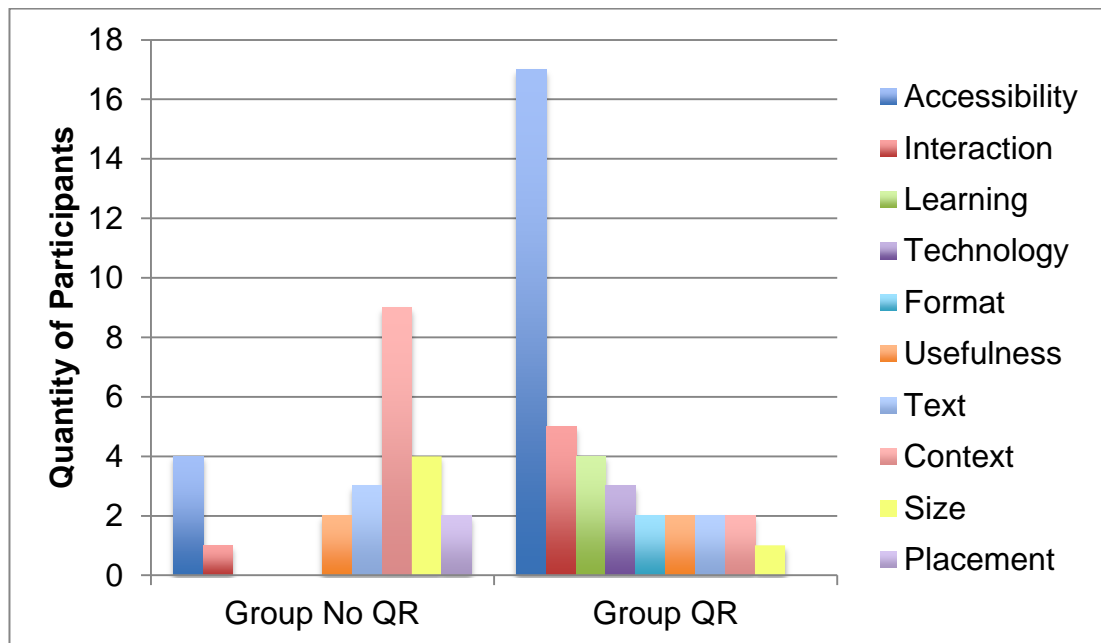


Figure 33. Distribution of Themes According to Group Type

4.3.1. Accessibility

Accessibility is about accessing the information about the related artworks. The participants of control group commented that they wanted to access the information even when they leave the exhibition space. Moreover, 9% of the participants mentioned that having both Turkish and English texts on the information labels made informative texts accessible.

The participants of experiment group mentioned that they easily accessed the information through their smartphones. Furthermore, 21% of the participants agreed that accessing information anytime and anywhere they want was a positive feature of the QR codes. However, 9% of the

participants had an accessibility problem because of poor Internet connection.

4.3.2. Interaction

The interaction of visitors with each other and with exhibit objects is examined. Only one participant commented about interaction during control group. According to him/her, the information flow helped to interact with the paintings. During experiment group, 42.4% of the participants agreed and 27.2% of the participants strongly agreed that they felt good about the idea of interacting with other visitors using the comment section on the website. 9% of the participants of experiment group noted that the comment section on the information pages helped to interact with other visitors and artworks. Moreover, the possibility of interacting with other visitors increased the playfulness and interest of the website. Moreover, participants commented that the interaction with artworks increased while using QR codes. Lastly, a participant mentioned that visitors could control and save the information thanks to the QR codes.

4.3.3. Learning

Learning quality of visitors is examined according to their comments about recalling the information delivered during their visit to the gallery. None of the participants mentioned learning during control group. On the other hand, some of the participants of experiment group commented on their motivation for learning. For instance, a participant mentioned that QR codes made the information memorable. Also, using QR codes made the information easy to

recall. Another participant stated that the website design motivated to learn about the artworks. Lastly, according to one participant, QR codes enabled memorizing the informative texts and names of the artists.

4.3.4. Technology

Visitors' comments about the technology used during experiment group are analyzed. According to 6% of the participants of experiment group, the QR codes made them curious about the artworks. Moreover, they were satisfied to see the technology adopted information delivery methods at the exhibition space.

4.3.5. Format

Visitors' remarks about the format of the text and exhibit labels are analyzed. None of the participants mentioned format during control group. According to the participants of experiment group, the system of the website was clean, quick, and efficient. Also, the format was well organized.

4.3.6. Usefulness

Visitors' mentioned about the effectiveness of the information labels and QR codes. Participants of control group mentioned that it was useful to place an information label beside every artwork. Moreover, information labels were useful in terms of gaining information about the artworks, artists, and artists' principles of creating the artworks.

Participants of experiment group stated that using QR codes, as an

information delivery method was useful in terms of controlling and saving the information.

4.3.7. Text

Visitors' made some remarks about the length, color, and typefaces of the text located at the exhibit labels. Some participants of control group mentioned that there was too much text on the exhibition labels. Also, some of them stated that Turkish and English parts of the information labels could be separated into two labels or their color can be differentiated.

Nine percent of the participants of experiment group stated that the amount of text could be increased although the amount of text used during both groups was the same. Moreover, a participant added that using a website eliminates the effects caused by typeface such as big or small fonts.

4.3.8. Context

Majority of comments about the context of the information labels were participants from control group. 9% of the participants stated that the information about the educational background of the artists and about the art movements could be indicated. Moreover, additional information about the reasons behind the paintings and year of the specific artworks can be added to the informative texts.

According to 9% of the participants of experiment group, reviewing other works of the artists from the website was beneficial for creating an idea about

the artists' language of painting.

4.3.9. Size

As reported by the 16.6% of the participants of control group, the information tags should be bigger in size. On the other hand, 12.1% of the participants of experiment group stated that the text was easy to read because they could zoom in by using their smartphone.

4.3.10. Placement

Some of the participants of control group stated that the labels should be placed higher while none of the participants of experiment group commented on the placement of the information labels

CHAPTER 5

DISCUSSION

The results of the study will be discussed under two hypotheses. The first hypothesis will be examined under three categories. These categories are the timing data, visitors' learning and social interaction behavior and exhibit label factors. The second hypothesis will be analyzed according to the survey data compared by the age groups.

Analysis of the timing data indicated that using QR codes as an information delivery method was positively correlated with user engagement in exhibition spaces (Hypothesis 1). Therefore, the results provided supportive evidence for Hypothesis 1. The average holding time (AHT) values of information labels with QR codes were greater than information labels with text.

Comparing the average holding time (AHT) values of both groups demonstrated that QR codes seem to attract and hold visitor attention to a

greater degree than traditional information labels. Therefore, the implementation of QR codes to the information delivery process facilitated collaborative engagement with exhibit objects (vom Lehn, 2006).

Learning and sociability are the key factors for increasing visitor engagement in exhibition spaces (Ahmad et al., 2015; Othman, 2012). Also, visitor satisfaction and engagement is correlated with the experience of learning (Ahmad et al., 2015). One of the aims of the present study was to investigate how using QR codes as an information delivery method influence visitors' learning experience. The results of qualitative data showed that QR codes provoke motivations such as curiosity, challenge, and playfulness among visitors. Visitors noticing the QR codes got curious about discovering the information on the barcodes followed by the degree of challenge to reach the information using QR codes. Perry (2012) states that these types of motivations provide intellectual, emotional, and physical engagement. We found that most of the participants from experiment group strongly agreed that QR codes provided intellectual stimulation. On the other hand, only few of the participants of control group reported agreeing on the same issue. Moreover, some of the participants of experiment group mentioned that QR codes made the information easy to recall. Furthermore, they stated that using QR codes as an information delivery method motivated them for learning. In sum, the results of the study supported previous findings. Technology supported tools such as QR codes increase the level of learning and provide intellectual stimulation to the visitors in the exhibition spaces.

Exhibitions influencing group discussions and social interaction were found to increase visitor engagement (S. Bitgood, 2002; Sandifer, 1997; vom Lehn, 2006). Most of the research studied behavioral analysis of the participants that examined the exhibits with a companion or within a group. These analyses investigated the relationship between social interaction and visitor engagement. Social interaction affected how visitors experienced and examined the exhibit objects (vom Lehn, 2006). However, there is a lack of studies exploring the effects of providing social interaction with the help of a technological tool on visitor satisfaction. Patrons and staff members of the Museum of Inuit Art stated that QR codes could be used to start a conversation and interaction between visitors, artists, and patrons (Schultz, 2013). There are no studies on the relationship between the use of QR codes and social interaction. Another aim of this study was to investigate how the level of social interaction was affected by the use of QR codes. The results showed that nearly half of the participants of experiment group strongly agreed that they felt good about the idea of interacting with other visitors by using the comment section provided by the website. However, only a few of the experiment group participants shared comments on the website. After the experiment most of the visitors commented that they did not notice the comment section on the artists' information pages. Therefore, future studies can investigate this issue by explaining the visitors before they start the experiment about the comment feature or any other similar tool used as a communication device.

The results of the study also point out that designers and museum curators should consider some factors about the exhibit labels. These factors are design, context, and placement of the exhibit labels. Firstly, according to the researchers (Bitgood, 1989; Serrell, 1983) figure-ground contrast, interpretation of color to label or informative text, size of the label and designing the labels in a way that it will provoke manipulative stimulation are the design factors influencing label reading. Based on the results, participants prefer clean and efficient label design. According to Bitgood (1989), large letters draw more attention. Label size was decided to be 15x15 cm during control group. As reported by the participants of control group, the information tags should be bigger in size that provided support for the literature. Some of control group participants mentioned that English and Turkish texts could be differentiated according to color interpretation. Besides, most of the participants commented that the text was easier to read from the website in comparison with control group because participants could zoom in to the text with the help of their smartphones. Moreover, using QR codes as an information delivery method provoked manipulative stimulation that increased visitors' label reading duration. The context of the informative text influences the label reading. Previous studies suggest that the text should not be too technical (Bitgood, 1989; Serrell, 1983). None of the participants commented on the issue as stated by the researchers. However, some of the participants stated they would like to access information about the educational background of the artists and art movements, reasons behind the paintings, and year of the specific artworks. The placement of the exhibit labels is the last key factor influencing label reading. The results

specified that visitors preferred to have information labels beside every artwork. Bitgood, (1989) suggests that the information labels should be placed at 150 cm above ground level. However, pilot study results suggested that they should be placed lower than 150 cm because participants had difficulty reading the information labels. Therefore, the experiment was conducted with information labels placed at 120 cm above ground level. After the experiment, a few of the participants of control group stated that the labels should be placed higher. Even though information labels were placed at the same height during both groups, none of the participants complained about the height of the label during experiment group. The reason behind this can be because the participants of experiment group read the information from their smartphones that made it easy to access and control the information. There are different suggestions about the height of the wall labels. Smithsonian guidelines for accessible exhibition design (2000) suggest that wall labels placed between 122 cm and 167 cm are comfortable for reading for both those who are seated and standing. Therefore, the present study can suggest placing the labels in the range between a minimum of 122 cm to a maximum of 167 cm. However, this issue requires more analysis before suggesting a specific guideline about the ideal height of placing the information labels. Using QR codes minimized the need for occupying a space in front of the artworks as mentioned by some of the participants. Last, most of them mentioned that accessing information anytime and anywhere they want was a positive feature of the QR codes.

Bitgood (2002) points out that participants' demographic characteristics have an impact on visitor engagement in exhibition spaces. Hood (1983) states that the majority of museum visitors are younger than the population. Based on the results, 76.2% of the participants were aged 18 to 35 while 23.8% of the participants was aged 35 to 60. Moreover, mostly younger people use QR codes because it requires a smartphone according to a study (Schultz 2013). However, QR codes can be used by all visitors regardless of their age, sex, and abilities (Borun & Dritsas, 1997). In contrast with Schultz's study, all of the participants' aged 35 to 60 strongly agreed that they had no trouble using QR codes during the experiment. Also, 73.3% of the participants' aged 35 to 60 strongly agreed that using QR codes increased their interaction with artworks. According to the findings, Hypothesis 2, which claimed that younger people were more likely to use QR codes in exhibition spaces, was not supported. Further studies can investigate this hypothesis with a larger sample group consisting of equal sample sizes of younger and older participants.

Overall, the main findings of the experiment support previous research in the field and discovered new findings regarding the use of QR codes as an information delivery method and its' effects on visitor engagement. It is expected that the results of this study will contribute to understanding and improving visitor engagement in exhibition spaces.

CHAPTER 6

LIMITATIONS AND CONCLUSIONS

The influence of using QR codes as an information delivery method to increase user engagement in exhibition spaces was investigated in this study. The results demonstrated that the value of average holding time (AHT) seems to increase when the information is delivered with QR codes as opposed to delivering the information with traditional informative texts.

The learning activity is supported by the use of QR codes. QR codes may provoke curiosity, challenge, and playfulness among the participants. These motivations encourage visitors to learn. The information provided by the website such as additional examples of the artists' works provides intellectual stimulation to the visitors. Moreover, design and interactivity of the website support visitors' to recall the information delivered about the exhibit objects.

The results suggested that visitors have a positive attitude towards the idea of interacting with other visitors through the website. However, the communication tool needs further examination on drawing visitors' attention and motivating them to interact with other visitors. After providing the sufficient tool, the effects of social interaction on visitor engagement can be studied in exhibition spaces.

The second Hypothesis was unsupported by the experiment data. According to the survey results, middle-aged participants used QR codes and reach the information without difficulties. In accordance with the results younger and middle-aged participants evenly preferred to use QR codes. However, the distribution of age intervals wasn't normally distributed. Therefore, this hypothesis could be tested with a larger sample group consisting of equal sample sizes of younger and middle-aged participants.

Another aim of the present study was to compare the influence of using QR codes with the preference levels of designer and non-designer participants. Also, different nationality groups and its' influence on the use of QR codes were going to be tested. However, the sample sizes of both groups were not significant to test any relationship (Table 4). Therefore, further studies can investigate these issues with a larger sample size consisting of equal numbers of participants in both groups.

As mentioned before, the video recordings were used to obtain the average holding time values during control and experiment groups. According to the

control group recordings, the timing data values consisted of the participants' viewing time of the exhibit objects and reading time of the exhibit labels.

During the experiment group, participants' viewing time of the exhibit objects and viewing time of their smartphones were calculated as the total time spent in the exhibition to measure their engagement level. However, as a limitation of the study, we could not measure from the recordings if they only visited the website to gain information or were using it for other purposes. Further studies can use the website statistics to measure the duration of participants' time spent viewing the website to eliminate this limitation.

The lack of internet connection is another limitation of the study. Some of the participants couldn't reach to the website because of the lack of Internet connection on their smartphones. To eliminate this issue a Wi-Fi connection can be provided during the experiment in further studies.

The experiment was conducted in a single experiment site with 11 exhibit objects consisting of the same exhibit characteristics (oil paintings on canvas). Future studies can be done in different exhibition venues with different characteristics (3D objects or installations) of displayed objects. Therefore, the hypothesis can be tested in different conditions and settings. For instance, an archeology museum or a science museum can be suitable for the setting of further studies. Moreover, the information load of the exhibit objects should be considered because visitors' learning activity, information delivery process, and visitor engagement are strongly related to the information being presented.

On the whole, this thesis provided new knowledge on using QR codes as an information delivery method and its' effects on visitor engagement in exhibition spaces. The findings presented above are expected to construct a basis on implementing the QR code technology in exhibition environments to improve visitors' interaction level with exhibit objects.

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APPENDICES

APPENDIX A

APPENDIX A. QUESTIONNAIRES

Figure A.1. Questionnaire of Control group

BILKENT UNIVERSITY LIBRARY ART GALLERY QUESTIONNAIRE

*This questionnaire was prepared for the research of Bengisu Görel, graduate student of Bilkent University Interior Architecture and Environmental Design Department, for the purpose of learning about the use of technology in exhibitions. The information you share will only be used for academic purposes and will not be associated with you. For more information contact bengisugorel@bilkent.edu.tr

I agree to participate in the study.

Section A: Please answer the following questions.

1. Age:

2. Gender: Female Male Other

3. Education Level: Middle and High School or lower University Master / PhD

4. Profession / Department:

5. Nationality:

Section B: Please select only one number from 1 to 5 to indicate your agreement with the below phrases as described in the gray area.

	1: Strongly Disagree	2: Disagree	3: Neutral	4: Agree	5: Strongly Agree
1.	I visit museums or art galleries once approximately per month				1 2 3 4 5
2.	I'm used to seeing information tags near exhibits in art galleries				1 2 3 4 5
3.	Information tags were easy to read				1 2 3 4 5
4.	The amount of text on the information tags was appropriate				1 2 3 4 5
5.	I was able to access the information about artworks by reading the information tags				1 2 3 4 5
6.	I think that my interaction with artworks increased by reading the information tags				1 2 3 4 5
7.	I remember the information I gained about the artworks by reading information tags				1 2 3 4 5
8.	Information tags provided me with intellectual stimulation about the artworks				1 2 3 4 5
9.	The information tags motivated me to learn more about artworks				1 2 3 4 5

		1: Strongly Disagree	2: Disagree	3: Neutral	4: Agree	5: Strongly Agree
10.	I found it convenient that every artwork had its information tag next to it	1	2	3	4	5

Section C: Please answer the following questions.

1. Please add any additional comments about the information tags:

2. Evaluate your overall satisfaction for information tags:

Figure A.2. Questionnaire of Experiment group

BILKENT UNIVERSITY LIBRARY ART GALLERY QUESTIONNAIRE

*This questionnaire was prepared for the research of Bengisu Görel, graduate student of Bilkent University Interior Architecture and Environmental Design Department, for the purpose of learning about the use of technology in exhibitions. The information you share will only be used for academic purposes and will not be associated with you. For more information contact bengisugorel@bilkent.edu.tr

I agree to participate in the study.

I did not participated in this study before.

Section A: Please answer the following questions.

1. Age:

2. Gender: Female Male Other

3. Education Level: Middle and High School or lower University Master / PhD

4. Profession / Department:

5. Nationality:

Section B: Please select only one number from 1 to 5 to indicate your agreement with the below phrases as described in the gray area.

	1: Strongly Disagree	2: Disagree	3: Neutral	4: Agree	5: Strongly Agree
1.	I visit museums or art galleries once approximately per month				1 2 3 4 5
2.	I'm used to seeing information tags near exhibits in art galleries				1 2 3 4 5
3.	Information tags were easy to read				1 2 3 4 5
4.	The amount of text on the website was appropriate				1 2 3 4 5
5.	I was able to access information about artworks by using the QR codes				1 2 3 4 5
6.	I think that my interaction with artworks increased while using QR codes				1 2 3 4 5
7.	I remember the information I gained about the artworks by using QR codes				1 2 3 4 5
8.	Website reached by the QR codes provided me with intellectual stimulation about the artworks				1 2 3 4 5
9.	The design of the website motivated me to learn more about the artworks				1 2 3 4 5

		1: Strongly Disagree	2: Disagree	3: Neutral	4: Agree	5: Strongly Agree
10.	I am comfortable using mobile devices	1	2	3	4	5
11.	I often use QR codes in my daily life	1	2	3	4	5
12.	I did not have trouble using QR codes while visiting the exhibition	1	2	3	4	5
13.	The website was easy to use	1	2	3	4	5
14.	I felt good about the idea of interacting with other visitors using the comment section on the website	1	2	3	4	5
15.	I shared comments on the website	1	2	3	4	5

Section C: Please answer the following questions.

1. Please state reason(s) why you scanned the QR codes during your visit:

2. Evaluate your overall satisfaction with the QR codes in this exhibition:

APPENDIX B

APPENDIX B. EXHIBIT OBJECTS



Figure B.1. Burhan Doğançay (Taken by Görel, 2019)



Figure B.2. Fikri Cantürk (Taken by Görel, 2019)

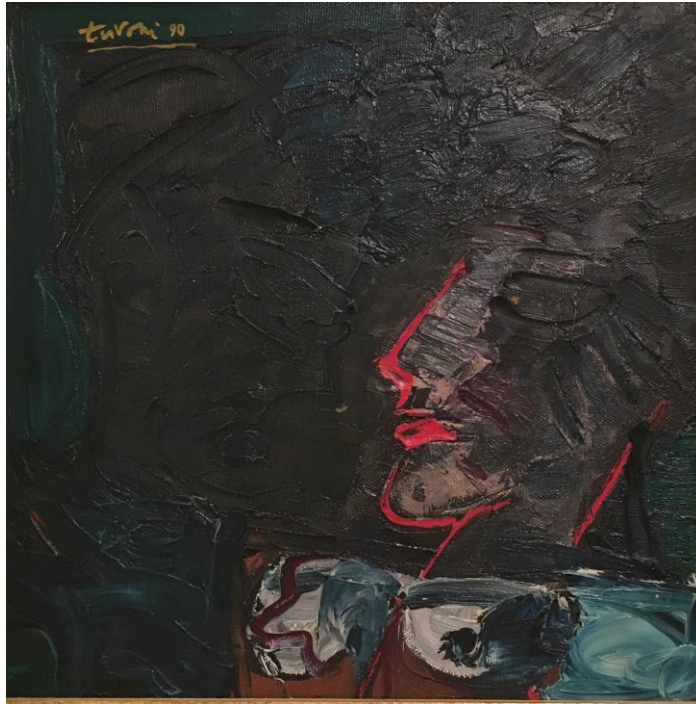


Figure B.3. Adnan Turani (Taken by Görel, 2019)

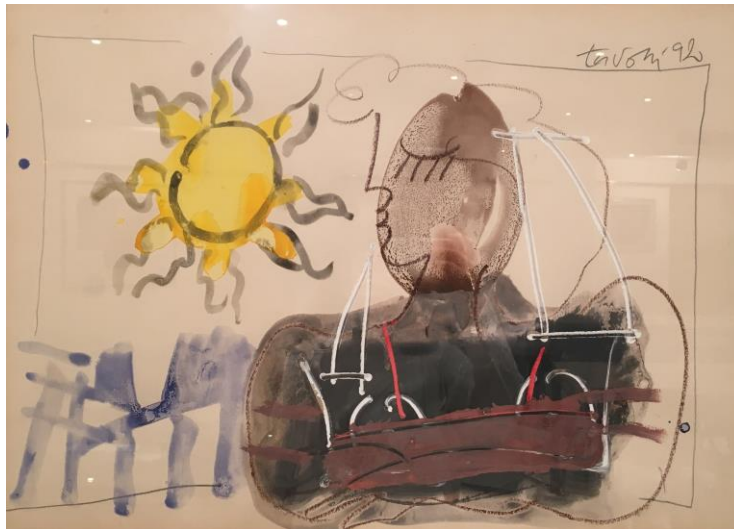


Figure B.4. Adnan Turani (Taken by Görel, 2019)



Figure B.5. Kayıhan Keskinok (Taken by Görel, 2019)



Figure B.6. Kayıhan Keskinok (Taken by Görel, 2019)



Figure B.7. Kayıhan Keskinok (Taken by Görel, 2019)



Figure B.8. Kayıhan Keskinok (Taken by Görel, 2019)

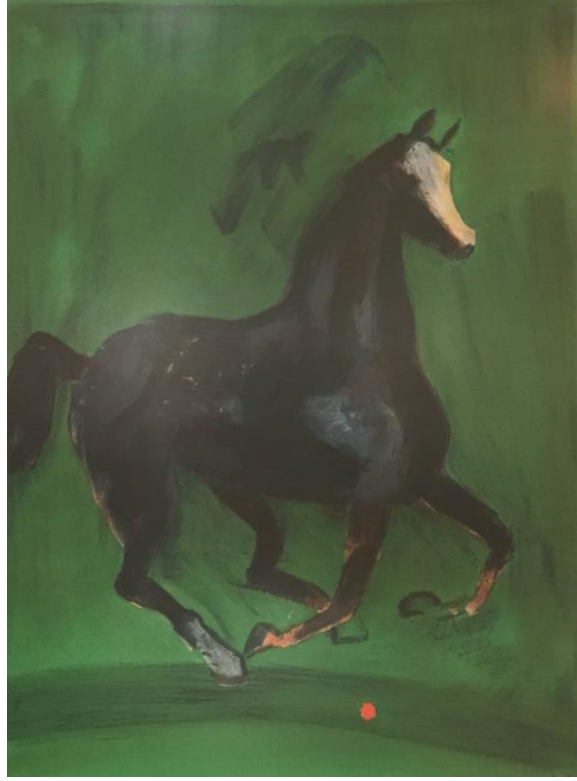


Figure B.9. Avni Arkaş (Taken by Görel, 2019)



Figure B.10. Sarkis Erganian (Taken by Görel, 2019)



Figure B.11. Fernand Leger (Taken by Görel, 2019)

APPENDIX C

APPENDIX C. INFORMATION LABELS OF CONTROL CONDITION

Burhan Doğançay

Kompozisyon

Alev-Kenan Eratalay Koleksiyonu

Kağıt, 53x73cm

Sanatçı, kentsel duvarlara duyduğu merak ve ilgiden ortaya çıkmış eserleri ile tanınır. Eserlerinde dünya çapında 100'den fazla ülkeye yaptığı seyahatlerden ilham almıştır. Sanatçı, kentsel duvarları zamanın geçişi, sosyal, politik ve ekonomik değişimin bir yansıması olarak görmektedir. Doğançay, kent duvarlarından topladığı posterleri ve diğer nesnelere kullanarak duvarları kendi sanat eserlerinde farklı serilerde yeniden yaratır.

Artist is primarily known for his works that grew out of his wonder and interest with urban walls. His works was inspired from his travels to more than 100 countries around the world. The artist sees the urban walls as a passage of time and reflection of social, political and economic change. Doğançay re-creates walls in different series by using posters and other objects collected from urban walls and reproduces these items into his artwork.

Fikri Cantürk

Kompozisyon, 1989

Alev-Kenan Eratalay Koleksiyonu

Tuval üzeri Yağlıboya, 68x78cm

Adnan Turani

Kompozisyon, 1990

Alev-Kenan Eratalay Koleksiyonu

Tuval üzeri Yağlıboya, 32x32cm

Adnan Turani'den yarıdan çoğu siyahla kaplı küçük bir tablo, önünde fazla durmadan yürüyüp geçebilirsiniz. Ama o da ne, tam giderken vuran ışıkta siyah bölümde bir hareket çarptı gözünüze. Evet, boya ka-banp alçalarak üç boyutlu bir çehreye bürünüp hemen karşısındaki kadını süzüyor. Kompozisyonun yukarısında sanatçı bilinen akışkan imzasını atmış, ama dikkatle bakınca altta siyah üzerine siyahla bir imzası daha var. Hmm, bu hiç de normal değil; evet "sır" dolu bir tabloyla karşı karşıyayız. İlk önce görmediğimizi görüyoruz ama sonra da ne gördüğümüze pek emin olamıyoruz. Sanatçının o pek güvendiğimiz gözlerimizle sevimli bir oyununa siz de gelin katılın

This small painting is almost fully covered with black. While walking beside the artwork you can see a movement in the darkness. Paint raises on some levels in order to create a male figure looking down to the female figure right next to it. Above, the artist's signature can be seen with yellow paint. While looking down to the black area another signature is hidden in the composition. This piece of Adnan Turani is full of surprises and mysteries.

Adnan Turani

Kompozisyon, 1992

Alev-Kenan Eratalay Koleksiyonu

Kağıt, 65x47cm

"Hiçbir sanat eseri, deneylere dayanan inandırıcı bir birikim olmadan gerçekleştirilemez. İnanca dayanmayan bir şey yaparak bir sonuca varılmayacağını düşünüyorum. Çalışmalarını beğendirmeye çabalamak da saçma geliyor bana. Böyle bir girişim ancak yalanın bir çeşidi olabilir."

"No artwork can be realized without convincing accumulation based on experiments. I don't think you can come to a conclusion by doing something that is not based on faith. It seems ridiculous for me to make people like my works. Such an attempt can only be a kind of lie."

Kayıhan Keskinok

Kompozisyon, 1990

Alev-Kenan Eratalay Koleksiyonu

Tuval üzeri Yağlıboya, 47x37cm

"Sisler, ışıklar, gizemli ortamlar benim dünyam. Sanat yaratıcılığın bir simgesel görüntüsüdür." diyen sanatçının resimleri iki dönem altında incelenmektedir. Birinci dönem resimlerinde geleneksel konular işlerken ikinci dönem resimlerinde figür çalışmaları yapılmaktadır. Birinci dönemde ağırlıklı Karadeniz düğünleri ve lunapark kompozisyonları çalışmıştır. İkinci dönemde ise sanatçı resimlerinde mitolojik öğeleri soyutlamaktadır. Aynı zaman kadın-erkek figürleri ile resimde heyecan ve hareket ögesi olarak çalışmaktadır.

"Fog, lights, mysterious environments are my world. Art is a symbolic image of creativity." The paintings of the artist are examined under two periods. While he was dealing with traditional subjects in the first period paintings, he made figure works in his second period paintings. In the first period, he worked mainly on Black Sea weddings and amusement park compositions. In the second-period, the artist abstracts mythological elements in his paintings. At the same time, he works with woman-man figures as an element of excitement and movement.

Kayıhan Keskinok

Kompozisyon, 1991

Alev-Kenan Eratalay Koleksiyonu

Tuval üzeri Yağlıboya, 57x47cm

Sanatçı tek figürlü ya da çok figürlü olsun bütün resimlerini görsel belleğinin yardımıyla, herhangi bir canlı, ya da modele başvurmadan gerçekleştirmiştir. Kendi anlatımıyla "görsel bellekten çalışabilmek için en başta, o hareketi yaşamamız gerekir". Kayıhan Keskinok tüm eserlerinde ele aldığı konularda yaşadığı hareketlerden yararlanmıştır. Sanatçı olarak en büyük zenginliği de bu deneyime dayanıyor.

The artist, whether single-figure or multi-figured, carried out all of his paintings with the help of visual memory without using any living or model. According to Keskinok, in order to be able to work from the visual memory, you must experience the movement first. Kayıhan Keskinok has benefited from the movements she has experienced in all her works. Her greatest wealth as an artist is his experience.

Kayhan Keskinok

Kompozisyon, 1990

Alev-Kenan Eratalay Koleksiyonu

Tuval üzeri Yağlıboya, 58x48cm

Keskinok'un konularındaki çeşitlenme ve zenginleşme, resimlerinde mekan anlayışında da farklı ele alışlar ile başbaşa ilerlemiştir. Zamanla bol figürlü resimlerdeki hareketi yer çekimsiz bir ortama taşımıştır. Resimlerdeki figürler birbirleriyle bağıntılarını yitirmeksizin sanki topluca hareket ediyor izlenimi vermektedir.

The diversification and enrichment of Keskinok's subjects has progressed with different approaches in his paintings. In time, he moved the movement in his abundant figures to a gravitational environment. The figures in the paintings give the impression that they are moving together as if they are not related to each other.

Kayhan Keskinok

Kompozisyon, 1989

Alev-Kenan Eratalay Koleksiyonu

Tuval üzeri Yağlıboya, 42x35cm

Figürler yer çekiminden koparak uzayda hareket ederler. Resimde varılan bu çözüm, düşsel ve fantastik konuların ele alınmasına izin vermiştir resimlerinde. Hareket halindeki kadın bedenleri, atların ve erkeklerin, kadın bedenleriyle, zariflikleriyle karşılık oluşturulan yabani tavırları sanatçının vurguladığı resimsel öğelerdir.

The figures move from space to gravity. This solution, which is taken in the picture, has allowed the handling of imaginary and fantastic subjects. Women's bodies in motion, horses and men, the female body, the wild attitudes that contradict with the elegance of the pictorial elements emphasized by the artist.

Avni Arkaş

Kompozisyon

Alev-Kenan Eratalay Koleksiyonu

Kağıt, 36x48cm

Avni Arbaş Türkiye'de modern ve soyut resmin öncüleri arasında sayılmaktadır. Paris'te aldığı eğitim sonrasında çeşitli çalışmalarını sergilerde yer almıştır. Daha sonra Picasso ile tanışmış ve çalışmalarından etkilenmiştir. Sanatçının Türkiye'ye döndükten sonra çalıştığı "Atlar" serisi üzerine Nazım Hikmet "Avni'nin Atları" şiirini yazmıştır. Sanatçının katıldığı bir panelde "Bazen bir at gibi hissediyorum" demiştir. Bunun üzerine moderatör "Hayır efendim" demiştir. Sonrasında sanatçı aslında bazen bir at gibi olmanın iyi olabileceğini aktarmıştır.

Avni Arbaş is considered one of the pioneers of modern and abstract painting in Turkey. After his education in Paris, he participated in various exhibitions. Later, he met Picasso and was influenced by his work. Nazım Hikmet wrote the poem "Avni's Horses" after the Artist's work of "Horses" series. Artist was discussing these "Horses" series in a panel. He said; "Sometimes I feel like a horse". The moderator said, "No, sir." Afterward, the artist stated that sometimes it might be good to be like a horse.

Sarkis Erganian

Kompozisyon

Alev-Kenan Eratalay Koleksiyonu

Tuval üzeri Yağlıboya, 27x17cm

Sarkis Erganian Paris Güzel Sanatlar Akademisi'nde sanat eğitimi almıştır ve orada Fransız ressam Gerome'un öğrencisi olmuştur. Çalışmalarını bitirdikten sonra Paris Salon Sergilerine katılmıştır ve daha sonra New York'a göç etmiştir. New York'ta bulunan ve büyük bir dağıtım gazetesi olan New York Herald'da çalışmıştır. St. Louis'deki dünya fuarında sergilenen yağlıboya tablolarından bir tanesi ile üçüncülük ödülü almış ve böylece Amerikan vatandaşlığına layık görülmüştür. Aynı zamanda yağlıboya çalışmalarının birçoğu Amerika'nın çeşitli şehirlerinde sergilenmiş ve bu eserler ona daha fazla ödül kazandırmıştır.

Sarkis Erganian studied art at the Paris Academy of Fine Arts. He there became the pupil of French painter Gerome. After he finished his studies he participated at Paris Salon Exhibitions. He migrated to New York and worked at New York Herald which is a large-distribution newspaper based in New York City. He was awarded the third prize for one of his oil paintings that was exhibited at the world fair at St. Louis and won the right to American citizenship. Moreover, many of his oil paintings were exhibited around American cities and these works brought him more prizes.

Fernand Leger

Kompozisyon, 1994

Alev-Kenan Eratalay Koleksiyonu

Tuval üzeri Yağlıboya, 24x31cm

Leger, Kübist nesnelerin kırılma stilini geometrik bir yorum ile çalışmalarına yansıtmaktadır. Ayrıca, sanatçı illüzyon unsuru olarak kullandığı üç boyutluluğa olan ilgisini korumaktadır. Leger, insanlar ve makineler arasındaki uyumu ve bağlantıyı ifade etmek için insan benzeri robot figürlerini tanımlamak için silindirik geometriler kullanmaktadır. Kaos, gürültü ve kentsel mekanlardaki yeni teknolojiyi ifade etmek için parlak ve ana renklere tablolarında yer vermektedir. Bunun yanı sıra, soyut nesnelere ve imgelerle bir hareket duygusu yaratmaktadır.

Leger accepted the Cubist style of fracturing objects in a geometrical interpretation. Also, the artist maintained an interest in the three-dimensionality as an element of illusion. Leger used cylindrical to describe human-like robotic figures in order to express a harmony and connection between humans and machines. In order to express chaos, noise and new technology of the urban spaces he used brilliant primary colors. In the compositions he created a sense of movement with abstract objects and images.

APPENDIX D

APPENDIX D. INFORMATION LABELS OF EXPERIMENT CONDITION

Burhan Doğançay

Kompozisyon

Alev-Kenan Eratalay Koleksiyonu

Kağıt, 53x73cm



fazlası için tarayın

Fikri Cantürk

Kompozisyon, 1989

Alev-Kenan Eratalay Koleksiyonu

Tuval üzeri Yağlıboya, 68x78cm



fazlası için tarayın

Adnan Turani

Kompozisyon, 1990

Alev-Kenan Eratalay Koleksiyonu

Tuval üzeri Yağlıboya, 32x32cm



fazlası için tarayın

Adnan Turani

Kompozisyon, 1992

Alev-Kenan Eratalay Koleksiyonu

Kağıt, 65x47cm

Kayıhan Keskinok

Kompozisyon, 1990

Alev-Kenan Eratalay Koleksiyonu

Tuval üzeri Yağlıboya, 47x37cm



fazlası için tarayın

Kayıhan Keskinok

Kompozisyon, 1991

Alev-Kenan Eratalay Koleksiyonu

Tuval üzeri Yağlıboya, 57x47cm

Kayıhan Keskinok

Kompozisyon, 1990

Alev-Kenan Eratalay Koleksiyonu

Tuval üzeri Yağlıboya, 58x48cm

Kayıhan Keskinok

Kompozisyon, 1989

Alev-Kenan Eratalay Koleksiyonu

Tuval üzeri Yağlıboya, 42x35cm

Avni Arbaş

Kompozisyon

Alev-Kenan Eratalay Koleksiyonu

Kağıt, 36x48cm



fazlası için tarayın

Sarkis Erganian

Kompozisyon

Alev-Kenan Eratalay Koleksiyonu

Tuval üzeri Yağlıboya, 27x17cm



fazlası için tarayın

Fernand Leger

Kompozisyon, 1994

Alev-Kenan Eratalay Koleksiyonu

Tuval üzeri Yağlıboya, 24x31cm



fazlası için tarayın

APPENDIX E

APPENDIX E. STATISTICAL ANALYSES

Table E.1. Frequency Table of Age of the Participants

		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	18 to 35	48	76.2	76.2	76.2
	35 to 60	15	23.8	23.8	100.0
	Total	63	100.0	100.0	

Table E.2. Frequency Table of Education Level of the Participants

		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	Female	48	76.2	76.2	76.2
	Male	15	23.8	23.8	100.0
	Total	63	100.0	100.0	

Table E.3. Frequency Table of Gender of the Participants

		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	University	42	66.7	66.7	71.4
	Master and PhD	18	28.6	28.6	100.0
	High School	3	4.8	4.8	4.8
	Total	63	100.0	100.0	

Table E.4. Frequency Table of Profession of the Participants

		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	Interior Architecture	9	14.3	14.3	14.3
	Administrative	10	15.9	15.9	30.2
	Landscape Architecture	1	1.6	1.6	31.7
	Computer Science	5	7.9	7.9	39.7
	Law	6	9.5	9.5	49.2
	International Relations	3	4.8	4.8	54.0
	Politics	2	3.2	3.2	57.1
	Engineering	10	15.9	15.9	73
	Medicine	1	1.6	1.6	74.6
	Media and Communication	2	3.2	3.2	77.8
	Architecture	4	6.3	6.3	84.1
	Economics	2	3.2	3.2	87.3
	Psychology	2	3.2	3.2	90.5
	Chemistry	2	3.2	3.2	93.7
	Physics	2	3.2	3.2	96.8
	Philosophy	1	1.6	1.6	98.4
High School	1	1.6	1.6	100.0	
Total	63	100	100		

Table E.5. Frequency Table of Nationality of the Participants

		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	Turkish	54	85.7	85.7	85.7
	Iranian	3	4.8	4.8	90.5
	Russian	1	1.6	1.6	92.1
	Pakistani	1	1.6	1.6	93.7
	English	1	1.6	1.6	95.2
	American	1	1.6	1.6	96.8
	Lebanese	1	1.6	1.6	98.4
	Albanian	1	1.6	1.6	100.0
	Total	63	100.0	100.0	

Table E.6. Frequency Table of Participants According to Group Type

		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	No QR	30	47.6	47.6	47.6
	QR	33	52.4	52.4	100.0
	Total	63	100.0	100.0	

Table E.7. Group Type Cross-tabulation for Questionnaires

		I'm used to seeing information tags near exhibits in art galleries		
		No QR	QR	
Valid	Strongly Disagree	Count	1	3
		% within group type	3.3%	9.1%
	Disagree	Count	1	2
		% within group type	3.3%	6.1%
	Neutral	Count	6	8
		% within group type	20.0%	24.2%
	Agree	Count	13	9
		% within group type	43.3%	27.3%
	Strongly Agree	Count	9	11
		% within group type	30%	33.3%
Total		30	33	

Table E.8. Group Type Cross-tabulation for Questionnaires

Information tags were easy to read			No QR	QR
Valid	Strongly Disagree	Count	0	0
		% within group type	0	
	Disagree	Count	2	2
		% within group type	6.7%	6.3%
	Neutral	Count	1	2
		% within group type	3.3%	6.3%
	Agree	Count	11	11
		% within group type	36.7%	34.4%
	Strongly Agree	Count	16	17
		% within group type	53.3%	53.1%
Total			30	33

Table E.9. Group Type Cross-tabulation for Questionnaires

The amount of text on the information tags was appropriate

The amount of text on the website was appropriate

			No QR	QR
Valid	Strongly Disagree	Count	0	0
		% within group type	0	0
	Disagree	Count	0	3
		% within group type	0.0%	9.1%
	Neutral	Count	4	5
		% within group type	13.3%	13.2%
	Agree	Count	13	7
		% within group type	43.3%	21.7%
	Strongly Agree	Count	13	18
		% within group type	43.3%	54.5%
Total			30	33

Table E.10. Group Type Cross-tabulation for Questionnaires

I was able to access the information about artworks by reading the information tags

I was able to access information about artworks by using the QR codes

		No QR	QR
Valid	Strongly Disagree	Count	0
		% within group type	0
	Disagree	Count	1
		% within group type	3.0%
	Neutral	Count	0
		% within group type	0.0%
	Agree	Count	9
		% within group type	27.3%
	Strongly Agree	Count	23
		% within group type	69.7%
Total		30	33

Table E.11. Group Type Cross-tabulation for Questionnaires

I think that my interaction with artworks increased by reading the information tags

I think that my interaction with artworks increased while using QR codes

			No QR	QR
Valid	Strongly Disagree	Count	0	0
		% within group type	0	0
	Disagree	Count	1	1
		% within group type	3.3%	3.0%
	Neutral	Count	2	4
		% within group type	6.7%	12.1%
	Agree	Count	11	10
		% within group type	36.7%	30.3%
	Strongly Agree	Count	16	18
		% within group type	53.3%	54.5%
Total			30	33

Table E.12. Group Type Cross-tabulation for Questionnaires

I remember the information I gained about the artworks by reading information tags

I remember the information I gained about the artworks by using QR codes

		No QR	QR
Valid	Strongly Disagree	Count	0
		% within group type	0
	Disagree	Count	2
		% within group type	6.7%
	Neutral	Count	12
		% within group type	40.0%
	Agree	Count	8
		% within group type	26.7%
	Strongly Agree	Count	11
		% within group type	33.3%
Total			30
			33

Table E.13. Group Type Cross-tabulation for Questionnaires

Information tags provided me with intellectual stimulation about the artworks

Website reached by the QR codes provided me with intellectual stimulation about the artworks

		No QR	QR
Valid	Strongly Disagree	Count	0
		% within group type	0
	Disagree	Count	2
		% within group type	6.1%
	Neutral	Count	1
		% within group type	3.0%
	Agree	Count	12
		% within group type	36.4%
	Strongly Agree	Count	18
		% within group type	54.5%
Total		30	33

Table E.14. Group Type Cross-tabulation for Questionnaires

The information tags motivated me to learn more about artworks

The design of the website motivated me to learn more about the artworks

		No QR	QR
Valid	Strongly Disagree	Count	0
		% within group type	0
	Disagree	Count	3
		% within group type	10.0%
	Neutral	Count	5
		% within group type	16.7%
	Agree	Count	7
		% within group type	23.3%
	Strongly Agree	Count	15
		% within group type	50.0%
Total		30	33

Table E.15. Group Type Cross-tabulation for Questionnaires

		No QR	
I found it convenient that every artwork had its information tag next to it			
Valid	Strongly Disagree	Count	0
		% within group type	0
	Disagree	Count	0
		% within group type	0
	Neutral	Count	0
		% within group type	0
	Agree	Count	7
		% within group type	23.3%
	Strongly Agree	Count	23
		% within group type	76.7%
Total			30

Table E.16. Group Type Cross-tabulation for Questionnaires

I am comfortable using mobile devices			QR
Valid	Strongly Disagree	Count	0
		% within group type	0
	Disagree	Count	0
		% within group type	0
	Neutral	Count	0
		% within group type	0
	Agree	Count	4
		% within group type	12.1%
	Strongly Agree	Count	29
		% within group type	87.9%
Total			33

Table E.17. Group Type Cross-tabulation for Questionnaires

		QR		
I often use QR codes in my daily life				
Valid	Strongly Disagree	Count	1	
		% within group type	3.0%	
	Disagree	Count	7	
		% within group type	21.2%	
	Neutral	Count	13	
		% within group type	39.4%	
	Agree	Count	5	
		% within group type	15.2%	
	Strongly Agree	Count	7	
		% within group type	21.2%	
	Total			33

Table E.18. Group Type Cross-tabulation for Questionnaires

		QR		
I did not have trouble using QR codes while visiting the exhibition				
Valid	Strongly Disagree	Count	0	
		% within group type	0	
	Disagree	Count	1	
		% within group type	3.1%	
	Neutral	Count	2	
		% within group type	6.1%	
	Agree	Count	3	
		% within group type	9.1%	
	Strongly Agree	Count	27	
		% within group type	81.8%	
	Total			33

Table E.19. Group Type Cross-tabulation for Questionnaires

The website was easy to use			QR
Valid	Strongly Disagree	Count	0
		% within group type	0
	Disagree	Count	1
		% within group type	3.0%
	Neutral	Count	0
		% within group type	0
	Agree	Count	6
		% within group type	18.2%
	Strongly Agree	Count	26
		% within group type	78.8%
Total			33

Table E.20. Group Type Cross-tabulation for Questionnaires

I felt good about the idea of interacting with other visitors using the comment section on the website

		QR	
Valid	Strongly Disagree	Count	2
		% within group type	6.1%
	Disagree	Count	3
		% within group type	9.1%
	Neutral	Count	5
		% within group type	15.2%
	Agree	Count	14
		% within group type	42.4%
	Strongly Agree	Count	9
		% within group type	27.3%
Total			33

Table E.21. Group Type Cross-tabulation for Questionnaires

		QR		
I shared comments on the website				
Valid	Strongly Disagree	Count	15	
		% within group type	45.5%	
	Disagree	Count	8	
		% within group type	24.2%	
	Neutral	Count	2	
		% within group type	6.1%	
	Agree	Count	4	
		% within group type	12.1%	
	Strongly Agree	Count	4	
		% within group type	12.1%	
	Total			33

Table E.22. Age Cross-tabulation for Questionnaires

			18 to 35	35 to 60	
I'm used to seeing information tags near exhibits in art galleries					
Valid	Strongly Disagree	Count	2	2	
		% within group type	4.2%	13.3%	
	Disagree	Count	2	1	
		% within group type	4.2%	6.7%	
	Neutral	Count	9	5	
		% within group type	18.8%	33.3%	
	Agree	Count	19	3	
		% within group type	39.6%	20.0%	
	Strongly Agree	Count	16	4	
		% within group type	33.3%	26.7%	
	Total			48	15

Table E.23. Age Type Cross-tabulation for Questionnaires

			18 to 35	35 to 60	
Information tags were easy to read					
Valid	Strongly Disagree	Count	0	0	
		% within group type	0	0	
	Disagree	Count	3	1	
		% within group type	6.4%	6.7%	
	Neutral	Count	3	0	
		% within group type	6.4%	0.0%	
	Agree	Count	15	7	
		% within group type	31.9%	46.7%	
	Strongly Agree	Count	26	7	
		% within group type	55.3%	46.7%	
	Total			47	15

Table E.24. Age Cross-tabulation for Questionnaires

			18 to 35	35 to 60
The amount of text on the information tags was appropriate				
The amount of text on the website was appropriate				
Valid	Strongly Disagree	Count	0	0
		% within group type	0	0
	Disagree	Count	3	0
		% within group type	6.3%	0.0%
	Neutral	Count	7	2
		% within group type	14.6%	13.3%
	Agree	Count	15	5
		% within group type	31.3%	33.3%
	Strongly Agree	Count	23	8
		% within group type	47.9%	53.3%
Total			48	15

Table E.25. Age Cross-tabulation for Questionnaires

I was able to access the information about artworks by reading the information tags

I was able to access information about artworks by using the QR codes

			18 to 35	35 to 60
Valid	Strongly Disagree	Count	0	0
		% within group type	0	0
	Disagree	Count	1	0
		% within group type	2.1%	0.0%
	Neutral	Count	2	4
		% within group type	4.2%	26.7%
	Agree	Count	15	3
		% within group type	31.3%	20.0%
	Strongly Agree	Count	30	8
		% within group type	62.5%	52.3%
Total			48	15

Table E.26. Age Cross-tabulation for Questionnaires

I think that my interaction with artworks increased by reading the information tags

I think that my interaction with artworks increased while using QR codes

			18 to 35	35 to 60
Valid	Strongly Disagree	Count	0	0
		% within group type	0	0
	Disagree	Count	1	1
		% within group type	2.1%	6.7%
	Neutral	Count	5	1
		% within group type	10.4%	6.7%
	Agree	Count	19	2
		% within group type	39.6%	13.3%
	Strongly Agree	Count	23	11
		% within group type	47.9%	73.3%
Total			48	15

Table E.27. Age Cross-tabulation for Questionnaires

			18 to 35	35 to 60	
I remember the information I gained about the artworks by reading information tags					
I remember the information I gained about the artworks by using QR codes					
Valid	Strongly Disagree	Count	0	0	
		% within group type	0	0	
	Disagree	Count	3	2	
		% within group type	4.8%	4.2%	
	Neutral	Count	17	6	
		% within group type	27.0%	12.5%	
	Agree	Count	24	22	
		% within group type	38.1%	45.8%	
	Strongly Agree	Count	19	18	
		% within group type	30.2%	37.5%	
	Total			48	15

Table E.28. Age Cross-tabulation for Questionnaires

			18 to 35	35 to 60
Information tags provided me with intellectual stimulation about the artworks				
Website reached by the QR codes provided me with intellectual stimulation about the artworks				
Valid	Strongly Disagree	Count	0	0
		% within group type	0	0
	Disagree	Count	2	0
		% within group type	4.2%	0
	Neutral	Count	6	2
		% within group type	12.5%	13.3%
	Agree	Count	22	2
		% within group type	45.8%	13.3%
	Strongly Agree	Count	18	11
		% within group type	37.5%	73.3%
Total			48	15

Table E.29. Age Cross-tabulation for Questionnaires

The information tags motivated me to learn more about artworks

The design of the website motivated me to learn more about the artworks

			18 to 35	35 to 60
Valid	Strongly Disagree	Count	0	0
		% within group type	0	0
	Disagree	Count	6	0
		% within group type	12.5%	0
	Neutral	Count	6	1
		% within group type	12.5%	6.7%
	Agree	Count	16	2
		% within group type	33.3%	23.3%
	Strongly Agree	Count	20	12
		% within group type	41.7%	80.0%
Total			48	15

Table E.30. Age Cross-tabulation for Questionnaires

			18 to 35	35 to 60	
I found it convenient that every artwork had its information tag next to it					
Valid	Strongly Disagree	Count	0	0	
		% within group type	0	0	
	Disagree	Count	0	0	
		% within group type	0	0	
	Neutral	Count	0	0	
		% within group type	0	0	
	Agree	Count	5	2	
		% within group type	22.7%	25.0%	
	Strongly Agree	Count	17	6	
		% within group type	77.3%	75.0%	
	Total			22	8

Table E.31. Age Cross-tabulation for Questionnaires

			18 to 35	35 to 60	
I am comfortable using mobile devices					
Valid	Strongly Disagree	Count	0	0	
		% within group type	0	0	
	Disagree	Count	0	0	
		% within group type	0	0	
	Neutral	Count	0	0	
		% within group type	0	0	
	Agree	Count	3	1	
		% within group type	11.5%	14.3%	
	Strongly Agree	Count	23	6	
		% within group type	88.5%	85.7%	
	Total			26	7

Table E.32. Age Cross-tabulation for Questionnaires

			18 to 35	35 to 60	
I often use QR codes in my daily life					
Valid	Strongly Disagree	Count	1	0	
		% within group type	3.8%	0	
	Disagree	Count	6	1	
		% within group type	23.1%	14.3%	
	Neutral	Count	9	4	
		% within group type	34.6%	57.1%	
	Agree	Count	4	1	
		% within group type	15.4%	14.3%	
	Strongly Agree	Count	6	1	
		% within group type	23.1%	14.3%	
	Total			26	7

Table E.33. Age Cross-tabulation for Questionnaires

			18 to 35	35 to 60	
I did not have trouble using QR codes while visiting the exhibition					
Valid	Strongly Disagree	Count	0	0	
		% within group type	0	0	
	Disagree	Count	1	0	
		% within group type	3.8	0	
	Neutral	Count	2	0	
		% within group type	7.7%	0	
	Agree	Count	3	0	
		% within group type	11.5%	0	
	Strongly Agree	Count	20	7	
		% within group type	76.9%	100.0%	
	Total			26	7

Table E.34. Age Cross-tabulation for Questionnaires

			18 to 35	35 to 60	
The website was easy to use					
Valid	Strongly Disagree	Count	0	0	
		% within group type	0	0	
	Disagree	Count	1	0	
		% within group type	3.8%	0	
	Neutral	Count	0	0	
		% within group type	0	0	
	Agree	Count	6	0	
		% within group type	23.1%	0	
	Strongly Agree	Count	19	7	
		% within group type	73.1%	100.0%	
	Total			26	7

Table E.35. Age Cross-tabulation for Questionnaires

I felt good about the idea of interacting with other visitors using the comment section on the website

			18 to 35	35 to 60
Valid	Strongly Disagree	Count	2	0
		% within group type	7.7%	0
	Disagree	Count	3	0
		% within group type	11.5%	0
	Neutral	Count	5	0
		% within group type	19.2%	0
	Agree	Count	10	4
		% within group type	38.5%	57.1%
	Strongly Agree	Count	6	3
		% within group type	23.1%	42.9%
Total			26	7

Table E.36. Age Cross-tabulation for Questionnaires

			18 to 35	35 to 60	
I shared comments on the website					
Valid	Strongly Disagree	Count	14	1	
		% within group type	53.8%	14.3%	
	Disagree	Count	7	1	
		% within group type	26.9%	14.3%	
	Neutral	Count	2	0	
		% within group type	7.7%	0	
	Agree	Count	2	2	
		% within group type	7.7%	28.6%	
	Strongly Agree	Count	1	3	
		% within group type	3.8%	42.9%	
	Total			26	7