

BUILDING A COLLABORATIVE SMARTPHONE APPLICATION FOR BLIND AND
LOW VISION VISITORS AT THE DALLAS MUSEUM OF ART

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The goal of my study is to develop a mobile application to enable all visitors, including blind and low-vision visitors, to autonomously gather and share information about interpretations of art and to have a fully independent museum-going experience. With an application, blind visitors have more access to opportunities and tools in the museum, which empowers their museum experience. My study used a qualitative, mixed-methods approach to research how blind and low vision museum visitors might increase their independence in the museum space and discover ways to equalize their access without relying on museum educators. In carrying out my study, I conducted interviews and collected data based on observations and transcribed and analyzed them using a grounded theory approach. I used Freire's theory of pedagogy of the oppressed and hooks' theory of education as the practice of freedom to frame my study.

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CHAPTER 1

INTRODUCTION

During a visit with a university class to the Amon Carter Museum of American Art, I noticed an individual enter the exhibit, and, surprisingly, he walked straight toward a piece in the middle of the room instead of the work most people see first, which is the one that is directly in front of patrons as they walk into the room. I observed him as he spent between five and ten seconds looking at each work of art. For the majority of the time, he was simply reading the labels on the wall without giving any attention, sometimes not even a glance, to the artwork he was reading about. His primary goal, as I observed it, was to read every informational label in the exhibit.

Reflecting on my experience, I noted that we had two museum facilitators working with our class, discussing the works of art in the exhibit. As a class, we had the benefit of being part of an intelligent, educated, and professional discussion. I wondered whether the visitor I observed would have had a more well-rounded experience if he had had the opportunity to listen to and interact with docent facilitators. I wondered if his visit could be improved with more access to information provided by museum, and this led me to consider other differently abled visitors as well.

Compared to my classmates and me, the visitor I observed had unequal access to opportunities/information, interaction, and discussion within the museum space, which left him out of a more comprehensive museum experience; comparing his experience to ours made me realize that this inequality might be even more pronounced with blind or low-vision museum-goers. As university students (more specifically art students who already know a great

deal about art), we were given opportunities and access many don't have. How can we work toward solving this problem and making it possible for all visitors—including people who are blind or have low vision—to have equal access to opportunities and educational tools in the museum?

Statement of the Problem

Freire's (1970) idea of *false generosity* is a concept that could be applied to this situation. According to Freire (1970), false generosity is the idea of giving, but going through the motions without actually taking into consideration all of the effects (p. 44). Freire's (1970) example of false generosity involved philanthropists donating to organizations that do not really need money (p. 44). Likewise, most museums are built with educated, seeing individuals in mind. They offer access to all the benefits of visiting an art museum, including providing information, education, entertainment, and discussion without recognizing how they are limiting that access to certain groups. Blind and low-vision individuals as well as those with limited education are at a disadvantage in museums, which are built for people who are able to guide themselves through an exhibit, observe the artwork with some level of understanding and comfort, read the informational labels with ease, and interact with the artwork. Many individuals, however, are not able to do those things, and museums need to work to provide tools and resources to enable all visitors to have the same access and opportunities. This problem affects all museum visitors, but it especially impacts blind and low-vision visitors. In order to address this gap, I proposed creating a pilot version of a mobile application (app) for the Dallas Museum of Art. This app will be accessible to all in the manner of *universal design* (UD), but I conceived of this app because of my interest in providing blind and low-vision

visitors a more autonomous experience when visiting the art museum (Persson, Åhman, Yngling, & Gulliksen, 2014). It was my goal to create an app that would allow blind and low-vision visitors to guide themselves through the DMA without needing help.

Purpose Statement and Research Questions

Below, I introduce the idea for my app, its purpose, and the research I undertook to assess its viability with blind and low-vision visitors in the art museum. In order to explore ways to help blind and low vision visitors have a self-directed experience in an art museum, I collected data on answers to the following questions.

Main Research Questions

- How can blind and low vision visitors have a self-directed experience in an art museum with the assistance or guidance of a mobile application?
- How might an individual benefit from using the app in the museum vs. using the app at home?

Sub-Questions

1. In what ways can blind and low vision museum visitors both independently experience a museum and interact with other visitors with the help of a mobile application?
2. How might a mobile application assist blind and low vision visitors in understanding interpretations or critiques of works of art?
3. How might a mobile application facilitate communication between blind and low vision visitors and all museum-goers?
4. How is access to and development of mobile applications important for museums and museum visitors overall?

I investigated these questions through a literature review, the building of an app, and first-hand qualitative research. I strived to answer these questions through piloting the app

with participants and through qualitative analysis. I interviewed participants three times; a low vision participant and a blind participant submitted to interviews once before and twice after the creation of the app and the collection of the qualitative data. Due to the time constraints of the professional participant, she submitted all of her interviews in one set after the app was enhanced; her responses also were based on the blind and low vision participants' thoughts and suggestions.

The initial interviews were used to discover the obstacles that blind and low vision visitors face during museum visits and how a potential app might address these challenges. To develop and improve the app, I observed interviewees using the app for the first time; later, I enhanced the app based on their initial experiences. The app was initially built based on my readings on and thoughts about what might help blind and low vision museum visitors. I used this data to determine how to further refine the app to better help blind and low vision visitors have self-directed experiences and give them access to educational tools in the museum. Later, I conducted a second round of interviews with the same participants after I enhanced the app based on their thoughts on and suggestions for what would make their visits more convenient. Finally, I observed interviewees using the enhanced version of the app at the DMA, and then I conducted a third and final round of interviews.

My research project as a whole was focused on the experiences of blind and low vision visitors. My aim was to find tools, research, and resources that would help blind and low vision visitors have a self-directed experience in an art museum, especially focusing on the question of how blind and low vision visitors could participate independently and interact with all other visitors with the assistance or guidance of a mobile app.

Purpose

I proposed creating a mobile application that gathers and stores conversations and asynchronous dialogues digitally and that shares interpretations, information, and questions to help all museum visitors embrace their knowledge and have a meaningful experience. The app allows blind and low vision visitors to be active participants, offering them a chance to have an interactive experience instead of a passive one. Before the creation of the app, at most, blind and low vision visitors were typically only able to interact with an artwork in order to understand it; they were not able to share their own thoughts or knowledge about it. While a lot of information about art is available to blind and low vision individuals in books or online, visiting a museum with the assistance of the app could be a unique and valuable activity because it would allow them to experience works of art with others, enriching their thinking and allowing them to be a part of the larger museum experience. Many cultures think of museums and galleries as important places that carry a certain gravitas or cultural meaningfulness. And with more thoughtful and effective accommodations, they can be a meaningful cultural experience blind people can also share.

In this way, the proposed mobile app has a much bigger purpose than just providing an accommodation to blind and low vision visitors to experience art—this app also would allow them to connect and contribute to their community by participating in conversation about art. Henrich, Cleveland, and Wolverton (2014) stated, “museums should work with differently abled people to provide a good environment for the blind visitors” (p. 141). With effective and helpful accommodations such as my mobile docent app, there could be a greater sense of openness and inclusivity in museums. As Falk and Dierking (2013) explained, “the museum ‘affordances’

are then matched up with the visiting public identity-related needs and desires” (p. 47). For example, when a visitor finds a museum in which certain needs are served, they can recommend that others visit it. Falk and Dierking (2013) additionally state that “the museum is the best device our culture has developed for the transmission of ideas to larger numbers of people” (p. 112). That number is even larger when museums are more inclusive and certain accommodations are taken into consideration.

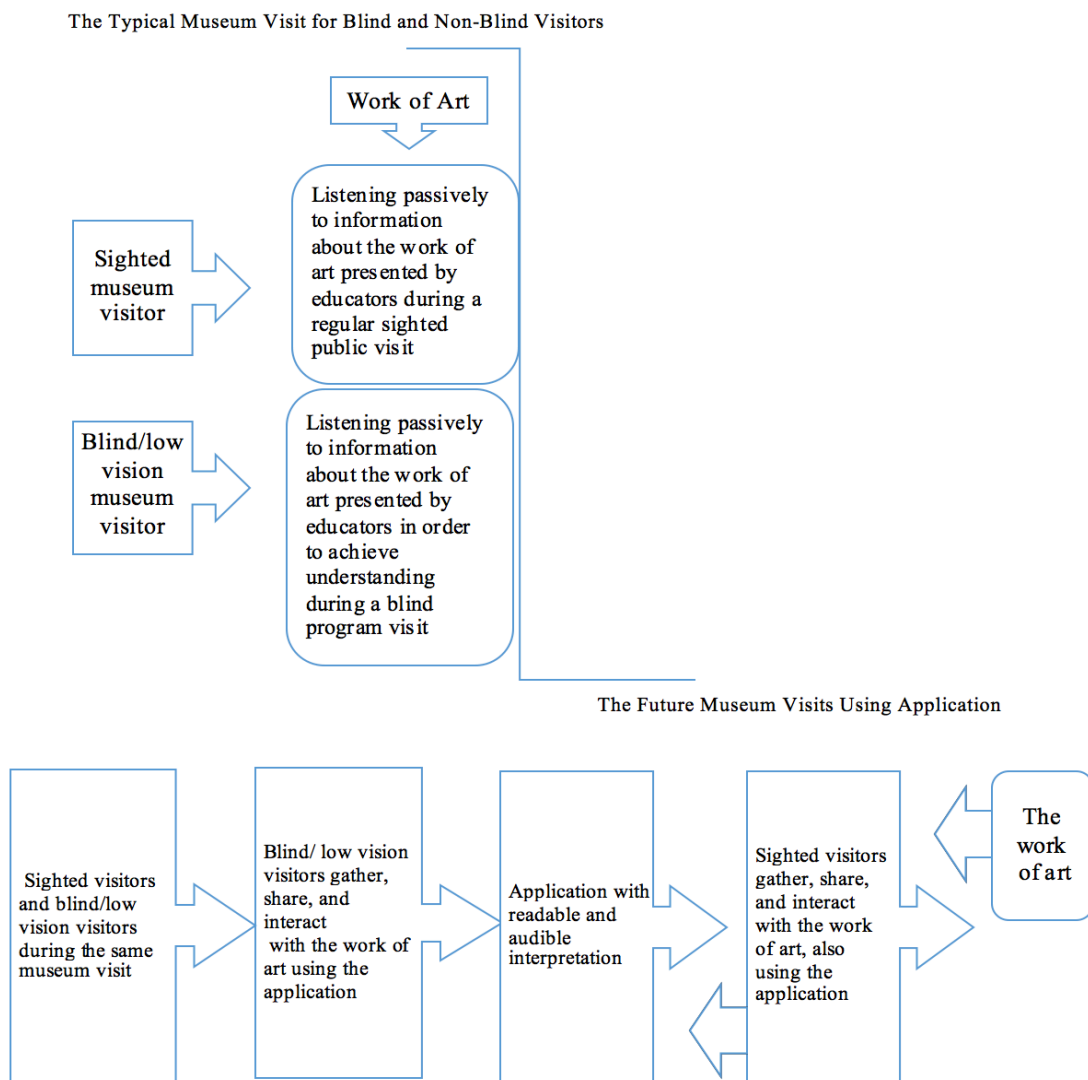


Figure 1. The Typical museum visit for blind and non-blind visitors vs. future museum visits using the app. This figure illustrates what blind and low-vision as well as non-blind visitors experience during a museum visit.

Different kinds of devices are used in museums to communicate with the visitors and to encourage engaging experiences; some of these devices include audioguides or “labels contained within hand-held devices carried around the gallery” (Falk & Dierking, 2013, p. 109). What makes my app different is that it enables visitors, especially blind and low vision individuals, to autonomously gather and share information rather than relying on museum educators or guides to do so. I argue that it is possible to aggregate stories, descriptions, and interpretations of works of art as shared by other visitors, regardless of vision status, as well as museum professionals, and make them available in an app so that any type of visitor could walk through a gallery or museum and hear reactions to particular pieces of art from their smartphone. I believe this would be especially helpful for blind and low vision visitors because it could provide them with an autonomous experience (Johnson, 2017). With this app, visitors might feel more included in the museum experience, have more independence moving through the museum, participate in discussion with other museum visitors, and more actively engage with museum pedagogy. The app allows users to “learn what the museum intended them to learn” (Falk, 2007, p. 4) and additionally hear other visitors’ interpretations that might agree with or be at odds with that the intentions. And maybe most importantly, blind and low vision individuals could be more empowered to experience and enjoy art.

The mobile app includes information, stories, thoughts, explanations, and interpretations from sighted visitors as well as blind and low vision visitors and museum employees such as curators or educators. The aim is to have a large diversity of voices included, as each individual experiences and enjoys art differently. The app will include a wide array of multicultural views from people with different educations, backgrounds, socioeconomic

statuses, races, ethnicities, abilities after it has been used several times because people will continue to add to it.

The app was built in a number of stages. First, I presented a proof of concept in collaboration with an experienced computer programmer. I designed a flow-chart and created an informal pseudo-code outline of what the app would do. Then, with the aid of the programmers at Shepherd Dog, an app development company in Denton (“Who We Are - Shepherd Dog.” (n.d.). I started building and testing the app itself based the idea that O’Connor, Kearns, and Anderson (2008) put forward: “We use what we know about one system or thing to understand or explain something that is not well-known” (p. 13). In other words, in order to demonstrate the idea of my app, In other words, I used the ideas I had and the partial app to improve it step-by step until the final result was reached.

My app includes a variety of interpretations and descriptions of *The Icebergs*, providing an opportunity for individuals to ask questions and develop their own thoughts, critiques, and understandings of the art work. If two visitors, blind and/or non-blind, share their knowledge and information about a work of art, they will usually give an interpretation. Their interpretations will differ, which brings a greater diversity of ideas to the app because, as Barrett (2014) suggested, “multiple interpretations are better than single interpretations” (p. 1). Beyond that, visitors need to ask questions to start developing their thoughts about a work of art and have what O’Connor, Kearns, and Anderson (2008) called, “an ongoing conversation” (p. 17). One visitor asks a question, and another visitor answers it through the app. The visitors do not have to exist in the same time to hear each other’s interpretations; they can hear and build on that knowledge at a distance, at different times, or on different dates. In other words,

the app opens up a greater set of questions and interpretations, led by many individuals, not just a museum docent or guide, allowing for a greater and more personal understanding and appreciation of the artworks.

As it continues to be used, this app should work to facilitate critical thinking, analysis, interpretation, and opinion-forming for all museum-goers as they experience visual art. There is no single point of view or interpretation for works of art, and it's important for all visitors to have effective tools that enable this type of thought. However, according to Barrett (2014), to make sense of the interpretations, the interpreter has to adjust them to make them comprehensible and coherent. At the same time, the interpreter has to make them meaningful to others and give a true interpretation about the work of art (p. 203). In other words, the interpreter of the work of art has to provide or share an understandable and cohesive thought about the work of art that gives a real sense of what the content of the art means. Museums must work to empower visitors to think independently, to call for changes to any program, and to avoid what Freire (1970) called the "anti-dialogical banking educator" (p. 93) in which the visitor is the passive recipient of knowledge from the docent facilitators, and visitors have no agency to select which works of art they observe and choose which interpretations are shared.

Docents are always somewhat limiting, giving only certain information about particular pieces. Usually, docent facilitators choose their favorite pieces of art to observe with visitors, and often, they do not consider visitors' interests or preferences. Docents typically share what they already know about the work of art or something they like about the painting, and the kinds of dialogue that take place rarely engage critical thinking skills in visitors or offer meaningful learning. They do not typically ask for visitors' interpretations, opinions, or

understandings, and they do not encourage them to share their thinking. According to Freire (1970), “true dialogue cannot exist unless the dialoguers engage in critical thinking” (p. 92). The purpose of this app is to address these issues for blind and low vision visitors and to give them more autonomy as well as create a space for the sharing of ideas for all users, sighted or not sighted.

Personal Motivation

As a Saudi Arabian, I did not have many chances to experience museum culture growing up because there are not a lot of museums in my country. Considering the museums we do have, I have heard many fellow Saudi Arabians say that they don’t feel comfortable visiting these places because they think they do not know enough about art and they do not know what to do when they go there. Discussing art and visiting museums are not common activities in Saudi Arabia, so I have always questioned and wondered what makes people feel comfortable going to any museum. Since coming to the United States, I have had a chance to increase my museum experiences. Studying here, I have met and interacted with low vision individuals, which led me to wonder even more what their museum experience might be like and what challenges they may face compared to sighted people.

In my museum education classes, we learned of special museum programs for people with blindness and low vision. For example, there is the Meadows Museum of Art in Dallas. There, I learned that blind and low vision programs vary greatly, and they offer different concepts, information, communication styles, and experiences depending on which museum you are visiting. There is no single option available to blind and low vision individuals at each museum at this time. I also learned during a museum visit that typically, the goal of museum

programs for the blind was not to discuss the work of art, but rather, to merely help them understand the content of the work of art. Museums did not usually endeavor to have the blind visitors share their perceptions or interact with the art in a discussion format. From these experiences, I decided to devote my research to finding viable solutions for enhancing the museum experience for these visitors. I wanted them to have a direct voice to show the obstacles they face during a museum visit in order to help museums improve their programs by mixing blind and low vision visitors with other visitors in groups. And I created a mobile app as an educational tool for all visitors to communicate and share thoughts and interpretations with each other. It is worth noting that, to my knowledge, this research hasn't been done before and a mobile app created for blind and low vision visitors in an art museum has not been previously developed. Therefore, its significance is in that it fills a gap and attempts to solve a problem that I have identified.

Definitions

- Access programs. Access programs are offerings that museums provide-- opportunities, educational tools, and accommodations of the needs of visitors, especially differently abled people.
- Application/mobile application/app. An app is an educational tool for download to smart phones that helps museum visitors, especially differently abled visitors such as people who are blind or have low vision, to share ideas and thoughts about works of art in the DAM.
- Asynchronous dialogue. Dialogue that does not occur at the same time. Rather, comments and ideas are saved within the app and shared to be heard and considered by other people at a different time.

- Blind. A person who is blind has lost their vision.
- Coordinators. A coordinator attends to the details of museum programming, making sure that all aspects of programs run smoothly and on time. They create programs and take care of details, such as organizing groups visits, providing all the supplies, making sure all of the parts are in place, and choosing where and when to put all of the components together.
- Dehumanization. To limit the abilities of differently abled people by not providing equal access and opportunity that meets their needs and instead requiring them to get along like the majority of people.
- Dialogue. Dialogue is when visitors share their thoughts about a work of art rather than simply listening passively to the docents.
- Disability. I use the term disability to indicate the limitations and restrictions imposed by institutions, societies, people, and cultures on differently abled people. For example, being blind or having low vision is not a disability. Rather, I view society as disabled in terms of the limitations it puts the blind and people who have low vision in a position of not having the same opportunities as others.
- Docent. A docent is typically a volunteer guide in a museum who does not have any formal museum education but is trained through a docent education program to conduct tours and discuss works of art with patrons.
- Equality. Equality is the belief that differently abled people are equal to everyone else.
- Facilitator. A facilitator is someone who engages more with the visitors and the art exhibits rather than the administrative running of the museum.

- Museum education. Museum education is programming focused on knowledge about culture, history, art, and societies as presented by museums.
- Museum program. A planned educational event for the public and held at a museum that is coordinated and facilitated by museum staff.
- Low vision. A person with low vision has lost a large percentage of their vision.
- Social justice. Social justice is the idea that we should allow differently abled people, especially blind and low vision individuals, the same access to all resources and opportunities as other visitors.

Background of the Study

Art museum education programs for blind and low vision visitors. Museum visitors draw from their sense of identity to create narratives about objects in a museum (Falk & Dierking, 2000, p. 61). Museums are places where visitors learn about culture, history, and identity. Further, which stories, types of art, or areas of history we are most interested in says a lot about who we are as individuals. Museums are, ideally, sites where all types of people are welcomed to visit in order to learn about art, history, and even themselves. However, some museums tend to be exclusive (either explicitly or implicitly) of certain types of visitors.

A good example of this is the way museums share and display information about an exhibit or work of art, which is typically limited to a small plaque on a wall. On these didactic labels, there are frequently words that the audience might not understand, dealing with fine points about the art, the artist, the kind of material used, and the type of medium in which the art is presented. The language used often refers to technical jargon or vocabulary that is not familiar to most casual art observers. Typically, blind and low vision museum-goers are offered

limited or no accommodations. Some museums have worked to create programs that are more inclusive of all types of visitors—taking into consideration different types of sensory capabilities—and some museums are eager to improve their programs and make them accessible whenever they can. However, the efforts are often insufficient, especially for the blind and low vision visitors who are the focus of this dissertation. Further, the programs in place to accommodate blind and low vision individuals tend to alienate them, and represent a mere an attempt to accommodate blind and low vision patrons as deviations from the norm.

Disability Studies

One of the main problems is that current programs and practices for accommodating blind and low vision individuals are inconsistent and widely varying among museums, which makes it particularly challenging for these visitors to achieve a generally shared concept or understanding of a certain object. Freire (1970) described the oppressed in an educational setting as merely receiving objects; their thinking is controlled and their creative power is inhibited. Blind and low vision individuals are in a similar situation when they go to museums. Museum exhibits are created by seeing people for other seeing people. Consequently, programs currently in operation adopt a variety of languages or tools to make necessary accommodations for blind and low vision visitors. However, accessibility is neither constant nor generalized. Blind and low vision individuals cannot typically enjoy museum visits at any time of their choosing; they must choose from times when special tours are provided, and not all museums even have this option (Wapner, 2013). This means that blind and low vision visitors are either not able to visit their local museums, or they have to travel to certain large, well-funded museums such as the Metropolitan Museum of Art in New York City for programs

specifically created for them. How many current or potential museum visitors might be affected by this situation? How many people have blindness or low vision in the US? How many museums are there in the US and how many of these museums offer programs for the blind?

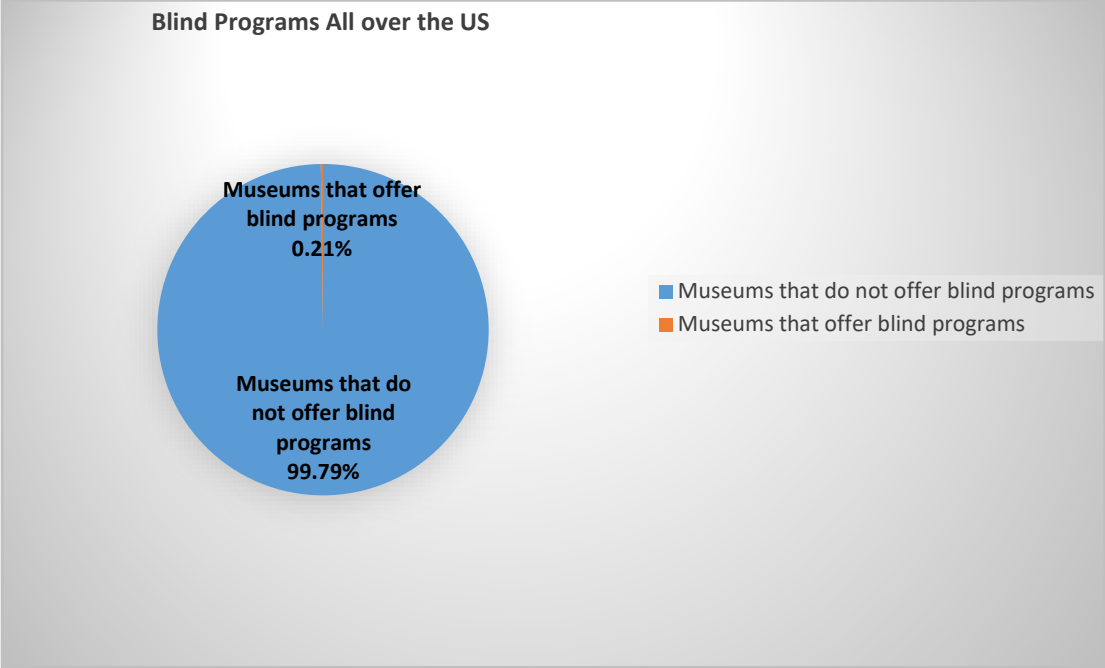


Figure 2: Programs for visually impaired. This figure illustrates the percentage of museums that offer programs for the blind.

Figure 2 is a graphic that illustrates the number of programs for blind visitors in art museums. It illustrates how blind and low vision people in the United States can attend only certain museums, parks, and exhibitions that are able to accommodate them. Steinhauer (2014) learned that “there are 35,144 active museums in the United States” (para. 1), yet the number of museums, parks, and exhibitions that offer either tactile interfaces or provide audio recording total only 87 in 21 different states (Brack, 2017, n.p.). Touch tours are available in eight museums around the U.S., but these hands-on experiences are available only as a part of *Art Beyond Sight* programs or during monthly tours (Stalvey, 2015, n.p.). *Art Beyond Sight* is an organization that promotes accessible art education programs for blind and low vision visitors.

Touch tours, according to Stalvey (2015), require advance appointments, which means that these programs or tours are offered to only a limited number of blind visitors and are not available to walk-in visitors (n.p.).

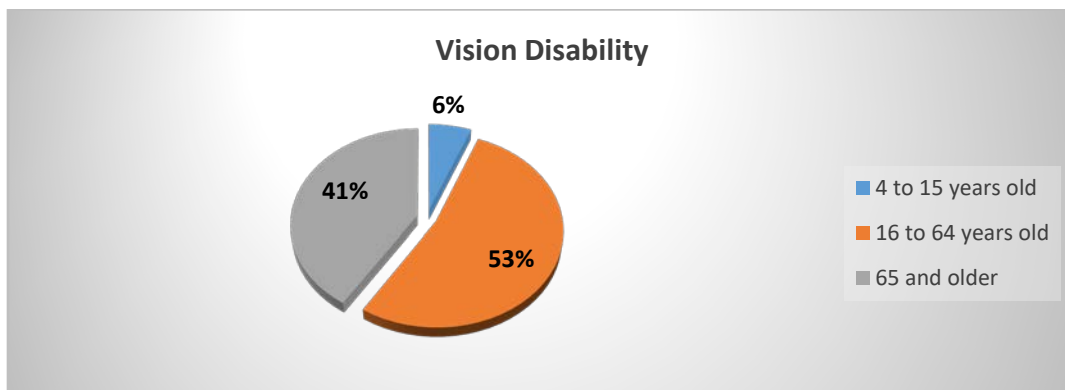


Figure 3: Incidence and age ranges of the visually impaired. This figure illustrates the age ranges and incidence of visual impairment in the United States.

Figure 3 shows how people with blindness are represented in terms of age groups. According to the National Federation of the Blind (2017), the total number of people with vision disability was 7, 297,100 (“Prevalence of Visual Disability,” 2017, para. 11). This number may be divided into three age groups. The first age group is 4-15 year-olds, citing 464,100 individuals with vision impairment. The second age group is 16-64 year-olds, citing 3,847,100 people with vision impairment. The last age group is 65 years and older, citing 2,985,900 people with vision impairment (“Prevalence of Visual Disability,” 2017, para. 11). This data shows that blind and low vision people are not a small minority. Therefore, instead of treating blind people as abnormal in museum spaces, a more ideal and inclusive approach would be to find ways for blind people to experience museums on their own terms. While the dominant sense for seeing people is eyesight, some researchers believe that hearing is the dominant sense for blind people (Wapner, 2013). There is a special challenge presented by the fact that art museums have been designed to provide visual experiences, and moving from the dominant sense to a

less dominant one might appear to involve a loss. However, it is my goal with this app to address a consistent, user-dependent, and user-determined way for blind and low vision people to experience art museums.

At this point, it is useful to ask whether hearing really is the dominant sensory modality for hearing blind people, or whether some other modality, such as touch, might be. Consulting with blind and low vision individuals on which modality would be the most useful for them to experience visual art would be an obvious approach to answering this question. Fukurai (1970) reported on two cases of blind individuals who used hearing as their dominant sense, suggesting that this modality is of great importance to visually-impaired people. I believe that hearing is a good place to start in creating and developing an independent museum experience for visitors with blindness and low vision. Furthermore, other sensory experiences like the touching of materials or the use of tools in museums is even more limited. Even still, I believe that touch-based accommodation programs are still limiting because not all artwork can be made available for blind visitors to touch. Touching is still relatively taboo in museums, and most museum spaces discourage this for all visitors, not just people with blindness or low vision. It is difficult to have blind touch collections, blind touch tours, etc. because of the cost of creating such collections. Therefore, an app that uses hearing is the most accommodating option. It can be used on a smartphone, which is a tool that is readily available (though socioeconomic status should be considered here) and it is a device that most individuals already bring to museums. Other senses, such as smell and taste, are difficult to harness in museums—and while some museums do make use of them, it is usually only through an educator who

controls what scents and tastes are made available. Like touch, tapping into scent and taste requires blind visitors to participate in a program run by

Sociocultural Learning

It might be suggested that an app like the one proposed here could be used in the privacy in one's home. However, one reason for the app to be used in the museum is that research shows that museums are important social learning institutions (Hien, 1994, p. 78). Thus, it is highly important to engage blind and low vision visitors in such a public environment.

Falk (2007) stated, "learning from museums should be affected by within-group social interactions, by social interaction and facilitation from individuals outside the visitor's social group, and by the cultural values and beliefs visitors hold relative to culture and identity" (p. 5). Blind and low vision visitors almost never interact with non-blind visitors during blind tours because these programs are only for blind people. However, interacting with other visitors can be a helpful and interesting part of the experience of sociocultural learning (Falk & Dierking, 2000, p. 43). Furthermore, in general, programs for blind and low vision individuals tend to neglect the value of communication between visitors, and this limits the discussion, critique, and comprehension among all visitors. Hien (1994) emphasized that the experienced visitor should teach his ideas to the learner visitor, and when both can share their ideas, learning occurs (p. 73).

Museums are sociocultural learning institutions in which people visit to communicate and meet with other visitors (Falk & Dierking, 2013). Falk and Dierking (2013) further explained that "cultural differences among visitors are complicated by the fact that the museum itself is a sociocultural entity, created by people with cultural values and biases" (p. 66). Visitors are led

around the museum by educators, docents, or guides who choose which paintings to discuss, what information to share, and how to provide context and direction for interpretation.

Although this approach limits visitors' freedom, these guided conversations facilitate interactions among them and with the works of art. Additionally, most museums have a planned curriculum that accompanies their curation, and these resources create an experience that is altogether more than just viewing art, and which would be difficult to replicate off-site.

A mobile app like the one created serves a number of purposes for blind and low vision individuals, including providing basic directions for moving through the space, sharing information about particular works of art, and prompting them with questions that encourage them to share their thoughts, knowledge, and prior experience, all within the curated, developed collections in a given museum. This experience is vastly different from viewing or learning about works of art from the comfort of one's own home, wherein the visitor might choose only works of art that interest them superficially based on education, identity, and social status.

My mobile app is a tool that blind and low vision individuals can use for expert guidance in museum spaces, but I also hope that it is one they will enjoy using. Falk and Dierking (2013) explained that "most museum visitors see learning and fun as a both-and rather than an either-or proposition" (p. 44), which is the use I envision for my app. Additionally, fostering the sense of community, education opportunities, and entertainment value that are all part of the museum experience; museums should work to provide those same benefits to blind and low vision visitors.

Another important role of museums is providing adults with enriching learning

opportunities after traditional schooling. Falk and Dierking (2013) wrote that “virtually all individuals visiting a museum understand that museums are educational institutions and consequently expect to learn something during their time there” (p. 44). Falk and Dierking (2013) also argued that sociocultural learning, which occurs when a visitor learns in the presence of other people, is a unique and important part of the museum learning experience. This suggests that museums have a role in the community that goes beyond the experiences of visitors within the facilities themselves. About this, Falk and Dierking (2013) stated: “Museums need to be concerned not only with the ‘literal’ sense of what they are, as defined by their buildings, collections, exhibitions, programs, and websites, but equally with the ‘imagined’ or ‘perceived’ sense of what they are, which resides in the minds of individuals living within their communities who may not regularly use museums” (p. 80).

Thus, museums should play their significant roles as educational sites dedicated to improving their communities and bringing art and culture to all visitors, especially in this case for blind and low vision visitors.

Limitations of the Study

I chose to write about blind as well as low vision visitors because they are limited in a similar way and have to deal with the same situation: both types of visitors require aid during a museum visit. Both types of visitors ideally visit the museum during special programs for the blind because even though they may have enjoyed the museum without accommodation in the past, most of them ended up losing their sight and became part of blind and low vision society, which means that they have some experience and memory of sight. In other words, blind and low vision people who lost their vision later in life are more likely to visit

museums than people who have been blind and low vision since birth, thus, both of my blind interviewees were not born blind but lost their sight later. The same applies to my low vision interviewee, whose sight was significantly reduced later in life. While these are limitations to my study in one way, they were the people I had access to who fit the description of the patrons I intended to serve. It is important to note that a person who is born blind has a unique perspective that informs how they understand all concepts, and therefore, their type of blindness plays a major role in their interpretation of visual artwork. Their experiences are different from those of individuals who lost their sight later in life, and they will be different from the experiences of low vision and full vision people as well (Fukurai, 1969). Having a participant that lost her sight at an older age might impact the kind of answers that I collect and use to guide the app development. A person who knows what red means or what a flower looks like will interpret and understand those concepts differently than a person whose mind has no actual/real image or who works in black and white (Fukurai, 1969). Additionally, another limitation is that there are blind people in the world who also cannot hear, and therefore, my app is not able to reach them; the app excludes people that cannot hear.

Additionally, anytime I asked a participant for their experience in a museum visit, I ran the risk of this individual telling me what they think I want to hear rather than what they actually thought or experienced, or, they might not have been unable to answer altogether. To try and anticipate this challenge, I assured participants that I was not looking for any answer in particular, and I only wished to hear their honest feelings and thoughts. I also assured them that the responses shared would be completely anonymous.

There were also limitations in building the app, given that I had never done it before. App development is not in my major field of study. Initially, I tried to use a program called “Build Your App In Five Steps,” but, because of my lack of knowledge of information science, I was not sure how to create a code or start building the app. Clearly, other people needed to be involved in helping me actually build the app, which meant that I had to share control of certain aspects of this research. This was a limitation but also an asset, as it made this research interdisciplinary and forced me to interact with programmers and computer scientists who are outside of my field of art education.

Further limitations include the fact that this app is a product that users would use on smartphones, so my study assumes a certain socioeconomic status for the user in terms of their ability to own and use one. Users who do not own smart devices cannot try my app unless a museum might offer their own smart devices for the visitors to borrow.

Ultimately, as a sighted person, I cannot fully understand what a blind person wants or needs despite my best attempts to gain empathy and understanding through these interviews. I will never truly know what it feels like to be blind, which limited my perspective in conducting this research.

The final limitation of this research was the limited sample size. I interviewed two participants, and their experiences might not represent most blind and low vision museum visitors. My participants have background experience with museums, and they bring some degree of expertise to their participation, which might not be true of the majority of blind and low vision museum-goers.

Summary

In sum, most museums have the problem of abiding by a banking ideology; they are the holders of information. This information only comes from one source (the museum), which is a way that museums usually use to teach visitors. Museum docents are often seen as ambassadors of the museum and are the holders of the information/knowledge, and visitors of the museums should learn from them passively.

In addition to that, differently abled people have problems visiting the museum during regular operating hours. They have difficulty accessing the museum's educational tools because museums do not have the tools that best serve differently abled visitors' needs. For example, visitors with limited or no sight cannot just come in and touch the museum's works of art to gather information about the works.

The goal of the app that I have created and tested in a museum setting addresses these issues and provides at least one way in which all visitors, and especially blind and low vision visitors, might increase the value of their museum experience.

CHAPTER 2

REVIEW OF THE LITERATURE

In this review of relevant literature, I introduce my theoretical framework of de/humanization. Then, I write about museum equality and social justice, museum education programs for blind and low vision visitors, sociocultural learning and constructivism, creating a smartphone application, and universal design.

Theoretical Framework

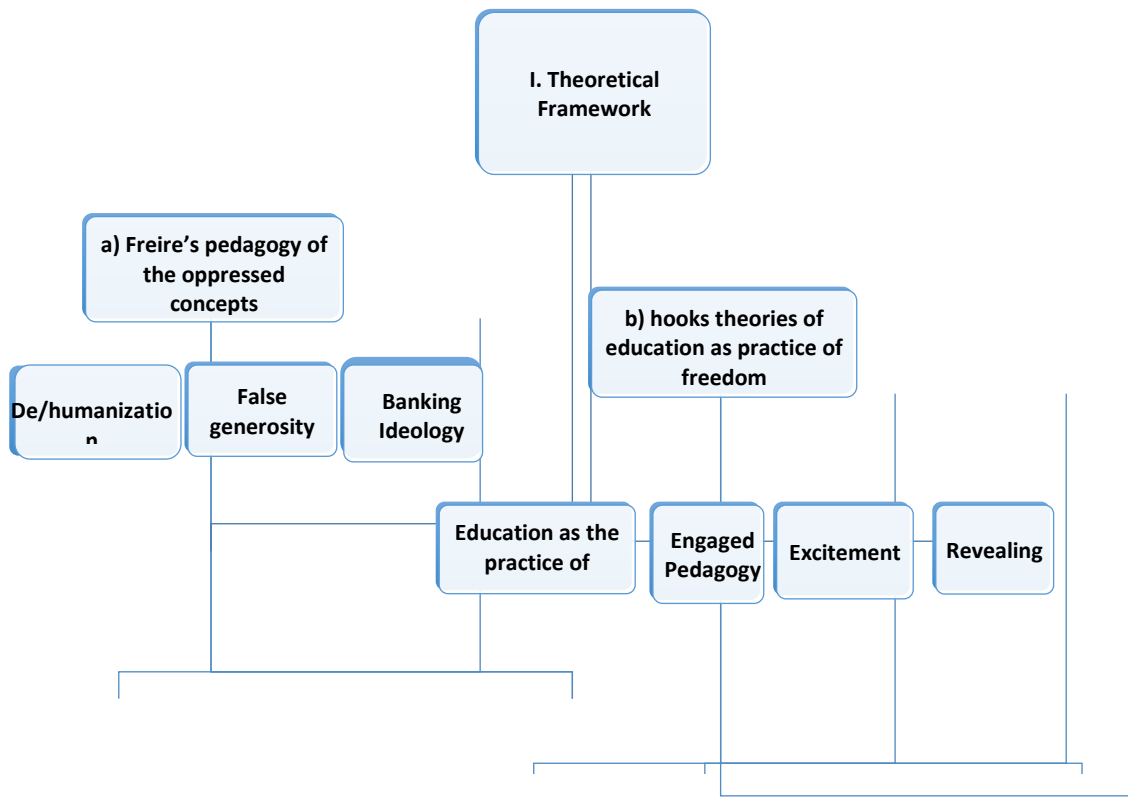


Figure 4: Diagram of theoretical framework. This diagram illustrates the theoretical framework used in this dissertation.

The theoretical framework for this study is built upon the ideas of humanization and dehumanization, and the ways in which those processes play out in education and pedagogy.

For brevity, I refer often to a combined “de/humanization” as one also necessarily refers to the other.

Freire’s Pedagogy of the Oppressed

I decided to use his theory and apply it to blind and low-vision visitors to a museum because his idea was to give freedom to the student to learn and share, and this is exactly what I want museums to provide for blind and low-vision guests to the museum. Paulo Freire was a prominent Brazilian theorist during the mid-to-late 20th century. Freire initially studied law but did not practice it, instead opting to teach language. Observing his students and drawing on his own experience of poverty, he noticed the relationship between education and social class as well as education and freedom. Responding to the needs of his country—where people needed to be educated to be able to vote, to be able to read to pass a literacy test, and to be informed about the issues in their country—Freire taught three hundred farm workers how to read and write in just forty-five days (Gadotti, Torres, & Milton, 1994, p. 15). It was during this time that he started to develop his theories of pedagogy, and the Brazilian government was so impressed by his work that they implemented these methods in educational institutions all around the country.

Freire was passionate about education because he believed it was the way to freedom and social change. He (1970) wrote about oppression, specifically the relationship between oppression and education. He asserted that we as educators should understand the issues that the oppressed face from their own point of view in order to help solve them (p. 94). This idea can be applied to the current study, positioning blind and low vision visitors as an oppressed group without rights and opportunities equal to those of seeing people.

I used Freire's concept of oppression related to education when I interviewed my participants and asked them about the obstacles that they face during a museum visit in order to try to solve these obstacles and serve their needs during their museum visit. For the purposes of my study with blind and low vision museum goers, the oppression that Freire refers to becomes discrimination against these visitors, so from this point forward in this dissertation, this issue will be referred to as discrimination against blind and low vision visitors. They are discriminated against because, unlike sighted visitors, they do not receive the same access to the tools and programs that museums offer.

Dehumanization

Freire (1970) described oppression as an "unjust order that engenders violence in the oppressors, which in turn dehumanizes the oppressed" (p. 44). Freire saw both the oppressed and their oppressors as victims, because the oppressor is locked into and blinded by the ways in which that oppression leads to their own self-dehumanization. Further, they are not able to liberate themselves; only the ones they have hurt can do that—though the responsibility for violence falls on the oppressor, building a critical consciousness is the responsibility of the oppressed because the oppressor will not be able to see that unjust order on their own. Freire (1970) stated,

Although the situation of oppression is a dehumanized and dehumanizing totality affecting both the oppressors and those whom they oppress, it is the latter who must, from their stifled humanity, wage for both the struggle for a fuller humanity; the oppressor, who is himself dehumanized because he dehumanizes others, is unable to lead this struggle. (p. 47)

In the terms defined above, museums that offer only segregated blind and low vision programs at a specific time are dehumanizing, having marked blind and low vision visitors as an

Other, making it possible for the museum to in turn treat blind and low vision visitors as less than human, or abnormal. According to Freire (1970), when museum curators, educators, and docents have this type of relationship with their visitors—a relationship based on a hierarchy of power, or on exploiting others—it is not an authentic human relationship. The oppressor, for example, could be an educator who creates blind and low vision programs in a museum, maintains their distant position of authority or power, and is thus unable to establish empathy or intimacy. In order to maintain their power, they have to turn human beings/subjects into objects. When the oppressor does that, they diminish themselves, and they close off the possibilities of fulfilling relationships. What they know about other human beings and themselves is quite limited and regulated by power—the oppressor typically would have been de/humanized first before going on to dehumanize others.

If museums had not accepted their own de/humanization, it would not be possible for them to dehumanize their visitors. The docents are first trained and told to act this way by the museum, and they buy into that way of interacting with the museum's visitors. They then begin to see themselves as the upholders of this routine, which allows them to continue to treat the patrons as if they are only a bother that needs to be taken care of. For example, by contrast, when museum curators are fully self-aware of their own participation in exploitation and marginalization, they are able to see people with low or no vision as fully human, which means they can participate in incorporating blind and low vision patrons into the normal learning environment — they accept blind and low vision people as having full humanity. Then, according to Freire, they no longer oppress blind and low vision visitors because they are in a true, equal relationship with them.

I used Freire's concept of dehumanization when I discussed the unfair practices that blind and low vision visitors face during their museum visits.

Banking Ideology

Banking ideology is the idea that teachers and institutions are the sole source of knowledge and that students/learners are the passive receivers of that knowledge (Freire, 1970, pp.73, 93). Teachers and/or institutions who create education programs therefore set up these programs based on their reality, not on the learners' needs (Freire, 1970, p. 94).

Many museums currently adhere to this ideology, treating visitors as passive objects to receive the museum's knowledge. Museums have labels directly beside each work of art to describe and provide information about the work. They offer docent facilitators who typically choose a small number of works they want to direct attention to and offer their own interpretations and opinions of the work of art. They typically don't ask questions, engage in dialogue, or encourage conversation or critical thinking (something I experienced on another tour at the Modern Art Museum in Fort Worth). Dialogue is a necessity for change; it is a practice of freedom where all types of people share thoughts and knowledge with each other (Freire, 1970, pp. 92, 93, 97). Within a museum space, this means encouraging questions and discussion amongst visitors to help them understand a work of art, reflect on it, or practice thinking critically. Dialogue, in Freire's view, will take place if critical thinking happens through communicating with students/visitors, which leads to "practice education" (Freire, 1970, p. 92). To Freire (1970), ideas should not be split into black and white, where there is one normal way of thinking and teaching is consequently a kind of transmission (p. 92)

Clearly, curators in museums create exhibitions for people who don't require vision assistance, who are familiar with visiting museums, and who find it easy to observe, interact with, and understand works of art confidently on their own. However, not all types of visitors are able to understand works of art on their own. If a museum would make the effort to become a place where all types of visitors could have the same opportunity as educators and sighted visitors, this effort of providing access to observation, interaction, understanding, and dialogue would eventually become the norm.

I used Freire's concept of banking ideology when I discussed programs for the blind that use banking ideology as the primary method of education and explain the content of the work of art to them passively.

False Generosity

According to Freire (1970), *false generosity* is the idea of giving, but going through the motions without actually taking into consideration all of the effects (p. 44). Freire (1970) explained false generosity by giving the example of philanthropists donating to organizations once, while what they really need is sustainable solutions (p. 44). When a philanthropist gives money to an organization, like a museum, to improve a program for a certain type of visitor, what is the outcome? What does that donation actually produce, and how does it help to liberate the type of visitor who may be blind or have low vision or be otherwise marginalized? In that generosity, there is a great opportunity; visitors will be so grateful to have the chance to go to the museum for free and be part of this great program. The assumption is that it will make them better people because they have had a chance to experience the arts and become more cultured. However, if examined critically, what one begins to see is that in this seeming

generosity the donor gets to feel good about themselves despite the fact that there is something inherently missing. They begin to feel as though they have done something just and selfless (A. Kreahe, personal communication, November 20, 2017), but have they truly made a difference in a person's life?

Education is a primary need, no matter one's race/ethnicity, gender, skin color, or background, and it should be provided equally for all. However, according to Hinchey (2008), "politicians and a wealthy elite collaborate to produce educational policies of benefit primarily to a select minority" (p. 118). Unfortunately, museums—as educational institutions—also fall victim to a similar phenomenon, treating visitors based on their status, and specifically their ability to see. In fact, visual programs have become the standard curriculum in museums and sighted visitors have become the "normal" visitor. From the perspective of museums, it is better to put all visitors with the same ability together in a museum program so that they can focus on that one group and offer them what they need all together at one time. It is also, in the museum's view, easier for people who are blind or who have low vision to interact with each other and to get along with each other because they have similar abilities and have engaged in similar experiences.

According to Waitoller and Thorius (2016), this labeling results in increased accommodations for blind and low vision visitors, which is a positive effect (p. 1). Museums offer special blind and low vision programs, and their primary goal is to help blind and low vision visitors understand the content of a work of art—albeit without giving them a chance to share their thoughts about it. However, as Waitoller and Thorius (2016) cautioned, educators need to view the label not as a sign of difficulty that will need to be dealt with but as a signal of

a difference that can bring opportunity and benefit to learners (p. 3). Doing so segregates the blind from other visitors. Interacting with visitors who have the opportunity to see and have different experiences than the blind visitor does would help the blind and low vision visitors communicate and think about the work of art critically, and doing so might enrich the overall conversation by allowing them all to ask questions or provide interpretations.

Freire's concept of false generosity shows that offering blind and low vision visitors "segregated programs" keeps the system exactly the way it is, so that little is changed or improved for the blind visitors or marginalized groups. These acts of charity might help with the issue temporarily, but the efforts don't address the root of the issue: These actions would help blind visitors participate in programs that the museum offers specifically for the blind, but the actions would not help the blind engage with their broader communities. Segregated programming creates the illusion that museums are treating all of their visitors well, and that philanthropists—in this case museums who offer blind programs—are worthy of gratitude. However, the truth is that this type of programming segregates blind and low vision visitors, robs them of the opportunity to experience all types of art, and chooses for them where and when they can visit the museum.

In this way, philanthropists' generosity toward the museum in fact dehumanizes the marginalized visitor, creating a distant relationship that maintains the power of the museum staff and their authority and influence over the visitor. As Freire (1970) explained, the process of humanization begins when transforming a situation, not just feeling good about it. This transformation, according to Freire, should accrue through a struggle toward freedom, and the oppressed have to wage the struggle for fuller humanity both for themselves and for the

oppressor, who himself has been dehumanized. Because the oppressor is dehumanizing others, the oppressor is unable to lead this struggle, and unable to see the necessity of the struggle in the first place (p. 47). For example, because museums (the oppressor) see the generosity that they have offered blind and low vision visitors (the oppressed) in the form of a special program, they do not see the necessity of change. This false generosity falls short of achieving their own humanization—and their ability to relate to other people and see them as fully human—because it is merely feel-good charity that addresses superficial issues.

The primary goal of museums' offering of blind programs is to transfer the idea of a work of art to blind visitors in order to help them understand its content. However, the primary goal should be to encourage blind visitors to think critically about works of art and then share their thoughts about them—giving them a truly valuable experience and treating them the same as sighted visitors. This act of ignorance by museums toward blind and low vision visitors, “is not merely about the representation of difference; it is about inclusion and exclusion” (Hall & Phoenix as cited in Lewis, 2003, p. 285). Museums have defined who is “fit,” and who is “normal,” and they have created a dominant culture of sighted, well-educated visitors. If a visitor is not in this “normal” group, they are seen as having a disability by default. But blindness or low sight are not actually disabilities, and they can only be viewed as such if a culture ascribes the meaning that way. Although unintentionally—and not by individuals but rather through the whole institutional apparatus—museums have labeled blind and low vision visitors as disabled, dehumanized them, and treated them as lesser human beings.

Thus, the question I ask is: How can we humanize museum visitors, whatever their differences are? Museums could incorporate ideas from Waitoller and Thorius (2016) to

improve their curriculum. These scholars focused specifically on students, but their ideas can be applied to museum visitors as well; they focused on ableism as a kind of racism, and the discussed how educators need to overcome that through two mixed pedagogies: 1) *culturally sustaining pedagogy* (CSP), which is a pedagogy that focuses on ethnicity, race, identity, and culture, and 2) *universal design learning* (UDL), which is focused on learning differences. According to them, educators should not separate dis/abled learners from other kinds of learners: Similar to how racists perceive other cultures as being different and discriminate based on these differences, ableists see people with disabilities as different in a way that brings about discrimination.

Culturally Sustaining Pedagogy (CSP) and Universal Design Learning (UDL)

Waitoller and Thorius' (2016) concept of CSP has at its foundation the idea that institutions of learning can and must create a curriculum that includes all students and does not deny different students' race, ethnicity, or individual differences. Applying this idea more broadly, if educators focus on CSP, they keep the dominant culture from discriminating against the minority by discouraging the kind of pedagogies that perpetuate a sense of superiority. This pedagogy is supposed to be inclusive and give students/museum visitors a chance to share their individuality.

Through UDL, we can apply the ideas of CSP to disabled learners. In the context of museums, curators have to create curricula that fit the needs of marginalized visitors who are considered to be "abnormal" visitors—especially blind and low vision visitors who are particularly dehumanized in the visual arts—in order to humanize their relationships. Hinchey (2008) discussed a similar idea, noting that the high failure rate of African American students

should not be blamed on some unspecified inability of these students; rather, the blame rests on the cultural bias inherent in the education system. These students have been taught subjects that do not interest them and do not match their background, culture, and/or their race. The focus of their schoolwork has been learning more about White culture because, in the U.S., White culture has become the standard for curricula (Hinchey, 2008, pp. 33, 34). Again, a similar thing is happening with blind and low vision visitors in museums: curators and educators of museums, who have power and are usually sighted, create curricula that serve the sighted visitor's needs, considering them the dominant culture. Educators, according to Waitoller and Thorius (2016), should put learning variability into the curriculum so that anybody can access and use that curriculum no matter what their backgrounds, cultures, or prior experiences. The curricula are fixable and can be molded and shaped to fit peoples' needs. There should be multiple options to achieve the same goals for every learner, no matter what learning differences are (Waitoller & Thorius, 2016, p.4).

This is what my app hopes to achieve: to serve all types of visitors without distinguishing them as "normal" or "not normal" and part of the "dominant culture" and/or not part of the "dominant culture." It will help blind and low vision visitors have the same access that is experienced by sighted visitors. Thus, through my study, I had to pay close attention to the experiences and the stories of the oppressed, the blind and low vision visitors, because I aimed to give blind and low vision visitors the opportunity to create their own humanization. This app, I hope, is transformative not only for my blind and low vision participants, but also for all museum visitors who might use the app, museum educators, and docents.

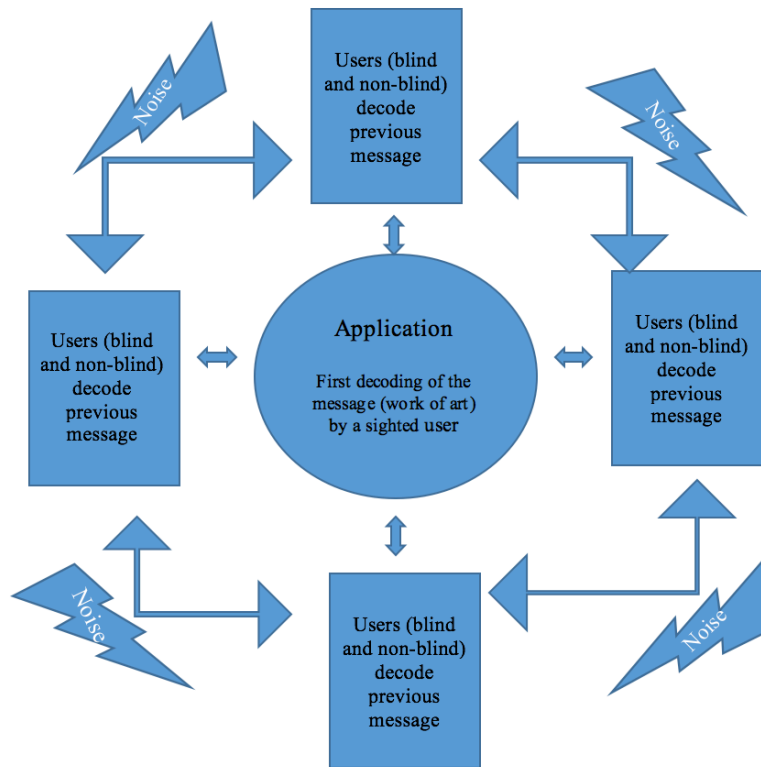


Figure 5: Feedback loop. This figure illustrates how the feedback loop works inside the application.

Museums should avoid thinking of learning differences as deficits, and they should move beyond the idea that disability is disability and view it as diversity instead. They should think of differences as just differences in order to find ways to reach all of their learners. museum curricula need to be created in such a way that it does not matter what the differences in the visitors are; any visitor should be able to find a way to participate in the museum. People with disabilities and learning differences have been discriminated against throughout history. Waitoller and Thorius (2016), argued that all people with disabilities, especially in the case of blind and low vision visitors, are still discriminated against because they do not have access to educational tools in museums as other sighted visitors do, and thus, they have no voice.

If museums look at learning differences not as disabilities but rather as differences, this

can hopefully change the curricula in museums, and the way that museums function, by creating a curriculum for museum visitors through which they can become experts. There is a culture of disability in which people with disabilities want that to be celebrated just as much as other cultures, which means offering dis/abled visitors *true generosity*.

The Empty Hand

True generosity is when museums offer their services to the public and to every visitor involved in education, encouraging visitors to give their narrative experience and/or ask questions and treating them as fully human by offering them “an empty hand” (Maclear, 2016, pp. 100,102,102, &103) (Goodley, Lawthom, & Cole, 2014). In other words, museums need to be willing to say that they do not know how to deal with a situation, such as joining dis/abled visitors with other visitors in the same museum visit, but that they are willing to move toward the journey together.

Museum curators often feel that they are the experts who offer the information and have the power to create special programs for disabled visitors. The visitors will receive this information from the museum, and they will accept the segregated programs they are being offered because that is the only opportunity. It is the option that museum curators feel most comfortable with because they are not open to admitting that they do not know the best way to deal with these special visitors. Thus, this inability to admit that they do not know the best way to solve a problem or deal with the situation creates a situation in which the best options for programs do not arise.

Just the act of extending the empty hand, not giving something but saying, “let’s take this journey together, let’s figure it out together, you (blind and low vision visitors) have

something to add and I (the curator) have something to add, but I do not have all the answers,” is risky, but worthwhile. It does not have to follow some rules or guidelines, and it might get messy. However, the blind visitor and the museum curator can work toward some conclusion after going through the process together. This idea of the empty hand is positive because it does not give quick solutions, or false charity/generosity. It teaches the student to go through the struggle and figure out a suitable solution for their problems. Museum curators need to find long-term, substantive solutions, which will require them to acknowledge that they might be part of the problem; they have to face these problems, work hard, and go through the struggle to have the freedom that Freire talked about.

False Generosity

False generosity is also related to Freire’s (1970) concepts of *dialogue* and *banking ideology*. When museums offer marginalized blind and low vision visitors a chance to visit the museum the marginalized visitors do not expect that they will dialogue with other visitors and think critically for themselves about their situations and how to change society’s structures to make it better for them so that they do not need the generosity of the capitalist/ museums anymore. In many cases, what museums give is a monologue, not a dialogue. Museums tend to treat their blind and low vision visitors in a way that makes them quietly go on the docent tour; they are going to feed the visitors, their work will help the visitors to understand what good taste is, and what good artwork is, and they will help the visitors understand how little they understand about what good art is. In essence, they will make them feel rather culturally unaware. That is banking, which is a basic transactional approach to teaching museum visitors and treating the visitor as a vessel the museum educator must fill up with information and

certain behaviors, as if they are going into a bank and making a withdrawal. Banking teaches neither the general visitor nor the blind or low vision visitor to reject and/or question the art on the wall. Rather, banking teaches visitors to take in and accept what the docent deems important and internalize elite taste and very expensive artwork as indicators of quality.

Freire (1970) wrote about false generosity as something to be revealed and unmasked; that is at the heart of true education, which comes through dialogue (pp. 44, 45). A person can unmask the world by telling somebody about it. A docent cannot help us gain meaning through dialogue as Freire discussed, when they are lecturing us. Freire's (1970) idea was that a person becomes humanized when they are able to see the world as full of false generosity and as created by the preconceived ideas that they hold in their mind. Real generosity is when museums offer their educational tools equally to all visitors. They avoid de/humanizing people by offering their visitors equal access to the opportunities in the museums and by having dialogue that enhances their visitors' knowledge and enriches their experiences.

I am using Freire's theories to understand and investigate the phenomenon in which museums oppress and de/humanize their blind and low vision visitors . In considering how I would encourage museum educators to change their outlook and change their relationship with society, I would ask the following: Why do they exist in the first place, and are they really serving the public? In relation to the topic of false generosity, there is a performance of care and a performance of love, which is not at all what occurs in museums. Museums need to be genuine rather than providing services and programs for self-gratification, and I think that this is a worthy goal that may be accomplished through suggestions I previously mentioned and the app that I have created.

hooks' Theories of Education as the Practice of Freedom

bell hooks' (1994) book *Teaching to Transgress: Education as the Practice of Freedom*, draws from the inspiration and influence of Paulo Freire when she discusses the impact of gender, race, and sex in education, and how teachers might deal with such issues in classrooms today. The writer identifies herself as a black woman from the rural South, who lived during a period of racial desegregation. hooks wrote that Freire inspired her to accept the challenges and feelings as part of a marginalized group. She developed her theories from her own struggles and experiences, which informed her writings about education.

hooks connects the ideas of freedom and education from the perspective of a teacher, and I find it useful to apply her theories to visitors and museums. hooks (1994) mentioned that some students (visitors, in my case) would like to be a part of their educational practice and share what they have experienced (pp. 88, 159). Drawing similarities between museum visitors and students, it is important for docent facilitators in museums to encourage visitors to share their experiences. According to hooks (1994), teachers cannot just ignore the experiences of the students because their lived experiences inform their classroom experiences. She claimed, "students have memories, families, religions, feelings, languages, and cultures that give them distinctive voice" (p. 88). Docents in museums should not silence visitors, they should give them the chance to practice freedom of learning. Even if it is a fresh and imperfect experience, or if what the visitors share is not fundamentally important, hooks (1994) asserted that education is not about the information itself, but rather the feeling of being valued and welcome. Docents should help visitors have this type of experience, encouraging and facilitating the sharing of diverse knowledge among the group (p. 88).

hooks (2010) additionally argued that students cannot become critical thinkers unless their teachers practice this concept of educational freedom, which encourages students to think critically, share their knowledge, and have feelings of joy when learning (p.8). This is exactly what I offer museum visitors (blind and non-blind) through my app.

I used hooks' concept of education as the practice of freedom when my participants used the app, which helped them be a part of their educational practice and share what they have experienced.

Engaged Pedagogy

Similarly, the concept of *engaged pedagogy* that hooks (2010) used commends teachers to know their students in order to fulfill their needs (p.19). By giving students a chance to share their opinions and talk about their lives, teachers can more fully appreciate where the student is coming from and how to meet them at that point. Teachers must avoid biases and engage all students in the practice of education (hooks, 1994, p.21; hooks, 2010, p.19). Only then can teachers employ the proper methods for each child to be successful. To do that, teachers must "enable students to think critically" (hooks, 2010, p. 8). Allowing the students to be engaged in a more conversation-oriented classroom setting, specifically by having each student write down and share information about themselves, is the best way to achieve these goals (2010, p. 19). Some students might not participate and engage in conversation about themselves because they feel vulnerable. However, engaging them with the whole class in a writing activity might take away that sense of vulnerability and make them more comfortable. In this way, students are allowed to express themselves in a safe way first before sharing the information by reading it. This technique can help students manage their shyness. Therefore, they are taking the risk of

expressing themselves through “mutual participation” (hooks, 2010, p. 21) because everyone in the class is doing it. Being vulnerable and sharing with the whole class is risky from the perspective of some students, but according to hooks, through mutual participation, these activities become an exercise that everyone is doing and everyone is involved in, so the sharing can seem less difficult (hooks, 2010, p. 21). *Wholeness* is a concept in which the entire class participates as a whole. According to hooks, students might not feel worthy enough to put themselves out there if not everyone else is doing so, but if the class has what she calls “integrity” and works as a whole, students will become more comfortable with the idea of sharing their own information (2010, p. 21). hooks (2010) stated,

Self-development and self-actualization arise through getting the students to share their personal ideas, information, and thoughts with the class. That is, it allows them to learn more about themselves, to develop and to realize that they can share their own personal life as well as learn more about the topics taught in the classroom. (p.22)

This is why discussion in classrooms can be an important feature. Looking at the mutual relationship between teachers and students, the process of active sharing allows students to grow because it creates a level of trust that everyone is involved in. No one is left out, which removes the sense of vulnerability that exists when only a few students share or participate in conversation in the class.

Additionally, hooks (2010) wrote about the concepts of dialogue and collaboration in terms of how they correspond with engaged pedagogy.. She stated that it is worthwhile to share, put your ideas with others’ ideas, and build knowledge about certain things (p. 21). According to hooks (YEAR), there is a fear of sharing ideas among students because they might not be considered the “right” opinions (p. 21). According to hooks (2010), what students and adults do understand is that it is “through dialogue that we best struggle for clearer

understanding” (p. 37). People do not realize that when they share their knowledge, interpretations, and ideas—whether or not they are accurate or true—they actually open a way for new ideas to be shared, corrected, or built upon.

Further, Maclear (2016) wrote that real generosity provides chances for hands to work and to contribute, not just to recover. Accordingly, people who are in positions to care for or take responsibility for others, such as teachers and educators, need to be willing to say that they do not know or are not sure what the best answer or solution is (Maclear, 2016, pp. 98, 99). Instead, these individuals need to work together to reach real educational goals.

I used these concepts in my consideration and analysis of dialogue between visitors (blind and non-blind), regardless of position, class, race, or gender. Sharing ideas freely allows visitors to learn from each other as well as from museums. hooks (2010) emphasized the brilliant idea that having dialogue with others, in terms of social justice, makes everyone belong; the one in power and the one that has no voice, the marginalized (p. 38).

I used hooks’ concept of engaged pedagogy when I interviewed my participants in anticipation of building the app with their input.

Excitement

hooks (1994), as a teacher, wrote about *excitement* in her class, which comes through collaborative effort between her and her students. Excitement is a way of teaching where each individual in the class has valuable existence (p. 8). Applying that to museums, educators, curators, docents, and visitors have to see value in working together within the museum space to learn from each other. Excitement is the way of teaching that hooks prefers because it is what makes the learning process continue (p. 159). In many cases, museums do not create

opportunities for blind and low vision visitors to attend their programs alongside other visitors. Therefore, museums are limiting their blind and low vision visitors' opportunities to attend the museum with others and access the educational tools that museums offer others. In doing so, they also limit blind and low vision visitors' ability to work with others collaboratively in order to create that excitement hooks claimed is essential in learning spaces.

I have used hooks (1994) as the framing theory for my research that discusses solutions for blind and low vision individuals in museums. hooks (1994) wrote extensively about the many changes that could be made in classrooms to promote experiencing joy in learning, as well as practicing freedom. Although her theories are primarily related to learning in schools, they can be applied to museums as they function as educational institutions.

I used hooks' concept of excitement in learning when examining how people who are blind or have low vision work collaboratively with other museum visitors through my app.

Revealing

According to hooks (1994), it is also important for teachers and educators to be vulnerable in the classroom and reveal things about themselves through dialogue. In the practice of engaging students in dialogue, it is important for students to reveal aspects of their actual thoughts and processes. The same is true for teachers. hooks (1994) said, "empowerment cannot happen if we refuse to be vulnerable while encouraging students to take risks" (p. 21). In fact, educators have to model vulnerability, as hooks (1994) stated, "create new models for interaction . . . ways of being that promote respect and reconciliation" (p. 108). It is necessary to be honest and genuine as teachers, to strip away preexisting notions of power and hierarchy for students to feel like they are on even footing with their teachers.

This aspect of engaged pedagogy involves giving examples from one's own life, allowing oneself to not always have answers, and messing up as a way of modeling critical reflection and how that process can lead to better actions, thoughts, ideas, and analyses in the end (hooks, 1994, p. 21).

This vulnerability in museum spaces sometimes surrounds behavior expectations. There is a lot that is not revealed about the museum in this regard, most notably the figures of authority. Museum visitors cannot see behind-the-scenes to understand how authority figures enforce the implicit codes of how to behave in museums. Sometimes, if a person is new to a museum, they may not feel a sense of belonging. If there are behaviors that are unacceptable, most first time visitors are unaware of them. For example, I was in a museum visit in 2017 on a public tour, and a young woman in our group asked this question about a specific work of art: "How did the museum get the work of art and how much did it cost?" She explained to the docent that she was writing a paper about it for her art class. The docent avoided answering by telling her to visit the website to look for an answer. These kinds of questions made the docent seem uncomfortable either because she simply did not know or because it is not part of the information that museums regularly share with the public. Museums usually avoid sharing information about their endowment, funding, and the prices of works of art to keep it confidential and maintain their elite status. However, revealing these details would suggest, especially if museums were trying to encourage critical thinking, that the museum had the means to acquire the piece. On the contrary, when the museum chooses not to divulge this information, there is a false relationship and creates a sense of distrust between visitors and the docent.

Often, because of these kinds of incidents, only those who have been a part of museum culture for a long time or who grew up in it feel comfortable in museum spaces. Comparing visits to museums that I attended with my professors and classmates to the ones I took independently, I noticed some key differences. When visiting a museum with my professors, we almost always had tours with either the educators of the museum, in which they would ask us great questions about their exhibitions to encourage us and engage us in that learning environment, or with facilitators who were well-trained and experienced in working with people. During the visit, these educators would talk with us about their educational background, how they had become professionals, how many years they trained or practiced, and how they had become knowledgeable professional docents. They would open their private meeting rooms for us to gather and talk. They would share information that they did not normally share with public visitors, such as information about their endowment and funding and other confidential information. None of this was the case when I visited on my own without my professors.

For example, I visited the Meadows Museum of Art with my professor, but I also remember visiting the museum with a public tour, which allowed me to have two different experiences: one as an insider (with my professor) and one as an outsider (on a public tour). On the public tour date, I was with a group of older people, primarily couples, and there was one family (a father, mother and their son). The first difference I noticed was that I had to pay the museum entry fee, which was free when I was part of a class. The docent for my group was an old woman. She introduced herself to us in the hallway, not in the meeting room where we usually had introductions as a class, and she said that she was just a volunteer and she had

always appreciated art and liked to help when the museum asked her. There were four groups on that day, and all the docents were old women who volunteered. Our docent chose the art that she liked, and she talked about some of the artworks. The docent gave a description of her own feelings toward the work of art and there was no questioning or dialogue practiced with the tour group.

While these might be small details, the differences between the two types of tours struck me as a kind of elitist practice. On the university class tour, the museum personnel engaged with us differently because of their relationship with our professor. They seemed to make an assumption that this was information museum education students would connect with and benefit from knowing. My classmates and I usually had tours with the best and most knowledgeable docent facilitators and met with curators who created and planned the exhibition, while typical museum visitors are not offered the same treatment.

In order for visitors to a museum to gain a full benefit, they also need to have experiences of deep engagement. Critical thinking, as hooks (2010) wrote, will never happen if teachers do not give students a chance to think for themselves and encourage them to share their knowledge. According to hooks (2010), teachers and students must work together to think critically (p.8). She emphasized that when teachers and students work together, they will not just think critically, they will also learn from each other and fill in the gaps with knowledge they both have (p.10). By doing so, students will not only learn to think and share their knowledge with others in the classrooms, but also learn that no one is always right and that “the shape of knowledge is changing” (hooks, 2010, p. 10).

In terms of museums, visitors (blind and non-blind) need opportunities to be open and share what they think about the work of art in order to fully appreciate and engage with all that museums have to offer. They have to give an interpretation from their own point of view, in their own words, shaped by their experiences, knowledge, imaginations, and thoughts. Even if they have no experience or have little knowledge, actually asking questions helps all visitors learn and work together in order to find answers and interpretation.

I have applied these concepts to emphasize this imperative for museum visitors to share their interpretations about the work of art in order to think critically and learn from the perspectives of other visitors (hooks, 2010, p. 10). Further, according to hooks (2010), developing critical thinking is the teacher's role, in which they have to encourage their students to discuss, ask questions, and have dialogue with them in order to learn. The information that they discuss with their teachers is going to stay with them because it fills a gap in their knowledge and it answers a question in their minds; they are not simply expected to absorb what they are told to remember (p. 43).

I used hooks' concept of revealing when blind and low vision participants used my app to reveal their thoughts, ask questions, and share what they thought about a work of art.

Conclusions to Theoretical Framework

Freire's (1970) theories are useful for understanding the experience of blind and low vision visitors in museums. Freire discussed how oppression is related to traditional education. He stated that in order to solve the problems of the oppressed, educators should understand the issues the oppressed experience from the points of view of the oppressed (Freire, 1970, p. 94). Educators cannot improve the way their students learn if they think that they are better

than their students and are the sole source of learning. In other words, the hierarchical attitude of educators toward their students can create a distance between them, which makes the learning environment unexciting. Freire's ideas apply to my study because I contend that blind and low vision visitors are oppressed because they do not have rights and opportunities equal to those of sighted people in museum spaces.

I used Freire's and bell hooks' concepts within education to shine a spotlight on the practice of dehumanization toward the marginalized museums visitors, such as the different experiences offered to perceived uneducated public visitors and blind and low vision museum visitors, in order to discourage this systemic issue in the future. I also have applied these concepts to blind and low vision visitors' programs in order to change their programmatic curricula, which will help the visitors become part of community-based learning in the museum.

Museum Equality and Social Justice

Fleming (2012); Nightingale & Mahal (2012); Smith, Ginley, and Goodwin (2012); Thorius & Tan (2016); & Graham (2010) are some scholars who studied museum equality and social justice. In their work, they discussed the rights of people with disabilities to have equal access and opportunities.

As a Muslim, I draw from my religious understanding of social justice, which means that everyone is equal and there is no difference between races, classes, or genders. Furthermore, everyone in the society should be able to gain equal access to opportunities; people with power should help those without so that everyone is able to access the same opportunities and live better lives. This is the definition that I use when I discuss social justice in museums. hooks

(2000) asserted that we share a responsibility to share wealth, power, and responsibility among all, not merely those with social or economic status (p. 158).

Museum equality is when all types of visitors can access the same educational tools, and visitors have the right to choose the place and the time they want to visit a museum. Visitors should feel welcome during their visits, and museums should not aim to limit their focus toward certain works or interpretations of the works. Instead of taking a hierarchical attitude toward visitors, museums should treat them as part of the museum culture, accepting that they have valuable experiences, thoughts, and interpretations to share. This collaborative and inclusive attitude is essential.

Fleming (2012) wrote about the museum as a place that should welcome all types of people, not just the elite, and he considered many issues that museums may face in their efforts toward the fulfillment of their mission in society. He explored their desire to reduce hierarchical attitude toward their visitors and actions they might take to improve their methods of executing their mission and fulfill their role in society. He felt that changing the hierarchy within museums would help museums better suit the needs of society.

Nightingale and Mahal (2012) discussed engaging diversity and equality in museums by providing a variety of examples of museums in the UK and the US that share such concepts with their audiences. For example, they described collections of artworks and objects from a various cultures. They also wrote about the role of museum personnel in charge of making diversity and equality a priority in their museums. They concluded that engaging in diversity and equality was the only way for museums to meet the needs of their visitors.

Smith, Ginley, and Goodwin (2012) argued for the rights of disabled people to have equal opportunities and access to all kinds of activities in their social lives. They wrote that disabled people do not need legislation or policy change but rather the effort of those in charge and society as a whole to bring about direct change. They make an important distinction about how society labels differently abled people, arguing that people with disabilities are not inherently disabled; rather, it is how society shapes these peoples' experiences that disables them. For example, they are not given equal access to many services in their communities, including education; and they are limited by services offered within their communities that don't have accommodations available (p. 59). They discuss issues of discrimination against people with disabilities, and they aim to find solutions for them through what they call the *social approach*. These authors provide evidence that some societies and museum programs don't offer people with disabilities equal access to the full museum experience, and they challenge the assumption of inherent disability with an understanding of how societies create the experience of disabilities by not accommodating these individuals' needs.

Thorius and Tan (2016), in their article, "Expanding Analysis of Education Debt," used the term *debt* metaphorically to explain the issues of individuals who are labeled as having disabilities and require assistance from others. The authors discussed the issue of race, social class, disability, and equity in education. They used the term *achievement gap* to describe the unequal opportunities available to students, specifically as they relate to race, class, background, and disability status. The authors additionally argued against the assumption of a *norm*, under which students from a certain background or with accessibility accommodation are excluded or alienated from the dominant culture. This accessibility accommodation pertains

to a situation in which a person with a disability needs assistance to communicate with others. For example, they discussed the history of segregated classes or programs for people who are labeled with a disability or who are students of color, arguing that such classes put these students in unequal learning environments. In this article, the authors give these students a voice by pointing out their rights and what society and the educational system should offer them. Their work is evidence that blind and low vision programs are sometimes segregated because it is not uncommon for educational spaces to exclude and limit the opportunities of certain groups.

Some authors make suggestions for educators looking to create programs for the blind, work with the blind, identify ways for the blind to have more accessibility to cultural sites, and find ways to make the lives of the blind more convenient. For example, Weisen (1991) discussed how the blind need freedom to enjoy museums independently and that it is society's responsibility to make it possible for them to do so. They asserted that blind people need to enjoy their visits independently and that museums should treat them as regular visitors.

Importantly, Corvest (1991) discussed issues facing blind and low vision visitors, one of which is the no-touch rule. He says because of "the physical and social taboo on touching," (p. 116), blind people are forced to listen to special facilitators who would describe the work of art in ways that blind cannot control. He discussed in detail the methods offered by museums in France, such as aural facilitation, but he determined that aural facilitation or similar methods were not as appropriate as the touch approach because touch is the most convenient way for the blind to understand a work of art. However, since this article is quite dated, and in the early nineties, it was typical for museum visitors to generally use live facilitators or listen to

recordings of a script via headphones for guidance. So blind and low vision visitors also would have listened only to one line of thinking rather than multiple minds sharing interpretations about a work of art. I contend that when many people share interpretations of a work of art through the app, blind individuals as well as sighted visitors can imagine and realize a greater sense of the artwork.

Corvest (1991) suggested an imperative for blind people to engage with their communities. Based on some of these ideas, I worked with my participants to more fully understand the factors that segregate them because of programs designed only for them. These efforts helped me to build the application in a way that serves their needs and allowed them to engage in asynchronous dialogue with others, meeting at least some of the needs of blind and low vision visitors to the museum. Although the dialogue doesn't happen at the same time, it becomes a

Label the Label

Helen Graham (2010) is a researcher at the International Center for Culture and Heritage Studies (ICCHS) who focuses on the "intersection between social policy and museums and on theories and practices of participative curation and research" (p. xii). In her article, "To Label the Label? 'Learning Disability' and Exhibiting 'Critical Proximity,'" Graham wrote about didactic labels in a museum and claimed that most people rely on labels/stereotypes to understand people, the world around them, similarities and differences, and common experiences. The author drew a comparison to the literal labels on the walls of museums that describe works of art, and how some visitors use them as starting points to think about the works of art. She encouraged educators to investigate how we use labels in life to do the same.

I applied her theory to discuss situations in the museum where stereotyping/labeling museum visitors has helped curators to offer assistance that addresses visitors' needs. For example, stereotyping/labeling helps curators make sure that museum visitors with disabilities get access to what they need. However, Graham (2010) emphasized that one should be careful not to stereotype others because it can cause stigmatization, which gives people a bad impression (p. 126). For example, blind people do not like to refer to themselves as impaired but rather as blind because blindness is not a disease but a fact that they cannot see; the term blind is more objective and more descriptive, which is a better way to think about it. How can we try to avoid using names and begin to use simple descriptions to end this kind of stigmatization or at least face it and deal with it?

Categorization

Graham (2010) also employed the term *categorization*, illustrated by the following example: some museum visitors like to have an introductory remark or statement of context about the exhibit before viewing. The information is minimal and, in this way, does not limit their critical thinking. If museum curators put the label on the display and write, for example, "this display is about racism," people might find it easier to start thinking about it for themselves because of this categorization. However, categorizing also has some disadvantages, including stigmatization. Graham (2010) argued that if the introduced category is related to an issue that people have negative feelings about, attracts negative emotion, or marginalizes people, the categorization can be a hindrance.

I used this term in the same context Graham used it. My hope is that the use of my app by the visitors to read or hear interpretations made by others about the work of art will help

them think critically. Reading or hearing others' thoughts can be used as an introductory statement, which Graham (2010) indicated visitors like to be offered by museums. Moreover, using categories in the app could allow visitors to interact with the artworks and art objects without anyone judging them about their ideas/thoughts during certain exhibitions. The interpretations in the app should help the visitors think about the work of art critically, ask questions, and add to the comments, some of which are already in the app. Thus, an introductory statement is already there, having been created by the visitors.

Critical Proximity

Additionally, Graham (2010) used the term *critical proximity*, which is an approach that involves using the terms people use to describe their own identity and/or their lives (p.126). If certain groups or individuals have a preferred term that describes their identity or lifestyle, others should use those terms when identifying them. For example, many blind individuals prefer the term blind instead of impaired. Critical proximity helps them be understood and be met on their own terms instead of trying to look at blind or limited sight visitors from a critical distance. Critical proximity also relates to redistributing the local. The idea here is that a characterization may reduce the complexity of an experience, but in reality, every experience involves a network of complexity and should be understood in that way.

I used the idea of critical proximity in my study because the goal was to create an app for blind or low vision individuals so that they would be able to share their experience and talk about it the way blind and low vision visitors talk about it, not the way that others often do (from a critical distance). This way, all visitors can learn equally from blind and low vision

individuals who use their own terms, increasing critical proximity for both blind and low vision visitors and non-blind visitors.

Outing

Graham (2010) discussed the term outing, which she described as when society at large identifies someone or a group of people as abnormal. For example, when the dominant culture uses terms such as disabled, Graham (2010) claimed that museums tend to treat individuals with blindness or low vision as abnormal and alienated (p. 119). This is particularly problematic as some people do not self-identify as having a disability, or they may try hard to conceal their disability. Thus, because museums may not be aware of such situations, they may not try to provide access to all of the museums' existing or modified educational tools to improve the learning, thinking, and knowledge of blind or low vision patrons.

Graham (2010) outlines the language that should be used when talking about people with disabilities, and she emphasizes the importance of using the terms *they* choose when describing their identity. This exercise of critical proximity allows blind and low vision people to share their thoughts and ideas or stories. And in doing so, other visitors can hear their choices of words, understand what is really on their minds, and see how they describe something from their point of view.

I have used Graham's theoretical ideas when discussing the app with blind and low vision individuals. In this way, the app has a much bigger goal than just giving blind and low vision people access to what is in the museum. I think the app has the power to encourage blind and low vision visitors to share their valuable knowledge with other visitors. I was very interested and excited to hear what a blind or low vision visitor would say about a work of art. I

do not know what their life is like in other ways, and I hope to provide them with an experience and place where they are able to feel that they are valuable contributors, and give them the opportunity to share their knowledge, unlike in society, where what is offered to them and how they are able to interact is often limited.

In summary, people who are differently abled, such as blind and low vision visitors, need to have equal access and opportunities in museum spaces. This relates to aspects of equal opportunity and social justice because access could center around the relationships with others and could affect the way one experiences works of art in order to understand the art. Other visitors get the benefit of interacting with sighted visitors when they visit. This cannot be done if blind and low vision visitors only visit museums when separate programs are offered for them. If blind and low vision visitors don't have equal access to the museum, it amounts to a kind of discrimination. Separate is rarely equal as history has divulged (hooks, 2003, pp. 17-20). They need the effort of those in charge, like art educators, museum educators, and society at large to offer sustainable museum programs. The scholarship outlined above aids understanding of the unique situations of people with disabilities and their experiences of being excluded. Understanding their needs is important not just for them, but for everyone. When blind and low vision visitors can enjoy being in museum any time they want, they are able to share their knowledge and contribute ideas, which will enrich the diversity of the museum experience.

Art Museum Education Programs for Blind and Low Vision Visitors

Wapner (2013); Benoist (1991); Dodd, Jones, Jolly, and Sandell (2010); Johnson (2017); Hartley (1995); Fukurai (1974); Dodd, Sandell, Jolly, and Jones, (2008); Mallerai (1991);

Ruyssinck and Raemdonck (1991); Marwick (1995); Kirby (1991); and Barrett (2014) all discussed how museums have sought to offer ways for visitors to rethink their preconceived ideas about disability.

Wapner (2013) and Benoist (1991) both dealt with the experiences of blind and low vision people in terms of their day-to-day challenges and their unique skills (e.g., that hearing is a dominant sense for the blind). The authors noted that many blind individuals like to discuss and hear from others rather than attend tours for the blind; and they prefer to touch the artwork because they want to act independently. Benoist (1991) also pointed out the differences between individuals who were born blind and those who lost their sight later in life—this distinction has a significant effect on their knowledge, prior experience, and interpretation of a work of art. These authors encourage empathy for the difficulties that blind people face on a museum visit. Considering their work allows for better understanding of the needs of blind and low vision visitors, what they are seeking when visiting a museum, and what makes their visit more convenient. They provide evidence that hearing is a dominant sense for the blind, and they show that there is a difference between those who were born without sight and those who lost it later in life. A blind person who lost their sight later in life has prior experience of the visual world and can make sense of what sighted people mean when they use a concept or a word. A person who was born blind, on the other hand, does not understand what a sighted person means when they say, for example, “the sky is blue;” the blind person who lost their sight later in life probably does have an understanding of what blue means.

Wapner (2013) discussed his right as a blind person to visit museums any time he wants, including during regular visiting hours. When he arrived at a museum, he asked for an audio

headset, a feature available in many museums that allows visitors to hear descriptions about given works of art. He could not believe that this specific museum did not offer audio headsets for blind people at that particular time simply because he was visiting outside of the scheduled programming for the blind. He was disappointed to learn that blind and low vision individuals could not enjoy museum visits at any time of their choosing; they could enjoy the museum when special tours were provided.

Wapner (2013) further discussed the idea of engaging the blind by addressing the barriers present in museum architecture and programs. He argued that museums are valuable because they welcome everybody to attend and to engage in a socio-cultural learning environment. Therefore, museums have an obligation to work toward removing the barriers that prevent blind people and people with disabilities from enjoying their museum visit.

Wapner (2013) demonstrates how important it is for the blind to engage with others. Wapner (2013) mentions that he did not like to have a guide during his visits or to touch objects to be able to understand the work of art; instead, he preferred to discuss the work of art with others. Part of what my app aims to do for blind and low vision visitors is help them have a more independent visit during regular program hours.

Dodd, Jones, Jolly, and Sandell (2010) wrote about a museum program that asked all visitors to rethink their ideas about disabilities by producing narratives about them. The program spread awareness about disabled people and collected perceptions from different types of visitors. Most of these perceptions were positive: They liked to see people with disabilities visiting the exhibitions alongside them. Likewise, the perceptions of the visitors with disabilities were also positive, and they liked to be offered the chance to visit the museum

during a regular public tour to interact with artworks and with other visitors. One of the disabled visitors wrote: “At least I am here [in the center] not here [at the margins]” (Dodd, Jones, Jolly, and Sandell, 2010, p. 99).

Dodd, Jones, Jolly, and Sandell (2010) can help museum educators understand how able-bodied people think about disability, how disabled people think about themselves, and how disabled people might interact in an exhibition that welcomes a wider variety of groups. They demonstrate that people believe in the rights of visitors with disabilities to attend museums with them, and that people without disabilities can benefit from this integration. The research also shows that blind and low vision visitors can be engaged within museum programs with other visitors if the curators/educators of these programs design them to be more inclusive.

Johnson (2017) wrote about his desire to write an article with his wife, who is blind and could not attend art class because the only ones available were created exclusively for sighted people. Johnson showed that not only are blind people excluded from attending art classes, but also, they are excluded from attending museum exhibitions and galleries, and he attempted to overcome this barrier by establishing workshops for blind students to learn about art and create art. There are several ways in which everyone benefitted from these workshops, from the creation of a community of diverse museum visitors to helping his students understand their identities through the creation of art, to providing opportunities otherwise unavailable for blind people. One of the blind participants even mentioned that she would not have attended a given exhibition if the curators hadn't asked her to visit, because she thought—as many others

in the workshops did—that museums had been created only for sighted visitors and blind and low vision people could attend only programs specifically for the blind (p. 8).

The positive attitudes of blind students of all ages in Johnson’s workshop and their excitement and commitment to attending the classes and finishing the work illuminates how much the workshops meant to them. This article shows that a majority of blind and low vision visitors, much like Johnson’s students, need to have these kinds of art workshops, art classes, and museum programs to help them believe in and value themselves. These types of programs also help them interact with others without any limitations or barriers, helping visually-impaired people realize that they aren’t so different from sighted people—even if that is the prevailing idea in society. Blind and low vision people should know that they do not have to be the same as sighted people to have access to the same opportunities.

Hartley (1995) discussed the Richard Attenborough Center for Disability and the Arts at Leicester University, which develops art courses that serve the needs of people with disabilities. Hartley wrote about physical access, visitors with disabilities as practitioners--which means that people with disabilities are the ones making the art--educational access, and staffing. He highlighted examples of museums that give blind and low vision individuals and people with other disabilities the chance to create and exhibit art and emphasized the collaborative work between visitors with disabilities as practitioners and non-disabled people as helpers, teachers, and/or museum staff.

This source helped me to understand what would help people who are labeled with a disability, especially blind and low vision people, during their visit to a museum. Additionally, this research informed me about what my app should include to accommodate their needs.

Fukurai (1974), a teacher of blind and low vision students, wanted to find ways to bring better perception to blind and low vision students in order to help them live a fuller and easier life. He discovered that they could use other senses to interpret the surrounding environment. For example, blind and low vision people can use their sense of touch to feel what is around them. He drew from his own experience as a teacher who had never before worked with blind and low vision students to write a series of anecdotes, which are short in length but deep in meaning. For example, when one student described that feeling the air around him as a box that he could perceive, that helped Fukurai understand that students use other senses besides sight to make sense of the world around them.

Fukurai's (1974) work is a great guide for people who want to work with blind and low vision individuals. The author shares his own experience with teaching art courses to the blind using clay (p. 107). He also offered examples of certain words that the blind use, along with what those words mean to his blind students, to show that there are often differences in understanding a word or concept based on whether that person lost their sight at birth or later on (p. 96, 98). Some blind people used their own terms to explain a work of art; however, there were some common concepts that all the students used to describe a specific thing—such as the word beautiful, which they interpreted as flat and soft (p. 103). But there were differences in word choice between those who had been blind since birth and those who lost their sight later on. The latter would be able to know what an object looks like, or what a concept means—they can picture it in their minds and understand it in a different way than people who have been blind since birth. As such, the word choices blind-since-birth people used were

different from those that a sighted person or a person who lost their sight later in life would use (p. 104).

Fukurai (1974) gave some advice to seeing people for talking to a blind person (p. 93). He suggested that someone explaining something to a blind person has to be careful with their word choice and should avoid relying on blind people's past experiences when explaining a new concept—the blind person might understand the concept literally and miss a nuanced meaning. But when he helped his blind students use their imagination to understand a concept, new meanings and revelations about the art work surfaced. For example, one of them gave a creative explanation that a seeing person had never noticed or thought about when he asked one of his blind students about his feelings when he is walking down a corridor. The student surprised Fukurai with the words he used:

When I walk in the center of a corridor, I feel the air on both sides of my body as if it were supporting me. If the air seems to stop moving around me I know I've come to a corner. For me, the school building is like a box filled with air. (p. 107)

According to Fukurai (1974), blind people think that they are living a perfect life, and they do not think that blindness limits them; they know how to deal with their condition by using touch and hearing as dominant senses. He encouraged his blind students to expand their sense of touch, using not just their hands but also their bodies to feel what's going on around them. His experience with his students suggested that blind children are more perceptive than low vision children who only rely on their sight because the former also use their sense of hearing to make sense of what they are doing (p. 122).

Fakurai (1974) adds important context to the understanding of the lives of blind and low vision people in terms of how blind people, especially those who are blind from birth, think and

how they might experience something that they had never seen. When I built my app for the blind, I tried to keep in mind what is useful for sighted visitors when they use the app or interact with the blind—making sure docents have the right methods to explain a concept and helping them to understand what a blind person means by a certain word he or she uses. Additionally, Fukurai's (1974) research supports the idea that the blind could offer an explanation or thought that a seeing person might not have ever considered before. Fukurai's experiences also evidence that blind people are perfectly capable of contributing, and that society is what disables them from participating fully. Fakurai (1974) established that blind people are different in a positive way which can add to society rather than being different in a way that gives seeing people the right to reject them and/or disable them.

Dodd, Sandell, Jolly, and Jones (2008), who comprise a think tank of disabled activists, met with staff from nine different museums in the U.K. to create exhibitions that asked their visitors to answer the question, "How does this display/film/session change the way you think about disability?" They asked their visitors to fill out a chart with their perceptions. The minority of visitors were concerned and could not challenge their stereotypes about disability, but the majority were accepting and expressed interest in thinking about people with disabilities as independent and active (p. 145). People with disabilities were happy to be engaged with and felt valued as part of their community. The authors also investigated the language that visitors used to describe their thinking about people with disability, favoring language that indicated equality and emphasized that social barriers should be stripped away.

Dodd, Sandell, Jolly, and Jones (2008) provided evidence that sharing ideas, thoughts, stories, and experiences can help people learn from each other. Narratives collected from the

exhibitions' visitors showed that sharing experiences could shape the way people think about a given subject. This is a great example of the idea that visitors' perspectives could be significantly affected by learning about the lives of people with disabilities.

Mallerais (1991) discussed blind peoples' experiences visiting the Chateau de Blois in the Val de Loire in France, and how they discovered the museum using their senses. The museum offered a program for the blind in which they could use their senses of touch and hearing. Blind visitors were able to feel a plastic model of the Chateau to familiarize themselves with its layout; the model could also be partially disassembled, allowing blind people to experience the changes the Chateau had undergone over its history. Mallerais (1991) also mentioned the museum was working on a future opportunity for blind people to visit the chateau independently, arguing that blind people have the right to visit the museum at any time. He wrote that if seeing visitors are capable of participating in the museum community, blind people are, too, and could even add to the overall experience as they "rediscover the volumes, outline and surface treatments in a more direct and sensitive way" (p. 133).

Mallerais (1991) struggled with the idea that the chateau did not have suitable equipment that blind people needed during a visit, such as touch artworks and Braille text, proposing that the blind be offered more programs throughout the year. Although this experiment was conducted in 1987 and 1988, studies still ask museums to offer more programs for blind people, showing that this problem still remains.

Mallerais' (1991) work demonstrated that blind people are not limited, and can in fact teach seeing people. However, although this article comes from a place of caring about blind people, the author does not see any problem with blind visitors being segregated in special

programs only for the blind — he was comfortable with the blind engaging with other handicapped people in the chateau, but not during regular visiting times. I disagree with this approach based on what I learned from Freire (1970), hooks (1994), and Wapner (2013).

Ruysinck and Raemdonck (1991) discussed many different exhibitions from 1970 to 1988 that aimed to facilitate access to art for blind people. They examined what challenges blind and low vision visitors faced at these exhibitions as well as how the exhibits benefited them. The authors believed in the need for blind visitors to be able to touch the art, and they noted that the size of the art object sometimes made it hard for the blind to get close to the work and touch it. They argued that the exhibition space should be comfortable for the blind to position themselves in it and touch each object. They also noted the difficulty that arises when guides, lecturers, and docents are unable to explain a work of art to blind visitors who do not have prior knowledge and/or relevant experience. The authors suggest developing a group of five people as facilitators who are trained to explain the museum and its works to the blind and develop good educational methods based on the varied experiences of blind people. They also suggested offering alternative materials for the blind, such as catalogues in Braille and audio recordings.

Ruysinck and Raemdonck (1991) documented the history of exhibitions that tried to help blind individuals gain access to educational tools. In contrast to their method, explaining the artwork to the blind was not my primary goal in developing the app. More importantly, my research endeavored to probe how best to help a blind visitor engage with other visitors and add to the broader conversation, not just simply understand what the work of art looks like. Helping blind and low vision visitors access the educational tools in museums is a very good

idea, but it does nothing to combat the misunderstanding that their limitations always leave them in need of help from others. Changing the architecture or the design of the museum in order to help them join conversations are possible solutions, but I think there are other ways to address the problem as technology such as smartphone apps becomes more readily available and adaptable.

The articles of Marwick (1995), Kirby (1991), and Barrett (2014) discussed how blind visitors can effectively share their thoughts about works of art. Marwick (1995), for example, discussed his experience in Edinburgh City Museum and Galleries with *The People's Story*, a historical exhibition in which the museum asked the senior citizens of Edinburgh to tell their stories about the city. The exchange showed the importance of sharing the thoughts and stories of visitors with each other, and how these exchanges added new and different meanings to *The People's Story* rather than relying on labels provided by the museum.

In this case, *The People's Story* dialogue in itself is the work of art. The exhibition helped broaden people's perspectives of the city itself. This is specifically relating to the importance of encouraging sharing ideas among blind/sighted people in museums. Marwick (1995) provided strong evidence that collecting others' thoughts, stories, prior knowledge, and experiences is a great tool for educating visitors. Sharing stories should give new meaning to a work of art that other visitors may not have thought about before.

Similarly, Kirby (1991) discussed several different exhibitions in which blind and low vision people interacted with sighted visitors, and how sharing their thoughts with the artists and the sighted visitors helped them become involved and learn. In that collaboration, blind and low vision individuals created a productive learning environment with both the sighted

visitors and the artists. Kirby drew from his own experience as a low vision person to demonstrate that blind and low vision people can not only obtain knowledge from others, but also can add to others' knowledge. The author concludes that museums should benefit from adding blind and low vision visitors to the museum culture, and that blind and low vision visitors should not be treated as abnormal.

Barrett's (2014) built on the idea that sharing thoughts with others could strengthen their thinking about works of art. Barrett stressed the importance of gathering interpretations from others about a work of art; those interpretations might not be "right," but they might make sense in their own way and add to a larger conversation about a work of art. Barrett (2014) emphasized the need to differentiate between objective and subjective interpretations—some interpretations provide more insight into a person's experience than they pertain to the work of art's meaning. Barrett provided ways to make sure that the visitor offers an interpretation that could benefit others' understanding of the work of art, and he suggested different kinds of questions that could be asked. Barrett's work influenced me to include questions and instructions in my app that would allow the users to give their best thoughts about and interpretations of a work of art.

In sum, all of these articles dealt directly with the primary aim of my app: to put differently abled visitors in conversation with one another. My app seeks to gather thoughts, interpretations, and stories from museum visitors, and it saves them for other blind and non-blind visitors to read or hear them on their own time and at their own pace. Compiling these various interpretations of a work of art should allow blind and low vision visitors to attend the museum and interact with artworks independently.

However, being an independent blind visitor should not mean that one *has* to work alone, therefore, my app also enables the blind visitor to engage with others. Even if a blind visitor cannot provide his or her own analytic, visual interpretation due to not being able to see the art, the blind visitor can enrich the conversation by adding more to it—telling a story, or asking questions about it. In addition to helping blind and low vision people fully access what museums have to offer, interactions like these might help sighted visitors see aspects of the art that they might have previously overlooked. The collaboration of sighted visitors and blind and low vision visitors can bring about a more enriching museum experience for all.

Sociocultural Learning and Constructivism

In researching how to make the best app possible, I draw on several sources concerned with sociocultural learning (how we learn around people while in groups), including Falk and Dierking (2013); Falk (2007); Griffin (2007); Falk & Dierking (2000); and Hien (1999) and Hooper-Greenhill (1999). These are important studies of museums as spaces for learning, community, and culture.

Falk and Dierking (2013), for example, attempted to answer questions about why people go to museums, what they do there, and what, if anything, they take away from these experiences (pp. 23, 24). According to them, individuals visit museums for several different reasons: to satisfy their ambitions, inspire themselves, have a good time, and learn about different cultures (pp. 26-34). Importantly for my own research, Falk and Dierking (2013) also wrote about the importance of using digital media to offer visitors the chance to access more tools (p. 119). Creating an app can offer marginalized visitors more opportunities to access educational tools in a museum, and in this case, specifically blind and low vision individuals can

benefit. Falk and Dierking (2013) sought to comprehend the motivations of people for visiting certain museums, and they learned that, first and foremost, people are informed by their identities and backgrounds and these most influence their choosing a particular museum; they further determined that their educational goals were secondary. Their work is important for understanding the different kinds of individuals who visit museums and what their motivations are in visiting; it further informed the content of my app to better fulfill their needs and goals.

Additionally, Falk and Dierking (2000) drew insights about how to make museums better places for learning. Here, they broke down the motivations of museum visitors as they related to museums as places of learning. They emphasized that people learn better when they are with others and that sociocultural learning is an important concept. Since I wanted to help engage blind and low vision individuals with others in a regular museum visit, Falk and Dierking (2000) reinforced my suggestion that museums should engage all types of visitors to make the museum a great site of learning.

Further, Falk (2007) discussed the importance of learning in museums and the importance of museums as learning institutions. His article is a great source for people who work in museums and seek to improve their programs and make them beneficial for their visitors. It is also a great source for museum-goers who need guidance about how to interact with work in a museum and how to gain full the benefit from their visit. Falk and Dierking's (2000) work influenced my development of the app in that not all people are familiar with visiting museums and sometimes need direction or guidance. For those unfamiliar with museums, the application strives to meet all of their needs while guiding their interpretations and facilitating asynchronous dialogue with other visitors.

Griffin (2007) explored the relationships among students and teachers in museum spaces and how museums could best serve their needs. He discussed the importance of students being in an encouraging environment for learning, emphasizing the teacher's role in using museums to create a beneficial learning experience.

Rennie and Johnston (2007) also discussed museums as learning institutions. The researchers sought to measure individual learning experiences and the benefits visitors gain from museum visits. Because I have created an app that helps blind and non-blind visitors interact with works of art independently, I Rennie and Johnston's (2007) research on learning in museums to help my app facilitate "a personal process" (p. 59) and afford each visitor "his/her own pattern of engagement and a unique learning experience" (p. 59).

Hien (1999), an important figure in constructivist theory, discussed the significant role of museums as places of learning and the processes through which visitors learn in museums. A common conception within education is that children are born with a blank slate, or "tabula rasa." When children are born, they have no knowledge or experience that informs their understanding of the world, which some believe is also true when any individual learns something new. The idea is that everything they know has had to be learned, and more specifically, it had to have been taught by teachers who share all information.

To contrast, there is an opposing theory(1999), that when an individual is learning something brand new, what is already inside their head can be applied to the new subject. In this sense, learning is the process of constructing meaning. This theory also posits that all learners have something in their minds that is valuable and worthy of being shared (Hien, 1999, pp. 1-2). When teachers are able to tap into this knowledge or interpretation, they provide

opportunities to engage students and facilitate better learning. Both the teachers and students have something to share, regardless of their base level of knowledge, and the act of sharing adds to the learning experience (Hien, 1999, p. 3)

Hien (1999) discussed in detail different learning approaches (traditional lecture, text, discovery, and constructivism) and argued that constructivism is the most effective learning approach (p. 3). According to Hien (year), constructivism argues that both knowledge and the way it is obtained depend on the minds of the learners. It follows that the minds of the learners are as important to the learning process as those of the teachers (p. 4). This theory can also be applied to the museum experience. Museum education has generally followed the first theory of learning (the blank slate), in which the docents hold the knowledge and the visitors come in to passively learn about the objects. According to Hien (1994), applying the constructivist approach to the museum setting should be done in a manner that is easy for the visitor to comprehend so the viewer can construct knowledge from an exhibit (a self-constructive act) (p. 5). In other words, visitors can gain knowledge from exhibits, apply it to what they already know, and share it with other people. As opposed to just walking through the museum passively and reading the placards or having the docents explain the exhibits to their visitors, only the first step would involve visitor interactions with the docents. The second step, which is what I am suggesting, would be interaction among the visitors. In this way, the sighted visitors also could gain knowledge from the questions that the blind and low vision visitors pose because sighted visitors might have overlooked a particular aspect of the art until it was specifically addressed. This type of interaction heightens the museum experience for all involved.

Hien (1994) reinforced the notion that museums have a significant role in teaching people, and each visitor has their own role in sharing knowledge and contributing to the larger culture. Hien's (1994) work supports the idea this type of interactivity is beneficial for both blind and low vision museum visitors as well as all others. With the help of the app, visitors are able to engage more meaningfully and gain a better understanding of the works by sharing their knowledge and interpretations (p. 3).

The museum itself is a place where visitors can gather to share their knowledge, and in this manner plays a significant role not just in displaying artworks but also in creating community and bringing together people who have similar interests in learning about art. Hien (1994) emphasized the important role of sharing ideas and interpretations in order to create an enriched learning environment and reinforced the idea that all visitors have an important, active role when visiting a museum.

Hooper-Greenhill (1999) considered constructivism as an approach to learning wherein museum visitors are active learners. She posited that all visitors come to museums with different needs and different knowledge of the art, and introduced the theory of *learning and communication*, which has brought about changes in how museum educators see their visitors' needs and has been a part of a larger cultural change (p. 67). In the past, not many museums considered the accommodation needs of their visitors. Museums used to see their visitors as groups who visit the museum to gain knowledge passively and then leave. Today, museums take their visitors into consideration more than before and see them as individuals who have a variety of goals when visiting a museum. Now they work toward accommodating their needs,

which improves the richness of the museum learning environment and leads to improvement in museum culture (p. 67).

Hooper-Greenhill (1999) also discussed, in great detail, *Constructivist Learning Culture* (CLT) in her article “Learning in Art Museums: Strategies of Interpretation.” She questioned how a visitor tries to understand a work of art. She asked whether they interpret the artwork based on their own point of view or whether they interpret based on how society would interpret it. She argued that most museum visitors are not passively looking at the work of art, but they are actively engaging with the art (p. 44). She also asserted that in order for museums to educate visitors, they need to understand how these visitors interact with and think about works of art that they are already familiar with (p. 46). How far discussion goes between the visitors depends on how much is known by the visitors, and the level of interpretation will be based on the level of prior knowledge. According to her, attitudes and beliefs also determine how fully a visitor can interpret (p. 46). Hooper-Greenhill’s (1999) work provided evidence that people can teach each other new concepts, information, and knowledge about a work of art with which they are already familiar, and it bolstered my prediction that the app would help all visitors enrich their knowledge when they share and read or hear comments in the application.

All in all, these sources support the importance of museums to a culture and the role of museums as educational sites and places of sociocultural learning. Understanding the motivations of visitors to museums informed the creation of my app and helped me address visitors’ needs and goals. The app also supports established research on the effectiveness of active learning in museum spaces where greater learning happens when all visitors share their

knowledge. Additionally, my app is supported by as Falk & Dierking (2013) work, which showed that using technology in museums can offer visitors better interaction with works of art.

Creating the App

To build my app, I have utilized sources in information science, a field of academia that writes about technology. These sources best helped me serve my app users' needs in terms of adding or searching for information in the app. They helped me accommodate users of the app to share their interpretations and thoughts in a convenient and easy way. In this regard, O'Connor, Kearns, and Anderson (2008); Fahy (1995); O'Connor, Copeland, and Kearns (2003); and HapGood (1993) offered ideas that were useful for informing the creation and development of the app.

O'Connor, Kearns, and Anderson (2008) discussed information systems for librarians and students and provided an explanation as to how students can build and/or design systems from scratch using their own terminology. They explained that students must question what they are building and determine specific ways to use a system. Their work was useful for starting to build the app; they reassured that an app does not have to be built all at once. Rather, an app is best built step-by-step, keeping in mind what the app creator aims to achieve how they can use the basic materials and information that they have.

Fahy (1995) also wrote about information systems and technology. She discussed the significance of using new technologies in museums as a way to enhance communication between a museum and its visitors, which could offer more opportunities for learning. She described in great detail the kind of technology currently being used, as well as the technology that should be used in museums. She offered examples of museums in the United Kingdom that

use technology to document and record information on objects in their museums, and how these systems work to validate the documents that give information about the objects in the museum. She also explained the advantages and disadvantages of using such systems, and gave details about system users, capacity, changes that can be made, access to sensitive information, etc. She discussed the issue of using technology to enhance communications in exhibitions today, and provided some ideas for future usage in museums. I used Fahy's practical examples of technology usage in museums as a guide to help me make decisions about the app. For example, according to Fahy (1995), one aspect of newer technology is that it can help museums "develop new ways of communication which allow the visitor to explore the richness and diversity of collections at their own pace and to their own requirements" (p. 82). Clearly, technology has progressed even more since his study in 1995. For example, according to Fahy (1995), "information about an object is fleeting. It is easily lost if it is not captured at the time the object is acquired by the museum. Without it, it is difficult to make discussions or judgments about the importance of the object to the museum and cultural history" (p. 83). Thus, museum workers might need to spend more time and energy acquiring information about their objects, visitors, labels, and historical information. The goal was to create an app that is effective and easy to use, and Fahy's article helped me get all of the "do" and "do not" information before finalizing my app.

O'Connor, Copeland, and Kearns (2003) and HapGood (1993) suggested demonstrating a prototype or *proof of concept* in terms of what terminology I should use to build the app, and their work lead me to look at the project as an engineering project. In this sense, proof of concept is a common term that programmers and engineers use to build a project without

being sure of the exact details of how to build it. They start with what they know, then try to notice any mistakes, try various solutions, and finally reach the results they are looking for. In other words, they build the project step-by-step using trial and error and not all at once (B. O'Connor, personal communication, November 28, 2017).

Hapgood (1993) discussed several cases in which individuals at MIT tried to solve a problem. In doing so, they considered solutions as not set solutions but possible solutions. For example, they might ask themselves: How can a person decide which of the solutions to use for now? What are all the factors? What information are we offered? Do we have ten years to develop it, or do we need it next week? Hapgood also mentioned the concept of *generate test regenerate* (GTR), which means making a good guess about how to approach a project, then testing it and redesigning it. I used this guidance to start building my app based on the materials, information, and ideas that I had collected at that point. I tested the app myself, and when it didn't work correctly, I identified what worked, where it failed, and how I could understand those failures to make it better. Then I did it again, using Hapgood's (1993) lesson on trying the many possible solutions even if it is clear that I have not yet achieved the final, perfect solution.

O'Connor, Copeland, and Kearns (2003) studied instances in which people needed to find information, but not information that was available in a library. For example, the authors recommend knowing and using certain theoretical and mechanical concepts to improve the ability to find information through the provided source. Their work helped me realize that adding a function that can help my app users search for certain thoughts or comments using a keyword is important; being able to search should help them go back to review a certain

comment they have read. When building the app, I tried to keep in mind how to make it possible for the users to find information faster and more easily. As O'Connor, Copeland, and Kearns (2003) suggested, I used proof of concept theory to improve the functionality of the app.

In sum, research above helped me build my app and consider ideas about which kind of system would most benefit my users, and anticipate obstacles I might have faced in building the app. Their work helped me identify the strengths and weaknesses of the access systems in my app that I need to enhance in order to make it easy for museum visitors to use it. Additionally, letting my participants use it in its early stage applied a GTR strategy testing, observing, and gathering feedback, learning from users which aspects of the app were successful or not and enabling me to respond appropriately.

Universal Design

The Origin

UD is the design and composition of an environment so that it can be accessed, understood, and used to the greatest extent possible by all people regardless of their age, size, ability, or disability. An environment (or any building, product, or service in that environment) should be designed to meet the needs of all people who wish to use it. ("What is universal design," para.1). UD is important to my study because it is freedom of movement through which everyone gets treated the same. UD helps people with diverse needs access the same opportunities. By doing so, according to Persson, Åhman, Yngling, and Gulliksen (2014), if museums take advantage of increasing the sustainability of all their visitors, then the quality of

their learning environment, their programs, and their educational tools offered to visitors will grow (p. 505).

Museums will be able to maintain their morals and ethics if they accommodate all diverse visitors equally and in the same manner (Persson, Åhman, Yngling, & Gulliksen, 2014, p. 506). On the other hand, it would be nearly impossible to accomplish this if blind visitors attend the museum and cannot access the same educational tools or have the same opportunities as other visitors. Treating people all the same does not mean that there is one solution that can fulfill everybody's needs all at once (Persson, Åhman, Yngling, & Gulliksen, 2014, p. 507). Likewise, what serves blind people may not address other people with different disabilities. Nevertheless, at the same time, according to Persson, Åhman, Yngling, & Gulliksen (2014), helping small diverse groups might also end up helping others (p. 507). In other words, in helping blind and low vision visitors attend museums, move independently through museum spaces, and interact with works of art on their own using my app, the app might also improve the experience of all visitors by giving them a chance to share and learn from each other. Implementing changes, such as the offering of this app, while seemingly small, improve society and create a rich environment for learning on the whole.

History

UD began in 1997, when Dr. Ronald Mace of North Carolina State University, along with a group of product designers, architects, environmental design researchers and engineers, created a list of seven principles that would guide new designs. I write about these seven principles below and explain how my app incorporates UD.

The first principle of UD is *equitable use*. This means that all users should be able to interact equally or at least equivalently with a product. In the case of my app, this means that not only should blind and low vision visitors find it easy and equitable to use. Further, because the app is installed on a smartphone, it can take advantage of alternative input and output means that are already in use on these devices.

The second principle of UD is *flexibility in use*. That is, the app allows blind and low vision users to access and fully utilize museums at whatever time they choose rather than relying on specific blind and low vision programming, which runs only on specific days.

The third principle of UD is *simple and intuitive use*. My app provides easy usage and at the ability for users to provide feedback about the project. My app provides a means of collecting feedback from the users as they interact with each other and give their own perceptions about it. Further, the app requires contact information so that the users can give their perceptions about the app and museum services to improve them.

The fourth principle of UD is *perceptible information*. According to UD, the definition of perceptible information is that “the design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities” (“Principle 4: Perceptible Information,” 2018, para. 6). Accordingly, are users able to interact with each other about the work of art using the app? How easy is it for users to perceive, see, or understand the information in the app? My app attempted to accommodate a type of user, called an “administrative user,” who is part of the museum administration and who can add any educational tools from their museum into the app. The options for this type of user include creating barcodes for the artworks, creating physical labels for the artwork, and adding photos

of the artwork, evaluations of the exhibition, feedback regarding perceptions of visitors, etc. These options direct the usage of the app. The other type of user is the visitor, referred to in my app as the “regular visitor user.” Visitors using the app use two main windows, each of which are dedicated to creating the profile and scanning the barcode, which can be found on each work of art, to allow visitors access to the work of art’s page within the app and to encourage them to add comments, thoughts, and stories. All thoughts about a certain work of art are on one page that relates to that particular work of art so that every visitor can read, hear, and interact with other users about the same work of art. Notifications are sent to the visitor’s email when someone responds to their comment, and an administrative user reviews comments before they are posted in case something is offensive or inappropriate.

The fifth principle of UD is *tolerance for error*. That is, the app should make it OK for the user to make mistakes when using it in order to avoid frustration when using the app.

The sixth principle of UD is *low physical effort*. That is, the app should be easy to use and accessible for all users. Blind and low vision users have access to audio and microphone features to be able to search in the app, obtain information, and contribute comments and other thoughts. Furthermore, each exhibit in a museum can have one barcode that opens all its artworks in order to minimize repetitive actions, which is a sub-principle of UD. Then, the user can choose from among all artworks the work of art they want to interact with.

The seventh principle of UD is *size and space for approach and use*. My app will be used on users’ own devices and should be easy to download. In a perfect world, museums would be able to offer devices for visitors who do not own smart devices, and users would return them before leaving the museum.

In summation, in the past, institutions did not take accommodations for blind and low vision individuals into consideration. Fortunately, things have progressed and many institutions have shifted toward more inclusive thinking and actions. Offering visitors a chance to interact with works of art using the app is one way to accommodate museum visitors with a number of different needs (Persson, Åhman, Yngling, & Gulliksen, 2014, p. 507). The principles of UD are a great guide for making the app suitable for all types of users who will visit the museum. All visitors should be welcome to visit museums, and the use of this application will aid in the museum's ability to enrich the lives and fulfill the needs of a more diverse set of visitors.

How Does My App Embody UD?

The concept of UD was critical in the design of my program and curriculum because embodying these concepts ensured that every attempt was made to design the application in a way that provides access to as many as possible. Everyone will have access and everyone will be involved. There will be no distinction between the visitors as far as who will be able to participate.

According to Waitoller and Thorius (2016), when Culturally Sustaining Pedagogy (CSP) and Universal Design Learning (UDL) concepts are used together, the app developer can focus on the "what" being learned "with multiple means of representation" (p. 4,9), so they do not just represent what is being learned in one way. Rather, the app can employ multiple ways to access that take into account various learner perspectives. The app should also focus on the "how," which is how the material is presented. The app should offer multiple means of action and expression so that any different kind of student can find a way to participate and show that they have learned the material. There have to be multiple different kinds of activities

and multiple different kinds of assessment. Finally, the “why,” which means that there has to be multiple levels of engagement. In other words, why are we learning this? What is the purpose? It’s important to engage the interests of all learners, not just the majority culture or the able bodied. An app of this kind should help each one find their motivation and engagement through multiple sources. The what, the how, and the why have to appeal to a variety of visitors instead of just one type of visitor. In this way, everybody can be an expert learner (Waitoller & Thorius, 2016, pp. 4, 9). Accordingly, I have made every effort in the design of my app to follow the practices of UD.

Conclusion to Review of Literature

In conclusion, from my research I have learned that most people who write about blind and low vision peoples’ experiences generally refer to them in terms of their disability. The idea that the community assumes their sight is a disability is an example of one of the many barriers to their self-authority (Hall & Phoenix as cited in Lewis, 2003). However, other scholars assert that being blind or low vision is not a disability, and instead it is society that has disabled the blind and low vision population from living with the same opportunities as others (Smith, Ginley, & Goodwin, 2012). Much of the research highlighted here also discusses the experience blind and low vision individuals have had in programs designed to aid them in understanding works of art as well as how these programs should be enhanced to meet their needs. However, only one (very old) article suggested engaging blind and low vision visitors with others in order to enrich their visiting experiences (Mallerai, 1991). The theories I used in developing my app included theories around equality and social justice (Smith, Ginley, & Goodwin, 2012); collaborative ways of teaching and learning between students and teachers (hooks, 1994);

marginalization (Hinchey, 2004); and sharing knowledge, stories, experiences, and thoughts with others in order to understand and add to their knowledge and experiences (Freire, 1970). Additionally, research also demonstrates that providing learning environments that engage with a diversity of all types of people is one of the goals of many museums as educational institutions (Falk & Dierking, 2013, p. 127).

Further research provided insight that helped me build the app itself (O'Connor, Kearns, & Anderson, 2008; HapGood, 1993). My overall goal in creating the app was to help blind and low vision visitors not only engage with art work in museums more specifically, but also contribute meaningfully to it. Research that discussed the issues and problems blind and low vision individuals face during a museum visit from their own points of view demonstrates how museums typically limit them from learning (Wapner, 2013; Ruysinck & Raemdonck, 1991). Additionally, I conducted primary research via participant interviews to learn more about the limitations that museums inflict on visitors.

I still seek to answer the question of how blind and low vision visitors can have a self-directed experience in an art museum with the assistance or guidance of a mobile app. Since the development of the app, my study has continued to expand by investigating these questions: In what ways can blind and low vision museum visitors independently participate and interact with other visitors using a mobile app? How might a mobile app assist blind and low vision visitors in understanding interpretations or critiques of works of art? How might a mobile app facilitate communication between blind and low vision visitors and all museum-goers? And how is access to and the development of mobile apps important for museums and museum visitors overall?

Gaps in the Literature I Seek to Fill

People have studied and developed programs for blind and low vision visitors that are segregated and offer touch-based (tactile) art experiences. However, not enough people have discussed engaging blind people with other visitors. Other types of devices are being used in museums, but when authors write about technology as it relates to the experience of blind and low vision individuals, they are typically referring to audio headsets, which traditionally have been used to address their needs in some ways (Wapner, 2013). However, the failure occurs when the museum does not consider that these individuals should have the freedom to visit the museum and use the audio by themselves, without a guide or someone else walking them through the museum and at a time they would like to go to the museum rather than only in a specific program for the blind. The literature has pointed out possible solutions that are not adequate for present circumstances, and it has not provided solutions to important problems (Mallerai, 1991; Dodd, Sandell, Jolly, & Jones, 2008) such as the fact that blind and low vision people are still limited and often segregated by their available accommodations, and thus prevented from learning with other visitors and adding to others' knowledge. Museums believe it is acceptable to segregate the blind; they have created museums specifically with seeing people in mind.

Authors Kirby (1991) and Mallerai (1991) suggested that in order to solve these issues, museums need to offer more programs for the blind throughout the year, and improve programs for the blind by offering articles that consider their experience from their perspective. Basically, offer them more of what they already have. Researchers have rarely suggested engaging blind visitors with seeing visitors; only one 1991 study by Marcus Weisen suggested

this as a possibility. Today, this issue still remains relevant. Most researchers subscribe to the notion that seeing is the norm and blind people are not from the dominant culture. And because of this, blind individuals are limited and not given the same opportunities to share and broaden others' experiences and knowledge. The predominant point of view in the literature has been to offer blind people some extra help in blind programs and assume that they are not a part of the normal experience of the museum.

My study seeks to fill those gaps by examining and rethinking how we conceptualize museums and programs for blind visitors. A museum should not be a space where we just provide tools to make up for things that are missing; a museum should be a space where blind people are considered as essential and valuable as every other visitor.

Further, only one study by Ruysinck and Raemdonck (1991) considered a museum's architecture and design, arguing that it's not possible to engage the blind with other visitors because of the space and the barriers that prevent blind people from walking by themselves and experiencing the artwork independently. The way galleries are set up makes it difficult for blind people to navigate, and because of this they often require a guide. However, I think that this issue could be solved by the curators of the exhibition, wherein they create and plan the space in keeping with the principles of UD so that it is convenient for the blind to walk freely and independently. Another possible solution is offering communication about the layout of a gallery up front before a blind individual walks through a space so that they know what to expect. Therefore, this is not an insurmountable issue; the architecture does not necessarily need to change, but the way curators design the galleries needs to be changed.

Most of the studies about serving blind and low vision museum visitors were dated, and recent literature on this subject was challenging. In addition to the scholarship presented here, there were dissertations about blind visitors, but there were very few educational articles or edited book chapters, which represents a huge gap. This lack of scholarship might be because people have accepted the idea that museums are for seeing people. One study from the United Kingdom by Dodd, Jones, Jolly, and Sandell (2008), in which the authors collected perceptions of seeing visitors to determine if they would accept seeing a blind person visiting the museum with them, did assert that it was the right of blind individuals to be there because they could think and talk just like seeing visitors. In their study, blind visitors did say that they felt like they could visit museums now, whereas before they thought museums were just for seeing visitors. But that was the most recent article, and it was nearly ten years old at the time for this writing.

Clearly, most museums have decided that engaging and accommodating blind and low vision people in museum spaces is not a priority. However, they are missing a significant opportunity. It is unfortunate that interested parties have turned away from this discussion when there remains a significant opportunity to accomplish more in the museums and meet the needs of valuable members of their community.

CHAPTER 3

METHODS

To answer my research questions, I used interviews, observations, and prototype/proof of concept. I collected my data three times in different places and on different days. At first, in order to gain insight to help me build my app, I interviewed my participants and learned about their needs. Then, I interviewed my participants to test a prototype of my app. Last, I observed my participants using the app and interviewed them after I had enhanced it based on their suggestions in the second interview. I followed the same interview pattern with both the blind and the low vision interviewees: one interview before the creation of my app and two afterwards. Due to the limitations of my employee of the museum participant, I conducted all the interviews with and the observation of her at the same time.

I interviewed a total of three participants. The first was a low vision female, a 74-year-old who used to visit museums for pleasure when she had more sight but who now has trouble going due to her diabetic retinopathy, which has greatly diminished her museum experience. The second participant was a blind female, a 23-year-old who used to visit museums on school field trips and with her family when she was young. She stopped visiting museums as she grew up and discovered other interests, specifically in reading, especially reading novels where things are described vividly, which brings the words to life for her. Visualizing life through reading is easier for her than visualizing the art in the museum. Interviewing these two people helped me understand the difficulties and the challenges they face during their visits to museums. I believe it is also helpful to have participants who are familiar and interested in art, as students or practitioners, to provide a clearer understanding of their thought processes and experiences.

Because I am an artist as well as a teacher, we have similar interests and shared knowledge. In these interviews, I hoped to gain a better understanding of the specific needs of blind and low vision individuals. I wanted to learn how they feel about existing museum programs for blind and low vision visitors, experience art, interact with other visitors, and access educational tools in the museum.

The last participant was a female professional participant who is the Manager of Access Programs at the DMA. Access is a term that the DMA uses to describe the programs museums provide to differently abled visitors. As a professional participant, she helped me understand the challenges blind and low vision visitors face from her perspective, and she outlined the opportunities and accommodations museums such as the DMA offer these visitors.

I interviewed and observed all of my interviewees at each stage of the app development, and I made adjustments and changes as necessary to create the most effective resource.

This research is designed to answer the question: “How can blind and low vision visitors have a self-directed experience in an art museum with the assistance or guidance of a mobile application?” To answer that question, I created two sub-questions: “In what ways can blind and low vision museum visitors both independently experience a museum as well as interact with other visitors with the help of a mobile application? How might a mobile application facilitate the sharing of ideas between blind and low vision visitors and all museum goers? How is access to and development of a mobile application important for museums and museum visitors overall?”

Participants

My low vision participant is a 75-year-old female and the family member of a friend of mine. She suffers from diabetes, which has caused her to lose 60% of her sight, and she is legally blind. She is interested in art and has visited some museums, and thus, she offers a unique perspective because she can speak to her experience visiting museums before and after losing her sight.

I interviewed her three different times. The first interview took place before the creation of the app, and the two other interviews occurred after the app was created. My first and second interviews with my low vision participant were done in her kitchen, and my third interview with her was at the DMA. She chose the days and times that were best for her as well as the location of the first and second interviews. I used my locked and password-protected cellphone to record video of the interviews. Each interview was about 30 minutes in length.

My blind participant is an undergraduate student at UNT. She has been blind from birth and she has a twin sister, who is also blind. She is very independent and her attitude is similar to a sighted person. She has an iPhone with which she can interact with technology easily similar to the way she might interact with technology at the museum. She uses accounts on social media and email. She can walk by herself anywhere using only a cane. She is a creative writer, and she is interested in reading and writing because that is how she learns about the world.

My first and second interviews with my blind participant were done in Marquis Hall at UNT. For the first two interviews, she chose the days and times that were best for her and I chose to conduct the interviews in a classroom in Marquis Hall. Like the first participant, the

second participant did her third interview at the DMA. My blind participants and I went to the DMA together with a driver who took us to and from Denton, TX, where the DMA is located.

My third interview participant is a professional in creating museum programming for visitors with varying abilities at the DMA; her title is Manager of Access Programs. She conducts tours for the visually impaired, but she is fully sighted. I interviewed her to help me understand the challenges blind and low vision visitors face, and we discussed the opportunities museums such as DMA offer for these visitors.

Due to my professional participant's time limitations, I conducted her interviews after I enhanced the app, so she did not have the chance to see the prototype. All of my interviews with her were done in a room at the DMA. She chose the day and time that was best for her. Her interviews lasted about 40 minutes total, and I used my cellphone to video record the interviews.

Site

The DMA is an encyclopedic museum, which means that it collects art from all cultures and time periods. Their mission statement emphasizes providing art for all visitors through different programs, and they work toward promoting the significance of learning and creativity ("Mission Statement," 2018). According to the DMA website, the museum has more than 24,000 works ("The Collection," 2018). Also, the museum has different regional collections, such as African, American, Ancient Mediterranean, Asian, and contemporary ("Collections," 2018). The DMA offers free entry, and all types of visitors and all ages can attend any exhibition or program of their choice.

Protection of Human Participants

Before I started the interviews, I told my participants that they would be anonymous, our discussion would be confidential, and no one would read any interview transcripts except for my professor, who serves as the principal investigator for the Institutional Review Board (IRB). The transcripts and recordings were kept in a secure location that is not accessible to anyone except my major professor and me. I also made it clear to the participants that if at any point in the process they wished to quit or not continue the interview, they should simply tell me and we would stop immediately. I informed them that this procedure was part of the IRB's ethics in research requirements.

Data Collection

Interviewing blind and low vision individuals is a key piece of my research. These interviews helped me understand their unique needs and guided me as I built the mobile app. There were three stages of data collection in my study. In the first, I did in-depth interviews with my blind and low vision participants to collect information that helped me build the prototype app, and I incorporated their feedback throughout the app's development. An in-depth interview, according to Hesse-Biber (2017), uses individuals as a point of departure, assumes individuals have unique and important social world knowledge, yields deep exploratory and descriptive data, and draws patterns from "thick descriptions" (p. 104). I asked open-ended questions for the purpose of obtaining in-depth responses and a better understanding of the participants' experiences. I asked follow up questions as needed to obtain more information and to clarify answers. I recorded and transcribed the interviews, and I conducted a qualitative analysis of the interview responses (Hesse-Biber, 2017, p.104). For

major themes, I coded the responses and analyzed them against the research question. I learned from Maxwell (2013) that coding depends on a complete thought and depends on initials when I conduct the interview. For example, I learned that when conducting my interviews, I had to listen to what the participant would say as a complete thought but then I would code it with an initial to mark it as a concept that the participant wanted in the application or asked for as a way to access museums better.

I used *open coding*, which is conducive to analyzing this type of interview data. I also used *closed coding*, which means that I looked for repetitive words and ideas that I read in participant transcripts based on literature that I had read to prepare for the study. Then, I highlighted all the repetitive words and ideas, and I joined similar codes to name them with one common theme. There is no standard starting method for writing codes; what matters is getting familiar with the transcript before starting to code. After coding the transcript, I went back to the literature and found additional codes to add to my pre-existing codes (Maxwell, 2013, pp. 104-105, 115-116).

I organized my questions for the first interview into three main sections: 1) What motivates and prevents blind and low vision museum audiences' decisions to visit/not visit museums? 2) What are their needs, perceptions, or opinions about museum programs in the U.S.? 3) What are the challenges they face during museum visits that make them less inclined or not interested in visiting museums? I asked them about any enjoyable museum experiences they have had in the past as well as positive accommodations or programs they have experienced. The goal of these questions was to gain a sense of their self-directed experiences. I also took into consideration their eyesight development (whether they previously experienced

art without vision impairment) because that could have an effect on their interpretation and understanding of works of art (Fukurai, 1969).

General Interview Format

- First interview: Learning about the participants' needs. I asked about the background information, museum experiences, obstacles, and challenges the blind and low vision individuals had encountered during museum visits. I also inquired about their experience with interpreting art as a blind and low vision individual.
- Second interview: Testing the prototype of the app. In an effort to enhance the app after its initial creation, I asked participants their thoughts about what aspects of the app needed to be redesigned, and I asked them to give feedback on the ease-of-use of the app.
- Third interview. I asked participants to use the app after I had enhanced it based on their suggestions after having used the prototype. Then I asked them questions again about the second use.

I wrote a memo immediately following each interview and jotted down notes throughout the interviews (Hesse-Biber, 2017, pp. 311-312). I gathered my thoughts to draw any connections or identify themes I found after completing the interviews. This procedure required me to not only write my thoughts, but also develop my own theories and reflections throughout the interview stage. The post-interview memos helped me to answer my research questions, added to my research by triggering new ideas, and helped me revise ideas and questions for later interviews (Hesse-Biber, 2017, pp. 313,314).

I spent time writing interview transcripts, which played a major role in my understanding the data, analyzing and making connections, and thinking about the problem

and my research question. Following the unique ideas that were generated by the interviews helped me choose the direction I should take with the app and what to focus on and get rid of. I also worked during this stage to become aware of how my own experience and identity informs my research to be aware of my own biases, even if it was not possible to avoid bias completely (Hesse-Biber, 2017, p. 39; Maxwell, 2013, pp.124,125).

Understanding Blind and Low Vision Visitors' Needs

The first stage of this study was to understand my participants' needs. Both of my participants had different needs and abilities with regard to using the app. I asked them about all the challenges they have faced during previous museum visits. I also asked them about what would make a museum visit more convenient, what would help them enjoy their visits, and what would help them get the most benefit from it.

Building the App

The second stage of this study was building the app. Due to finite time and resources, I chose only one work of art from the DMA as the focus of the prototype app: *The Icebergs* by Frederic Church (1861), a piece that is very well known at the DMA. I chose this work of art for several reasons. First, it is large in size, about 1 meter by 2 meters, according to the DMA's website. It is also not a narrative work, so there is no story that visitors must know about it prior to offering their interpretations ("*The Icebergs*," para. 1, 2017). Additionally, it is an iconic work of art, and it is considered to have an "aura" (Benjamin, 2007, p. 222). I was curious to know if visitors, blind or not, might have been aware of this aura and/or whether they would make it a focus of their interpretations.

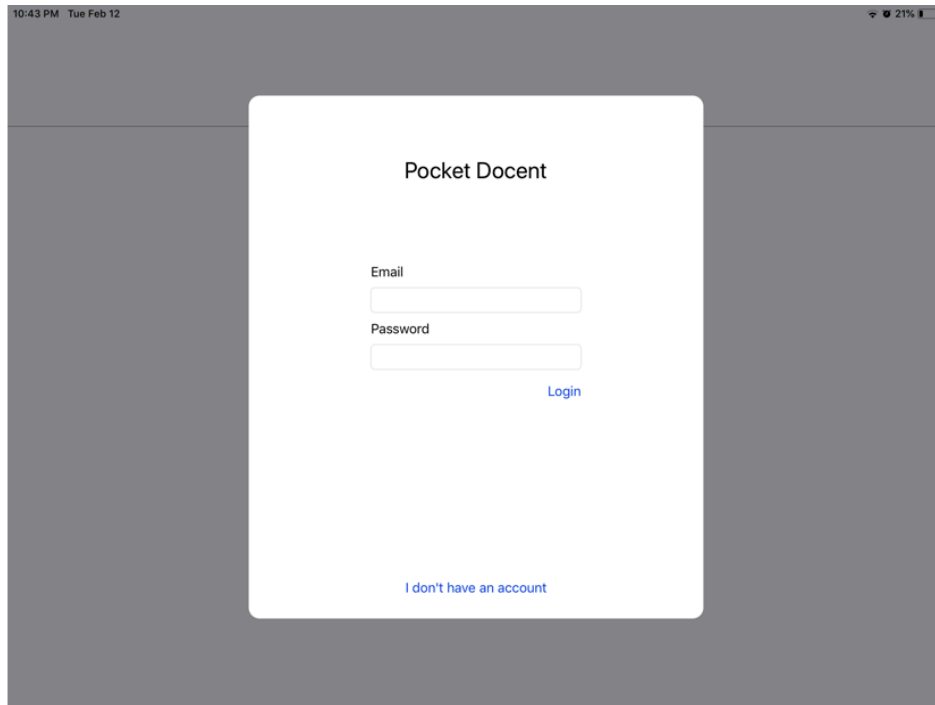


Figure 6: Creating a profile window. This figure illustrates how the profile window appears to users and how they can create a profile.

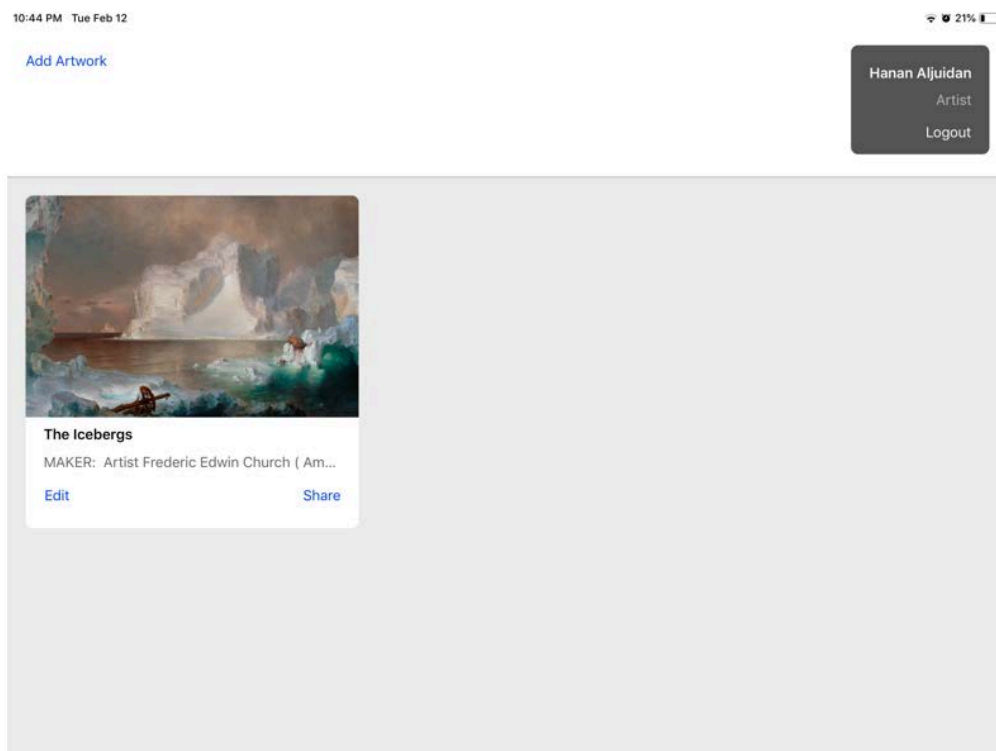


Figure 7: Artists' user page. This figure illustrates how museums can add works of art in the pages of the application.



Figure 8: Visitors' scanning barcode window. This figure illustrates the barcode where visitors scan in to access the works of art and their descriptions.

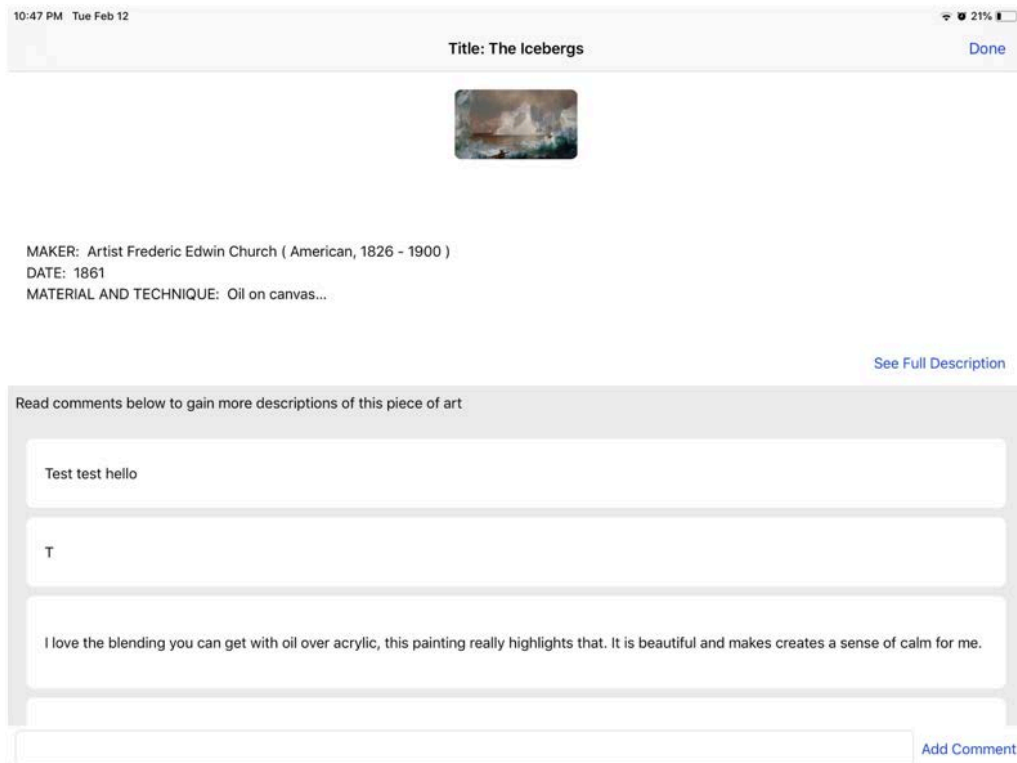


Figure 9: The work of art. This figure illustrates how the work of art appears to users.



Figure 10: Double tap to enlarge the image. This figure illustrates how to enlarge the picture in the application by double tapping.

Although my app was developed in response to my reading on the subject and my participants' suggestions and experiences in addition to making adjustments to the app based their first use, I took into account my developer's recommendations for building an effective app using good user experience and design.

After these considerations, I accommodated two different types of users. The first user is called the *administration user*, which is designed for use by someone who is on the museum staff and who can add educational tools from the museum into the app's offerings. They need to create a user profile from the profile window, which is the first window that appears in the app (Figure 6). Because of my limitations in developing the app (time, cost, location, etc.), the first version of the app had only a single administrative user, which I called Artist user (Figure 7). The other features of this initial version of the app included: barcodes, physical labels,

virtual labels, and audio labels for the artworks, photos of the artworks, feedback that reflected the perceptions of the visitors, add neutral visual descriptions. The second version of the app was built for visitors, who are referred to in the app as *user*. Both sighted and blind and low vision visitors who use the app are presented with two main windows, which are dedicated to creating their profile (Figure 6), and a scanning the barcode (Figure 8). To create a profile, visitors add their name, email, and password. Once in the app, they scan a barcode that is on the label of the work of art and which allows them to access the work of art's page/window and hear or read others previously recorded thoughts and comments (Figure 9). Users can also add comments, thoughts, stories, interpretations, etc. All comments about a certain work of art are on the page that relates to that work of art and where the work of art is located. Every visitor can interact with other users about the same work of art, which creates a richer learning environment. To hear the descriptions and comments, blind and low vision users can activate the voice-over feature that is already built into their Apple devices; sighted users can read or listen to the comments. Users scroll down to find more comments. Users who use voice-over can touch the screen and hear every comments, descriptions, and guidelines available in the app. Low vision users can enlarge the image by tapping twice on it, and sighted users can see the full wall plaque description provided by the DMA by tapping twice on it (Figures,10, 11). To add a comment, sighted users can touch the *add comment* feature, and blind and low vision users hear the voice-over saying "leave your comment or thought about the work of art. Text field. Double tap to edit." They scroll down to the blank area for adding a comment or press "add comment" if they touch add comment feature (figure 9).

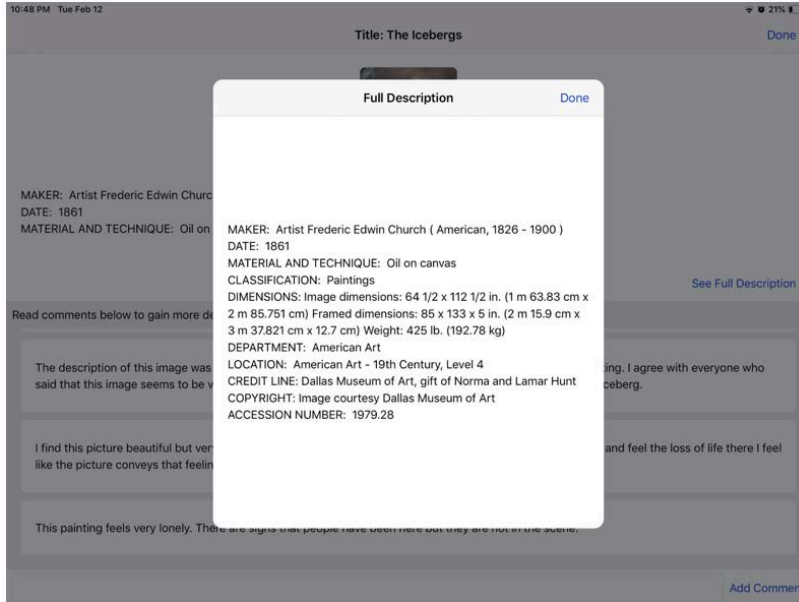


Figure 11: Double tap to see full DMA wall description. This figure illustrates how to double tap to see the full DMA description.

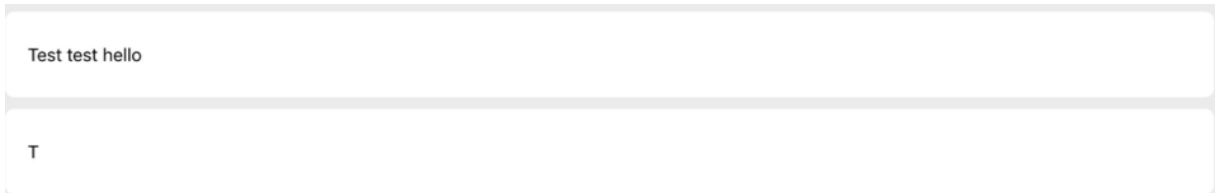


Figure 12: Testing the voice-over. This figure illustrates how the voice over was tested.

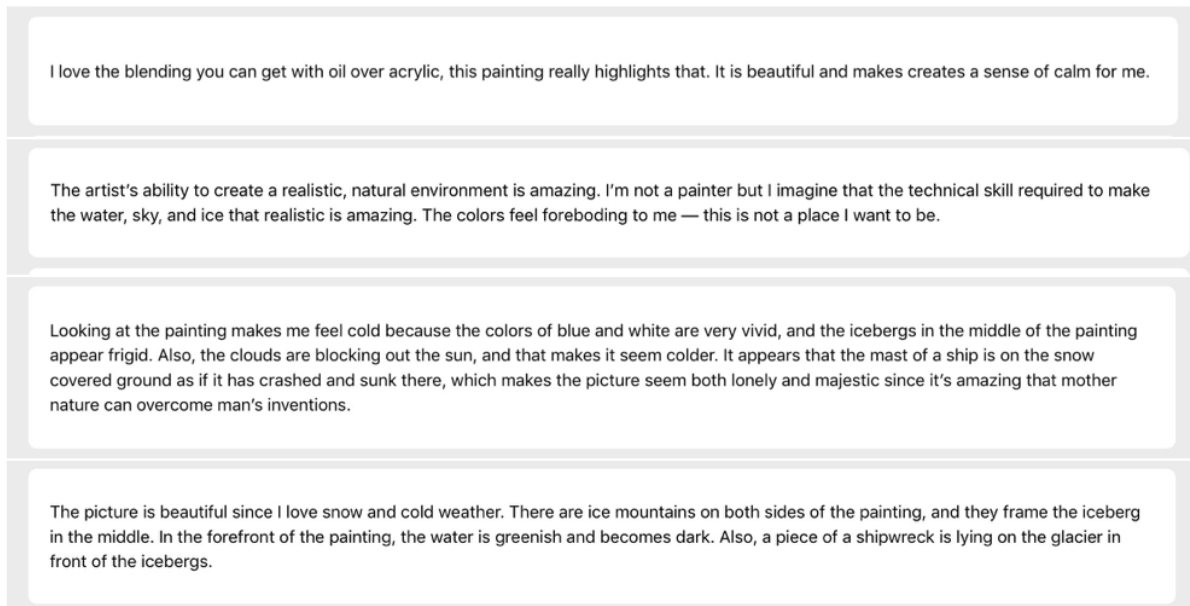


Figure 13: College and programmers' comments. This figure illustrates comments that have been added to the application.

Figure 9 shows my comment using the voice-over test. I needed to have some comments or thoughts that regular users added or shared, so I asked some friends and the programmers who built the app to add their comments and thoughts about the work of art in an effort to make the app ready for users to use (Figure 13).

Data Analysis

I used a grounded-theory approach as my analysis tool. According to Hesse-Biber (2017), “The idea of a grounded-theory approach is to read carefully through the data and to uncover the major categories and analytical concepts, and ultimately the properties of these categories and concepts and their interrelationships” (p. 231). In this regard, I wrote a memo right after conducting each interview in order to build theory and draw out some findings (Hesse-Biber, 2017, pp. 311-312; Maxwell, 2013, pp. 19-12, 32-38, 46-48, 105).

After I conducted and transcribed all interviews, I reviewed and read them in their entirety several times. I made a list of codes—words or phrases that appeared repeatedly in the transcripts (Hesse-Biber, 2017, p. 315). Some were *head codes* and others were *sub-codes* (Hesse-Biber, 2017, p. 315). These terms refer to a number of related words or phrases, or sub-codes, which I recorded and then combined into a single, more general concept, called the *head code* (Hesse-Biber, 2017, p. 316). Themes emerged from the coded transcripts, and I highlighted those themes. For every theme, I wrote down my interpretation of what it meant and made connections to my main research question, which was: How can blind and low vision visitors have a self-directed experience in an art museum with the assistance of a mobile application? I focused on the question of what blind and low vision individuals actually need from museums to make their visits beneficial. Within the coding of the first set of interviews, I

looked for themes relating to what the participants need in general, what their experience has been in the past, and any challenges they have faced visiting museums.

Within the coding of the second set of interviews, I looked for themes related to how the app could be improved. I then added features to the app based on those responses, and after using it, I tested the data.

In analyzing the data, I enhanced the results by finding additional sub-codes by going more in depth with the transcripts of the first interviews. I figured out how to lump/collapse codes together to have sub-codes, without neglecting data. Then, I revised all of the interview transcripts a second time. As expected, new codes emerged when my participants tested the application at the DMA, so I added these or related them to previous codes. Then, I looked at all of the participants' responses with the same repetitive ideas or words to make better sense of the data I had collected. Further, I observed my three study participants using the application.

Responses provided more ideas than the literature, and some of them challenged the literature. Sometimes responses were similar to the literature, which means my study provided evidence that the literature is valid (Hesse-Biber, 2017, p. 239). In presenting my findings in this dissertation, I provided the transcripts to give a direct voice to the blind and low vision visitors so the reader can understand the obstacles the blind and low vision visitors face during a museum visit. Throughout this study, I discussed my participants' challenges and experiences and spoke for them as they are often unaddressed or ignored.

Summary

In summation, I attempted to discover the answer to the question, "How can blind and low vision visitors have a self-directed experience in an art museum with the assistance or

guidance of a mobile app?” My three sub-questions, “In what ways can blind and low vision museum visitors both independently experience a museum as well as interact with other visitors with the help of a mobile app?”, “How might a mobile application facilitate asynchronous dialogue or communication between blind and low vision visitors and all museum goers?” and “How is access to and development of a mobile app important for museums and museum visitors overall?”

Further, I collected data, analyzed the data, created an app as an educational tool, gathered thoughts and suggestions to refine it, revisited data collection and analysis, and evaluated the research.

In conducting this research, I attempted to discover the answers to these questions using a qualitative method of interviews followed by coding to answer questions related to: What motivates and prevents blind and low vision museum audiences’ decisions to visit/not visit museums? What are their needs, perceptions, or opinions about museums programs in the U.S.? What are any challenges they face during museum visits that make them less inclined to or not interested in visiting museums? The findings of this study fill a gap in the literature because previous research has not considered ways in which blind and low vision visitors can have an autonomous and collaborative experience at a museum.

CHAPTER 4

RESULTS

This chapter details the findings of my interviews and observations. The data is presented using the headings based on the themes that emerged from my interviews with participants. As I show below in detail, participants shared some similarities and presented some differences in their responses. Some of these similarities and differences were in the following areas: participants' abilities to see and use the app, the way they reflected on a work of art, how they shared their thoughts and memories, their physical accessibility to the museum and the app's features, challenges that prevented them from enjoying the museums and using the services the DMA offers, and changes in the application that my participants asked for.

Findings from First Interviews: Learning about the Participants' Needs

Ability to See and Make Sense of Colors and/or Objects

Low Vision Participant

Low vision participant has good days where she can see more clearly and bad days. She is blind most of the time. She can see colors and shapes/figures, but it depends on the object/figures and the color. She can see bright colors such as yellow and white and dark colors such as black. However, she has some difficulty seeing other rainbow colors such as purple. My low vision participant described her vision as like having a spider web to look through. One eye is not good at all and the other eye can see a little and can mostly only distinguish between light and dark. She becomes blind and cannot see if the light is too bright, like in bright sunlight. Likewise, if it is too dark or dim, she cannot see. Going from dark to light, she is always

temporarily blind. She can somewhat see in normal light conditions. She has trouble with colors unless they are vibrant, and even then, she can't distinguish shades/figures.

When visiting a museum, the works of art have to be at eye level to the wheelchair that she uses, so she can get near enough to them to try to see them.

Low vision participant can't see things on a small video screen, or even on a large one. She can watch television, but she can't pick out any details. She can't see anything that her daughter doesn't help with or describe for her. She can see light and movement, but she can't see people's faces.

Low vision participant can imagine things in colors, because she stated losing her vision when she was 18 years old. She is able to create a full picture in her mind when her daughter describes things to her. She dreams in full color and in her dreams she can see just fine.

Blind Participant

Blind participant has been blind from birth. She can't see anything, even light. Reading is her way to discover the world. Authors of novels describe so many things, which is why she is very inquisitive. She likes to read novels, because novels can bring the idea into life for her in a very vivid way. Thus, everything for her is like a story. She does not see a picture in her mind. However, she can conceptualize it in her mind in a very descriptive vivid way. In other words, she can imagine exactly what an object/thing looks like, if she has already experienced this object/thing over her lifetime. However, for things she has never 'seen' /experienced before, her mental image is segmented at first, and then it comes more into focus as she experiences it more.

Blind participant does not have a sense of colors. However, when she thinks of colors, she pairs it with objects. For example, brown always makes her think of chocolate, and blue always makes her think of the ocean. That is how she conceptualizes color in her mind. She learned this from a book that her parents always read for her called *Hailstones and Halibut Bones*. It tastes all the colors of the rainbow. It pairs the colors of the rainbow with each of the five senses. After experiencing this book, she had a sense of the taste, smell, touch, and sight of these colors, and how they make her feel. This book helped her grasp color as a more abstract thing and create “pictures in her mind.”

Blind participant asks a lot of questions about things she does not know about, gathering information to know more about the world, going out and having life experiences. Those things help her create pictures in her mind and bring them more into focus.

Professional Participant

Professional participant is a sighted person. Normally, for her, there are not very many challenges during a visit to a museum. She grew up going to the DMA and to other local museums of art as a visitor. She normally goes to museums by herself.

Accessibility/Barriers Participants Faced during Their Past or Previous Museum Visits

Low Vision Participant

At first, low vision participant did not believe that her needs and opinion were important to share and she was reticent to talk in our interviews until I encouraged her.

When low vision participant visits a museum, she needs art with bright colors, bold shapes, and a big size. Because she sits in a wheelchair, she can't see when a work of art is not

hung at an accessible level. Sometimes the work of art is placed too high on a wall and that blocks her vision. She needs to get close enough to see the work of art. If she could pull a work of art close enough to her face, she could see it.

When experiencing a work of art, low vision participant needs someone to describe the work of art to her so that she can tell what the details are that she can't see. She could get an idea of the object through someone's explanation.

She needs more touch. For her, this is going to help her get a sense of the work of art. Sadly, museum rules do not allow works of art to be touched.

Although my low vision participant liked my app, she was against the idea of using the app in the museum by herself and alone. The idea of going to a museum independently scares her because of a horrifying situation she once witnessed. It happened a long time ago. A blind woman was trying to walk across the street. There were a lot of cars and nobody helped her. That scared my low vision participant and she did not ever want to be like that woman. Because of this, my low vision participant thinks she would be hurt if she walked alone in the museum and no one offered to help her.

Challenges that Prevent Blind and Low Vision Participants from Visiting the Museum

Low Vision Participant

Low- vision participant stopped visiting museums because of her vision condition. She has not visited a museum for a long time, but recently she visited Push Library. She would visit a museum but it depends on if her family is going with her. She does not drive. She cannot get somewhere on her own. She would also need somebody to push her wheelchair.

Low vision participant avoids going to places where there are many people because she feels uncomfortable with her daughter pushing her around in her wheelchair. She is worried that her daughter is going to run her into other people or something. She does not want to be a burden or bother anyone. She also does not want to be in anyone's way. She would prefer not to go to a museum than to be a pain in the neck to other visitors.

Low vision participant has to be in a place where it is set up to be easily accessible for people with disabilities, people in wheelchairs, or people who are visually impaired.

Blind Participant

Blind participant stopped visiting museums because of her vision. For her, it has been more worthwhile to read a novel than to visit a museum because she could not imagine what was happening at the museum, but in novels, authors always bring things to life in a very vivid way.

Because she is not able to see the art, blind participant thinks that she has no opportunity to engage with the art in the museum. This is why she does not go to museums. She wants to be sure that there is a way that she can engage with the materials in the museum.

For blind participant, she questioned how she would experience the museum, especially an art museum. She asked, "How can I experience art without being able to feel it?" She thinks that because of technology (iPhone and internet), she has started to find answers to that question in a more definitive way than she had in the past.

Even if everything is visual, blind participant wants to have more access to the museum and is interested in having art described to her. She would like to be a part of the art and museum community.

My blind participant's personality is very strong and independent. She is confident when she is in a place that she is familiar with. But, in a new place, she needs time to get to know that place before she can feel confident or independent. In a new place, she feels lost and needs to experience that place at least once. After that, she will be able to navigate it.

Professional Participant

Professional participant believes that the DMA is missing out on what she called "anytime activities," that can be done at any time without the assistance of a museum educator. She wishes that the DMA had more resources for blind and low vision visitors to be able to explore the museum. She would like to have Braille didactic labels, large print labels throughout the collection, or tactile resources. She wants more resources that a drop-in visitor can do anytime.

Using the services museums offer blind and low vision (outreach) and all visitors: Low vision participant. Low vision participant has never been on a blind-assisted tour in a museum. She went on a regular visit once but did not return. She does not plan to visit museums. She was offered an audio-guide so she could listen to information about the artifacts but this isn't sufficient for making her want to return to a museum.

Using the services museums offer blind and low vision (outreach) and all visitors: Blind participant. Blind participant went to a museum on a regular visit with her family and did not plan her visit in advance. On field trips in school, she went to museums and those were planned out in advance.

Using the services museums offer blind and low vision (outreach) and all visitors: Professional participant. According to the professional participant, the DMA has a set of

structured programs for blind and low vision visitors, or people can also request special tours in advance. However, most people with vision impairment just come to the museum without having planned anything in advance.

The professional participant mentioned that the DMA website has teaching ideas and it has all these discussion questions that could be good for sparking a conversation. However, she thinks it would be kind of hard to do on a phone.

Second Set of Interviews: Testing the Prototype of the App to Enhance it

The DMA displays *The Icebergs* on their webpage with only the basic description of it, which I used in my app. This is often referred to, in the museum world, as a tombstone label.

The label states:

The Icebergs

Maker: Artist: Frederic Edwin Church (American, 1826 - 1900)

Date: 1861

Material and Technique: Oil on canvas

Classification: Paintings

Dimensions: Image dimensions: 64 1/2 x 112 1/2 in. (1 m 63.83 cm x 2 m 85.751 cm)

Framed dimensions: 85 x 133 x 5 in. (2 m 15.9 cm x 3 m 37.821 cm x 12.7 cm)

Weight: 425 lb. (192.78 kg)

Department: American Art

Location: American Art - 19th Century, Level 4

Credit Line: Dallas Museum of Art, gift of Norma and Lamar Hunt

Copyright: Image courtesy Dallas Museum of Art

Accession number: 1979.28 ("the icebergs", n.d.)

I placed this description right after the point when users see or explore the image of the work of art on the app. The users read/hear this description as the basic description that the DMA

uses on their webpage. My blind and low vision participants reflected on that description after they heard it.

Participant Reflections on the Work of Art after Hearing the DMA's Didactic Label for *The Icebergs*

Low Vision Participant

Low vision participant didn't like the DMA's description to be in the first position of my app.

My low vision participant thinks that the DMA's description doesn't tell her what the painting is. It just talks about the oil and acrylic paint used, and she wants something that says it is a picture of an iceberg with mountains in the background and a shipwreck in front and all the details of the work of art.

She thought it was too much technical information. She didn't think it was helpful for understanding the work of art that she is trying to discover.

She wanted a visual description of the work of art on the label instead, so that she would know what the picture looked like.

Blind Participant

Blind participant thinks that the basic description of the DMA (wall label) didn't tell her anything about what was in the picture (*The Icebergs*). It told her technical information about the picture, such as how much it weighs, who made it, and where it came from, but it did not give her any emotional information about the painting.

Blind participant wanted to hear subjective opinions about *The Icebergs* rather than just technical information. She wants to hear a visual description about the work of art first that would tell her what the work of art looks like.

Participant reflections on the work of art after hearing the DMA's didactic label for *The Icebergs*: Professional participant. In my professional participant's opinion, the DMA wall description does not venture into interpretation.

Reflections/Opinions/Thoughts on the Work of Art after Hearing App Commentary on *The Icebergs*

Four sighted users shared their thoughts about the work of art as comments that they typed into my app. I asked two of my colleagues to look at *The Icebergs* in my app and share any thoughts, opinions, stories, experiences, and/or interpretations of the work of art that they think could help other users interact with the work of art when they read/hear their shared comment. The resulting comments from my colleagues can be read/heard on the app and are what my participants heard when they interacted with the app. Here I provide all of the comments on my app as they appear.

Colleague 1. I love the blending you can get with oil over acrylic. This painting really highlights that. It is beautiful and creates a sense of calm for me.

Colleague 2. The artist's ability to create a realistic, natural environment is amazing. I'm not a painter but I imagine that the technical skill required to make the water, sky, and ice that realistic is amazing. The colors feel foreboding to me—this is not a place I want to be.

Colleague 3. Looking at the painting makes me feel cold because the colors of blue and white are very vivid, and the icebergs in the middle of the painting appear frigid. Also, the clouds are blocking out the sun, and that makes it seem colder. It appears that the mast of a ship is on the snow covered ground as if it has crashed and sunk there, which makes the picture seem both lonely and majestic since it's amazing that mother nature can overcome man's inventions.

Colleague 4. The picture is beautiful since I love snow and cold weather. There are ice mountains on both sides of the painting, and they frame the icebergs in the middle. In the forefront of the painting, the water is greenish and becomes dark. Also, a piece of a shipwreck is laying on the glacier in front of the icebergs.

Blind Participant

In order to hear the comments, voice-over was activated when my blind participant tried the app.

She thinks art is very subjective, like writing. One person can look at *The Icebergs* and feel very lonely, and another person can look at it and feel very calm and peaceful. Thus, she thinks she would like to hear a visual description that describes the art itself.

After hearing all of the comments in my app, my blind participant imagined how she might think of the work of art; she said, “[the work of art] represents a really cold wintery landscape where something pretty intense happened with a ship. There was definitely a crash and it is supposed to represent this very solemn, majestic serious thing. The sky and the water sort of are the background, they kind of all set the picture.”

Low Vision Participant

Voice-over was activated for my low vision participant to hear the comments that other users shared about the work of art in my app. The last comment states: “The picture is beautiful since I love snow and cold weather. There are ice mountains on both sides of the painting, and they frame the icebergs in the middle. In the forefront of the painting, the water is greenish and becomes dark. Also, a piece of a shipwreck is laying on the glacier in front of the icebergs.”

My low vision participant thought this comment was very descriptive, because there were bits and pieces of what some people said in other comments, but she didn't know there was an iceberg or mountains until she heard this last description.

It helped my low vision participant make meaning of what *The Icebergs* looks like and it helped her embrace her own opinion about the work of art. At first, when she heard this comment, she thought it was Alexa speaking to her, because of her experience using Alexa.

The comment above helped her see what the work of art looks like in her mind's eye because the comment was descriptive enough to allow/help her to envision it.

Professional Participant

As my professional participant stated before, the DMA's wall description does not venture into interpretation. She acknowledged that on my app, visitors can leave their own interpretations or responses to others' thoughts. She thinks the DMA wall label/ description is very basic information and she doesn't think it is enough to really get a sense of what a painting looks like.

Participants' Opinions during their First Time Trying My App as a Prototype

Low Vision Participant

Low vision participant has a little feeling in her fingers. She has never used Braille or an iPad. She had a negative experience using a cellphone, which was supposed to be easy for seniors to use because it had big buttons. Unfortunately, even that phone proved too much for her since she would accidentally press the Menu button and then get lost in the Menu, unable

to see what was written on the screen. Because of these negative experiences with technology, she was a little bit stressed about using the app.

In her first time trying the app, low vision participant did not sign in or scan the QR code/ barcode, because she does not know how to do it and she does not have an email address anymore since she cannot see to use email. She was confused about trying the prototype of my app. She was scared to play with the app at first, or even touch the screen. Trying the app drives her crazy; it frustrates her. She thinks it needs tweaking.

To move between the comments in my app, a user needs to swipe up or down to be able to read/hear the comments. The swiping goes only in one direction, from left to right, which was another issue that prevented my low vision participant from being able to use all app features.

Also, there was a “done button” in the app in a weird place, and it was confusing my participant. Her first experience made her nervous and uncomfortable. Her body language showed this because she shacked her hands up (mimic screaming) then hugged herself, and she has a scared look on her face.

My low vision participant couldn't figure out the swiping gesture required to work the app on the iPad. She would touch the screen with the back of her finger, which is why the screen wasn't responding to her swipe. After trying it several times, she finally controlled it and figured out which part of her finger she should use to swipe, but, still, she finds it difficult to swipe. She couldn't see the picture of *The Icebergs* in the app. It was too small and there was no way for her to make it bigger.

Low vision participant likes that the app is on the iPad because its screen is bigger than the cellphone, which makes it easier for her to see.

Low vision participant liked the whole idea of the app, and she found it to be a very positive experience. She thinks it would help anyone who wasn't able to see a picture to at least visualize it in their mind. On the other hand, my participant thinks that creating this app for blind and low vision participants to use independently is good, but it would not help them find their way around inside the museum, which is very important to her because of her past experiences and fears.

Blind Participant

When blind participant tried the prototype of my app, it did not have a visual description. It had only the users' comments, which described/discussed the work of art. My blind participant was confused when she heard the comments from my colleagues on the app because they were very descriptive. She thought she would have heard comments saying, "Wow! Great art!"

Blind/low vision participant could neither sign in nor scan the QR Code/barcode because for her it is very tricky. However, she has an email and iPhone and she is savvy in using her iPhone for social media, text messages, navigating the internet, and answering and making phone calls.

Using the prototype of my app confused her because the iPad works differently than her iPhone. In the past, she tried the iPad for one of her school courses but she could not use the Braille keyboard. The Braille keyboard is more convenient and familiar for her when she uses her iPhone because its size is much smaller.

After playing with my app for almost 15 minutes, my blind participant had a sense of how it works. Blind participant said that what she loves about my app is that it brings the blind community and the sighted community together, which in her opinion, is really needed. She finds the app easy to use.

Blind participant thought that the descriptions my colleagues shared are beautiful and that they really bring the work of art to life.

Blind participant loves the person-to-person element, that people describe this work of art because that makes it like reading a book for her, which has been the piece that has been missing for her during museum visits. She thinks this app is very accessible (easy to press buttons) and clean with the voiceover, so everything feels perfect.

Blind participant never felt that she was struggling to figure out what was going on with the app, and she thinks the app definitely would serve her needs.

Blind participant thinks she can get even more information from the app than she has ever really received about a piece of art.

Blind participant thinks this is really compelling, because it bridges that gap; sighted people are thinking how they could best describe this to a blind person in a way that makes it come to life for them, which makes us all better describers and participants in the art community.

For my blind participant, this app is like asking somebody next to her, “Hey what does this look like?”

Blind participant thinks that nothing is off limits if the app keeps having people describe these images. She thinks the app captures this really well.

Blind participant believes that this is the first time that she has ever gotten the gist of a piece of art without having to ask somebody about it, which she thinks is powerful and empowering.

She even offered to buy the app from me but I told her I can't sell it because I am still conducting a study.

Changes Participants Asked to Have in My App to Make It Useful and Easy to Use

After trying the prototype of my app, my participants asked me to change some of the features in the app to make it more useful and easy to use.

Low Vision Participant

Low vision participant suggested to have a touchable screen rather than a swipe feature. She wants to hit the feature that she wants to hear and/or work with instead of swiping the screen, which she finds difficult because she has little sense of touch on her fingers.

Low vision participant also suggested that I make the picture of *The Icebergs* that I use in my app big enough for her to see it.

My app shows the image first, then shares a basic description of the DMA, then all of the users' comments. Low vision participant wants to, first, hear a visual description by "an expert" of what the painting looks like, and then, she would like to hear comments from visitors. Because art is subjective, in her opinion, everybody pretty much talked about how the art made them feel. One person said it's a place you wouldn't want to be and another said it was a beautiful place and calm. Thus, she wants a description that covers all the painting content. She also wanted more description of the colors.

Low vision participant wants the app to speak to her, just like the Amazon Alexa that she uses, and tell her what the painting is because she can't really see the picture.

Blind Participant

Although I am using only one work of art for my study, blind participant was eager to improve the app and wanted to have it ready with all of her suggestions as soon as possible. So she provided a lot of suggestions that could help blind users benefit the use of my app. Many of her suggestions would have required more time and/or money, which I do not have right now. As a student, I am focusing on testing the idea of my app using one work of art.

Right now, my app is only available on an iPad. Blind participant wanted to have the app available on the iPhone, because it is a smaller device. She can use one hand to type and the other hand to hold it and put it near her ear to hear the voiceover. Also, the Braille keyboard is easier for her to use on the iPhone.

As I said before, my app shows a picture of the work of art first, then the basic description of the DMA, and last, the comments that users of my app shared. Like the low vision participant, the blind participant wanted to have a visual description to tell her what the art looks like first. She wanted to start immediately with hearing a visual description about the work of art, and then hearing about the historical and social context, as well as other visitors' interpretations.

Blind participant suggests including a tutorial or a user guide within the app, which would present general, orienting information about the app before a user would start.

Blind participant thinks having the art numbered so that she could type the number of the work of art instead of a QR Code/barcode would be helpful because scanning the QR

Code/barcode can be a little bit tricky if the camera doesn't capture it perfectly. She couldn't get a sense for how to scan the QR Code/barcode.

Blind participant also suggested including categories because it lets the user be a little more selective. For example, paintings and sculptures would be in separate categories, or 3D and 2D art, or the 19th century, the 20th century, etc.

Blind participant suggested that my app could be useful for blind kids in art classes because, currently, they use a headset that describes the work of art for them. This means that they cannot interact with rest of the kids in the class to discuss the art.

Professional Participant

Although my professional participant tried my app after I enhanced it based on blind and low vision participants' suggestions and thoughts, I had not yet done the third interview set with my blind and low vision participants. Thus, I asked her to share with me any changes that would make the use of my app easier.

My professional participant suggested having a neutral visual description that wouldn't be an interpretation for visitors who can't see the image. She recommended using established guidelines that are available on the art education for the blind site ("Online Accessibility Training," 1996).

My professional participant suggested I remove the DMA wall label description from my app and have only a neutral visual description in my app.

My professional participant suggested I add discussion questions because it could be good for sparking a comment. Professional participant suggested I create my own questions

and make them be open-ended discussion questions so that the users could answer them and interact with them by adding their own perspective.

My professional participant suggested that for visitors who are partially sighted or low vision, to zoom in on the image to make parts of it bigger, which would be really useful.

Enhancements Made to the App Based on My Participants' Interviews

To build the app, I asked some programmers who offered to help build the prototype of the app for free. They also offered to help improve the app as much as they could. They refined the app following most of the suggestions that my participants asked to have. However, there are still several things that would, ideally, be improved but this would require more time and money than I have. Some of the changes were not the best solution to refine the app such as, changing the QR code/barcode to numbering as the blind participant suggested. The app programmers agree that the barcode is not helpful for the blind participant, but they need to have more time to discuss and try other solutions and test what would really help. I also could not have any categories for works of art, because I am only testing on work of art. I could not add the zoom in and zoom out for the picture; the programmer would need more time and money to create codes for that. However, the programmers were able to make it possible to enlarge the picture by tapping twice on it. Thus, I think the changes they made were helpful and allowed my participants to easily use my app when they tried it on the DMA trip.

Changes that have been made to the app include refining the swipe feature to make it easier to swipe both left and right rather than swiping in just one direction. The programmers made the screen touchable so that my low vision participant could choose the comment that she wants to hear rather than having to swipe through each comment until she finds the one

that she wants. I also added a visual description that is neutral so my participants can hear this visual description first and gain an idea of what the work of art looks like before hearing other comments and sharing their own thoughts. When my participant taps on this visual description feature one time, she can hear a neutral visual description of the work of art, which states:

The Icebergs is an oil painting on a 5.4 foot by 9.4-foot canvas. In the center of the painting is a medium-sized white iceberg with a gray sky behind it and dark ocean surrounding it. On both sides of the canvas, icy mountains and glaciers take up the space on right, left, and front center. The colors throughout these glaciers are deep green, bluish, pinkish, and white. At the very front of the painting, a ship's mast can be seen lying on the icy ground. It's daytime, but the sky is overcast with clouds. Other icebergs can be seen at a distance further out to sea to the left of the central iceberg that is featured, and a little ice tunnel can be seen on the right side of the painting in the foreground with water running through it and some brown rocks on top of it and next to it.

Now, when a participant taps the screen twice, they can have the size of the picture increased. The "done" button used to be in an odd position, and now it has been moved to the top of the screen. Also, the "add comment" button has been added so that users who add their comments can make sure that they have saved their comments after they share them. Before enhancing this feature, users would not necessarily understand that they would have to tap on a blank space that they had shared their comments in; there was no "add comment" button, so they were inclined to tap "done," which caused them to lose their comments/not have their comments saved.

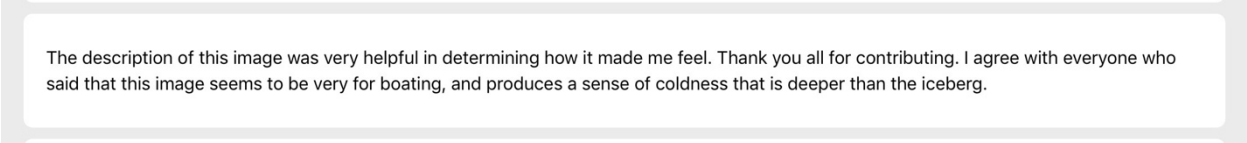
Third Set of Interviews: Using the App at the DMA to Gain Feedback about the App after I Improved It Based on Participants' Suggestions

The third stage began after the app was built. I planned to observe my blind and low vision participants using my app at the DMA, which is how I intended my app to be used. I wanted the participants to interact with the app in front of the actual art work (*The Icebergs*) at

the museum. I wanted to explore whether my participants could feel the aura of the work of art when they were in front of it. I wondered if being at the museum would make any difference for my participants.

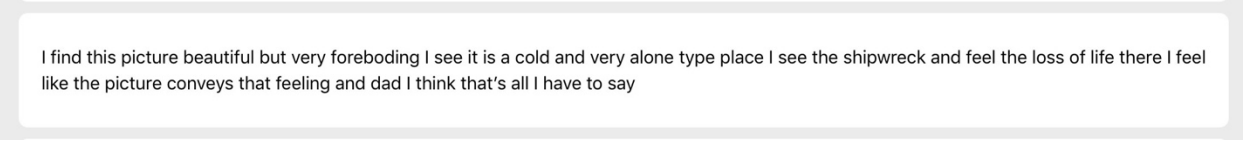
Since my blind participant cannot drive, we decided to go to the museum together. I asked a driver to drive us to the DMA and bring us back to Denton, where we both live. Together, we went to the DMA while my low vision participant was driven to the museum by her daughter. My low vision participant arrived with her daughter pushing her on a wheelchair. By the time they arrived, I had already interviewed my blind participant. My low vision participant was sitting on her wheelchair and I was next to her. I gave her my iPad and I asked my participant's daughter and my other participant to leave so that I can have a quiet area to do the observation and record the interview. I started observing my participant using my app on my iPad.

I asked my blind and low vision participants to share their thoughts after they had tried the app (Figures 14, 15, &16). Both the blind and the low vision participant shared their thoughts by speaking into the voice-over feature.



The description of this image was very helpful in determining how it made me feel. Thank you all for contributing. I agree with everyone who said that this image seems to be very for boating, and produces a sense of coldness that is deeper than the iceberg.

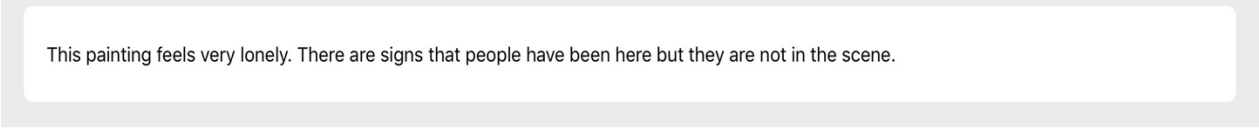
Figure 14: Blind participant shared comment. This figure illustrates the comment that wore shared by my blind participant.



I find this picture beautiful but very foreboding I see it is a cold and very alone type place I see the shipwreck and feel the loss of life there I feel like the picture conveys that feeling and dad I think that's all I have to say

Figure 15: Low vision participant shared comment. This figure illustrates the comment that wore shared by my low-vision participant.

I interviewed my professional participant on a separate day. My professional participant shared her thoughts on my app by typing then after she had tried each feature.



This painting feels very lonely. There are signs that people have been here but they are not in the scene.

Figure 16: Professional participant shared comment. This figure illustrates the comment that were shared by my professional participant.

Accessibility/Barriers Participants Faced During our Visit to the DMA

Low Vision Participant

The low vision participant claims to have more of a feeling for the painting when she is in front of the actual work of art at the DMA. However, the lights of the gallery make it hard for her to see the painting.

If she was allowed to get up close enough to see the work of art, that would help her understand and see the work better. But, she is not allowed to get closer to *The Icebergs* because there is a barrier that is protecting the art and prevents close-looking.

Low vision participant can feel the “aura” of a work of art sometimes, and she claims that the aura speaks to her. Seeing a work of art’s aura makes her feel happy. Looking at the work of art at the DMA, the low vision participant thinks the art is huge and the frame is huge too.

Blind Participant

During our visit to the DMA, blind participant held my hand and used her cane. My blind participant and I walked together. We used the elevator, which did not have any “speech” ability, so I had to push the button to the correct floor.

Because she could not see, I verbally explained all my physical actions to her; otherwise, she would ask me, “What’s going on?”

We spent some time finding *The Icebergs*. Staff at the museum did not approach us even though we asked for help.

There was a general unwelcoming attitude from the staff/security guard. There were five guards gathered in the area of *The Icebergs* when my blind participant and I sat on the bench at that area. Only my blind participant and I sat on the bench in front of *The Icebergs*. The guards who were there were standing in the corners in pairs and there was one guard who was guarding *The Icebergs*, standing right in the entrance of the gallery. The guards seemed uncomfortable standing there, observing us and then talking amongst themselves. It seemed excessive that there were five guards in one small area of the gallery when only myself and my participant were in the room.

Ability for Participants to Use the App after Refining It (Based on Participants’ Suggestions and their Opinions on the Improvements)

Professional Participant

Professional participant created a username and scanned the QR Code very easily. She was very interested and engaged when using the app.

Professional participant believes that museums in general are missing the voices of their visitors and that this is the case specifically at the DMA. She feels my app fills in a gap because visitors’ voices are missing in the galleries.

Professional participant was excited to use the app and found it compelling.

Professional participant really likes how she can read/hear others peoples' reactions to the works of art and she finds it interesting.

Professional participant likes how the comments are interconnected in my app and that one person can respond to another person. She stated, "It's kind of a discussion that's going on within this app."

Professional participant thinks the app is really cool and that it would be very helpful.

Professional participant thinks, as a sighted user, reading the comments helped her notice things that she wouldn't have noticed otherwise; it helped to add to her understanding of the painting, or to her appreciation of the painting.

Professional participant's opinion is that the key component that is missing in my app is the visual description. Without it, the app might be a little bit challenging for someone who is blind and/or low vision.

Professional participant took only two minutes to add her comment.

Neutral Visual Description

Before interviewing my blind and low vision participants for the third interview, I added a neutral visual description to my app because my participants asked to have it. The language that I used to describe the work of art could influence my blind and low vision participants toward my way of interpreting the art even if the description were neutral. I was concerned that I would take their freedom away if I told them what is in the art. I wanted them to hear the comments discussing the art and then they could freely add to the discussion. However, after discussing this with my professional participant, she helped me realize that neutral visual

description is helpful. Therefore, I added it to the app and the blind and low vision participants benefited from that change.

Low Vision Participant

Low vision participant found this version of the app easier to use. She thought maybe she learned how to swipe but she still needed help. She needed my help to tell her when to touch and when to swipe right or left. She did not know that she could tap on the picture twice to have the app describe the painting even though I described the changes to her that would make this happen. Because of her comments, I also had made changes so that she could make the picture bigger by tapping on it.

Low vision participant touched the screen, and the voice-over responded and read her one of the comments. However, she did not know how to scroll down, which would have lead to the next comment. She asked whether she should scroll down by touching or by swiping. As she said, her problem was that she couldn't see it all, she couldn't see any of what was on the screen.

Low vision participant found that the black printing on white on the screen is good for her because the background is fairly flat white and not too shiny.

Low vision participant could fully look at the picture of the work of art in my app because she could make it bigger. Because of this, she was able to see the icebergs and the darkness in the bottom of the work of art. She did not find it very foreboding.

Low vision participant tapped to enlarge the picture, even though she used the app in front of the actual work of art. Before, she saw only darkness in the corners of the paintings,

but after revision, low vision participant could see that there are rocks and a shipwreck because she heard about these details in the description.

Low vision participant found the other descriptions very helpful to her. If she had not heard them, she would not have been able to see/tell what is in the work of art.

Low vision participant expressed that this app is going to be a beautiful thing for people like herself who cannot really appreciate art unless they get help or asks someone to describe it.

Blind Participant

Blind participant used the app very easily and she seems to know what to do.

After my blind participant heard all the comments on my app, she swiped to the bottom to “add comment.” She immediately tapped on the microphone and started adding her comment by speaking into the microphone.

Blind participant noticed a typo on her comment and she could correct the typo. She deleted it and re-added it without asking for my help. She was very confident and independent when she used the app.

Blind participant still thought if she could type a number to get onto the page of the work of art instead of scanning a QR code/barcode, it would be helpful for her. She also asked to have the works of art put into categories where she could type the name of the category to find the work of art such as, 2D and 3D art, oil painting, acrylic painting, or 19th century, 20th century, etc. However, this study tested only one work of art. Last, she wanted to try the app on the iPhone rather than the iPad because, for her, the phone’s size and features would have been more helpful. Besides that, she thought everything else is really usable and accessible, and

she liked all of the changes. She thought it was a lot clearer and the voice-over was clean. She said it worked really well, and she thought that it was easier to use.

She was excited to see it continue to expand.

Blind participant liked the app so much that she asked to experience another work of art at the DMA after she was finished experiencing *The Icebergs*.

Once my blind participant finished trying the app in the DMA, she asked if there was another image she could experience.

Blind participant shared one suggestion after trying the app at the DMA. She suggested that I add an online component, which would increase opportunity for user engagement.

However, she thought that coming to the museum and experiencing my app at the museum was really beneficial.

Blind participant liked using the app in the museum rather than at home. She thought coming to the museum and listening to the comments/descriptions in my app was a wonderful experience that she does not think someone could get at home.

Participants' Reflections on *The Icebergs* at the DMA after Hearing the Visual Description and the Comments/Thoughts of Users of the App

Professional Participant

Professional participant shared her thoughts on my app. She stated, "This painting feels very lonely. There are signs that people have been here but they are not in the scene."

Blind Participant

When blind participant was younger, she wished that she could feel a Picasso painting. She also wanted a painting to be made in three dimensions because it would make a lot more

sense to her. It would be helpful for her if didactic labels were written in Braille and if they detailed what the work of art is about. She felt that even if she were able to touch objects in museums, she would still need a Braille didactic label to read because if she touches an object without any sort of background information, she is not able to understand what she is touching. However, she thought using my app was way better than she thought. Having a description of the image really brought it to life for her in a new way. Language is important to her. For her, talking about abstract paintings that she was not able to touch was an effective way of understanding what was really around her. Having an explanation for what was around her, she could picture it in her head to some degree. Thus, she was able to call on some sort of inspiration from what was being described. She also described how words have always been pictures for her. Novels were her gateway to the world of art because it means more to her to read a novel than decipher a picture because of what an author is able to do with words, images, sentences and things of this nature.

Blind participant shared her thoughts in my app by speaking into the microphone of the iPad. In her comment, she stated, "The description of this image is very helpful in determining how it made me feel. Thank you all for contributing. I agree with everyone who said that this image seems to be very foreboding and produces a sense of coldness that is deeper than the iceberg."

Low Vision Participant

While my low vision participant was using my app, she shared with me her thoughts about the other comments in the app. One comment stated, "This is not a place I want to be,"

and my low vision participant commented, “My feelings exactly.” Another of her comments stated:

The picture is beautiful since I love snow and cold weather. There are icy mountains on both sides of the painting, and they frame the iceberg in the middle. In the forefront of the painting, the water is greenish and becomes dark. Also, a piece of a shipwreck is laying on the glacier in front of the icebergs.

My low vision participant commented, “That’s the best description, really.”

Low vision participant can see the aura of the work of art from the descriptions and the visitors’ comments in the app. She could see the iceberg in the middle of the painting. She stated, “It feels very cold and not really lonely but alone. It makes me feel cold and alone. I am sure it’s beautiful, but I mean it’s kind of a desolate place, and there is a shipwreck there, so lives have been lost.”

In order to share her thoughts on my app, my low vision participant needed a moment to think. She wanted to offer something “intelligent.” She used the microphone in the iPad and spoke into it. Her comment in the app stated, “I find this picture beautiful but very foreboding. I see it as a cold and very alone type place. I see the shipwreck and feel the loss of life there. I feel like the picture conveys that feeling and I think that’s all what I have to say.”

When at the museum, my low vision participant shared this thought:

Art is more than just viewing; it’s feeling. You feel and I don’t particularly like how this [*The Icebergs*] makes me feel. It makes me remember when we used to drive back and forth across the United States. My husband was in the Navy and we would be going from one station to another and going through the mountains; this was before the Interstate. You know, you just had highways and going to the mountains and through the valleys. To me is just like soooo alone. And, of course, I also had like a three-week old baby in the car with me and I was, *Aaahhh* (mimics screaming). I didn’t like it. It was winter and it was icy and I was terrified we would have, you know, ... been on the side of the road and my baby would freeze. I see this [the painting] as cold and alone. Just the fact that there is an iceberg there and a shipwreck, it’s not a place that I want to be ... scary.

Reflection on the Information about *The Icebergs* on the DMA Mobile App (video and audio)

The DMA also offers an audio and a video description of *The Icebergs* (and other works of art in their collection) on a mobile app. I was worried that the existence of the DMA's mobile app would make my idea for an app obsolete. I was afraid that my app would not contribute new information, so I studied the DMA's app and asked participants to review it as well as my own.

The DMA's app has two descriptions of *The Icebergs* in audio and video format, which feature experts in the art field. The audio description is 34 seconds long and there is no written version of the audio. Thus, I typed what I heard. The audio title is "Frederic Edwin Church (American, 18-1900), 1861, oil on canvas." An excerpt of the audio states:

Frederic Edwin Church studied with Thomas Cole, the founder of the Hudson River School, which was a group of New York painters who created dramatic images of the American landscape. Unlike his teachers' paintings, Church's landscapes were not explicitly allegorical or religious. Rather, Church's work reflects his interest in science and exploration. While his early works depict scenes from New England and New York, he later travelled widely, visiting South America, the Arctic, Jamaica, and the Holy Land. Church often dramatically displayed his heroic landscapes of exotic locales and drew large crowds of paying visitors (DMA mobile application, 2016);(the icebergs audio, 2016)

The video commentary description in the DMA's mobile app is 3:27 minutes long, it is titled, "Curator Sue Canterbury discusses this painting," Like the audio commentary, there was no written description, so I transcribed what I heard. The video commentary shows Associate Curator of American Art, Sue Canterbury, standing in front of *The Icebergs*, talking about Frederic Edwin Church. An excerpt of the video states:

If one were to talk about Frederic Church, the creator of this painting, *The Icebergs*, one would term him not only as an artist, but also as an explorer and definitely a showman, who had his finger on the pulse of public taste. He cannily realized that the public really wanted exotic views of foreign lands and so that's something that he exploited for

several years. In 1859, he decided to travel to the northern hemisphere and went up to Labrador to explore the region of the icebergs, and he set a new precedent for the first artist to actually commission an expedition; and so, that summer of 1859, he commissioned a schooner with boats, and all through the summer, he would go out in small boats, sketching, taking small sketches of all the various icebergs, so it was really quite dangerous as it was summer, and this is the time when icebergs tend to calve smaller icebergs, and anyone too close to it could really be in peril, so a lot of the sailors thought he was quite nuts for doing this, but the results were/are in the proof of this painting. Once he got back to New York, he put all of these sketches together to create *The Icebergs*, something that he referred to as one of his great pictures. And it was in 1861 when he finished it, that he exhibited it in New York, and people lined up around the block, paying 25 cents to see this painting. And at that time, because he was a Union sympathizer, and now the Civil War was just starting off, he called it *The North* to give people a sense of his affiliations, and it was met with great acclaim. However, in the near future, he decided to ship it to England to show it there, and knowing that the English were more sympathetic to the South, he changed the name to *The Icebergs*, so again showing that he had his finger on the pulse of public taste, this time British taste. The painting was so successful that it was purchased out of that exhibition by a Manchester businessman and it was placed in his home. However, over time the house was turned over to the city and it became a boys' detention home and there the painting languished at the top of a back stairwell, taking the abuses of some schoolboys, but there it remained unrecognized for many years. And back in the United States, art historians and dealers were wondering where in the world that picture had disappeared to. But it was around 1978 that the caretakers of the boys' school decided that they wanted to raise some extra money to build a little sort of getaway for the boys in the country, and they thought about that great, big picture up on the back stairwell, and thus, they made some calls and what happened was the unleashing of a whole sort of bevy of museums and dealers and auction houses who were in the chase to get ahold of this picture. Finally, it was decided to send it to auction in New York in 1979, where the price of the painting at the hammer was a record not only for works by Church but also for any American paintings sold to that point in time (DMA mobile application, 2016) ;(the icebergs video, 2016).

Low Vision Participant

After my participants heard both video and audio commentary in the DMA's app, I asked them if they liked this kind of information and whether it might help them get a sense of the art and share their opinions about it. As stated earlier, I was concerned there would be overlap between the DMA's app and my own, which is why I was curious for my participants to

comment. My participants shared their thoughts about it and compared it with the description and the comments in my app.

My low vision participant listened to the descriptions that the DMA offered on its app. The DMA's app provides historical context but doesn't give a physical description of what can be seen when looking at *The Icebergs*. My low vision participant felt she got more information from the viewers' descriptions in my app than she did from the DMA's description of the painting in their mobile app because the DMA's app just gave information about the artist. This didn't help my low vision participant develop a sense of the painting, though it did help her learn about the artist.

When she heard the video app and she thought that the video description of *The Icebergs* on the DMA's mobile app was extremely interesting and gave a lot of background information that she really enjoyed. However, the video still did not describe what the painting looks like to a sighted person and it is not descriptive of the painting. My low vision participant thought that the background information helped her understand the historical context of the work of art, but she felt that anyone who can't see needs a stronger description. She liked hearing about the artist going to the site of *The Icebergs* and taking boats out to sketch it. This made her understand why the artist put a shipwreck in the painting because it shows danger, but she wouldn't have known there was a shipwreck in the painting without the description in my app.

Blind Participant

Blind participant likes that she got more biographical information about the artist from the commentary in the DMA's app. However, she did not get any sense of what the art looked

like. With my app, she got a sense of the art without background information about the artist, so she thinks they work really well together.

My blind participant listened to the video description of *The Icebergs* in the DMA's app and she thought it was fascinating because this description gave her a sense of the history behind this art and how this art came to be. She was particularly interested in background information because she is a writer. Blind participant thought it was interesting to hear about a painting's origin because sometimes visitors forget that all art starts with a person and an idea. This video gave my blind participant a sense for that, and just hearing the history of where this art ended up over time and how it became used for so many different things was interesting to her. On the other hand, blind participant still thought that the other comments in my app gave a better sense of what the art looks like. The DMA's video and the audio in their mobile app gave her a sense of the artist and how he came up with this image. However, it did not tell her very much about what this image looks like. She thought the comments in my app were what helped her visualize *The Icebergs*.

Blind participant suggested, after hearing the video description of *The Icebergs* in the DMA's mobile app, that I should add this historical element of the art in my app so that people could find this in its entirety in one place.

Conclusion of the Results

In summary, in conducting this research and collecting my data, I learned a lot about and from my blind and low vision participants and my professional participant, all of whom are very thoughtful and incredible people.

My participants did not know about the services that museums might offer. Thus, museums should either do much more to publicize these offerings or offer these activities and services all the time, not just during a specific tour or a program.

Blind and low vision visitors want to hear a neutral visual description that tells them what is in the art. I learned that they want to hear the content of the work of art and not just the interpretations and/or opinions of others about the work of art. Without a neutral description of the work of art in my app, blind and low vision visitors would be forced to construct an image based on other people's interpretations. This is not ideal, so a neutral visual description is necessary and important for them to be able to fully develop their own thoughts about a work of art.

I asked my blind participant if she was able to get a feeling for the character of the art since she had heard all the comments about it. I was looking at the picture of the work of art that is in my app as she described it to me. She said, "it represents a really cold wintery landscape where something pretty intense happened with a ship. There was definitely a crash and it is supposed to represent this very solemn, majestic serious thing. The sky and the water are sort of a background; they kind of all set the picture." I was amazed at how she could feel the character of the work of art and imagine that meaning as if she could actually see it. I was surprised that she actually described not only *The Icebergs*, but also the sense of the work of art that I thought only sighted people could feel. The blind participant gave very specific descriptions and chose precise words to describe the meaning of the work and what she thought *The Icebergs* looked like. Compared to the comments she had heard, which described what other viewers had seen and how they felt, she actually described not only *The*

Icebergs and her feelings, but also a sense of the character of the work of art.

I learned from my low vision participant that although my app was helpful in many ways, it did not account for the physical barriers that remain in the museum space. For my low vision participant, the museum is still fraught with structural obstacles and is difficult to navigate. My professional participant provided me with a great idea, which was to include discussion questions in the app that could spark the discussion about the work of art. Adding discussion questions would be a great way to prompt people to think and encourage them to share their thoughts. It would also lead to more opportunities for critical thinking. hooks and Freire pointed out that critical thinking assists visitors (blind, low-vision, or sighted) in avoiding oppression. If discussion questions are added to the application that ask participants to compare and contrast what others have understood from the painting with what they have understood, it could open the mind to an analysis of how and why people view the artwork differently, leading to an understanding of differences among visitors and their experiences. They could further be asked to analyze the causes and effects of these differences, which could help open minds to the ideas of differently-abled people and what access they are offered in society and in museums. Thinking critically also entails thinking about oppression and discrimination in society. Discussion questions that bring about these kinds of observations would be useful in the application to further the discussion of how these practices affect members of society. Both sighted and blind or low-vision visitors will be able to draw distinctions between their own groups by interacting with and discussing the work of art.

Discussion questions would make adding comments more accessible and not rely on people with art historical knowledge to lead the discussion. Contributors might feel like they

belong to a community, and offering their own comments might help them realize how valuable they are as well as help them critically synthesize ideas from the larger community.

My blind participant used sighted expressions when she was talking about the app, even though she cannot see. Once my blind participant finished trying my app in the DMA, she asked if there was another image she could “look at.” She would also use the phrase “see it” instead of “experience it.” This tells me that my app was effective in terms of getting her to think about works of art. Both my blind and low vision participants could not make sense of the work of art content until they heard the description and the comments about the work of art that are in my app. They “saw” the art through my app description. My low vision participant expressed that she saw it in her “mind’s eye.” Without my app description and comments, they said they would not have been able to make sense of *The Icebergs*.

When my low vision participant and I were sitting in front of the work of art at the DMA, she was so attached to my app that she relied on it and referred to the picture in the app rather than to actual work of art that was in front of us. I think this was because it was easier for her to see the image on the screen (because she could enlarge it), rather than the actual painting (which she cannot get close enough to see properly). This taught me that it is very important to include the enlarging feature in the app for those with low vision and for those who just want a better look at a detail.

The data in this chapter shows that my app helped my participants to get a sense of and experience the work of art in a museum, share their own thoughts, memories, and feelings, and be a part of a learning community, all of which were goals of this study.

CHAPTER 5

DISCUSSION

This study was created to find valuable solutions for blind and low vision museum visitors. In this study, through the grounded theory method, I created an app as an educational tool that would serve the needs of blind and low vision individuals during their visit to the museum. The primary research question was: How can blind and low vision visitors have a self-directed experience in an art museum with the assistance or guidance of a mobile application?

This question intended to allow blind and low vision museum visitors to attend the museum at the time of their choice, to enjoy their visit, to interact with the work of art and other museum visitors (sighted and non-sighted), and to share their opinions and thoughts about the work of art by adding to the discussion about the work of art through the app.

A variety of sources were used in the development of the ideas that informed the app as well as the development of the app itself. I took clues from the discussions I had with scholars, museum staff, and participants about what to investigate. I conducted several levels of analysis, including reading the available literature, establishing steps for building my prototype app by consulting with computer scientists experienced in the genre, transcribing and coding participant interviews and observations, and relying on my own prior knowledge.

I used the following sub-questions to round out my investigation process: In what ways can blind and low vision museum visitors both independently experience a museum as well as interact with other visitors with the help of a mobile application? How might a mobile application facilitate communication between blind and low vision visitors and all museum goers? How is access to and development of mobile application important for museums and

museum visitors overall? My results demonstrated that blind and low vision museum visitors who used the app benefitted from its use. In addition, based on my findings, I produced a list of comprehensive solutions that museums can implement to assure that blind and low vision guests have a valuable visit in the museum.

Finally, my inquiry into the issue of museum access for all also brought about several insights into the process of developing my app and making it useful for blind and low vision visitors, which are listed below. After carefully considering my findings, I was able to answer my overriding research question: How can blind and low vision visitors have a self-directed experience in an art museum with the assistance or guidance of a mobile application? Further, I also suggest some implications of this study, and I examine the practical applications of my study. Additionally, I make recommendations for further research.

Summary of Findings

Step 1

The research took the form of three main steps. The first step was learning about my participants' needs. I needed to know what they were missing when visiting museums. I asked myself "What do I want to find out?" and "How can I develop the app to make it satisfy their needs?" I investigated the background of my participants, their museum experiences, and the obstacles they face when visiting museums. I also inquired into the challenges they face in interpreting or experiencing art as a blind and low vision individual.

Step Two

Step 2 involved testing the prototype of the app in order to enhance it. First, I had to

determine whether they could use the prototype of the app. The participants used the prototype app at the museum by observing and interacting with one particular piece of art. I then gathered my participants' thoughts on what in the app needed to be redesigned. I gathered information about how easy the app was to use. Based on my participants' thoughts and suggestions, I tweaked and enhanced the features that were hard for them to use in the prototype.

Step 3

Step 3 of the study involved taking a trip to the DMA with the participants to use the enhanced version of the app. I wanted my participants to use the app in front of the actual work of art in the museum, to be among other visitors, and to have a full experience of a museum visit. Allowing blind and low vision museum visitors to participate in the community would, according to my blind participant, bring the blind community and the sighted community together, which in her opinion, is really needed. During this on-site visit, I observed my participants. My study showed that there is a need and a desire for my app. My app also demonstrated that it helped blind and low vision participants and allowed them to share their thoughts without needing somebody to help them. The app facilitated a kind of discussion in which visitors and/or users of the app can build their thoughts onto each other's. The results also indicated that blind people may not have the access to museums that they want.

Further, I also gathered participants' thoughts about the descriptions of *The Icebergs* that DMA offers on its mobile app. I compared the information that my app provides about the work of art with the information that the DMA offers on its mobile app in terms of their benefit to visitors. This interaction suggested that the descriptions provided by the DMA via wall label

were less useful for blind and low vision visitors. If provided only the wall label text, the blind or low vision visitor will almost always need to ask someone to explain the work of art to them. The wall label does not describe what the work of art looks like. It does not explain anything that is included in the work of art, like the colors, the scene, or the objects. Instead, the wall label gives only basic information about the art such as the size, the date, the artist's name, the materials used, etc. It does not even include the techniques used to make the art.

Additionally, all of my participants asked to be offered a neutral visual description, which can help them get a sense of what the art looks like. They found the comments and thoughts feature in my app and the person to person element really helpful, which in turn added to their favorable opinion about the art. Further, the interactive feature allowed them to join others in and add to the discussion by sharing their own thoughts. In terms of my professional participant's valuing of the app, they indicated that they were able to notice things in the art that they did not notice before, such as evoking of emotion of the users who made the comments. Furthermore, according to my professional participant, having the voice of the visitors is an especially attractive feature of my app. Additionally, this participant acknowledged that adding further descriptive elements of the artwork, as my app does, enhances what the DMA might be missing in its own visual descriptions of the artworks.

Discussion of Drawbacks

Although I had hoped that my app would allow blind and low vision visitors to have an autonomous experience at an art museum, one major flaw about museum visits for them is that there are still many physical barriers in museums that prevent a truly autonomous experience. Throughout this project, I encountered gaps in accommodations that need to be

explored further before museums can offer an equally accessible opportunity for all visitors. First, for example, museums should make sure that the works of art or artifacts are placed so that low vision visitors can get close enough to see them. The light has to be good; not too bright and not too dark. Additionally, the space around the work of art should be wide enough so that they can move around it easily with canes or wheelchairs. Furthermore, I suggest having activities for blind and low vision visitors whenever the museum is open to make them feel welcome and to provide greater access to the works of art. Moreover, museums should also find a way for them to share their voices and thoughts about the art. It is important for museums to find ways for blind and low vision visitors to independently experience a museum and interact with other visitors. My app is an accessible educational tool that can help museums provide these benefits to blind and low vision visitors.

In addition to the features provided in the app, museums should also consider providing Braille wall text, neutral visual descriptions of the art on wall labels, hands-on activities, and touchable samples of the displayed artifact or art work. However, while these accommodations are good and useful, one of the most important accommodations for blind and low vision is providing them with free and independent use of the museum's resources; the features described here do not offer them the freedom and features they are looking for and that increase the value of their museum experience.

My mobile application facilitated sharing ideas (asynchronous dialogue) between blind and low vision visitors and all museum goers. According to my blind and low vision participants, the basic/neutral visual descriptions I provided in the app helped them understand the art without asking somebody for help. They also indicated that the app's describing of the work of

art helped them get a sense of what it looks like in terms its aura (as described in chapter 3). Further, according to my professional participant, the comments in my app created a useful discussion about the work of art in which every user referred to the previous comment and add to it. Even when blind and low vision patrons are allowed to touch the art but are not offered to hear the description of it, they are neither able to understand it as well nor share their own thoughts about it. It will not help them embrace their opinions/thoughts and their feelings about it, which is one of the most important experiences blind and low vision visitors are missing in the museum/ during a museum visit.

In conducting this study, I learned that each blind person presents a special case; they are individuals that have unique needs and abilities. Some blind people know how to use Braille and some do not, for example. Some know how to use technology and some do not. Some of them can see only light, while some are totally blind and see only darkness; others, like my low vision participant, can see better based on others' explanations.

Importantly, according to my blind participant, my app would SERVE HER NEEDS. SHE was able to get even more information from the app than she has ever really received about a piece of art. My blind participant loved that the descriptions in the comments were very vivid "really bring it to life." She also felt that the descriptions in the app comments were quite detailed, which, for her, made the experience like reading a book, which was a big piece of what had been missing for her during museum visits. Interacting with this app was the first time that my blind participant had ever gotten the gist of a piece of art without having to ask somebody about it, which she thought was powerful and empowering. Further, my low vision participant thought the app could help anyone who wasn't able to see a picture to at least

visualize it in their minds. She also found the idea of the app positive; using it helped her envision the work of art in her mind's eye.

What I Learned From Participants about How to Make an App for Blind and Low Vision Museum Visitors

Although the initial app was successful, its success was limited by time and resources as well as access to additional participants. My blind, low vision, and professional participants asked for some of the following features to be included in the app, but I could not do so due to these restrictions. Additionally, there were some other features I would have liked to have included in the app, but doing so was not possible, also because of time and resources. These were technical features that programmers would have had to build for me.

Further, I learned from my study that there are differences between blind and low vision visitors that mean they have different needs that need to be addressed by any app that is developed for them; additionally, each blind or low vision person is an individual, and may have additional or separate needs than others. In addition, my app should have options for people who do not understand how to use technology; and, even though some users were familiar with smartphones, some of them were nervous about using new technology. For example, some might not know how to or be able to swipe; some might prefer to use my app on a phone rather than an iPad because the phone is smaller and the Braille keyboard is easier to use on the iPhone.

In addition, my study showed that, for people who have low vision in particular, there should be a way for them to enlarge the picture in the app or "zoom in" so they can see it better. Further, signing into the app and pulling up the page for the work of art were tricky

steps for blind and low vision participants because obviously they can neither see nor scan the barcode. There should be a way to make it easy for them to sign their names and enter the first page without typing and/or scanning. There should also be more user-friendly ways to find the works of art that are stored in the app or to search for additional works of art. One suggestion in this regard might be to add a number to each work of art so that blind users only have to type the work of art's number into the device. One more thing that would help the users of the app would be to create a feature that blind and low vision visitors could speak into, similar to Amazon's *Alexa*. I observed my low vision participant very easily interacting with her *Alexa* device. For example, she would ask the device to read her a book, play her music, and more. This type of interface could reduce the difficulties of using technology, typing in Braille, signing in, and scanning a barcode. This feature could help the users to interact with the work of art more easily without following complicated steps or asking for help.

I employed programmers to build this app for me, using a special group of UNT students who staff Shepherd Dog Company and provide the services for free. Working with them, I conveyed the features that I wanted the app include. I tested the app first, and then went back to the programmers for refinements. With further trials and testing, this app could be improved by further research and development; ideally, it would be offered free to visitors of the museum, and additionally, it would be beneficial for museums to market and advertise the app for use in their facilities.

Implications and Practical Applications

My research changes the field by addressing the fact that museums aren't doing enough to make their facilities and art works accessible, especially for blind and low vision visitors. My

research adds to the field by asserting that blind and low vision visitors have the right to visit museums at any time the museum is accessible to any other visitor. Contrary to scholars such as Mallerai (1991), who does not see any problem with blind visitors being segregated into special programs only for the blind, I see my research addressing a gap in understanding of what blind and low vision patrons need at museums to be treated equally. My approach to blind and low vision visitors is more in line with Kirby (1991), who suggested that museums need to offer more programs for the blind throughout the year, improve programs for the blind by offering interaction with sighted visitors, and consider the museum experience from the perspective of the blind or low vision visitor. However, although Kirby's (1991) arguments support improvements in blind and low vision services, Kirby does not go far enough in terms of unlimited and unrestricted access. Before Blind and Low-vision guests at the museum had access to the application, they were missing two main aspects. First of all, they had no way of getting a neutral visual descriptions (data) to begin to create an image or story in their own minds about the artwork. The neutral, visual description in the application provides this as well as comments from other visitors about the art that help the blind and low-vision visitor get an even better understanding of the work of art (metadata). The second aspect that was missing was the ability to share their own reactions and impressions of the work of art after experiencing it. The application asks the user to share a comment, and that adds the voices of all visitors, including previously discriminated against visitors, like blind and low-vision visitors. They can come and use the application to engage with the art at any time of their choice, and they can interact and share ideas about the art without the help of a docent.

Overall, my research implies that what museums are doing now is not enough and that museums need to consider becoming accessible to blind and low vision visitors at all times. Moreover, museums should provide a way to give them a valuable visit regardless of when they come. Wapner's (2013) ideas about what he needs and prefers as a blind person support my contention that most blind and low vision visitors prefer not to have a guide and that they don't even necessarily want to be able to touch art objects; additionally, they preferred to discuss the work of art with. I was able to address some of these issues in the development of my app.

Further, museums would increase equality if all visitors could access the same educational tools and choose when they visit a museum. Visitors should feel welcome during their visits, and museums should not aim to limit their focus onto only certain works or interpretations of the works. Instead of taking a hierarchical attitude toward visitors, museums should treat them as part of the museum culture, accepting that they have valuable experiences, thoughts, and interpretations to share. As Smith, Ginley, and Goodwin (2012) argued, this collaborative and inclusive attitude is essential. They argued for the rights of disabled people to have equal opportunities and access to all kinds of activities in their social lives. They are not given equal access to many services in their communities, including education; and they are limited by services offered within their communities that don't have accommodations available (p. 59). My research, at least in some ways, fills these gaps, making previously unavailable accommodations available.

More importantly, I endeavored to probe how best to help a blind visitor engage with other visitors and add to the broader conversation, not just understand what the work of art looks like. Helping blind and low vision visitors access the already-available educational tools in

museums is a very good idea, but it does nothing to combat the assumption by museums that their limitations mean that they always need help from others. For example, the research done by Ruysinck and Raemdonck (1991) emphasized merely explaining the work of art to the blind visitors by offering alternative materials such as catalogues in Braille and audio recordings. However, this still does not lead to full access for blind and low vision museum visitors. My app tried to bridge this gap in understanding of what blind and low vision visitors need and want; to make it understood that it is important for blind people to have a voice in the museum. I helped them to have a voice by sharing comments, thoughts, and ideas through the app interface. Like Marwick (1995), I argue that it is important to encourage this kind of asynchronous dialogue among blind and sighted people in museums. Marwick's (1995) experience in the Edinburgh City Museum and Galleries with "The People's Story" encouraged similar interaction, though the smart phone technology of today was not available at the time of his study. Similarly, Kirby (1991) concluded that museums could benefit from adding more blind and low vision visitors to the museum culture, and that blind and low vision visitors should be treated not differently but rather as useful contributors whose ideas enrich the museum experiences of all patrons.

My app can help blind and low vision museum visitors engage with the sighted community. It is helping them share their thoughts and opinions about the work of art instead of passively having the docents explain the work of art to them. My app is helping not only blind and low vision visitors share their thoughts, but also, it provides a base discussion where all visitors, blind and non-blind, can build on each other's' ideas and perceptions of the work of art.

Even if a blind visitor cannot provide their own analysis or visual interpretation due to not being able to “see” the art, the blind visitor can enrich the conversation based on their own understanding by telling a story, asking questions about it, or even sharing their own interpretations of the art after they get a sense of the character of it from listening to the neutral visual description (provided in the app) along with other visitors’ comments about the art. In addition to helping blind and low vision people fully access what museums have to offer, interactions like these can help sighted visitors understand aspects of the art that they had previously overlooked. The collaboration of sighted visitors and blind and low vision visitors can bring about a more enriching museum experience for all.

Recommendations for Further Research

Each and every individual has certain needs and abilities. For example, some of the blind know how to use Braille and some don’t; some know how to use technology and some don’t; some of them can see only light, some are totally blind, and others can see through others’ explanations, like my low vision participant.

Freire (1970) pointed out that in an educational system in which the students do not have freedom, and therefore are oppressed, they can become dehumanized (p. 44). Freire (1970) also admonished that false generosity really does nothing in terms of attending to what blind and low vision visitors want in their museum visits. Although some of his observations and the conclusions he drew might seem radical today because we have more access than ever before for disabled persons due to the Americans with Disabilities Act, and we have come a long way in how we view education in modern times, we need to recognize that we still have room for growth. Additional studies that focus on how museums have implemented programs

to provide more access to blind and low vision visitors should be done. Additional interviews with the blind would be useful for ascertaining the best practices being used in museums across the world. Then those practices could be expanded.

Moreover, hooks (1994) pointed out that in order for students to have real freedom, they need to be able to share their own valuable experiences, and teachers need to make that possible. Without this ability, it is unlikely that critical thinking will take place (p. 88). The question is; how can we get blind and low vision visitors to share their experiences without inhibition? More research into methods that could be used to enable them to share their experiences would be beneficial. This research might be able to find the ways value these visitors' contributions since they have not had full access to museums in the past, and most still do not have equal access.

Given unlimited time and unlimited resources, several versions of my app could be developed to meet these individuals' needs. For example, a voice activated version that does not need touch at all would be beneficial to those who also have motor disabilities. An Alexa-like feature would enable low vision visitors to speak to the app and have it respond to commands, which would address the difficulty of scanning the barcode, among other benefits.

Other features that I wanted to add but could not because of limited resources were to have a notification feature where the app notifies users of any new comment added to the works of art that someone has marked as favorite, as well as the chance for the visitors/users to evaluate the gallery which would encourage others to visit the museum and share their perceptions too. While this app is a great beginning in closing the gap between the blind /low vision and sighted community it is clear that the app could expand even further in the future.

Conclusion

This study was created to find valuable solutions for blind and low vision museum visitors. My inquiry into the issue of museum access for all also brought about several insights into the process of developing my application and making it useful for blind and low vision visitors. The results of my investigations demonstrated that these visitors' use of the app in one museum benefitted them by increasing access to art works and other visitors. My mobile application facilitates sharing ideas and communication between blind and low vision visitors and all museum goers. To my knowledge, no one else has done this type of research, and a mobile app created for blind and low vision visitors in an art museum has not been previously developed. And, although I had hoped that my app would allow blind and low vision visitors to have an autonomous experience at an art museum, and it did make an incremental step in that direction, there remain many physical barriers in museums that prevent a truly autonomous experience.

In addition, I am currently working at an internship at the Sid Richardson Art Museum, where I am applying much of what I have learned from conducting this study to museum programming, minus the use of the technology. One example of this is during the Sid Richardson museum program "Tea and Talk," which is an hour long event held in the galleries where visitors can engage in discussions with docents and educators about works of art in the Sid Richardson's collection while enjoying some tea. I noticed that the visitors to "Tea and Talk" were passively listening to the docent explain about the work of art. Only a couple of visitors shared information that they drew from their own experiences. Thus, I suggested to my supervisor that we should give visitors blank note cards to write down their

thoughts/perceptions about the work of art in order to encourage visitors to share what they thought about the work of art. I asked my supervisor to make these blank note cards available in the galleries so that visitors who could not attend the event and hear the discussion would also have the opportunity to share their thoughts.

We piloted this at a session of “Tea and Talk”. After the visitors had written their thoughts, they did not want to give their cards back to us. This surprised me a lot. Previously, I had clearly said that I was going to collect their cards after they finished writing their thoughts about the work of art. I wanted them to know that their cards were going to be given back so that they would only write something they wanted to share. I am not sure what to attribute this to, maybe shyness?

My supervisor put a stand next to a work of art in the gallery that had a sign that read, “Read and add your own thoughts about the work of art. Be descriptive to allow people who cannot see the art interact/get sense of the art.” There were blank note cards, pencils, and other visitors’ cards. Although this spontaneous action did not get the results that we had wanted, my supervisor thought it would be useful to begin implementing this activity at each program, and the visitors would be more prepared for it. I look forward to seeing the results.

Further, I have improved the Sid Richardson Art Museum’s information booklet by adding a basic/neutral visual description to each work of art so that blind visitors can make sense of the work of art. I also added discussion questions for a visitor who has no experience in museums, which can lead to a discussion about the work of art. I categorized the art based on the type of weather the works of art show. For example, ‘cold’ for the works of art that

show snow. I basically used the idea of my application without using the actual application/technology.

In addition to that, I will train the Sid Richardson museum docents in how they would approach blind and low-vision visitors, what their needs are, and how to accommodate their needs during their museum visit to help them have valuable and unique experiences.

Both in the application and when applying these principles to situations where there isn't technology present to facilitate discussion, like at the Sid Richardson Art Museum, discussion questions can and should be added to help the visitors, both sighted and blind or low vision, have a valuable experience. As mentioned before, using critical thinking questions will help visitors not only analyze the work of art but also the society that they live in and that still presents barriers with which certain members of society are confronted, leading to oppression or discrimination. These discussions will be truly valuable in the museum setting because they will allow the visitors to think critically.

The valuable lessons that I have learned through this research process will be applicable now and in the future to any job in museum education that I go into and I hope that this research can be used by other museum professionals, educators, and visitors who want to advocate for increased accessibility for all.

APPENDIX

INTERVIEW QUESTIONS

First Round Interview Questions

Background information:

- How often do you go to an art museum?
- What is the main reason for you to visit an art museum?
- Tell me about your experience in museums.

- Was your visit how about a blind and low vision tours or just a regular visit for a seeing audience?
- Did you go with someone? What was your partner's role?

Museum experience/obstacles and challenges blind and low vision individuals face during museum visits:

- Please describe the visit in as much detail as possible (step by step, minute by minute, etc.)
- What program were you targeting/looking for when you searched for blind programs (touch, tactile, audio recording, etc.)? Did it serve your needs?
- Did you plan your visit or make reservations in advance? Why or why not?
- Were there any challenges during your visit?
- What are the features that you wish had been there but were not?
- What else can you tell me about your visit?

Interpreting or experiencing art as a blind and low vision individual:

- Are you able to create a picture in your mind? Is it a full picture or just a spectrum/section/segment?
- Can you imagine things in colors?
- What helps you create a picture in your mind?
- (If applicable) Describe a museums visit now compared to when you had full vision?
- As a sighted person, I am curious to know, do you feel the presence of a work of art? Do you feel the "aura" of a work of art? In other words, can you "feel" a work of art's gravitas or importance without a verbal description?
- An extra question to professional participant (00003), what do you think is currently missing in your current programs at the DMA?

Second Round Interview Questions

Questions about the app usage:

- Questions about the app content/ storytelling Is my demonstrating of “how to use the app” clear to you? Is it easy to understand?
- What was your reaction first toward using the app, positive, negative, terrifying, excited?
- What do you think about it after you have tried it, is it easy to use, or confusing?
- What aspects of it you think is helpful and what aspects of it you think it needs improvement?
- What aspects do you wish were there but you did not find them?
- Do you think using the app can serve your needs during your museum visit?

Questions about Storytelling

- There was a brief description of the work of art that the DMA used in their museum, do you find it helpful to get the idea of the work of art? Was the description helping you make your own opinion, thoughts, story, and embrace your experience to share with others?
- Did you find it helpful hearing others’ thoughts about the work of art?

Third Round Interview Questions

Interviewee participants will be asked to give their feedback about the app after improving it based on their experiences.

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