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CELLPHONES IN THE MUSEUM SPACE:
A TOOL FOR INCLUSIVITY IN THE TWENTY-FIRST CENTURY

by

Neecole Alisia Gregory

A Thesis

Submitted in Partial Fulfillment of the

Requirements for the Degree of

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Major: Art History

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To Marcia and David Dayton.

Though I flew to my destinations, it was you who gave me the wings.

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ABSTRACT

As museums transform into institutions that are audience-focused, they also face a public that has modernized, both technologically and socially. To better engage these audiences and meet their demands, museums have begun to tap the omnipresent cellphone as a tool. This study investigates how cellphones can aid small to medium-sized museums to engage a broader and more active visitor population as well as a variety of underrepresented audience groups. The resulting data will be able to demonstrate for museums that cellphone-based programs are attainable for any size museum with a variety of staff. A review of the literature based on the paradigm shift in the museum world through the presence of digital and mobile technologies was conducted, answering the five research questions that structure this study. I conclude that the cellphone's established place in contemporary society allows it to aid museums in attracting a diverse, new audience.

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INTRODUCTION

Thesis Statement

Museums, as a public and social entity that many are familiar with today, emerged in the late eighteenth and early nineteenth centuries from the curio cabinets and private collections of the wealthy.¹ Unlike in the past, museums are now confronting a world where technology is rapidly developing. Integrating current technologies into the museum space has become a frequent topic of discussion among museum professionals. Today's guests demand a new role that sees audiences as active influencers and participants in the museum space. This interaction can be accomplished by the numerous software programs and other digital technologies that cellphones support. Examples of these digital programs include quick response (QR) codes, augmented and virtual reality, and gamification, all of which are widely discussed in this field of literature.²

The application of these tools for meeting changing visitor demands for personalized museum experiences has been some of the introductory steps in adapting to a world dependent on digital technology.³ While larger museums may have the size and resources to better explore and implement these technologies, small-to-medium museums have less ability to research and apply these tools. It is these smaller institutions that will benefit from a cross-institutional

¹ Tony Bennet, "The Formation of the Museum," in *The Birth of the Museum: History, Theory, Politics*, 1st ed. eds. Tony Bennet et al (New York City, New York: Routledge, 1995), 19.

² Mar Pérez-Sanagustín et al, "Using QR Codes to Increase User Engagement in Museum-Like Spaces," *Computers in Human Behavior* 60 (2016): <http://dx.doi.org/10.1016/j.chb.2016.02.012>; Hyunae Lee et al, "Experiencing Immersive Virtual Reality in Museums," *Information & Management* 57, no. 5 (2020): <https://doi.org/10.1016/j.im.2019.103229>; Daniel Carvajal, María Morita, and Gabriel Bilmes, "Virtual Museums, Captured Reality and 3D Modeling," *Journal of Cultural Heritage* 45 (2020): <https://doi.org/10.1016/j.culher.2020.04.013>.

³ Mark Osterman, "Museums of the Future: Embracing Digital Strategies, Technology and Accessibility," *Museological Review: Museums of the Future* 22 (2018): 10.

analysis that outlines the effects of applied mobile technologies upon their museum and audiences. Though digital technologies allow for a multi-level social and educational experience that visitors desire,⁴ there is the question of which variety of apparatus will most effectively involve the visitor in the museum space. This issue has become focused in recent years with institutions looking at the visitor's cellphone as a platform to host personal engagement, learning, and input.

As a device that many visitors already bring into the museum, the cellphone can enable more audience engagement. Cellphones can interact with tech-savvy younger audience members or people with disabilities that are hindered by the social and built barriers of the traditional museum. These groups have at times been approached with indifference or bias, resulting in a gap in the scholarship from museum staff, which has affected professional standard practice. The bias stems in part from museums' self-reporting and research on present audiences, where these groups are already underrepresented.⁵ This behavior creates a pattern of neglect towards audience groups that do not always have a strong presence in museum crowds. Furthermore, these attitudes do little to attract these groups, nor generate specialized efforts to accommodate them. It is vital to note privately owned institutions have initiated programs to increase accessibility as is legally required under title III by the Americans with Disabilities Act (ADA). State-owned museums are also obliged to do the same under title II.⁶ As museums are not only

⁴ John Falk and Lynn Dierking, "Enhancing Visitor Interaction and Learning with Mobile Technologies," in *Digital Technologies and the Museum Experience: Handheld Guides and Other Media*, ed. Loïc Tallon and Kevin Walker (Lanham: AltaMira Press, 2008), 28.

⁵ Kirsten Drotner, "Our Museum: Studying Museum Communication for Citizen Engagement," *Nordisk Museologi*, no. 2 (2017): 149, <https://doi.org/10.5617/nm.6353>.

⁶ U.S. Department of Justice, "Maintaining Accessibility in Museums," April 29, 2009, https://www.ada.gov/business/museum_access.htm.

urged but demanded to make accessible options, applicable research and case studies with underrepresented specific groups would be the most beneficial to fill holes in the professional literature.

The changing paradigms in museum practice are repositioning the attentions of museums from the main purpose of maintaining their collections, to an active visitor-based point of view.⁷ This new mentality supports widespread advances that include new, progressive tools to better attract and engage audiences. By incorporating the modern cellphone's capacity to interact with visitors on an individual basis, museums can allow group members to develop their museum experience while also maintaining control of the content that is released.

Literature Review

In the past decade, there has been a wealth of literature on digital and mobile technologies in the museum, such as audio tour devices and tablets. Still, there are few resources specifically on the application of cellphones in this context. This literature review will center on studies that are key to understanding digital and mobile technologies while remaining progressive in demonstrating the value of their recent application. I will begin with an examination of the latest developments in visitor participation and the evolving requirements of the visitor in the museum space and then assess the place of digital technologies in contemporary museums. The focus will subsequently shift to mobile technologies and their use in the museum context. Though this topic is not explored deeply in the literature, it is crucial to understanding the direction that museum professionals have taken with digital inclusion. The literature review

⁷ Peter Samis and Mimi Michaelson, "Introduction: Setting the Stage," in *Creating the Visitor-Centered Museum* (New York City: Routledge, 2017), 1.

will conclude with an examination of the application of cellphones as tools of engagement. There will be an emphasis on specific audience segments that museums and professionals have considered more challenging to engage with by using traditional means.

There are barely half a dozen pieces of prominent scholarship existing on the topic of the paradigm shift, defined as how the museum has examined and reconsidered its role in society. This transition into a modern, twenty-first century museum requires changes on multiple levels from how museums communicate to what they prioritize as an organization.⁸ Gail Anderson, in her edited volume, *Reinventing the Museum: Historical and Contemporary Perspectives on the Paradigm Shift* presented detailed documentation on these changes in museum standards and practices. The “reinvented museum” is discussed considerably in a series of essays by key scholars with a focus on adjustments in how museums communicate and redirect their priorities including being audience-focused and introducing modern technologies. Though many of these essays were written before the turn of the century, they summarize the causes that lead to the vast changes in museum practices that come in future decades, such as complex cases of repatriation or new forms of dialogue with visitors.⁹ Authors debate previous methods museums have utilized to adapt to changing audiences and eras before re-evaluating their roles as stewards and public figures. Keeping with rising themes in recent literature, essays in this book focus on the motivations of the visitor. This is a topic that museum scholars are still attempting to understand the correlations between visitor motivations and their behaviorisms within the museum.¹⁰ It has

⁸ Gail Anderson, “Introduction: Reinventing the Museum,” in *Reinventing the Museum: Historical and contemporary Perspectives on the Paradigm Shift*, ed. Gail Anderson (Lanham: AltaMira Press, 2004), 1-3.

⁹ Anderson, “Introduction: Reinventing the Museum,” 2.

¹⁰ Siëlle Phelan, Johannes Bauer, and Doris Lewalter, “Visit Motivations: Development of a Short Scale for Comparison Across Sites,” *Museum Management and Curatorship* 33, no. 1 (2018): 1-2, <https://doi.org/10.1080/09647775.2017.1389617>.

become essential in developing an active experience for them and demonstrating the importance of audience research. There is an awareness that museum visitors are a conscious group who bring their mindsets, opinions, and influences into the museum space that affect both how they interact with it.

Neil Kotler and Philip Kotler probe deeper into why museums wish to engage with larger audiences and the contemporary pressures of other leisure and recreational venues in their article, *Can Museums Be All Things to All People? Missions, Goals, and Marketing's Role*.¹¹ The Kotlers briefly discuss the place that modern technologies have in a visitor's concept of entertainment and how technology pushes the parameters of the museum in the mind of museumgoers. Their article is one of the few to suggest strategies to advance and align specific museum practices with current trends in museology. One of these approaches suggested including technology seamlessly in the museum space by marketing the museum for entertainment. Rebranding the museum in this way is one of the more drastic changes to its customary form, as technology had been previously included for the main purpose of serving a larger, and more diverse audience. By the Kotlers' logic, the inclusion of technology does not need to have one purpose in the museum space. It can be an asset that serves some of the museum's more traditional functions, such as community service. An application such as this can further validate digital inclusion regarding long-term planning. I use this example to outline the benefits that cellphones can provide beyond personal visitor use. Additionally, I incorporate the Kotlers' process of providing criticisms and counter-arguments against their theories. This

¹¹ Neil Kotler and Philip Kotler, "Can Museums be All Things to All People?: Missions, Goals, and Marketing's Role," *Museum Management and Curatorship* 18, no. 3 (2000): 271, <http://dx.doi.org/10.1080/09647770000301803>; Referenced in Neil Kotler and Philip Kotler, "Can Museums Be All Things to All People? Missions, Goals, and Marketing's Role," in *Reinventing the Museum: Historical and contemporary Perspectives on the Paradigm Shift*, ed. Gail Anderson (Lanham: AltaMira Press, 2004), 167.

method is an effective way to demonstrate the advantages of mobile and digital technological inclusion as it allows for a detailed display of how digital devices impact visitor experiences.

Unlike Anderson and the Kotlers, Graham Black's *The Engaging Museum: Developing Museums for Visitor Involvement* uses quantitative data to act as a model for museums to create a space that promotes visitor engagement. Black applies his analysis of quantitative data, making a comprehensive professional practice guide for various institutions.¹² To support my points, I will utilize Black's research methodology by employing specialized data and case studies of individual museums. This multi-institutional analysis allows me to use case-specific studies performed by museums to demonstrate various trends and patterns that appear in a variety of museums and audiences. Black's contributions to underrepresented audience groups and audience segmentation are useful in my discussions on how cellphones can contribute to museums' engagement with certain visitor groups. Black references the "Visitors' Bill of Rights," which the USA Visitor Services Association produced in 2001, as he explores the issue of peoples' needs in the museum space. Black claims that servicing the needs and the motivations behind the expectations of the museumgoer will result in improving interactions with various audience segments and demographics, although he admits that a solution to engage every visitor is unachievable.

A survey given to museum professionals in 2009 by the Center for History and New Media is one of the earliest pieces of scholarship on how museums adapt to digitization in the museum field.¹³ At that time, 67 percent of the respondents claimed to be in the process of or had

¹² Graham Black, "Introduction: Meeting the Demands Placed on the Twenty-First Century Museum," in *The Engaging Museum: Developing Museums for Visitor Involvement* (New York City: Routledge, 2005). 3-4.

¹³ Sharon Leon et al, *Mobile for Museums* (Fairfax, VA: Center for History and New Media, 2009), 2-3.

finished implementing a project based on mobile technology. Mobile technology is two-way communicative, computing devices with networking technology that is available to go with wherever its user needs it. Currently, this consists of smartphones, tablets, and even watches.¹⁴ Around the turn of the century, museums already had cellphone tours, mobile apps, QR codes, podcasts, etc. which were the most common forms of engagement utilizing the cellphone. One of the frequent rewards of implementing mobile technologies in the museum space is the visitor's ability to utilize their device (with which they are familiar.) Of the museums in the survey that stated they had mobile content, 70 percent depended on the visitor to provide the device, which is considered a more efficient and cost-effective alternative to the museum supplying devices. Several drawbacks of mobile inclusion were mentioned, including cost and staff training which impeding some institutions from the digitization process. The value of this survey lies in the suggested implementation of cell phones. Responding institutions indicated that cellphones should be treated as tools of engagement with audience members, which is the basis of my thesis. To achieve this effective interaction with museumgoers, museums should develop a variety of mobile programs as an addition to the physical narrative that is presented and create opportunities for further educational learning and entertainment.

Ross Perry's collected volume of articles, lectures, and teachings, *Museums and Digital Culture: New Perspectives and Research*, holds a wealth of information, data, and case studies associated with cultural institutions and digitalization.¹⁵ Several chapters offer background literature relevant to my thesis. Drs. Tula Giannini and Jonathan Bowen's article "Museums and

¹⁴ IBM, "Mobile Technology: Communicate, Collaborate and Create Using Mobile Devices," <https://www.ibm.com/topics/mobile-technology>.

¹⁵ Tula Giannini and Jonathan Bowen, "Preface," in *Museums and Digital Culture: New Perspectives and Research*, ed. Ross Parry (Switzerland: Springer, 2019), ix.

Digitalism” presents digital culture as a part of society that has infiltrated every aspect of modern life, altering how populations complete even simple tasks.¹⁶ The authors demonstrate how cultural institutions are not excluded from this occurrence and their audience members bring this digital culture into the museum space regardless of the opinions of museum professionals. This fact has encouraged, if not forced, staff members such as curators to expand their expertise to incorporate digital inclusion to achieve greater diversity and encourage active dialogue from audiences. I use this research to argue that museums cannot continue to commit themselves to their traditional forms if they wish to engage with a world that is always technologically advancing.

In the same book, Ross Perry’s essay, “How Museums Made (and Re-Made) Their Digital User,” categorizes the digital museum visitor as either an “operator,” “individual,” or “the actant.”¹⁷ These labels represent an evolving understanding by museum professionals of the digital user and how to place them in the context of the museum’s digital and physical space. Additionally, the labels given to digital users show their capability to personalize their digital experience as well as their narratives, opinions, and museum experiences.¹⁸ The ability of the museumgoer, as a digital user at least, to model the museum space to their own needs is an important contribution to the discourse about visitor capabilities and interaction with digital tools. Furthermore, this behavior can show how different administrative actions and behaviors on

¹⁶ Tula Giannini and Jonathan Bowen, “Museums and Digitalism,” in *Museums and Digital Culture: New Perspectives and Research*, ed. Ross Perry (Switzerland: Springer, 2019), 28.

¹⁷ The digital user as an operator is explained as part of the digital framework, or in this case the museum’s digital system. As an individual, the user changes into someone outside of the system. Rising in modern museum’s perception of the user is the concept of them becoming an actant, which means they become active in the digital environment of the museum.

¹⁸ Ross Perry, “How Museums Made (and Re-Made) Their Digital User,” in *Museums and Digital Culture: New Perspectives and Research*, ed. Tula Giannini and Jonathan Bowen (Switzerland: Springer, 2019), 275-276.

behalf of the museum can both initiate and maintain a more active user. The use of digital technologies as intermediary tools can transform a passive visitor into an active one. This essay further bolsters my thesis, as it shows that a combination of digital inclusion and emerging professional practices in how museums view the visitor can make an optimal environment for the contemporary audience member.

The Brooklyn Museum has collected data from 2008 to 2018 that maps the use rate of mobile digital projects compared to traditional media in their many engagement ventures.¹⁹ It was found that two percent was the average number of visitors who engaged with several digital opportunities, such as digital guest books, guided tours, and mobile apps. In such a large museum that offers permanent and temporary exhibits that span from contemporary to ancient eras, this low usage of their digital platforms and technologies can be explained by many factors. Traditional forms of engagement in the museum (comment areas, didactic labels, and guided tours) are frequently compared to digital points (interactive kiosks, dial-in audio tours, and mobile apps) for their effectiveness in delivering information, attracting the visitor's attention, and maintaining it. In addition to this, the data shows that comparisons such as active or passive engagement, permanent or special exhibits, and the ability to comment or even create content are aspects that need to be evaluated as the cause of low visitor interaction with mobile technologies. This information's importance to my thesis resides in the data that shows the museum audience's ever-changing influence on the outcomes of digital projects. Though the low user rate is disheartening in the Brooklyn museum case, it was collected over a span of a decade while museums, and their visitors, have gone through many changes. Nevertheless, the case study

¹⁹ Sara Devine, "Engagement at the Brooklyn Museum: A Case Study of Use Rate and Lessons Learned," in *Museums and Digital Culture: New Perspectives and Research*, ed. Tula Giannini and Jonathan Bowen (Switzerland: Springer, 2019), 334.

reveals the necessity of museums to incorporate all the factors of their institution into the projected outcome of their digital projects.

In the article, *Re-Conceptualizing Museum Audiences: Power, Activity, and Responsibility*, Dr. Theopisti Stylianou-Lambert draws a unique connection between audience research and the paradigm shift occurring in museums. Stylianou-Lambert theorizes that while museums should empower their audiences, there is a danger in romanticizing the energized museum visitor and ignoring the museum's personal responsibility to steward education, information, and discourse.²⁰ The article outlines the basic needs that technology fills for audiences, such as instant gratification and entertainment. However, Stylianou-Lambert warns against museums rushing to introduce technologies to audiences they assume want them. Encouraging active visitors to construct their meanings of experiences, especially with the aid of technology, brings forth a new issue where audiences may believe that all experiences within the museum space are equal and valid. This mentality can create a precedent of how visitors should enjoy their museum experience, intimidating others from entering the museum environment, and diminishing the power of individuals to personalize their visit. Despite the optimism of this practice, it should not be approached by the museum forcing a guiding hand to maintain order. The argument presented by Stylianou-Lambert contradicts most literature on the active audience member. Moreover, her claim supports one aspect of my thesis that argues that museums should remain aware of their position in society. Institutions should not be neutral concerning social or political issues nor allow the possibility of negative and hurtful tropes to proliferate while

²⁰ Theopisti Stylianou-Lambert, "Re-Conceptualizing Museum Audiences: Power, Activity, Responsibility," *Visitor Studies* 13, no. 2 (2010): 130, <https://doi.org/10.1080/10645578.2010.509693>.

promoting free choice and activity to their audiences. The traditional roles of the museum as steward, educator, and public service provider remain central.

An emerging topic in the literature is the expanded accessibility provided by technology, especially the increasing use of popular mobile technologies. Eleanor Lisney, Jonathan Bowen, Kirsten Hearn, and Maria Zedda's article, "Museums and Technology: Being Inclusive Helps Accessibility for All," suggests how the implementation of both digital and mobile technologies can benefit audience members with mental, physical, or developmental disabilities.²¹ Their solutions are presented as low-cost and inclusive and will be discussed further in my research as effective implementations that will broadly benefit people with disabilities in the museum space.

One of the more elusive audience groups is the younger generation, from ages thirteen to nineteen. Dr. Vasiliki Tzibazi, who specializes in social work, education, and community wellbeing, researches this younger audience demographic who has traditionally been excluded from the narrative and experience presented by museums.²² The issue of young people being under-represented in the museum space, which causes them to see the institution as not designed for them, has been crucial to institutions trying to attract a wider audience. The contribution of this article is the participatory action research (PAR) approach in engaging these younger audiences. The PAR approach has been used to address current events, such as social justice movements, from the perspective of museumgoers. This approach involves viewing the museum's control of knowledge from the position of the public to overturn unequal balances of power. Remaining impartial to these life-changing events that influence their visitors has placed

²¹ Eleanor Lisney et al, "Museums and Technology: Being Inclusive Helps Accessibility for All," *Curator: The Museum Journal* 54, no. 3 (2013): 353, <https://doi.org/10.1111/cura.12034>.

²² Vasiliki Tzibazi, "Participatory Action Research with Young People in Museums," *Museum Management and Curatorship* 28, no. 2 (2013): 153, <https://doi.org/10.1080/09647775.2013.776800>.

institutions and their internal practices under scrutiny. Tzibazi agrees with the PAR approach but advocates that the museum can be more than an educational device for young people. Museums need to transform into institutions that not only aid in the development of young people but allow them to have an active voice as museum visitors. In the context of my research, this provides a foundation for why cellphones can ease this transition for museums since younger audiences are perceived as digital natives. Additionally, due to the role cellphones have in how young adults access information as well as construct their identities, these generations already view the cellphone as a powerful asset.

Methodology

There is research on the inclusion of digital technologies in museums in abundance. Frequent topics in the literature are augmented and virtual reality, mobile applications (apps), and gamification. Studies typically concentrate on the audience of one museum or a few in the proximity of one another in a city, limiting the application and practicality of the study's findings to the field. Further research and exploration of these topics as they apply to multiple institutions and audience segments can lay the foundation for more specialized studies into different technologies and their impact. Museums must start from scratch and explore the benefits and drawbacks of mobile digital technologies personally before applying them in their specific museum environment to ensure that digital projects are effective in fulfilling their personal needs and that of their audiences'. Because of the financial demands this research requires, it poses a further obstacle for smaller museums exploring their digital options. Additionally, there is little research on the rationale, goals, and collective positive and negative effects of using cellphones to encourage museum visitors to be active participants in their experience and engage more with the institution. The purpose of this thesis is to examine how museums' application of cellphone

technology can encourage active visitor participation in the museum experience and assist museums to engage more efficiently with the contemporary museum audience member. As this research is conducted, it will be guided by the following research questions:

1. Has the paradigm shift from a collection-based focused to a visitor-based focused museum experience supported the use of a cellphone to encourage a participatory and engaging visitor encounter?
2. Are cellphones an appropriate tool to elicit the above-stated experiences, and how have institutions dealt with them in the museum space in the past?
3. Are there specific digital programs (i.e., mobile apps, gamification, or augmented reality) that use cellphones as a platform that are more effective in achieving these experiences?
4. Can cellphones contribute to more inclusivity and accessibility between museums and underrepresented groups such as younger audiences (ages thirteen to nineteen), older adults (sixty-five and above), or those with physical, mental, or developmental disabilities?
5. What are the most effective practices for implementing cellphone-based technologies in the museum context based on successful case studies from the cross-institutional research pool?

Literature in museum practices benefits significantly from research that encompasses drawbacks and advantages of cellphones and the software programs they support. This research aims to furnish a corpus on the current issues of cellphone inclusion in the museum space, as well as data on how today's museums are implementing mobile content via specific applications or digital programs. There will also be a focus on the motivations of museum visitors as to why they would prefer to interact with mobile technologies. By employing case studies and in-depth

research, I will provide insights that go beyond the existing scholarship. This thesis will include effective implementations of cellphone-based programs in everyday museum practices and reactionary responses to a crisis will be discussed. These examples will demonstrate what models are successful with contemporary museum visitors, including those in unique and marginalized audience groups. This information is presented and developed for museums that lack a current plan for digital and mobile technology inclusion with various financial and staffing restraints.

Organization

Chapter One, “The Era of the Contemporary Museum and the Active Visitor,” will focus on the formation of the modern, visitor-centric museum, key pioneering factors that initiated this change from the traditional collection-focused institution, in practices amongst museum professionals, the incentives for this shift, and the benefits of heightened engagement with visitors. A discussion on the importance and rise of the active visitor who wants more control of their museum experience demonstrates the need for evolving professional practices. Chapter One will also illustrate how this sequence of events encouraged the introduction of digital technologies such as cellphones. Since the early 20th century, museums constructed the narratives that their visitors participate in and assumed what museumgoers would both enjoy and be interested in. The resulting disinterest in museums led museums to find mediums that would attract visitors effectively, while also gathering input about what museumgoers desire from modern institutions.

Chapter Two, “The Cellphone and the Museum Experience,” will rigorously discuss the history of the cellphone’s application in the museum environment alongside other mobile digital technologies and the overall benefits of cellphones, both in normal operation and times of crisis. Counterarguments against the frequent complaints that museum professionals have against

cellphones such as how they pose as distractions or take control of content from the museum will be included. After the assessment of the cellphone's already influential presence in both society within and outside the museum walls, this chapter will introduce the cellphone as a further asset by noting its capabilities as a platform for numerous other digital programs to launch. These programs will be reviewed individually in Chapters Three and Four. Furthermore, this analysis will identify the additional advantages of the cellphone by discussing its applications in the recent events surrounding the COVID-19 pandemic.

Chapter Three, "Bring Your Museum Tool," focuses on the application of three common types of digital software and hardware programs that rely on the modern cellphone for utilization in the museum space: mobile apps, QR codes, and augmented reality. Based on research gathered from various case studies that are cross-institutional, this chapter will discuss specific digital applications' overall effects on museum audience engagement. Any consistent drawbacks and positive attributes of the digital application will be noted as well as optimal uses based on successful cases. The museum mobile app will be introduced as the most familiar and widely implemented cellphone tool. Second, the QR code, which acts as a connection between the physical world and the digital landscape, will be reviewed as well as its operational relationship with mobile apps. Case studies will show the successful application of QR codes and their capabilities to aid visitors. Finally, augmented reality's working relationship with both QR codes and mobile apps, which aid in functionality for users, will be examined to demonstrate the interconnectivity that is possible with museum visitors.

Chapter Four, "The Cellphone's Recent Developments as an Engagement Tool," will further discuss digital programs using the cellphone within the museum space and visitor engagement that museums have only recently begun to explore. This chapter will survey social

media apps, gamification, and crowdsourcing. Utilizing relevant case studies, this chapter will analyze both the positive and negative attributes to better understand the effects of implementing these cell phone-based programs. There will be a specific emphasis on the effort of museums to involve visitors at multiple levels as consumers, contributors, learners, and even gamers. Finally, based on an extensive multi-institutional examination of relatable case studies, features that lead to successful implementation and higher engagement with marginalized groups like young adults, will be discussed with proposed models of administration.

The thesis concludes with a reconsideration of the goals of this research by revisiting the five questions that guided this study. This review will demonstrate that cellphones have a significant, needed role within the museum space. As outlined in this study, museums have the capability, at any capacity, to integrate technologies into their institutions, which has become a necessity as society technologically advances. Finally, further implications for the topic of this research will be examined to aid in guiding future discussion about the relevancy of cellphones in museums as tools of engagement, entertainment, and education. The general lack of scholarship that addresses museum visitor motivations, new mobile technologies, and the benefits gained for specific underrepresented audience groups from the adoption of cellphones within the museum defines the need for further research.

Chapter One: The Era of the Contemporary Museum and the Active Visitor

In the twenty-first century, modern museums are being pressured to change how they interact and engage with the public due to the desire of audience members to have a more active place in the museum experience.¹ This pressure is being applied from many different fronts. As institutions, museums are having to compete with other entertainment industries, producing experiences that are both educational and enjoyable to the contemporary visitor.² By becoming an attraction, museums will be able to draw in more diverse audiences. Moreover, the multiple ways information is delivered to museumgoers have been the basis of the traditional museum experience, yet this practice has also come under questioning during a new era.³ To engage the modern audience, museums must now take on a more social role and act as hosts to conversations that involve a multitude of groups and cultures, not just sporadic individuals.⁴ As a field, museums are having to incorporate new procedures involving diversity and inclusion,⁵ the active museumgoer,⁶ and modern technology. The new visitor-focused approach, resulting in a “new museology,” that is popular among museums today is the direct result of a paradigm shift that supports this transition from a mentality of leading museum curators and staff that has

¹ Rémi Mencarelli, Séverine Marteaux, and Mathilde Pulh, “Museums, Consumers, and On-Site Experiences,” *Marketing Intelligence & Planning* 28, no. 3 (2010): 331, <https://doi.org/10.1108/02634501011041453>.

² Çağıl Özel and Seda Sökemen, “Postmodern Museum Visitor Experience as a Leisure Activity,” in *Co-Creation and Well-Being in Tourism*, ed. Antónia Correia et al (Springer International Publishing: Cham, 2017), 35.

³ Misael Rojas Terraza, “Museums and Digital Devices: Towards the Open Access of Museums and engagement Through Digital Devices,” Master’s Thesis, (Aalto University, 2019), 21.

⁴ Aurel Gheorghilas et al, “The Challenges of the 21st-Century Museum: Dealing with Sophisticated Visitors in a Sophisticated World,” *International Journal of Scientific Management and Tourism* 3-4 (2017): 69.

⁵ Henry Evans et al, “Museums Beyond Neutrality,” *Nordisk Museologi* 29, no. 2 (2020): 21.

⁶ Dorottya Bodnár, “Escapism or Active Involvement? A Dimension of Museum Visitor Experience,” *Vezetéstudomány: Budapest Management Review* 50, no. 11 (2019): 22, <https://doi.org/10.14267/VEZTUD.2019.11.02>.

previously focused museums on their collections. This shift in priorities forces museums to reevaluate how they interact with their audiences and communities.

The Paradigm Shift

This paradigm shift is somewhat controversial as it conflicts with the traditional purposes that museums have adhered to since their conception. Joseph Veach Noble, former president of the American Association of Museums outlined the conventional functions of the museum in his 1970 manifesto. The museum's essential concerns include collection, conservation, study, interpretation, and exhibiting.⁷ All of these duties are referencing the objects that museums hold and their contribution of knowledge to the public.⁸ Even in their traditional roles, museums have always claimed to be a benefit to the public. These tasks support the original concept of the collection-focused museum, but this resulted in dissatisfaction by a more socially aware audience concerned with the potential cultural superiority held by cultural institutions.⁹ The Dutch museologist Peter van Mensch, a professor of Cultural Heritage at Amsterdam School of Arts, outlined the changes of these functions in the contemporary paradigm. He narrows the museum's obligations down to preservation, study, and communication.¹⁰ Regarding collecting and interpretation, aspects considered vital to the former paradigm, museums may still incorporate them as they change to an audience-based focus. As this paradigm shift takes hold of the

⁷ Stephen E. Weil, "Rethinking the Museum: An Emerging New Paradigm," in *Reinventing the Museum: Historical and Contemporary Perspectives on the Paradigm Shift*, ed. Gail Anderson (Lanham: AltaMira Press, 2004), 74.

⁸ Steven Conn, "Do Museums Still Need Objects?," in *Do Museums Still Need Objects?* (Philadelphia: University of Pennsylvania Press, 2010), 20.

⁹ Vikki McCall and Clive Gray, "Museums and the 'New Museology': Theory, Practice, and Organizational Change," *Museum Management and Curators* 29, no. 1 (2014): 20, <https://doi.org/10.1080/09647775.2013.869852>.

¹⁰ Weil, "Rethinking the Museum," 74-76.

museum world, institutions must find new innovative ways to interact with their visitors, shedding the traditional object-focused mentality. In turn, visitors have come to desire a more active part in the construction of their museum experience. This requires museums to adapt rapidly to various internal changes, including the introduction of modern technologies that can have a place in supporting these adjustments.

With the paradigm transformation, which first began at the end of the twentieth century, comes the emerging concept of meaning-making and its relationship with museumgoers. Meaning-making is a process where both society and individuals will attach multiple values to an object. In traditional museums, the meaning that visitors create is typically affixed to the narrative that the object is already provided with by the museum, with the value being in the object and not the experience the visitor gains from interacting with it.¹¹ The difference in recent practices that strive for more active museum visitors is that they are to create their own museum experience based on personal contexts, motivations, and inquiries.¹² Both the current and long-standing practices of museums are being questioned by the public as to how information is being exchanged seems to no longer be efficient. In turn, this problem reflects on the role of museums in society. While there are many genres of museums, their social roles are the same: contributing to public education and cultural preservation.¹³ It has been standard for museums to complete these goals by focusing heavily on collection stewardship and maintenance.

¹¹ Emilie Sitzia, "The Ignorant Art Museum: Beyond Meaning-Making," *International Journal of Lifelong Education* 37, no. 1 (2018): 6, <https://doi.org/10.1080/02601370.2017.1373710>.

¹² Lois Silverman, "Visitor Meaning-Making in Museums for a New Age," *Curator: The Museum Journal* 38, no. 3 (1995): 161, <https://doi.org/10.1111/j.2151-6952.1995.tb01052.x>.

¹³ Eva Hornecker and Luiginia Ciolfi, "Understanding the Context: Key Themes for Visitor Interaction in Museums," in *Human-Computer Interactions in Museums* (San Rafael: Morgan and Claypool Publishers, 2019), 2.

Collection stewardship includes, but is not limited to, object preservation, deaccessioning, emergency planning, proper insurance, and collection availability to the public.¹⁴ The discourse about collection stewardship extends into the current discussions about how museums communicate with their audiences. When a museum constructs an exhibit, it corresponds with its audience members via a narrative that the objects display. Curators produce and develop meanings that they wish to communicate to an audience, which in turn narrows the focus of attention of visitors as they follow the narrative constructed for them.¹⁵ Audience members are no longer content with this approach as it influences the process of meaning-making that visitors are supposed to direct. Furthermore, most museums display their artifacts in exhibits that are disassociated from their original historical context, further restricting the story that museum objects can display. Instead of projecting the institution's modern values and society, museums are now trying to display their artifacts in a less isolated environment.¹⁶ A new practice can include steps to use an appropriate dialogue when discussing a particular culture and exhibit objects in an environment that exemplifies the culture to which they belong.

The shift in collection stewardship has also come to include not only researchers and museum staff but also the public who desire easier access to history and heritage. Underuse by the public is just one of the many issues that museums have regarding their growing collections. In Europe, this problem persists in some of the oldest museums.¹⁷ How museums communicate

¹⁴ Rebecca Buck, "History of Registration," in *Museum Registration Methods*, 5th ed., ed. Rebecca Buck and Jean Gilmore (Washington, DC: The AAM Press, 2010), 9.

¹⁵ Gunther Kress and Staffan Selander, "Introduction to the Special Issue on Museum Identities, Exhibition Designs and Visitors' Meaning-Making," *Designs for Learning* 6, no. 1-2 (2012): 17-18, 10.2478/df-2014-0005.

¹⁶ Weil, "Rethinking the Museum: An Emerging New Paradigm," 76.

¹⁷ Suzanne Keene et al., *Collections for People: Museums' Stored Collections as a Public Resource* (Los Angeles, CA: UCLA Institute of Archaeology, 2008), 28.

with their audience directly has been the role most drastically affected by the paradigm shift. External pressures from the public, such as a decrease in visitor attendance and an increase in visitor dissatisfaction with established museum practices, from the public have caused internal changes being made by museum professionals. The outcome is museums changing how they view the position of the audience member. Current literature in audience research demonstrates that there are different approaches to gratifying the museum visitor in the future.¹⁸

When accepted and adapted to, the paradigm shift is vital to how museums will operate in the coming years. Museums have come to notice that they only attract a narrow sociodemographic group of visitors that primarily consists of those in higher socio-economic and educated groups.¹⁹ This issue is a result of many visitors believing that the museum is not an institution made for them. It can be reasoned that many museums were not developing themselves to be a service to the public. Museum staff focused on objects within a collection, presenting them as they saw fit, and assuming exhibitions would benefit those who visited.²⁰ Complaints with this type of museum-visitor interaction do not disregard the importance of cultural perpetuation, where museums acted as catalysts to transfer knowledge and values to the next generation. The new model for museums claims that, though still effective, objects may not be the most efficient way to provide information to the public.²¹ New generations expect the

¹⁸ Nicholas Abercrombie, Longhurst, Brian, *Audiences: A Sociological Theory of Performance and Imagination* (London: Sage Publications, Ltd, 1998), 7.

¹⁹ Graham Black, "Remember the 70%: Sustaining 'Core' Museum Audiences," *Museum Management and Curatorship* 31, no. 4 (2016): 386, <http://dx.doi.org/10.1080/09647775.2016.1165625>.

²⁰ Hilde Hein, "The Authority of Objects: From Regime Change to Paradigm Shift," *Curator* 50, no. 1 (2007): 78.

²¹ Hein, "The Authority of Objects: From Regime Change to Paradigm Shift," 78.

traditional role of education from museums, but also sensationalism²² (though seen as unsophisticated by many) has an added allure of excitement and entertainment for the museum visitor. Additionally, visitors and advocates alike demand more access to these collections that inevitably affects how museums have customarily stewarded their collections. Today's curators deal with a "crisis of accumulation of the past"²³ in which their institutions are still trying to cope with the influx of acquisitions that happened in the 1970s and 1980s.²⁴ This matter leaves a large portion of collections hidden away from the public's eye, which is another example of museums deciding what their audience members wish to see. Practices such as this face criticism by both professional and non-professional audiences who want to have more contact with the collections that museums either guard heavily or do not allow into circulation as exhibits.²⁵

Museums are shedding an authoritarian way of practice and incorporating other sociological elements to present institutions and exhibitions that are socially conscious.²⁶ These elements can include social and political issues as well as visitor demographics such as their financial or ethnic backgrounds. Topics that are social or political can cover anything from protests sparked by racial injustice to a presidential election while visitor demographics can

²² Juan Gabriel Brida, Marta Meleddu, and Manuela Pulina, "Understand Museum Visitors' Experience: A Comparative Study," *Journal of Cultural Heritage Management and Sustainable Development* 6, no. 1 (2016): 48.

²³ Rodney Harrison, "Forgetting to Remember, Remembering to Forget: Late Modern Heritage Practices, Sustainability and the 'Crisis' of Accumulation of the Past," *International Journal of Heritage Studies* 19, no. 6 (2013): 580, <https://doi.org/10.1080/13527258.2012.678371>.

²⁴ Jenni Morgan and Sharon Macdonald, "De-Growing Museum Collections for New Heritage Futures," *International Journal of Heritage Studies* 26, no. 1 (2020): 56, <https://doi.org/10.1080/13527258.2018.1530289>.

²⁵ AK Milroy and Andrew Rozeffelds, "Democratizing the Collection: Paradigm Shifts in and Through Museum Culture," *Australasian Journal of Popular Culture* 4, no. 2 & 3 (2015): 116, https://doi.org/10.1386/ajpc.4.2-3.115_1

²⁶ Tracy Jean Rosenberg, "History Museums and Social Cohesion: Building Identity, Bridging Communities, and Addressing Difficult Issues," *Peabody Journal of Education* 86, no. 2 (2011): 117.

include their race, economic status, or age. These influences affect both the audience and the institution. Clear discourses around social, historical, and cultural differences are rendered into exhibition displays and narratives, where what divides society is highlighted.²⁷ It is undeniable that museums have a distinct platform that they can utilize. Museums have evolved from presenting values, attitudes, and assumptions²⁸ that they believe identify their audience members. Instead, there has been a shift in professional practices where curators and museum staff are allowing the visitor to identify themselves in the context of the museum. The result has been a broadening of the number of museumgoers who can relate to exhibitions, an issue that frequently kept audiences away. Accepting that visitors have personal narratives that they bring into the museum is the first step towards a unique experience that they can construct themselves.²⁹ This new working policy pushes against the neutrality toward social issues on which museums usually stand. Traditionally, museum professionals have wanted to treat the museum space as a place of reverence and untouchable isolation.³⁰ By shedding the illusion that museums can be impartial, they can continue to relate to the public. Accepting this shift not only in professional practice within museums but in the changes of their audience will keep them from slipping into irrelevance.

²⁷ Richard Sandall, "Museum and the Good Society," in *Museums, Prejudice, and the Reframing of Difference* (London and New York: Routledge, 2007), 3.

²⁸ Weil, "Rethinking the Museum: An Emerging New Paradigm," 76.

²⁹ Clover et al., *Adult Education, Museums and Art Galleries: Animating Social, Cultural and Institutional Change*, ed. Peter Mayo (Rotterdam: Sense Publishers, 2016), 156.

³⁰ Hein, "The Authority of Objects: From Regime Change to Paradigm Shift," 80.

New Museology

A common theme in the “new museology”³¹ is the desire of visitors to be “active.” An active role is the public being both visitors to the institution and a collaborator amongst the museum’s curatorial functions.³² The involvement of a visitor is variable; their choice of entering the institution also alters the narrative with which they are presented. Up to this point of the paradigm shift, museums have settled with their set demographic of those who choose to come to a museum, which is typically those with an educational motivation or an older generation who enjoy the secluded, isolated silence of the museum space.³³ A stamp of validation comes from the museum, where a person may become cultured and intelligent by viewing exhibitions.³⁴ In the contemporary age, this situation is reversed. The museum requires the visitor to fill and fund their halls and exhibitions. A new attitude has led the public to gauge the modern museum’s place in their daily “leisure” time, which is the availability of residual time not dedicated to obligations involving work or family.³⁵ Cultural institutions must contend with the other activities with which visitors would rather fill this leisure time. This issue has led to museums maintaining various commodities, including current technologies and blockbuster events to keep the public’s attention.³⁶ Common applications include ways for audiences to give feedback on

³¹ McCall and Gray, “Museums and the ‘New Museology,’” 19.

³² McCall and Gray, “Museums and the ‘New Museology,”” 20.

³³ Christine Burton and Carol Scott, “Museums: Challenges for the 21st Century,” *International Journal of Arts Management* 5, no. 2 (2003): 57.

³⁴ Eilean Hooper-Greenhill, “Culture and Meaning in the Museum,” in *Museums and the Interpretation of Visual Culture* (New York: Routledge, 2000), 14.

³⁵ Hooper-Greenhill, “Culture and Meaning in the Museum,” 59.

³⁶ Nick Prior, “Speed, Rhythm, and Time-Space: Museums and Cities,” *Space and Culture* 14, no. 2 (2011): 206.

exhibits and programs, make active decisions, outreach programs, and the ability to assemble their museum experience. Changes such as this allow audience members to engage in the process of self-identification and meaning-making on their terms.³⁷

By giving a visitor a more active role within the institution, museums must recognize that it is not entirely possible to engage all members of their audience. Creating programs and exhibitions that are not for a generalized group that museums have claimed are their main visitors is an inclusive step to making more audience members less passive. This interaction is supported by visitors connecting with familiar facets in an exhibit that represents their own identity, culture, or societal interests. After this initial point of engagement, visitors are open to the various social interactions, educational opportunities, and interactive experiences the museum provides. Incorporating the interests, motives, and needs of sub-groups into the museum and its exhibitions is the spark for making a visitor more involved.³⁸ To accomplish this, cultural institutions need to understand whom their audience groups are comprised of and what they are interested in. Audience research allows a museum to identify unique qualities in an audience, that can affect a museumgoer's visitation.³⁹ Currently, audience research has limitations to what it can contribute to broader subjects. Most investigations are carried out with a specific topic or

³⁷ Theopisti Stylianou-Lambert, "Re-conceptualizing Museum Audiences: Power, Activity, Responsibility," *Visitor Studies* 13, no. 2 (2010): 137.

³⁸ Eva Reussner, "Strategic Management for Visitor-Oriented Museums," *International Journal of Cultural Policy* 9, no. 1 (2003): 104, <http://dx.doi.org/10.1080/1028663032000089868>

³⁹ Kevin Coffee, "Audience Research and the Museum Experience as Social Practice," *Museum Management and Curatorship* 22, no. 4 (2007): 378.

operation,⁴⁰ demographic label, educational engagement, or single visit participants.⁴¹

Regardless, models of visitor behavior and demands based on patterns found within various studies have been developed.

The Contextual Model of Learning is an example of an ongoing framework based on the ever-changing context of museum education.⁴² There are multiple levels of sway that audience members will bring with them into a meaning-making situation. On a personal level, individual histories influence the visitor, such as previous experience or knowledge. Next, the sociocultural factors, including aspects of one's culture or place in society, will direct how the visitor engages with exhibitions and the museum. Last, all engagement happens in the physical context of a museum. How an institution presents itself, from climate control to space, affects a visitor's interaction with their environment.⁴³ Despite this model being based in a learning context, it is still applicable since many museums remain dedicated to being educational. This theory exemplifies that even specific studies and audience research done by institutions on their unique communities can be beneficial. Many museums hold the same goals, though how they wish to achieve them differs. Previous cases of audience research offer patterns of behavior that museums can use to understand the basic motivations and influences of general audiences. From

⁴⁰ Coffee, "Audience Research and the Museum Experience as Social Practice," 378.

⁴¹ Michele Everett and Margaret Barrett, "Investigating Sustained Visitor/Museum Relationships: Employing Narrative Research in the Field of Museum Visitor Studies," *Visitor Studies* 12, no. 1 (2009): 3, <https://doi.org/10.1080/10645570902769084>.

⁴² John Falk and Lynn Dierking, "Enhancing Visitor Interaction and Learning with Mobile Technologies," in *Digital Technologies and the Museum Experience: Handheld Guides and Other Media*, ed. Loïc Tallon and Kevin Walker (Lanham: Rowman Altamira, 2008), 20.

⁴³ Falk and Dierking, "Enhancing Visitor Interaction and Learning with Mobile Technologies," 22.

there, an institution can hone onto more elusive demographics of their audience with a specialized study.

In addition to understanding the behaviors of audiences is the need to execute platforms that interact with visitors on a level they desire. There has already been resounding success in terms of digital application to this new reality within the museum world. While Chapters Three and Four explore in more detail the application of specific technologies involved with cellphones, it is necessary to acknowledge the technological revolution that has inserted itself into museums in general. The combination of digital tools and “new museology” has changed collection stewardship, public interaction, and other internal processes to fit a new reality where technology acts as a medium for how many people receive and interpret information. Similar to other aspects of the shift, museums have accepted technology to various degrees. Digital tools have been stereotyped as expensive, unfamiliar, and even high-risk resources that would require further skill and training from museum staff.⁴⁴ Even outside the museum, new devices and technologies are distractions from physical, customary experiences.⁴⁵ To a museum holding onto the traditional collection-based mentality, this is counter-productive. Technology will advance the museum’s abilities beyond what is possible with a single object⁴⁶ and the physical institution alone.

⁴⁴ Ross Parry, “The Practice of Digital Heritage and the Heritage of Digital Practice,” in *Museums in a Digital Age*, ed. Ross Parry (London and New York: Routledge, 2010), 1.

⁴⁵ Parry, “The Practice of Digital Heritage and the Heritage of Digital Practice,” 1.

⁴⁶ Catherine Devine and Matt Tarr, “The Digital Layer in the Museum Experience,” in *Museums and Digital Culture: New Perspectives and Research*, ed. Tula Giannini and Jonathan Bowen (Switzerland: Springer, 2019), 298.

Modern museology has gone through an unprecedented change since the end of the last century. A visitor-focused mentality has resulted in museums seeing their audience members differently. This new practice requires institutions to develop new procedures and introduce new technologies. Due to a lack of preparation or even acceptance of this paradigm shift, many museums still struggle to cope. To ease the transition, museums should explore the many characteristics, influences, and needs of their visitors through audience research. Examples of effective research can include examinations done by other institutions, as these studies may offer valuable patterns on certain demographics or sociocultural groups. Once needs are identified, it will be necessary to explore new forms of engagement that fulfill the audience's requirements. To achieve further engagement, museums may require the incorporation of modern technology, as this is something practical and familiar to visitors today. Regardless of the steps a museum takes to ensure a clear line of effective communication with its audience and community, a traditional approach will no longer be effective or accepted.

Chapter Two: The Cellphone and the Museum Experience

In the United States alone, around 96 percent of Americans own a cellphone, with 86 percent having at least one smartphone.¹ Digital culture has become the norm in societies that desire to remain “connected” and have instant access to an abundance of information, accurate or not. The smartphone’s ability to engage with the Internet and social media platforms allows users to participate in unique spaces that enable sharing. Many have associated this type of sharing with creativity, active participation, and various forms of identity agency.² The virtual world has aided innumerable people in developing their own personal, social, and cultural identities by supporting countless connections across communities and access to information. Museums attempting to integrate new technologies into their space is not a new trend, and it has only grown as modern technologies develop. This progress warrants a further discussion about the numerous benefits of digital technologies, especially the cellphone, as an asset for relationship building between museums and their audiences.³

The cellphone is a familiar and readily available technology to many museum visitors. Museums, galleries, and libraries have begun to research ways to profit from the dependence audience members have on their mobile devices as well as the possibilities cellphones offer. Normally, cellphones can assist museum visitors with many of their informational requests,

¹ “Mobile Fact Sheet,” Pew Research Center, accessed December 5, 2020, <https://www.pewresearch.org/internet/fact-sheet/mobile/#:~:text=The%20vast%20majority%20of%20Americans,smartphone%20ownership%20conducted%20in%202011.>

² Jacob Johanssen, “Unable to Tweet: Inhibition and the Compulsion to Share,” in *Psychoanalysis and Digital Culture: Audiences, Social Media, and Big Data* (New York and London: Routledge, 2019), 71.

³ Tula Giannini and Jonathan Bowen, “Museums and Digitalism,” in *Museums and Digital Culture: New Perspectives and Research*, ed. Tula Giannini and Jonathan Bowen (Switzerland: Springer, 2019), 28.

activities, and initial engagements with the modern museum. As museums begin to integrate the visitor's cellphone into museum spaces, some concerns are raised by professional staff. In the context of the museum, cellphones are typically used for personal photography⁴ which can be intrusive on the customary museum experience by some professionals.⁵ Museums that instigate a policy of no cellphone use or personal photography are likely to alienate visitors.

Many modern museumgoers use their cellphones and personal photography in the process of their social interaction or meaning-making, which is a term used to describe how people understand their environment and lives through personal influences such as their experiences, beliefs, and knowledge.⁶ The physical interaction between visitor and display is deepened by the use of mobile technology, as museumgoers utilize photography or video recording to construct their narrative out of what is present in the museum space.⁷ Additionally, there are worries of excluding those who enter the museum's space with no desire to incorporate digital technology, including families or individuals who do not have the access nor time to achieve cellphone use competency. Creating an experience that is digitally inclusive, but not exclusive to those who do desire the traditional museum experience, will ensure that the narrative of the museum is incorporating the needs and desires of as wide of an audience as

⁴ Theopisti Stylianou-Lambert, "Photographing in the Art Museum: Visitor Attitudes and Motivations," *Visitor Studies* 20, no. 2 (2017): 114, <https://doi.org/10.1080/10645578.2017.1404345>.

⁵ Stylianou-Lambert, "Photographing in the Art Museum," 115.

⁶ Kylie Budge, "Objects in Focus: Museum Visitors and Instagram," *Curator: The Museum Journal* 60, no. 1 (2017): 67, <https://doi.org/10.1111/cura.12183/>.

⁷ Carey Jewitt, "Digital Technologies in Museums: New Routes to Engagement and Participation," *Designs for Learning* 6, no. 1-2 (2012): 80, 10.2478/df-2014-0005.

possible. Despite claimed drawbacks and hesitation from museum professionals, cellphones already have a place in museums as equipment visitors use in their daily lives.

Benefits of the Cellphone

Benefits to implementing cellphone usage in the museum environment include easier access to museum exhibits and collections, personal relevance, and interactivity.⁸ Museum staff has begun to recognize the valuable resource that is walking in with their visitors. In a 2015 survey conducted by the Center for History and New Media, 67 percent of the museums who responded stated that they were developing mobile content or had already introduced one to their audience.⁹ To understand a cellphone's place in the museum, it is important to evaluate its value in society in general. Mobile devices, especially smartphones, are seen by many users not only as a form of communication but as a portal to instant information.¹⁰ From this attitude that society already has regarding cellphones, museums can similarly use them to better fill the individual needs of their audience members. As stated in Chapter One, the public's desire to have more casual access to museum collections has spurred changes in the practice of cultural institutions.

Collections have been traditionally unavailable to more diverse groups of researchers or interested parties. Digitization of collections must address this issue as digital inclusion allows for global access to collections.¹¹ To make museum collections more accessible and support

⁸ Loïc Tallon, "Introduction: Mobile, Digital, and Personal," in *Digital Technologies and the Museum Experience: Handheld Guides and Other Media*, ed. Loïc Tallon and Kevin Walker (London: AltaMira Press, 2008), xiv.

⁹ Sharon Leon et al, *Mobile for Museums* (Virginia: Center for History and New Media, 2009), 2.

¹⁰ Nitza Davidovitch and Roman Yavich, "Usage of Mobile Phone Applications and Its Impact on Teaching and Learning," *International Journal of Higher Education* 7, no. 1 (2018): 2.

¹¹ Joshua Drew, Corrie Moreau, and Melanie Stiassny, "Digitization of Museum Collections Holds the Potential to Enhance Researcher Diversity," *Nature Ecology & Evolution* 1 (2017): 1789, <https://doi.org/10.1038/s41559-017-0401-6>.

unique interactions with them, museums have also turned to cellphones. As previously stated, users already utilize cellphones to discover and search for new information.¹² Numerous museums have turned to mobile apps to give visitors access to not only objects that are exhibited, but those that are in storage. Large institutions such as the British Museum, the Louvre, and the Metropolitan Museum of Art (the Met) utilize mobile apps this way. Collection images are shown on the apps in high-resolution with a brief didactic passage. The British Museum and the Met also have a feature that allows the user to discover related information on the object they are viewing and share personal favorites with others on social media platforms.¹³ Visitors are then able to discuss the collection, have access to more information about their favorite objects and exhibits, and even be inspired to create art of their own. A successful application is further guaranteed when the museum adapts the cellphone as an interpretive device to further the experience of the visitor and assist in their meaning-making process.¹⁴

The ability of the visitor to make the museum experience personal is key to the engagement process within museum content and its exhibits. Instead of simply receiving information, visitors develop a multitude of individual interpretations¹⁵ thus giving them an active role in constructing their museum experience. Mobile technologies now offer new paths

¹² Kate Goldman, "Understanding Adoption of Mobile Technology within Museums," in *Mobile Apps for Museums: the AAM Guide to Planning and Strategy*, ed. Nancy Proctor (Washington, DC: The AAM Press, 2011), 1044.

¹³ Binyue Cui et al, "Smart Mobile APP of Museum – Investigations and Design for Local Culture Protection," in *Proceedings of the 12th International Conference on Computer Science and Education* (Houston, TX: IEEE, 2017), 39.

¹⁴ Goldman, "Understanding Adoption of Mobile Technology within Museums," 1044.

¹⁵ Claire Bailey-Ross et al, "Engaging the Museum Space: Mobilizing Visitor Engagement with Digital Content Creation," *Digital Scholarship in the Humanities* 32, no 4 (2017): 692, <https://doi.org/10.1093/llc/fqw041>.

for museums to personally connect their visitors with content.¹⁶ Common platforms for this type of engagement are through a museum's mobile app that invites active participation with an institution's collection.¹⁷ Furthermore, the use of social media via mobile apps has become a popular activity for users on their cellphones, especially the platforms such as Facebook and Instagram.¹⁸ Interesting trends arise in visitor use of social media, personal photography, and meaning-making. Social media consists of websites and mobile applications that enable users to create content and exchange it with an international audience. Based on these features, social media acts as an effective platform for individual engagement with the museum space, as digitization has allowed for civic, social, political, cultural, and other types of open participation on media platforms.¹⁹ Museums can use this established social environment to maintain discourses on topics that their visitors wish to engage in, discarding the previous neutral position of museums. From June 16th to 22nd in 2020, the Pew Research Center surveyed 4,708 U.S. adults on how they were using social media. Of those interviewed, 36 percent of users were using social media to make posts to show their support of a social or political cause, 35 percent looked for information on rallies or protests, and 32 percent encouraged others to act on issues they saw as important.²⁰ Based on the social and political climate of 2020, these social and

¹⁶ Bailey-Ross et al, "Engaging the Museum Space," 691.

¹⁷ Bailey-Ross et al, "Engaging the Museum Space," 693.

¹⁸ Kylie Budge, "Objects in Focus: Museum Visitors and Instagram," *Curator: The Museum Journal* 60, no. 1 (2017): 67, <https://doi.org/10.1111/cura.12183>.

¹⁹ Peter Booth, Anne Ogundipe, and Sigrid Royseng, "Museum Leaders' Perspectives on Social Media," *Museum Management and Curatorship* 35, no. 4 (2020): 374, <https://doi.org/10.1080/09647775.2019.1638819>.

²⁰ Brooke Auxier, "Activism on Social Media Varies by Race and Ethnicity, Age, Political Party," FactTank, Pew Research Center, published July 13, 2020, <https://www.pewresearch.org/fact-tank/2020/07/13/activism-on-social-media-varies-by-race-and-ethnicity-age-political-party/>.

political areas are topics that visitors want to engage in, especially within museums that house physical culture and history that can activate these conversations.

Cellphones can also be effective for museums that wish to aid and attract underrepresented audience groups. Some of the prevalent topics discussed today involve the social movements that concern raising awareness of social identities and roles with which people identify. These social identities have always been present, but there has never been a platform as wide-reaching as the modern cellphone, which has global access and appeal. Steady advancements in digital technologies since the 1990s have allowed these groups to share their stories with a global audience.²¹ The museum space reflects the dynamics of the world outside it, whether it is brought in by visitors or displayed to them as an exhibition. Museums can greatly affect their audiences, by either educating them on topics or allowing an open forum where current issues can be discussed. Beyond this personal influence, they can act as a facilitator for social understanding for communities and create more equal societies.²² To encourage this process, museums have developed governing practices and programs that develop an inclusive experience, but though these efforts increase audience numbers, it frequently fails to change its diversity.²³ Mobile technologies, such as cellphones, have been a favorite with museum professionals due to their accessibility and many use them. These tools provide more active, quick feedback from audiences, compared to the traditional surveys and questionnaires.

²¹ Donna Hancox, "Transmedia for Social Change: Evolving Approaches to Activism and Representation," in *The Routledge Companion to Transmedia Studies*, ed. Matthew Freeman and Renira Gambarato (New York and London; Routledge, 2019), 332.

²² Richard Sandell, "Museums and the Combating of Social Inequality: Roles, Responsibilities, Resistance," in *Museums, Society, Inequality*, ed. Richard Sandell (London and New York; Routledge, 2002), 4.

²³ Karen Hughes and Gianna Moscardo, "For Me or Not for Me? Exploring Young Adults' Museum Representations," *Leisure Sciences: An Interdisciplinary Journal* 41, no. 6 (2019): 516-517, <https://doi.org/10.1080/01490400.2018.1550455>.

Museums use these forms of feedback to acquire information from specific visitor groups to involve them in the design process of exhibits and the museum space.²⁴ Cellphones, as well as other mobile devices, can allow the user to adjust multiple settings that make the device more accessible to the user's needs. Due to these capabilities, museums have the chance to reach out to a variety of groups that have been underrepresented in their audience populations.

There are international initiatives to foster inclusivity and ease of access in learning and museum environments. The ARCHES project, which stands for “Accessible Resources for Cultural Heritage EcoSystems,” is a prime example of a program that is trying to join the abilities of various technologies to support the needs of people with disabilities. The project uses technological advances such as 3-D modeling and barrier-free apps which have been co-designed by 200 people with disabilities throughout Europe. Four participatory research groups within ARCHES aid developers and researchers in creating digital and mobile programs to promote accessibility in the modern museum.²⁵ The ARCHES project estimates that their three-year timeline will produce publications, guidelines, apps, multisensory material, and games to aid museums in inclusion and supporting the access preferences of people.²⁶ The approach of projects such as this is not to develop tools that will categorize museumgoers by their disability, but instead, by what the museum can do to support accessibility. These same features can be useful for everyone who wants to receive and interact with the museum space and narrative.

²⁴ Vanessa Cesário et al, “Designing Interactive Technologies for Interpretive Exhibitions: Enabling Teen Participation Through User-Drive Innovation,” in *Human-Computer Interaction – Interact 2017: 16th IFIP TC 13 International Conference Mumbai, India, September 25-29, 2017 Proceedings, Part I*, ed. Regina Bernhaupt et al (Cham, Switzerland: Springer, 2017), 233.

²⁵ “ARCHES Helps European Museums to Become Barrier-Free with 3D Art Replicas, Mobile Phone Apps, Games, and Sign Language Video Avatars,” ARCHES, accessed February 28, 2020, <https://www.arches-project.eu/>.

²⁶ “Results,” ARCHES, accessed February 28, 2020, <https://www.arches-project.eu/results/>.

Tools such as the cellphone have capabilities that allow this new mindset to become a reality as they have a mixture of personal preference settings and advanced mobile technology. Outside the museum, cellphones are already being utilized in a manner that supports the accessibility needs of their user, which demonstrates a transfer into the institution of space would not be as difficult as museum staff and professionals would imagine.

Generally, the cellphone has many features that are already available to people with disabilities. To discuss how museums can utilize these features to benefit marginalized groups, it is necessary to briefly discuss mobile technology elements that support accessibility. Since Apple launched its iPhone 3GS, screen readers have been incorporated into smartphone Operating Systems (OS) to aid users to better interact with the device and have control over the OS and mobile applications (apps). The software mainly assists by detecting texts and commands on the cellphone's screen and announcing them to the user via text-to-speech.²⁷ Within the museum space, text-to-speech programs are useful for the capability to read text aloud for blind or visually impaired visitors, translate speech into text or sign language for the hard of hearing or deaf,²⁸ language conversion for foreign visitors,²⁹ or articulate text for readers with developmental disabilities. Museumgoers who have mobility impairments can benefit from the GPS technology within smartphones as it allows for them to navigate at their own pace and tailor tours to their interests without being required to keep up with tour groups. Content can be

²⁷ Gerard Goggin, "Disability and Haptic Mobile Media," *New Media & Society* 19, no. 10 (2017): 8, <https://doi.org/10.1177%2F1461444817717512>.

²⁸ Gregg Vanderheiden, "Redefining Assistive Technology, Accessibility and Disability Based on Recent Technical Advances," *Journal of Technology in Human Services* 25, no. 1-2 (2007): 152, http://dx.doi.org/10.1300/J017v25n01_10.

²⁹ Ayushi Trivedi et al, "Speech to Text and Text to Speech Recognition Systems – A Review," *IOSR Journal of Computer Engineering* 20, no. 2 (2018): 40, 10.9790/0661-2002013643.

automatically displayed on their screens as a visitor passes a certain exhibit that acts as a trigger point for the GPS.³⁰

Though the cellphone does much to aid the visitor, it also assists the cultural institution in addressing the issue of museum accessibility. Museums have the charge of making their spaces, material, and programs available to as many people as possible,³¹ but that becomes more complex depending on the specific needs of some visitors. There are requirements of inclusivity that museum professionals and staff could see as an issue, such as extra financial cost or hiring of specially trained staff. Regardless, the museum space needs to be as accessible to as many people as it can be, and museums have technologies available that could shift the costs and pressures off their shoulders. As previously stated in this thesis, visitors are entering the museum with their cellphones, which have shown to be both an active and affordable tool to museums. By tapping this resource, accessibility can become attainable for more museums who wish to better serve their audiences.

Cellphones and COVID-19

Recent events have also shown the cellphone's ability to aid museums during a crisis, acting as a place of contact and a tool to assist in enforcing safety regulations. In late 2019 and throughout 2020, the COVID-19 pandemic has swept through the world. It is a highly contagious infection of the upper respiratory tract that is spreading as easily as influenza strains or the

³⁰ Kim Spencer, "Leveraging Smartphone Technology to Protect Museum Visitors," American Alliance of Museums, July 3, 2020, <https://www.aam-us.org/2020/07/03/leveraging-smartphone-technology-to-protect-museum-visitors/>.

³¹ EunJung Chang, "Museums for Everyone: Experiments and Probabilities in Telepresence Robots," in *Exploring Digital Technologies for Art-Based Special Education: Models and Methods for the Inclusive K-12 Classroom*, ed. Rick Garner (New York and London: Routledge, 2019), 65.

common cold.³² To stifle the spread of the virus, both self and official quarantines were mandated. With an overwhelming amount of physical isolation, much of society turned to the digital world to serve their need for socialization. This unprecedented time has left many institutions, especially museums, floundering to survive in a world that does not accommodate the traditional relationship between museums and their audiences. The Network of European Museum Organizations conducted a study in Europe in 2020, with 92 percent of European museums reporting that they had closed due to the COVID-19 pandemic.³³ When museums were finally permitted to open, mostly out of financial pressures, it was at a limited capacity. Audience members and staff were required to wear masks and remain at least six feet apart, large groups were restricted, and small spaces could only hold a certain number of people. Such restrictions diminished the museum environment that supports social and educational interaction as there were no guided tours, interactive activities, or lectures authorized in this new reality.

Implementing digital technologies, especially cellphones, is an effective step in countering the fallout of crises such as COVID-19. As museums were initially closed, many have come to depend on social media and mobile apps to survive. For example, state museums in Italy began utilizing their social media platforms as more than mere instruments of communication but to make information more broadly available. Museums across the country doubled their posts in April 2020 on Facebook, Twitter, and Instagram, providing content such as interviews, virtual

³² David L. Heymann and Nahoko Shindo, "COVID-19: What is Next for Public Health?," *The Lancet* 395, no. 10224 (February 2020): 544.

³³ Sarah Dominique Orlandi, "Museums Web Strategy at the Covid-19 Emergency Times," *DigitCult - Scientific Journal on Digital Culture* 5, no 1 (2020): 58.

treasure hunts, and virtual guided tours led by museum directors.³⁴ In turn, the social interactions from the public spiked.³⁵

Mobile apps are also supported by the museumgoer's cellphone which will be discussed in detail in Chapters Three and Four. Museums such as the Yale University Art Gallery and the White House Historical Association implemented their museum app's digital tour features to allow visitors to carry out curated tours, safely from home. Positive opinions of digital activities such as these are that they are a safe, entertaining way to escape the stress of professional and educational pressures that are on technological outlets because of COVID-19.³⁶ In turn, museumgoers also save the cost of having to travel to a museum or can see collections that are not near them.³⁷ In addition to virtual tours, access to everything a museum has to offer, such as recorded events, financial donations, and museum updates, is available through mobile applications.³⁸ Utilizing popular platforms, such as social media and mobile apps, has proven to be a successful line of engagement, leading museums to rethinking their prior use of these outlets. Furthermore, cellphones proved to be useful as museums re-opened during the COVID-19 pandemic. Due to safety regulations, services such as guided tours and loanable tour devices were no longer available to museum visitors. The use of mobile apps to deliver guided tours was

³⁴ Deborah Agostion, Michela Arnaboldi, and Antonio Lampis, "Italian State Museums During the COVID-19 Crisis: From Onsite Closure to Online Openness," *Museum Management and Curatorship* 35, no.4 (2020): 366, <https://doi.org/10.1080/09647775.2020.1790029>

³⁵ Agostion, Arnaboldi, and Lampis, "Italian State Museums," 369.

³⁶ Ranny Rastati, "Virtual Tour: Tourism in the Time of Corona," in *the 6th International Conference on Social and Political Sciences* (Paris, France: Atlantis Press, 2020), 491.

³⁷ Rastati, "Virtual Tour," 491.

³⁸ "How Museums Are Leveraging Their Mobile Apps During Covid-19," Tips & Trends, Cuseum, published May 1, 2020, <https://cuseum.com/blog/2020/5/1/how-museums-are-leveraging-their-mobile-apps-during-covid-19>.

a tactic already being used by museums, with audio tours having been given through cellphones since the 2000s.³⁹ Using these digital guides to replace docents and guide devices will aid museums in their adherence to safety regulations in the future. Mobile apps also allow for a reduction in contact due to their ability to give the user instant access to the general information about a museum. The mobile app is typically the museum website reproduced into a format acceptable for the standard cellphone.⁴⁰ These examples support the modern museum's goals of sustaining a place of social and educational growth, even when the physical institution is unavailable.

COVID-19 has shown the adaptability of museums, but also the need for preparedness plans that incorporate digital technologies when museums disconnect from their communities. A preparedness plan highlights the weak points within an institution that an emergency can exacerbate. This plan outlines ways to prevent or lessen effects, coordinate staff duties, and a recovery plan.⁴¹ Though these plans are commonly developed to alleviate the fallout of events like natural disasters or human activity,⁴² events like COVID-19 threaten museums too since without the financial support and physical presence of the visitor, museums lack both support and purpose. The American Alliance of Museums, an organization that represents the professional museum community, surveyed on June 8, 2020 of 750 museum directors. Of those who responded, 33 percent of their institutions are at a high risk of permanent closure with 87

³⁹ Ellen Giusti, "Improving Visitor Access," in *Digital Technologies and the Museum Experience: Handheld Guides and Other Media*, ed. Loic Tallon and Kevin Walker (Maryland: AltaMira Press, 2008), 101.

⁴⁰ Pawel Weichbroth, "Usability of Mobile Applications: A Systematic Literature Study," *IEEE Access* 8 (2020): 55563, 10.1109/ACCESS.2020.2981892.

⁴¹ Valerie Dorge and Sharon Jones, "Introduction," in *Building an Emergency Plan: A Guide for Museums and Other Cultural Institutions* (Los Angeles: The Getty Conservation Institute, 1999), 4.

⁴² Dorge and Jones, "Introduction," 11.

percent claiming that their museums had only a year or less of financial reserves. Interestingly, 75 percent of these directors said that their museums used virtual educational programs to reach their audiences, especially students, parents, and teachers.⁴³

To support themselves financially, there are cases of museums monetizing this digital content. For example, the Mattatuck Museum in Connecticut physically shut its doors in March 2020 but has remained virtually active, charging a ten-dollar fee for Murder Mystery events. Other museums are offering virtual memberships with inclusive digital content at a fee, such as the Carnegie Museums of Pittsburgh which hosts members-only digital events while their museum is closed.⁴⁴ Though these examples are a general argument for the aid digital technologies can give during a crisis, there are no reasons why the presence of personal mobile devices such as cellphones cannot be always included as museums have shown their malleability when it comes to technology.

The fears of museum staff should be addressed regarding the negative impact of cellphones in a museum environment, as these are the professionals that understand the framework of their institutions best. There is an outdated assumption by traditional museologists that the museum space is meant to be free of technology. Even in the modern era, some museums rarely approve of visitors taking photographs and even discourage cellphone use.⁴⁵ The most

⁴³ Natanya Khashan, “United States May Lose One-Third of All Museums, New Survey Shows,” Press Release, American Alliance of Museums, published July 22, 2020, <https://www.aam-us.org/2020/07/22/united-states-may-lose-one-third-of-all-museums-new-survey-shows/>.

⁴⁴ Brendan Ciecko, “How Museums Can Generate Revenue Through Digital Content and Virtual Experiences,” Financial Stability, American Alliance of Museums, published July 22, 2020, <https://www.aam-us.org/2020/07/22/how-museums-can-generate-revenue-through-digital-content-and-virtual-experiences/>.

⁴⁵ Jonathan P. Bowen and Tula Giannini, “The Digital Future for Museums,” in *Museums and Digital Culture: New Perspectives and Research*, ed. Tula Giannini and Jonathan Bowen (Switzerland: Springer, 2019), 552.

widespread application of cellphones in the museum is their use in visitor personal photography. Some curators and directors would define cellphones and personal photography as intrusive, superficial, and noisy. Quiet contemplation, they believe, is required to observe exhibits and objects.⁴⁶ Arguably, this is not how visitors create experiences. If the museum aims to create meaning-making moments, in which visitors will include personal influences in their interpretation of the museum environment, they need to understand how visitors individually do this, even outside the museum walls. Mementos such as photographs not only document an event but aid visitors to process it.⁴⁷ Moreover, visitors desire to prove that they have traveled to distant destinations and enjoyed different cultures. They will post their photographs of these experiences on popular social media sites. This kind of exposure can allow museums to explore visitor encounters and level of engagement within the institution using metadata associated with location, time, user profiles, hashtags, and readily available analytics.⁴⁸ Such media exposure can also increase the online presence of the museum without the active participation of its staff.

Another negative assumption about cellphones, even outside the museum, is that they distract visitors from their physical surroundings. A study University of Pittsburgh associate professors Drs. Fang-Yi Flora Wei, Y. Ken Wang, and Michael Klausner⁴⁹ showed that audience groups, such as college students, have difficulty incorporating new information when using their

⁴⁶ Stylianou-Lambert, "Photographing in the Art Museum," 115.

⁴⁷ Brian O'Doherty, "The Eye and the Spectator," in *Inside the White Cube: The Ideology of the Gallery Space* (Santa Monica & San Francisco: The Lapis Press, 1986), 52.

⁴⁸ Huy Quan Vu et al, "Evaluating Museum Visitor Experiences Based on User-Generated Travel Photos," *Journal of Travel & Tourism Marketing* 35, no. 4 (2018): 495, <http://dx.doi.org/10.1080/10548408.2017.1363684>.

⁴⁹ Dr. Fang-Yi Flora Wei is an associate professor of Communications, Dr. Y. Ken Wang is the associate professor and director of Computer Information Systems and Technology Program, and Dr. Michael Klausner is an associate professor of Sociology at the University of Pittsburgh, Bradford.

cellphones in educational situations. Between the need to update social media platforms, answer emails, send texts, and instant messages (IMs), cellphones frequently require their users to switch from reality to digital reality.⁵⁰ For a more general audience, another survey was conducted by Asurian, a technology insurance company, from August 18th to 20th in 2019, which revealed that 1,998 U.S. smartphone users who completed the survey admitted to checking their phone around 96 times a day – which equals one glance or viewing every 10 minutes. Interestingly, almost half of the participants see their smartphones as tools to aid them in achieving a work-life balance.⁵¹ With this information in mind, it is safe to assume that it is little the museum can do to counter cellphone use when a visitor enters a museum. Forbidding cellphone use may act as a deterrent to those the institution wishes to attract the most, such as young adults since 18- to 24-year-olds check their phones twice as much as any other age group.⁵² Essentially, museums that oppose cellphones are making an unresolvable point as visitors are too attached to their mobile devices outside of the institution’s walls. It is better to accommodate this by ensuring that when visitors look at their cellphones, they are still looking at some form of content.

Other concerns of museum professionals are how cellphone-based programs in the museum space will be accepted and engaged with by specific audience segments, both in groups and as individuals. Family groups make up a specific portion of the visitor population of numerous museums and thus, their needs would be imperative in the design of a cellphone-based

⁵⁰ Fang-Yi Flora Wei, Y. Ken Wang, and Michael Klausner, “Rethinking College Students’ Self-Regulation and Sustained Attention: Does Text Messaging During Class Influence Cognitive Learning?” *Communication Education* 61, no. 3 (2012): 186, <http://dx.doi.org/10.1080/03634523.2012.672755>.

⁵¹ Asurian, “Americans Check Their Phones 96 Times a Day,” Press Releases, accessed December 14, 2020, <https://www.asurian.com/about/press-releases/americans-check-their-phones-96-times-a-day/#:~:text=Americans%20now%20check%20their%20phones,tech%20care%20company%20Asurian1>.

⁵² Asurian, “Americans Check Their Phones 96 Times a Day”.

program in the museum space.⁵³ A museum must consider the best way to approach the diverse group's many needs, capabilities, and desires. This situation is difficult, as socio-economic factors do not permit museums to assume that all visitors, especially family groups, have access to a personal cellphone, or have enough experience with the technology to utilize it to its full potential. Introducing a museum-provided device, such as a tablet, runs the risk of visitors being excluded from the museum experience if the person-to-device ratio is not balanced.⁵⁴ Additionally, any software or hardware problems will further discourage the user. The answer to these issues lies not in the implementation of mobile devices in the museum context but in the changes that their inclusion has made on museum practices.

As mentioned in Chapter One, establishing a process that allows for contribution and participation from the visitor, supported by the new paradigm, is essential. Generally, a narrative is a representation of a series or sequence of events.⁵⁵ When executed in its simplest form the traditional museum narrative is shown through labels, exhibition layouts, and didactic panels.⁵⁶ Within this definition, there is stress on the word "representation" as narratives are someone's concept of what representation should look like regarding a certain topic. In terms of a visitor narrative, this regards interactions and processes within the museum space where visitors gain knowledge of themselves and exhibits. With this information, visitors construct their distinctive

⁵³ Stefan Rennick-Egglestone et al, "Families and Mobile Devices in Museums: Designing for Integrated Experiences," *Journal on Computing and Cultural Heritage* 9, no. 2 (May 2016): 1.

⁵⁴ Rennick-Egglestone et al, "Families and Mobile Devices in Museums," 6.

⁵⁵ David Rudrum, "From Narrative Representation to Narrative Use: Towards the Limits of Definition," *Narrative* 13, no. 2 (2005): 196, <http://doi.org/10.1353/nar.2005.0013>.

⁵⁶ Sunghye Choi, "Making the Negotiation Between Narratives of Museums and a Visitor," 23.

narratives under the influence of their own experiences, knowledge, and background.⁵⁷ This narrative differs from that of the museum interpretation, which traditionally bases its exhibitions on facts and objects.

The purpose of this traditional museum narrative is to allow visitors to immerse themselves in new worlds.⁵⁸ When a visitor narrative is supported by standard and modern technologies, such as cellphones, an interactive environment is further upheld. There is a difference between digital inclusivity and dominance in the museum space. If the narrative of the museum is too digitally rendered, it will only revert to the original issue of the museum dictating how the visitor wishes to experience their museum visit. There is the further exclusion of those who are not digitally native nor desire its aid while they interact with the museum narrative. There will always be members of the audience who enter the museum for the conventional experience and will reject the technologies introduced. The traditional approach is occasionally all a museumgoer will need to develop their own experience and meanings. The introduction of cellphones can assist in the museum's role as both an educator and a storyteller but cannot completely replace the traditional narrative. In the example of family groups, allowing them to choose how they wish to experience the narrative the institution offers and accepting that they will interpret representation in their way, is the first step to a more universal inclusion.

Cellphones have a place in the museum context, though how they will achieve the most effective outcome needs to be determined by the individual museums' needs and capabilities.

⁵⁷ Sunghee Choi, "Making the Negotiation Between Narratives of Museums and a Visitor: Empowering a Visitor Through Narrative-Making" (PhD diss., The Pennsylvania State University, 2010), 22, https://etda.libraries.psu.edu/files/final_submissions/5596.

⁵⁸ Leslie Bedford, "Storytelling: The Real Work of Museums," *Curator: The Museum Journal* 44, no. 1 (2001): 31, <https://doi.org/10.1111/j.2151-6952.2001.tb00027.x>.

While some will require the latest technologies to deliver the cultural or scientific narratives their objects have, others will only need modern devices to act as a supporting role as communicative devices. The full incorporation of cellphones into museums is part of a broader discussion of digital technologies in general. Changing technology in the museum space will be continuous, as these digital assets rapidly develop. The multitude and speed of these changes are due to the advancements of technology as well as their varying roles in society and entertainment. This unsteady characteristic alone may be one reason why museum professionals are wary of introducing or accepting cellphones as they require continuous updating. Regardless, the cellphone is present, though sporadic, in museums. To aid in focusing scholarship on how the public as well as specific audience groups are motivated to either ignore or utilize, specific cellphone technology will be explored in the following chapters.

Chapter Three: Bring Your Own Museum Tool

In this era of rapidly changing technologies, remaining loyal to traditional museum practices can be lethal to an institution. It is not entirely the fault of these conventional museums, as exploring the application of digital technologies is costly and often exceeds the expertise of in-house professionals. Case studies and research of various applications that use cellphones as a platform for active interaction with visitors are either scattered or narrowly specific to the museum that sponsored the research. Regardless, a case study-based approach is still beneficial to proving the advantages of cellphones in the museum space as studies honed to the details of a single museum relay general information and patterns of effective technology applications. This chapter will focus on the benefits and drawbacks of popular technologies that work in conjunction with the cellphone. Examples will include mobile applications (apps), quick response (QR) codes, and augmented reality. Exploring the advantages and shortcomings of each application allows for a well-rounded understanding of its applicability and will demonstrate that the active experience that museum visitors are seeking can be supported by these applications and the modern cellphone.

Mobile Applications

Mobile apps are a familiar, readily available tool for museums. Since 2008, there has been an abundance of apps made, even for the museum experience.¹ Museums have created apps to have a strong presence in the lives of their increasingly technologically native visitors. A problem arises though since introducing the technology is, at times, beyond the museum staff's capabilities. Many museums will contract developers to construct the framework of the mobile

¹ Ted Forbes, "Native or Not? Why a Mobile Web App Might Be Right for Your Museum," in *Mobile App for Museums: The AAM Guide to Planning and Strategy*, ed. Nancy Proctor (Washington DC: The AAM Press, 2011), 381.

apps for them, but it is the responsibility of museum professionals to determine what the app needs to accomplish for both the museum and audience.

First, a museum must decide what resources they can invest in the app. These resources dictate the quality of the app and its potential outreach. Next, a museum must choose which of the two types of apps, device-native or web-based, will better serve the institution. The familiar device-native app is directly downloaded onto the device from an app store, whereas a native app has access to and is supported by the cellphone's hardware. Native apps are also considered more marketable in mobile app stores and recognizable as they support user interactions on the cellphone.² Web-based applications are not as integrated into the interface of a user's cellphone but instead, imitate the cellphone's operating system. This type of app functions from a web browser, augmenting a website for optimal viewing on a mobile device, offering some options from device-native apps.³ An application can be a hybrid of the two by taking certain features from both if it is beneficial to be so. Both application formats offer their benefits, but device-native apps allow for the active implementation of the app, and cellphone, in the museum space. It is these elements that make them more marketable than their web-based counterparts.

The main benefit of the device-native app is the utilization of the many features of the user's cellphone. Features such as increased access to collections and engagement between the museum, its exhibits, and audiences frequently are referenced as reasons why museums should adopt tools such as mobile apps. Mobile apps, like cellphones, act as a platform for other tools to be executed from and come with their advantages. One such tool is augmented reality (AR)

² William Jobe, "Native vs. Mobile Web Apps," *International Journal of Interactive Mobile Technologies* 7, no. 4 (2013): 28, <http://dx.doi.org/10.3991/ijim.v7i4.3226>.

³ Jobe, "Native vs. Mobile Web Apps," 28.

which functions in correspondence with mobile apps. AR is a “real-time direct or indirect view of a physical real-world environment that has been enhanced/augmented by adding virtual computer-generated information to it. AR is both interactive and registered in 3D as well as combines real and virtual objects.”⁴ In addition to AR, mobile apps can work alongside quick response codes, commonly known as QR codes. Appearing on exhibit labels or other areas of the gallery, QR codes can act as physical links within the museum space to various pages and resources in the museum mobile app. QR codes are translated by a scanner that reads a matrix code to present information to the user.⁵

Recent studies show that when introduced to a museum’s mobile app, users preferred the reanimation of conventional instruments such as museum maps, audio and visual tours, timetables of exhibits, and upcoming events. They also enjoyed new ways to purchase tickets and frequent updates on the museum.⁶ Mobile apps can allow museums to provide modern solutions for visitors, even beyond the museum walls. The apps require constant access to Wi-Fi or cellular connectivity to be functional. To users who do not have data plans or museums that do not offer free internet access, this can be an issue. To counter this, mobile apps on numerous platforms can be developed to be partial, if not fully, functional without internet access.⁷ Naturally, the app will not be able to perform all functions, such as updating or presenting

⁴ Julie Carmigniani et al, “Augmented Reality Technologies, Systems and Applications,” *Multimedia Tools and Applications* 51 (2011): 342. <https://doi.org/10.1007/s11042-010-0660-6/>.

⁵ José Rouillard, “Contextual QR Codes,” in *Proceedings of the Third International Multi-Conference on Computing in the Global Information Technology* (New York City, New York: IEEE, 2008), 51.

⁶ Fedrica Palumbo, Gandolfo Dominici, and Gianpaolo Basile, “Designing a Mobile App for Museums According to the Drivers of Visitor Satisfaction,” in *Recent Advances in Museum Management and Marketing Proceedings of the 1st International Conference on Management, Marketing, Tourism, Retail, Finance, and Computer Applications* (Athens, Greece: WSEAS Press, 2013), 163.

⁷ Palumbo, Dominici, and Basile, “Designing a Mobile App for Museums,” 163.

current information, but it can give a user access to established guides or maps that do not require frequent change.

As previously mentioned, mobile apps may also house digital copies of customary museum tools such as maps. In the context of large, crowded museums, even useful items such as maps can become confusing and frustrating to visitors. Wayfinding through mobile apps has become executable for sizable institutions that wish to guide their visitors through personalized tours; they include features such as bookmarking favorite halls or exhibits beforehand and a social media interaction that allows for visitors to share comments on objects and exhibits.⁸ Essentially, wayfinding is meant to find and follow a chosen route for a user. The most common example is the mobile app, Google Maps, which is used by many to navigate roads and outdoor environments.⁹ Mobile apps are essentially more advanced museum websites that invite a higher level of interaction and give essential data to audience members who wish to have it in the palm of their hands.

Mobile apps have become popular as they both encourage the educational role of the museum¹⁰ as well as incite interactions between visitors, but apps also come with disadvantages. One drawback of mobile apps, in general, is the lack of primary data that shows how their use improves the museum visit. Many museums use mobile apps and websites to give open access to a catalog of their collection or traveling exhibits, but this can lead to copyright concerns.

⁸ Henry Tsai and Kelvin Sung, "Mobile Applications and Museum Visitation," *Computer* 45, no. 4 (2012): 95, <https://doi.org/10.1109/MC.2012.143>.

⁹ Jo Morrison, "Mobile Digital Wayfinding Tools: Enabling and Enhancing the Experience of Visitors with Different Access Needs," in *Inclusive Digital Interactives: Best Practices + Research*, ed. Beth Ziebarth et al (Washington DC: Smithsonian Institution Scholarly Press, 2020), 326.

¹⁰ Katerina Kabassi, "Evaluating Websites of Museums: State of the Art," *Journal of Cultural Heritage* 24 (2017): 194, <https://doi.org/10.1016/j.culher.2016.10.016>.

Typically, cultural institutions like museums are protected by fair-use exemptions in copyright laws when displaying protected artworks. There is a certain kind of danger with this type of digitization, as it opens copyrighted artwork, usually contemporary, to unlimited access, distribution, and alteration.¹¹ The institution must do an in-depth investigation of each object in their collection to identify the copyright owner if there is any.¹² Next, further determinations need to be made on whether the content is ready for mobile engagement, such as developmental issues regarding high-definition photography or even multi-dimensional displays.

Maintenance of the mobile app requires updates and patches to keep it fully functional. Other concerns exist such as which operating platform a museum will develop and release the app on, with the main options being Android or iOS for Apple products.¹³ To reach the widest possible audience, both should be used. Depending on the amount of content and the other goals of the museum for the app, development and maintenance will likely require a team of specialists. These specialists can include professionals such as programmers to develop the app for various platforms to who designers can incorporate quality photos and graphics. In some cases, museums will contract this work out to avoid the expensive, laborious job themselves. Developing a museum app comes with a high cost; the typical app costs an average of \$35,000.¹⁴

¹¹ Sharon Appel, "Copyright, Digitization of Images, and Art Museums: Cyberspace and Other New Frontiers," *UCLA Entertainment Law Review* 6, no. 2 (1999): 151-153.

¹² Peter Hirtle, Emily Hudson, and Andrew Kenyon, "Fair Use and Other Exemptions," in *Copyright and Cultural Institutions: Guidelines for Digitization for U.S. Libraries, Archives, and Museums* (Ithaca: Cornell University Library, 2009), 102.

¹³ Stefania Boiano, Jonathan Bowen, and Giuliano Gaia, "Usability, Design, and Content Issues of Mobile Apps for Cultural Heritage Promotion: The Malta Culture Guide Experiences," in *Proceedings of the Electronic Visualization and the Arts Conference*, ed. Jonathan Bowen, Suzanne Keene, and Kia Ng (New York City, New York: Springer, 2013), 1.

¹⁴ Nancy Proctor, "Mobile Business Models in a 2.0 Economy," in *Mobile Apps for Museums: The AAM Guide to Planning and Strategy*, ed. Nancy Proctor (Washington DC: The AAM Press, 2011), 288.

Nancy Proctor, a leading figure in digital and mobile technologies in museums and the deputy director for digital experiences and communications at the Baltimore Museum of Art, describes the reality of mobile apps in her guides for integrating mobile technologies into museums. Proctor explains that “the metrics of success for mobile...are therefore not just the number of downloads and dollars received, but also the extent to which the mobile program can engage audiences and support other museum programs, activities, and revenue streams.”¹⁵ With all these aspects to consider, many cultural institutions need to ponder if a mobile app is suited to their needs, is worth the initial cost and upkeep, or if their website is not already sufficient.

Yet for all the above, for digital technologies to enter the museum, mobile apps are a popular choice. The Cleveland Museum of Art (CMA) has become renowned for such innovation. The institution developed “ArtLens,” a mobile app that provides guided tours and various types of information. It is a device-native application that integrates position location and image scanning, which utilizes the cellphone’s camera to scan objects to convert them into digital data.¹⁶ These additions aided in guided tours, location discovery, directions, and links to additional material about an exhibit. The app also allows for further interaction past the museum visit, permitting users to explore collections, even edit and share them. Furthermore, the CMA app alleviates fears involving copyright issues, as artists who require permission to alter or share their art are listed and their work digitally guarded, as much as possible, to keep users from

¹⁵ Nancy Proctor, “Mobile in Museums: From Interpretation to Conversation,” in *The International Handbooks of Museum Studies*, ed. Sharon Macdonald and Helen Rees Leahy (Hoboken: Wiley-Blackwell, 2015), 520.

¹⁶ Xu Wei and Zhong Jianping, “Mobile Application Used in Museum Learning and Its Case Study,” in *International Conference of Educational Innovation Through Technological* (Washington DC: IEEE, 2015), 91.

downloading it.¹⁷ This feature is vital to the social and creative capabilities of mobile apps which allow users to develop and share their creations through social media platforms. Instead of developing the narrative for the user, the CMA app is opening the floor for the user to utilize mobile technology in a personalized way by including individualized tabs that save the user's favorite exhibits. Additionally, this app contains necessary data that some users want, such as maps, screen readers for didactic panels, and lists of artworks viewed by the museumgoer. Attributes such as this can attract audience members; although not all of them will want the complete digital experience, some will feel comfortable with the idea of its availability. To accommodate the cost of the app's development, corporation sponsorship, advertisements, or membership fees could be applied.

Museums have begun to incorporate wayfinding into their mobile apps to allow users to select and follow their personally created tours through an institution. This feature is a tool of convenience and exploration for all users who enjoy the cultural experience of a museum at their own pace and with their personal accessibility needs in mind. There are emerging examples of standalone mobile apps that function with this as their sole purpose. The UCAN GO app is a free-to-use tool that has two main functions: an audio or visual description to aid the user in adjusting to a new area and a route finder to allow them to individually traverse a space. A clear interface, as seen in figure 1, allows users to select which accessibility features they will need during their trip. Building descriptions and accompanying images allow users with visual impairments to create audio maps to navigate the physical venue before they enter it. Once inside, the routing feature will pinpoint their position in the building and aid them in routing

¹⁷ "ArtLens App," The Cleveland Museum of Art, accessed November 8, 2020, <https://www.clevelandart.org/artlens-gallery/artlens-app>.

using visual cues or landmark-based audio instructions.¹⁸ Older adult visitors also benefit from this feature. As populations age, mobility and cognitive disabilities may arise. Age-related cognitive changes can affect abstract reasoning, working memory, and spatial orientation.¹⁹ Older adults value the ability to remain active and mobile, with activities such as visiting museums allowing them to enjoy social connections and engaging experiences. Wayfinding can ensure the safety of older adults, support their long- and short-term memories, and give them control of their day-to-day life.²⁰ Wayfinding enables older adult users to plan for uncertainty predetermining routes through a museum, and once there, orient themselves on personalized routes.²¹

Quick Response Codes

QR are digital additions to the museum space that allows visitors to choose when to engage with the technologically supported narrative presented by the museum. They act as a bridge from the physical world to more data in the digital landscape. Typically, QR codes have worked in conjunction with device-native applications and the user's cellphone, which is needed for the camera. The QR code can convert traditional media such as text or images to a hybrid communication media through the medium of a symbol. This format consists of a linear barcode traditionally used in commercial contexts. As seen in figure 2, the two are similar, but the QR is more compact and can be customizable. The symbols are scanned by a cellphone's camera that

¹⁸ Morrison, "Mobile Digital Wayfinding Tools," 329.

¹⁹ Sherry Willis, "Everyday Cognitive Competence in Elderly Persons: Conceptual Issues and Empirical Findings," *The Gerontologists* 36, no. 5 (1996): 596, <https://doi.org/10.1093/geront/36.5.595>.

²⁰ Laura Sorri, Eeva Leinonen, and Mari Ervasti, "Wayfinding Aid for the Elderly with Memory Disturbances," *ECIS 2011 Proceedings* 137 (2011): 1, <https://aisel.aisnet.org/ecis2011/137/>.

²¹ Morrison, "Mobile Digital Wayfinding Tools," 337.

has either software or a mobile application to interpret the encoded data within the square-shaped code.²² Their casual use in public spaces is a recent development²³ that has led to unique customizations from the typical square. To decrease the invasive nature of multiple digital screens relaying educational details, QR codes are easily created, low-cost replacements.²⁴ This application takes into consideration of counterarguments of museum staff regarding technology's intrusive nature. It is essential to explore the benefits and adverse effects of applying them in a museum context to understand the impact of QR codes on visitor satisfaction. Before adopting QR codes, museums should first consider the needs of their institution, the needs of their audience, and their ability to implement and maintain QRs along with their content.

The overall benefits of using QR codes have convinced numerous museums to include them as a more contemporary form of engagement with their audiences. These aspects range from their clean appearance to the way audience members interact with them. Display space appears to be a primary motivator for QR code use. Instead of using large didactic panels, museums have introduced QR codes as an avenue for more information.²⁵ QR codes and user mobile devices also offer useful analytics. This data includes the number of times a code is used,

²² Celalettin Aktaş, "QR Code as a Communication Technology and a New Medium," in *the Evolution and Emergence of QR Codes* (Newcastle upon Tyne: Cambridge Scholars Publishing, 2017), 29.

²³ Michelle Kelly Schultz, "A Case Study on the appropriateness of Using Quick Response (QR) codes in Libraries and Museums," *Library & Information Science Research* 35, no. 3 (July 2013): 207, <https://doi.org/10.1016/j.lisr.2013.03.002>.

²⁴ Mar Pérez-Sanagustín et al, "Using QR Codes to Increase User Engagement in Museum-like Spaces," *Computers in Human Behavior* 60 (2016): 73, <https://doi.org/10.1016/j.chb.2016.02.012>.

²⁵ Bryan L. Smith, "QR Codes: The Canary in the Coal Mine," in *Adult Education, Museums, and Art Galleries: Animating Social, Cultural, and Institutional Change*, ed. Darlene Clover et al (Boston: Sense Publishers, 2016), 250.

time used, and what type of device and browser an individual was using to access the code.²⁶

This data is useful to understand which displays are catching a visitor's attention and the average speed a visitor moves through a museum. All of this is valuable information concerning funding and audience research, as few alternatives can give precise, accurate information. Nevertheless, this is only the surface-level analytics that QR codes can be designed to collect. If a museum desires more detailed information, QR codes can link to more probing surveys on specific motivations and behaviors. Lastly, one of the most attractive benefits of this digital technology is that it takes relatively little effort and cost to produce. There are numerous free generators for QR codes online.²⁷ Physically executing the codes is not expensive either, depending on how a museum wishes to install them in their institution. Numerous examples can include codes posted on metal stands located at various points, to codes on a simple poster board that is placed next to exhibits. Relatively little work can result in providing visitors with the ability to explore a subject more broadly.

A successful example of the implementation of QR codes was the international traveling exhibit of *@Infinitum*. This project ran from March 2012 to June 2016, featuring fifty-four U.S. and Chinese artists. Between exorbitant insurance shipping costs in both China and the U.S., the expenses of this exhibit were considerably high. Taking budgetary concerns into the equation, the organizers of the demonstration introduced QR codes. The codes acted as tools to access more information about the display in a bilingual capacity. They also stood in the place of

²⁶ Smith, "QR Codes: The Canary in the Coal Mine," 250.

²⁷ Smith, "QR Codes: The Canary in the Coal Mine," 243.

objects that were missing.²⁸ In terms of application, this example covers both practical and audience engagement issues. Many members of the public think of museums as formal, traditional institutions. The introduction of QR codes permits a casual learning experience for some.²⁹ It also aligns with the active audience member narrative since it allows museumgoers to make the active choice of pursuing more information, based on their motivations.

Using Google Analytics, the exhibition collected information to answer questions about QR code use such as “did museumgoers use them?” and “are they engaging?” By October 2017, @*Infinitum* received 11,734 page visits, with 87.1% of the 5558 users being new. New users spent an average of 1 minute 37 seconds viewing the page, but returning users, about 12.9%, would spend an average of five minutes and 39 seconds.³⁰ These analytics show, at first, a curiosity for QR codes and then, when a user returns, a more engaging experience. If more in-depth material is needed, using the codes to direct visitors to surveys or questionnaires is also an option. In the end, executing QR codes are a low-risk, relatively low-cost way to integrate standard technology into the museum environment.

Based on this case study and overall research, it is important to consider several things before executing QR codes. First, ensure that the institution has efficient Wi-Fi³¹ to allow visitors to use the codes to access web pages in a timely, stable manner. This is not a requirement if the QR code links to a part of the museum’s mobile app. Second, decide which details are best suited

²⁸ Virginia Dressler and Koon-Hwee Kan, “Mediating Museum Display and Technology: A Case Study of an International Exhibition Incorporating QR codes,” *Journal of Museum Education* 43, no. 2 (2018): 160.

²⁹ Dressler and Kan, “Mediating Museum Display and Technology,” 161.

³⁰ Dressler and Kan, “Mediating Museum Display and Technology,” 163.

³¹ Dressler and Kan, “Mediating Museum Display and Technology,” 166.

for digital or physical content; putting too much information online or in a digital format may cause viewers to stare at their cellphones leading to a “head-down effect,” which disconnects them from their surrounding setting in the museum. Lastly, it is important to keep the sites that the QR codes link to updated and integrated, enticing the visitor to search further into the archives of data that stem from the original QR code, thus strengthening the educational role of their inclusion.

Since it has been established that QR codes are an excellent tool for linking physical objects to digital information and technologies, they have also been applied to aiding visitors who are disabled in the museum context. In Chapter Two, it was noted that cellphones have already present features that make them easily accessible tools for people who are mentally, physically, or developmentally disabled. QR codes can tap into this technology and allow access within the physical institution to create an inclusive experience for all audience groups. For example, although people with vision impairments make up about one billion of the world’s population,³² they are often excluded from the typical museum experience. The Victoria and Albert Museum (V&A) in London has created exhibitions more accessible to people with visual impairments. They allow their visitors to physically touch both replicas and original objects if there are no security or conservation issues.³³ The V&A has also incorporated cellphones and smartphones into their accessibility programs to both broaden the audience that can be served and work within their funding restrictions. Accessibility programs such as audio descriptions of objects are being written and recorded to allow for those who are blind or visually impaired to be

³² World Health Organization, “Blindness and Vision Impairment,” *Newsroom*, October 8, 2020, <https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment>.

³³ Barry Ginley, “Museums: A Whole New World for Visually Impaired People,” *Disability Studies Quarterly* 33, no. 3 (2013): 5, <http://dx.doi.org/10.18061/dsq.v33i3.3761>.

able to interact with objects. This multimedia guide is downloadable from the V&A's website and the V&A continues to develop an interface that is accessible to all visitors who have an interest in using it.³⁴

A recent prototype exhibition at the Maryland Archaeological Conservation Laboratory also demonstrates how exhibits can be designed for inclusivity. The exhibit is only a first step to model how QR codes can aid inclusivity in museums.³⁵ This show included 3-D replicas of stone projectile points (arrow heads) that were attached to a lanyard with a wooden disk containing a scannable QR code (figure 3). The code links to a specific webpage with information about the object. With this structure, the display was compact but durable enough to be handled.³⁶ This case study demonstrates the advantages of both 3-D printing and smartphone technology. 3-D printing can be used to create replicas that allow visitors who are blind or have low vision to handle objects and the QR codes permit them to access detailed information about the object they are experiencing. Once the QR code is scanned by the smartphone, a user can use a variety of accessibility features to access the information. These elements can include text-to-speech, or selective magnification, to allow users a closer look. A design strategy such as this can be implemented by institutions of varying sizes. The cost within this case study was \$350 for each QR code and 3-D replica, but experimentation with the materials and design process would allow for different materials to be used that can fit a smaller budget.³⁷

³⁴ Ginley, "Museums: A Whole New World for Visually Impaired People," 8.

³⁵ Cheryl Fogle-Hatch, "'Bring Your Own Device' (BYOD) Programming Facilities Accessibility for People Who Are Blind or Have Low Vision," *MW20*, January 15, 2020, <https://mw20.museweb.net/paper/bring-your-own-device-byod-programming-facilitates-accessibility-for-people-who-are-blind-or-have-low-vision/>.

³⁶ Fogle-Hatch, "Bring Your Own Device".

³⁷ Fogle-Hatch, "Bring Your Own Device".

Augmented Reality

As museums try to create a rich experience for their visitors, while also introducing inclusive and appealing tools, they have turned to augmented reality. Augmented reality (AR) seems like a surreal piece of equipment that only the technologically advanced could use efficiently and that the wealthy would afford. Luckily, advancements in its development have allowed for its application outside specialized fields and placed it in the hands of general audiences.³⁸ Despite their similarities, augmented and virtual reality is stark in their contrasts regarding user engagement. Virtual reality (VR) fully submerges a user in a digitally rendered environment with which they interact.³⁹ This experience can be delivered via a personal computer or a headset that covers the user's eyes and ears.

AR allows more interaction with the natural world. It permits users to interact with their environment, but with digital alterations that are laid over their physical environment. AR has been applied in various examples such as airline cockpits and classrooms. Though there are numerous ways to create AR, the most common tool to utilize is cellphones. There are two types of AR: markerless and marker-based. Markerless AR applies user positioning data acquired by a cellphone to pinpoint the location of the user before downloading digital data. Marker-based AR requires markers, such as at exhibits or certain spots, to accomplish the same purpose.⁴⁰ AR has

³⁸ Areti Damala, Isabelle Marchal, and Pascal Houlier, "Merging Augmented Reality Based Features in Mobile Multimedia Museum Guides," in *Proceedings of the XXI International Symposium CIPA 2007* (Athens, Greece: Athenai, 2007), 260.

³⁹ Timothy Jung et al, "Effects of Virtual Reality and Augmented Reality on Visitor Experiences in Museum," in *Information and Communication Technologies in Tourism 2016*, ed. Alessandro Inversini and Roland Schegg (New York City: Springer International Publishing, 2016), 623.

⁴⁰ Henry E. Pence, "Smartphones, Smart Objects, and Augmented Reality," in *The Reference Librarian* 15, no 1-2 (2010): 138.

been introduced to the museum context at varying levels and has met with different degrees of success. The reason behind the launch of AR into the museum world has, arguably, been due to the demand for museums to be more than just educational institutions, but entertainment establishments. A sense of competitiveness amongst museums has made them look for the latest attractions to bring in audiences.

Despite the advantages of VR, AR has benefits that can show that it is more suitable for the museum space. For instance, AR is less bulky since it does not require the additional equipment that VR does, which can burden a museum with space and financial expenditures as well. Additionally, this accessibility makes it more commonly available to users, as AR programs are frequently found on modern cellphones and other mobile devices. Many apps, such as Snapchat or Instagram, already use AR to entertain and engage their users socially. This example demonstrates a level of comprehension and familiarity that audience members will already have with the technology. Regarding application, AR can be a more cost-effective instrument if a museum uses marker-based tracking.⁴¹ QR codes are an example of a marker for AR. The ability to work in conjunction with QR codes has made AR a powerful asset in fields such as education, a role that museums hold prominent in their purpose. A user can scan a code and introduce an interactive AR program for the location or exhibition. Additional features include programs that give detailed didactic script at the user's request, visualize missing elements of an object, or give heightened accessibility to visitors who need intimate engagement with an exhibition to fully enjoy it. As seen in figure 4, the bones of a Pileated Woodpecker are brought to life with a representation of what it looked like as a living bird that is rendered with AR.⁴² This example is

⁴¹ Pence, "Smartphones, Smart Objects, and Augmented Reality," 143.

⁴² Marques and Costello, "Concerns and Challenges Developing Mobile Augmented Reality," 5-6.

from the mobile app, Skin & Bones, which was developed to increase visitor enjoyment and enforce the main goal of the Bone Hall in the Smithsonian's National Museum of Natural History, which is to study a collection that represents every group of vertebrate animals. There are thirteen skeletons featured in the app with ten AR experiences, thirty-two videos, and four activities are coupled with these selected exhibits to better display them to audiences. It proves that mobile technologies such as AR are not an attempt at gimmickry, but instead are essential for communicating detailed information about an exhibit to an audience.⁴³ The success of this app is shown that within the time since the app's development, it has achieved over 35,000 downloads.⁴⁴

AR has distinct problems such as museum professionals finding it an attempt at flashy gimmickry to keep audience members engaged. Another concern is technologies like AR are an invasive addition to the museum experience and not a supporting asset. To better explain the place of AR in the museum environment, is to outline its main goals, which is "to improve user's interaction between actual reality and the augmented one, adding natural feedback to the operator with simulated cues. These additional images expand the user's experience, providing engaging information that is easier to memorize and which improves attention."⁴⁵ These same studies show that AR controls the length of the visit and the time spent at each exhibition.⁴⁶ Though this gives the museum some influence over the flow of a museum visit, it goes against the narrative

⁴³ Marques and Costello, "Concerns and Challenges Developing Mobile Augmented Reality," 12.

⁴⁴ Marques and Costello, "Concerns and Challenges Developing Mobile Augmented Reality," 14.

⁴⁵ Francesca Serravalle et al, "Augmented Reality in the Tourism Industry: A Multi-Stakeholder Analysis of Museums," *Tourism Management Perspective* 32 (2019): 2, <https://doi.org/10.1016/j.tmp.2019.07.002>.

⁴⁶ Diana Marques and Robert Costello, "Concerns and Challenges Developing Mobile Augmented Reality Experiences for Museum Exhibitions," in *Curator: The Museum Journal* 61, 4 (2018): 543, <https://doi.org/10.1111/cura.12279>.

that institutions are trying to construct for the active visitor. As discussed before, AR is a standard technology and its use in the museum setting does not need to overwhelm the visitor. For some, it might require instruction. This issue can be remedied with options for more guidance through the AR program past the introduction screen, requiring development on behalf of the museum or their contracted team who are making the program.⁴⁷

One of the main problems with AR that museums have little control over is its environmental requirements. To work properly and efficiently, AR needs high voltage lighting to be activated, which excludes some objects with specific environmental needs from AR projects.⁴⁸ Within the museum, light is one of the many things that is monitored by staff, as high light levels, or even the wrong lighting, can damage delicate objects. Museums combine indirect lighting for illumination and spot lighting for highlighting objects within displays, but this takes skill as professionals need to balance risk and benefit when creating the lighting environment. Most museums set limits for an acceptable amount of light damage in trade for better visibility and allowing staff more freedom with lighting policies.⁴⁹ When determining a proper and functional lighting environment for an AR program, museum professionals need to consider if their museum space can handle the extra light, either natural or artificial. Furthermore, the technology functions best with plenty of open space. Crowded museum spaces may make it difficult for an AR program to scan a code or allow digital content to be laid out successfully.⁵⁰

⁴⁷ Marques and Costello, “Concerns and Challenges Developing Mobile Augmented Reality,”544.

⁴⁸ Marques and Costello, “Concerns and Challenges Developing Mobile Augmented Reality,”544.

⁴⁹ Genevieve Fisher, “Preventive Care,” in *Museum Registration Methods: 5th Edition*, ed. Rebecca A. Buck and Jean Gilmore (Washington DC; The AAM Press, 2010), 290.

⁵⁰ Marques and Costello, “Concerns and Challenges Developing Mobile Augmented Reality,”545.

Lastly, the cost of an AR program can be daunting. Many development companies estimate that 160 working hours and a custom-built, multi-feature AR app would cost a museum around \$300,000 or more. This price can change depending on the timeline, scope of work, and the development team available.⁵¹

Effective implementation of AR can be seen in Barcelona, Spain as a mobile augmented guide within Casa Batlló museum using augmented reality, featuring both indirect and direct views of the museum through the AR program. This architectural masterpiece was built by Antoni Gaudi and can receive up to 3,000 visitors a day due.⁵² An AR-driven tour is available as a game that requires visitors to use their cellphones to complete a series of puzzles.⁵³ Indirect AR is used for digitizing the physical environment of the museum, taking sweeping panoramic photos.⁵⁴ Based on questionnaires taken by 122 visitors, this application was generally used and well-received.⁵⁵ Based on the comments left on these questionnaires, in conjunction with the literature on AR, there were a few elements that would ensure success. First, if the AR is paired with audio, developers must ensure user control on volume and what the user sees and hears are synched. Second, the inclusion of closed captions provides further accessibility. Third, if possible, the AR should permit the user to set the speed of the spoken tour. Early AR programs

⁵¹ Arina Golosovskaya, "How Much Does Augmented Reality App Development Cost in 2021?" Invisible Toys, February 28, 2021, <https://invisible.toys/create-augmented-reality-apps/augmented-reality-app-development-cost/#:~:text=Augmented%20Reality%20app%20development%20costs,months%20and%20longer%20to%20develop>.

⁵² James Gimeno et al, "Combining Traditional and Indirect Augmented Reality for Indoor Crowded Environments: A Case Study on the Casa Batlló Museum," *Computers & Graphics* 69 (2017): 3, <https://doi.org/10.1016/j.cag.2017.09.001>.

⁵³ Gimeno et al, "Combining Traditional and Indirect Augmented Reality," 5.

⁵⁴ Gimeno et al, "Combining Traditional and Indirect Augmented Reality," 6.

⁵⁵ Gimeno et al, "Combining Traditional and Indirect Augmented Reality," 12.

were set on how long the narrative was expected to last in each room. Giving users freedom to control their pace by either GPS tracking or manual control is an additional contribution to the power of the active visitor. Lastly, the museum should ensure that the in-person experience is as rich without the AR. Some audience members will not want to interact with their cellphones or the AR program during their visit and this consideration will make the experience enjoyable for different demographics of the audience.

AR can further the museums' goal of being as inclusive as possible. Repeatedly, there appears to be a gap in the discussion concerning how to make the museum space welcoming to varied audiences.⁵⁶ Goals such as these have been the leading force in many studies conducted in the museum field today. Lesley Langa and her team partnered with a school that serves students with autism spectrum disorder (ASD), the Smithsonian Institution Accessibility Program (SIAP), the Smithsonian Center for Education and Museum Studies, and the Information Policy and Access Center at the University of Maryland to develop a two-phase research study on how mobile technology can help those with ASD during the museum experience. Ten families, with at least one child who has ASD with ages ranging from seven to eleven years old, volunteered to participate in phase one, which consisted of a questionnaire on the motivations of the families to visit a museum and their personal needs. Phase two involved the application of a technology that SIAP developed to assist visitors with ASD.⁵⁷

⁵⁶ Meredith Peruzzi, "Mind the Accessibility Gap," American Alliance of Museums, September 4, 2020, <https://www.aam-us.org/2020/09/04/mind-the-accessibility-gap/>.

⁵⁷ Lesley Langa et al, "Improving the Museum Experiences of Children with Autism Spectrum Disorders and Their Families: An Exploratory Examination of Their Motivations and Needs and Using Web-Based Resources to Meet Them," *Curator: The Museum Journal* 56, no. 3 (2013): 325-326, <https://doi.org/10.1111/cura.12031>.

Autism spectrum disorder consists of “a group of developmental disabilities that can cause significant social, communication, and behavioral challenges.”⁵⁸ People with ASD exhibit a range of characteristics that can be mild, meaning they have more advanced language and cognitive capabilities, to severe, where a person could be non-verbal.⁵⁹ Parents with children with ASD view involvement in community activities as important in their children’s development as they provide both enjoyment and meaningful learning experiences.⁶⁰ These parents note that there are barriers that prevent children with ASD from participating as frequently as children without.⁶¹ To provide an experience that caters to all people with ASD, museums need to create a digital environment that allows for self-regulation and self-control by the user, but assists, indirectly or directly, in guiding the user. Self-control is the act of completing an expected action by a visitor as a way of obeying an internal motivation. Self-regulation can be based on social interaction but can be maintained by strategies in which information is given by more experienced individuals through interactions or information which is delivered by mediating actions.⁶² Both of these attributes can be provided in a digital setting as a mobile technology environment can allow for the freedom of self-control but provide the structure of accurate information supplied by staff. The next factor involving people with ASD is selective and sustained attention. Selective attention is the ability of someone with ASD to be

⁵⁸ Langa et al, “Improving the Museum Experiences of Children,” 323.

⁵⁹ Langa et al, “Improving the Museum Experiences of Children,” 323-324.

⁶⁰ Langa et al, “Improving the Museum Experiences of Children,” 326.

⁶¹ Taylor Kulik and Tina Fletcher, “Considering the Museum Experiences of Children with Autism,” *Curator: The Museum Journal* 59, no. 1 (2016): 27, <https://doi.org/10.1111/cura.12143>.

⁶² Liliana Passerino and Lucila Santarosa, “Autism and Digital Learning Environments: Processes of Interaction and Mediation,” *Computers and Education* 51 (2008): 386-387, <https://doi.org/10.1016/j.compedu.2007.05.015>.

able to focus, despite the presence of a distraction. Sustained attention regards the person's ability to remain engaged and focused for an extended period.⁶³ The inclusion of interactive mobile technology can allow people with ASD to accomplish a task that is not repetitive and learn information without feeling overwhelmed or frustrated as they can set their own pace.

There is a lack of in-depth research and case studies of mobile technologies aiding museumgoers with ASD in a museum context, but there is material to demonstrate that, outside the museum, those with ASD respond well to cellphone and mobile-based programs. Augmented reality is immersive and engaging to a variety of audience groups. In a study led by Lizbeth Escobedo,⁶⁴ the Mobile Object Identification System (MOBIS) is an augmented reality app that the team developed to allow instructors to lay digital content over real-world objects.⁶⁵ MOBIS allows for instructors or moderators to set the level of prompting that each user requires while the system also tracks their progress. During this, algorithms constantly learn from users and apply the appropriate type of prompting that the system provides.⁶⁶ MOBIS increased the time students remained focused on a task by 20 percent and found that the only issue was understanding the initial smartphone interface.⁶⁷ As cultural institutions are constructing their mobile apps, they can have an inclusive approach that incorporates the feedback of people with disabilities. Integrating features that are present in MOBIS will allow professionals such as

⁶³ Lizbeth Escobedo et al, "Using Augmented Reality to Help Children with Autism Stay Focused," *IEEE Pervasive Computing* 13, no. 1 (2014): 38, 10.1016/j.compedu.2007.05.015.

⁶⁴ Lizbeth Escobedo is an associate professor at the Autonomous University of Baja California along with the rest of her research team compiled of Mónica Tentori, Eduardo Quintana, Jesus Favela, and Daniel Garcia-Rosas from the Center for Scientific Research and Higher Education.

⁶⁵ Escobedo et al, "Using Augmented Reality to Help Children with Autism Stay Focused," 38.

⁶⁶ Escobedo et al, "Using Augmented Reality to Help Children with Autism Stay Focused," 41.

⁶⁷ Escobedo et al, "Using Augmented Reality to Help Children with Autism Stay Focused," 43.

museum educators and school instructors to develop an appropriate and stimulating experience for visitors with disabilities.

There remain a variety of technologies that are untapped or have not been researched in depth that could be useful assets for museums. Through the careful integration of mobile apps, QR codes, and different realities in the museum space, the museum can allow visitors to construct their time at the museum and inquire into what truly intrigues them. In Chapter Four, applications that are based on mobile devices such as social media applications, gaming applications, and crowdsourcing will be discussed in the framework of emerging digital technologies within museums. There are still various gaps in the literature. The everchanging and updating world of modern technology causes these divides. Every year brings new models, codes, and devices that need time to be understood within a museum context. Additionally, this gap may also stem from a hesitation, or lack of ability, to execute these technologies in museums. By introducing these technologies into the museum space, necessary data would need to be gathered for museum staff and professionals to have the ability to see specific trends or patterns from environments where museumgoers are faced with modern technology. Once staff members have the skills to integrate these technologies into the institution, they need to reach out to the public to learn which programs will provide the best forms of engagement.

Chapter Four: The Cellphone's Recent Development as an Engagement Tool

Social media applications, crowdsourcing, and gamification are all examples of recently administered programs or features that have met with great success in the museum context. Despite these contemporary technologies being popular with museum audiences, they are difficult to maintain and keep updated for the average museum. It can be argued that new advancements in mobile technologies are not meant to replace the traditional museum experience, but to further expand its parameter and capabilities to engage the modern museumgoer. Both the physical institution and mobile technologies can complement each other to ensure that museums can continue to serve their audiences effectively.

Social Media Applications

The use of social media applications, such as Twitter, Facebook, or Instagram, allows the museum to gain access to a global audience and promote active engagement with their audience quickly. Additionally, these platforms allow the museum visit to become more of an informal learning experience. Based on studies done by the Pew Research Center in 2019, 72 percent of the American public use some form of social media, with platforms like Facebook, Instagram, and YouTube being the most popular.¹ Most, if not all, social media sites have a mobile application counterpart that is typically favored by users because of the ease of use and flexibility it provides. An online survey conducted by Adrienne Fletcher and Moon Lee of the Department of Public Relations at the College of Journalism and Communications at the

¹ Pew Research Center, "Social Media Fact Sheet," Internet & Technology, June 12, 2019, <https://www.pewresearch.org/internet/fact-sheet/social-media/>.

University of Florida² found that around 90 percent of American museums utilize social media. One of the positive attributes of social media applications is that they employ an already popular medium to extend the reach of museums. With over half the world's population – around 4.14 billion³ – using social media, museums can show their collections to anyone on the planet. As seen in figure 5, museums such as the Museum of English Rural Units utilize Twitter, a media popular on its mobile app, to show the audience snippets of their collection. This picture of a sheep gained over 112,000 likes and was shared 25,000 times on the platform. The effects also spread into the physical institution, which saw a 47 percent increase in visitors since becoming more active on social media.⁴ Though social media is not necessarily complex, a museum needs to develop an online persona to present to its digital visitor while creating content daily. In the example of the Museum of English Rural Units, the museum pairs its old photographs with modern dialogue that is both entertaining and familiar to its virtual audience. If museum staff wish for a more formal tone, the museum needs to consider if that tone will succeed in ensnaring audience attention.

Social media applications already have a place in the museum space, as museumgoers frequently interact with them during their visits. Personal photography was discussed in Chapter Two as one of the main uses of the cellphone in the museum, but photography also plays a

² Adrienne Fletcher and Moon J. Lee, "Current Social Media Uses and Evaluations in American Museums," *Museum Management and Curatorship* 27, no. 5 (2012): 510, <http://dx.doi.org/10.1080/09647775.2012.738136>.

³ Datareportal, "Global Social Media Overview," October 2020, <https://datareportal.com/social-media-users#:~:text=Facebook%20remains%20the%20world's%20most,platforms%20are%20owned%20by%20Facebook.&text=Facebook%20has%202.701%20billion%20monthly,2%20billion%20monthly%20active%20users>.

⁴ MuseumNext, "How Museum Can Use Social Media?," *Digital*, March 27, 2019, <https://www.museumnext.com/article/museums-can-use-social-media/#:~:text=Museums%20have%20been%20keen%20adopters,Tate%20attracting%20millions%20of%20followers>.

unique part in social media identities and interaction. Users of social media applications employ photographs to involve themselves in digital communities and to construct their social personalities in the virtual world as not only consumers but producers of content. On platforms like Facebook and Instagram, photographs become points of interaction for users.⁵ Museums can utilize this already active virtual ecosystem to encourage the participation and interactivity of visitors, using objects, exhibitions, and even other visitors as triggers. Within online social networks, which thrive on social media platforms, there are three main causes of association: influence, homophily, and environment.⁶ All of these motivations can be used by the museum to draw users to their virtual space, and even to their physical institution. Influence is the most forceful, as users are easily swayed by the actions of their online friends to do something similar, if not the same. Homophily refers to the sense of community users share when they have common interests with the environment while also stimulating social bonds.⁷ If these online interactions were put in the context of a museum, it would produce effortless exposure for the museum to both promote itself and assess its engagement with visitors. To extend this further, museums have begun to use the popular social media feature called the “hashtag.” Hashtags are keywords or phrases utilized by digital users to highlight topics and messages from the general content on social media.⁸ On most media platforms, hashtags are common, and museums can use

⁵ Kylie Budge and Alli Burness, “Museum Objects and Instagram: Agency and Communication in Digital Engagement,” *Continuum* 32, no.2 (2017): 139, <http://dx.doi.org/10.1080/10304312.2017.1337079>.

⁶ Costas Vassilakis et al, “Stimulation of Reflection and Discussion in Museum Visits Through the Use of Social Media,” *Social Network Analysis and Mining* 7, no. 40 (2017): 40, <https://doi.org/10.1007/s13278-017-0460-3>.

⁷ Vassilakis et al, “Stimulation of Reflection and Discussion in Museum Visits,” 40.

⁸ Marco Furini et al, “The Use of Hashtags in the Promotion of Art Exhibitions,” in *Proceedings of the 13th Italian Research Conference on Digital Libraries, IRCDL 2017, Modena Italy, January 26-27, 2017*, ed. Costantino Grana and Lorenzo Baraldi (Cham, Switzerland: Springer, 2017), 189.

them to promote exhibits, events, or even the institution itself by using geotags or hyperlinks that reveal the geographical information of an image or post.⁹ Additionally, online content that is attached to a hashtag allows a museum to easily find material associated with them to both evaluate user experiences and engagement, as well as for analytics such as user geographical origins.¹⁰

While continuing the conversation on the visitor's online interactions with the museum via social media, it is important to outline the benefits of subject matter created by the museumgoer. Personal curation, the collecting, editing, and sharing of content by the museum visitor via social media, has great meaning-making potential¹¹ as well as the chance to introduce a new learning environment. Meaning-making, how visitors interpret their museum experiences based on personal, cultural, and other outside influences, has been a common theme in this research, akin to its popularity in recent museum literature and audience scholarship. The introduction of social media in the museum space can stimulate audience members to develop new meaning-making scenarios. Inspiring museum visitors to create their material is not beyond the functions and purposes of the museum. The UK Museums Association characterizes one of the functions of the museum as an institution that encourages visitors to investigate objects to gain inspiration, education, and pleasure.¹² Meaning-making is transformed into the construction

⁹ Budge, "Objects in Focus: Museums Visitors and Instagram," 68.

¹⁰ Marco Furini et al, "The Use of Hashtags in the Promotion of Art Exhibitions," 197.

¹¹ Ben Rydal Shapiro and Rogers Hall, "Personal Curation in a Museum," *Proceedings of the ACM on Human-Computer Interactions* 158, no. 2 (2018): 13, <https://doi.org/10.1145/3274427>.

¹² David Gerrard, Martin Sykora, and Thomas Jackson, "Social Media Analytics in Museums: Extracting Expressions of Inspiration," *Museum Management and Curatorship* 32, no. 3 (2017): 232, <http://dx.doi.org/10.1080/09647775.2017.1302815>.

of a narrative by the visitor based on what they view within the museum and broadcast on social media.

In a study in which 222 Instagram accounts were reviewed and 14 interviews done of those who posted in 2012,¹³ some compositional and motivational concerns in the development of social media posts based on museum content were identified. First, museums provide the subject, but it is at the discretion of the user what they document and personally curate by editing these photos to fit any aesthetic or taste. Next, like the didactic panels and labels museums place beside their exhibits, a user captions their posts with a narrative that either describes their experience or personal thoughts on the subject.¹⁴ This process fits in the recent paradigm shift in which the visitor desires a more active role in the designing of their museum visit. In this case, they are creating the narrative they are experiencing and expressing by using their cellphones. Due to the control the visitor has over the tools, content, and encounters they can have in the museum, they are introduced to a new form of learning that is informal and directed by the learner. Social media with the aid of the cellphone can support informal learning inside and out of the museum space. Aspects including content creation and sharing with personalization of material allow for audiences to share cultures, common experiences, and be involved in the development of new content for museum collections. Social media allows for a large enough platform for the voice of a large, diverse group to input a variety of data.¹⁵ Certain audience

¹³ The study was conducted by Alexandra Weilenmann and Beata Jungselius of the Department of Applied Information Technology and Thomas Hillman of the Department of Education, Communication, & Learning from the University of Gothenburg.

¹⁴ Alexandra Weilenmann, Thomas Hillman, and Beata Jungselius, "Instagram at the Museum: Communicating the Museum Experience through Social Photo Sharing," in *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (New York City, New York: Association for Computing Machinery, 2013), 1847.

¹⁵ Russo et al, "The Impact of Social Media on Informal Learning in Museums," 162-163.

groups, such as digital artists or younger persons, use social media as repositories for their digital objects and artifacts.¹⁶ Data collected from a three-year study at a mid-South unnamed museum that focused on American roots and Country music¹⁷ shows that within the museum space, visitors commonly utilize their cellphones to collect images and videos. Next, visitors go through an editing process and share it on their social media to either include others in the experience, voice opinions of objects and the museum or indicate they were at that specific museum.¹⁸ As previously discussed in Chapter One, museums have the potential issue of copyright infringement with some of their art or objects. On the other hand, both physical and digital visitors are utilizing a museum's collection to create art that may go against the wishes of the copyright holder.

Participatory practices can include drawbacks such as the inability to control the use and interaction with media and the engagement of visitors. There are several disadvantages that professionals should be aware of when dealing with social platforms. First, it is important to understand that there are museums with a social media platform that have no negative experiences with the platform or those they engage, while others are plagued with them. It becomes the responsibility of the museum and its staff to decide the risks they are willing to take. The Holocaust Museum's YouTube channel, which began in August 2006, has an unmoderated comment section that is typically flooded with supportive comments or genuine questions, but it

¹⁶ Glynda Hull and John Scott, "Curating and Creating Online: Identity, Authorship, and Viewing in a Digital Age," in *Museum Communication and Social Media: The Connected Museum*, ed. Kirsten Drotner and Kim Schroder (New York: Routledge, 2013), 197.

¹⁷ This research was led by Ben Shapiro of the Georgia Institute of Technology, School of Interactive Computing, and Rogers Hall of Vanderbilt University's Peabody College of Education.

¹⁸ Shapiro et al, "Personal Curation in a Museum," 8-9.

also exemplifies the undesirable interactions museums can have with their audience on social media.¹⁹ YouTube has a sub-community of those who simply wish to antagonize and then there are the general museum visitors who are interacting negatively with the media. Like implementations of digital technologies, the drawbacks of social media can be exasperated without proper guidelines.²⁰ When developing a social network “persona” of one’s museum, constructing a social media policy unique to the institution is the best way to distinguish it from other museum media accounts.²¹ Once this policy is established, museums should adhere to it to remain as stable digitally as they are in the physical world. Though this policy can allow for proper handling of visitor engagement, museums are faced with the rising issue of how visitors use museum exhibits or displays digitally. As in the physical museum, there is little a museum can do to control how visitors create their experiences, which transfers over to the digital world. Though this takes control out of the hands of museums, this is a process that has already begun with the rise of the active visitor. Though this process can be unnerving to some museum staff, it is necessary to demonstrate an institution’s willingness to share power in designing the museum experience.

Young adults, aged typically from thirteen to nineteen, are another audience group that is under-represented in the populations that visit museums. Younger generations face barriers within museums that hinder their experience or deter them altogether. Obstacles such as finances

¹⁹ Amelia Wong, “Ethical Issues of Social Media in Museums: A Case Study,” *Museum Management and Curatorship* 26, no. 2 (2011): 104, <http://dx.doi.org/10.1080/09647775.2011.566710>.

²⁰ Padilla-Meléndez et al, “Web and Social Media Usage by Museums,” 897.

²¹ Bojana Suzic, Miroslav Karlíček, and Václav Strteský, “Social Media Engagement of Berlin and Prague Museums,” *The Journal of Arts Management, Law, and Society* 46, no. 2 (2016): 83, <http://dx.doi.org/10.1080/10632921.2016.1154489>.

or views of the institution being antiquated can manifest as social barriers. The result is young adults feel little connection with the modern museum and what it represents. When they do visit, teens and young adults frequently visit museums in a family or school groups, but they seem to be avoiding the institution when it comes to distributing their own leisure time.²² To counter this, many museums have begun to launch digital programs and activities. Additionally, this target audience is distinctively difficult to attract as they contain multiple subcultures that change with each generation.²³ Young adults are mostly comprised of Generation Z – also known as the iGeneration – who are those born from 1997 to today.²⁴ Generation Z are digital natives who have very little memory of a time before the technological advances that we are familiar with today.²⁵ The current literature on younger audience groups are small and containing gaps on how their motivations and being digital natives alter their interaction with technology in the museum space. Regardless, there are still applicable case studies that demonstrate that mobile technologies, act as communicative tools between museums and younger generations.

When young adults enter a museum space, it is important for staff to not assume that they cannot interact with their environment without their mobile devices. Still, museum staff should be aware that cellphones leave some impact whether they are present or not in the hands of

²² Patrizia Lattarulo, Marco Mariani, Laura Razzolini, “Nudging Museums attendance: A Field Experiment with High School Teens,” *Journal of Cultural Economics* 41, no. 3 (2017): 269, <https://doi.org/10.1007/s10824-016-9285-6>.

²³ Karen Hughes and Gianna Moscardo, “For Me or Not for Me? Exploring Young Adults’ Museum Representations,” *Leisure Sciences* 41, no. 6 (2019): 517, <https://doi.org/10.1080/01490400.2018.1550455>.

²⁴ Michael Dimock, “Defining Generations: Where Millennials End and Generation Z Begins,” Pew Research Center, January 17, 2019, <https://www.pewresearch.org/fact-tank/2019/01/17/where-millennials-end-and-generation-z-begins/>.

²⁵ Kim Parker and Ruth Igielnik, “On the Cusp of Adulthood and Facing an Uncertain Future: What We Know About Gen Z So Far,” Pew Research Center, May 14, 2020, <https://www.pewresearch.org/social-trends/2020/05/14/on-the-cusp-of-adulthood-and-facing-an-uncertain-future-what-we-know-about-gen-z-so-far-2/>.

younger generations. In a field experiment that was carried out involving 69 university students to visit the Museum of Tropical Queensland, Australia, a leisure visit was encouraged over a formal educational one. The students were given little prior instruction or information but were then randomly assembled into three control groups. The first group could enter the museum space and interact with it at their discretion, as if on a normal museum trip. The second group was instructed to focus on acting as if they were an exhibit designer or curator and present the exhibit in a way that focuses on the key point, with their cellphones. The third group could not use their cellphones or mobile devices.²⁶ Feedback from the students did not describe anxiety or stress over not having their cellphones, though this was only for one exhibit and not the entire museum. Furthermore, the group without their devices reported being less distracted, which they noted allowed for them to focus more on the exhibit. It is important to highlight that the group without cellphones did not spend as much time at exhibits and were more likely to interact with exhibits with audio-visual elements instead of simple text. This behavior demonstrated that despite their heightened attention to the exhibit, the students may have engaged with it less due to the loss of their cellphones. This study further supported the notion that students use their mobile devices to develop their personal experience, whether through posts on social media or personal photography.²⁷ Understanding how new generations are interacting with exhibits is key in developing the modern museum experience. Young adults do not enter the museum space simply to learn but to create and share their experiences, be inspired, develop their art, be entertained, or have an emotional encounter.

²⁶ Karen Hughes and Gianna Moscardo, "Connecting with New Audiences: Exploring the Impact of Mobile Communication Devices on the Experiences of Young Adults in Museums," *Visitor Studies* 20, no. 1 (2017): 38, <https://doi.org/10.1080/10645578.2017.1297128>.

²⁷ Hughes and Moscardo, "Connecting with New Audiences," 46.

Crowdsourcing

Social media is already a platform that encourages high levels of interaction outside the museum walls, and museum professionals can utilize this to gain both feedback and material from their audiences via a practice called crowdsourcing. Within the museum space, crowdsourcing can offer visitor contributions that lead to more representation among museum collections and new visitor experiences. Heritage crowdsourcing is “the creation, digitization, enhancement, analysis and interpretation of cultural heritage objects...and places by relatively large groups of people, through the completion of individually small tasks over the Internet.”²⁸ Museums, galleries, and archives have recently begun to employ heritage crowdsourcing to better develop their collections, organization, and evaluation of resources.²⁹ In 2010, the New Media Consortium began reporting on the dynamics of the museum world.³⁰ The 2013 report discusses “BYOD” or Bring Your Device as a significant contribution to mobile technologies being implemented in the museum space, but more importantly, it mentions the potential of crowdsourcing via mobile technologies. The report notes,

Crowdsourcing tangibly reveals the power of collaboration and dialog as visitors increasingly expect to engage with museums in a more personal way. While crowdsourcing is becoming widely used, museums still need to overcome challenges in embracing user-generated content and feedback. A genuine crowdsourcing project requires museums to relax their authority over the content and welcome ideas that deviate

²⁸ Chiara Bonacchi et al, “Participation in Heritage Crowdsourcing,” *Museum Management and Curatorship* 34, no. 2 (2019): 168, <https://doi.org/10.1080/09647775.2018.1559080>.

²⁹ Yuxiang Zhao, Xuanhui Zhang, and Xiaokang Song, “Crowdsourcing in the Digital Humanities: An Action Research on the Shengxuanhuai Manuscript Transcription,” in *iConference 2018 Proceedings* (Grandville, MI: iSchools, 2018), 1.

³⁰ Rachel Townsend, “Alternative Voices: Exploring Museums’ Use of Technology-Based Contributory Visitor Experiences” (Master’s Thesis, University of Washington, 2017), 6.

from what was expected in order to foster the type of synergy that frequently leads to innovation.³¹

Within the museum, crowdsourcing is popular through mobile devices and cellphones, as they allow for ease of movement and use with which visitors are most familiar. Moreover, many crowdsourcing projects are supported by exposure and feedback gained from social media platforms.

In addition to the benefits for visitors, museum professionals have found numerous uses for crowdsourcing, including correction and transcription, contextualization, complementing collections, classification, co-curation, and funding.³² Scaling the advantages of crowdsourcing to the level of the local community creates new museum experiences for visitors that are both personal and connected to their local heritage.³³ For museums that are catering to a larger, or international, audience that goes beyond the native community, institutions can provide a sense of ownership for the visitors as well as motivation to return to see finished projects through this engagement method.³⁴ Traditional projects are restricted to the knowledge, resources, and opinions of a small pool of individuals while crowdsourcing allows for global communities to contribute their opinions, cultures, perspectives, and history. This level of personal interaction also allows for museums to educate a larger, more involved audience. Museums do not simply

³¹ L. Johnson, S. Adams Becker, and A. Freeman, *The NMC Horizon report: 2013 Museum Edition* (Austin, TX: The New Media Consortium, 2013), 16.

³² Lindsey van der Lands, Ligia Ansems, and Vassilis-Javed Khan, "Paid Crowdsourcing as Concept and Content Generator to Enhance Museum Experiences," in *Museum Experience Design: Crowds, Ecosystem and Novel Technologies*, ed. Arnold Vermeeren, Licia Calvi, and Amalia Sabiescu (Cham, Switzerland: Springer, 2018), 139.

³³ Lands, Ansems, and Khan, "Paid Crowdsourcing as Concept and Content Generator," 138.

³⁴ Matthew Vincent, "Crowdsourced Data for Cultural Heritage," in *Heritage and Archaeology in the Digital Age: Acquisition, Curation, and Dissemination of Spatial Cultural Heritage Data*, ed. Marinon Lonnides and Thomas Levy (Cham, Switzerland: Springer, 2017), 80.

benefit from the heightened engagement that they have with museumgoers but can also introduce projects that rely on crowdsourcing alone, saving the expense and time of hiring staff to contribute and maintain.³⁵ Crowdsourcing is not a new concept, but museums are slow to introduce it into their practices and institutions due to a belief that it would lessen the power of curatorial and museum professionals.³⁶ Despite these fears, this inclusion is less about the power of those involved and more about contributions from multiple voices and how this can benefit all parties participating.

Notwithstanding the overwhelming benefits of crowdsourcing, it does have issues with mitigation, quality, and initial user engagement. Though museums desire the improvement of user experience, they cannot sacrifice dependable data for it. With the increased access to cellphones and other technologies, crowdsourcing can lead to an over-abundance of input from the public. Analysis from museum or project staff is required to sift through this data. Furthermore, if contributions to the collection or project are overwhelmingly not useful, then the goals and the meaning of the project are lost.³⁷ To counter this issue, museum professionals or project members should present a clear question or task to guide their contributors. Distributing these questions to diverse test groups will allow for more informative answers.³⁸ Initial participation from users can be minimal at the beginning of a project as visitors interpret how

³⁵ Vincent, "Crowdsourced Data for Cultural Heritage," 80.

³⁶ Townsend, "Alternative Voices," 6.

³⁷ Tom Wrigglesworth and Leon Watts, "The Value of User-Centric Crowdsourcing for Cultural heritage: Fostering Emotional Engagement with Integrity," in *Museum Experience Design: Crowd, Ecosystems, and Novel Technologies*, ed. Arnold Vermeeren, Licia Calvi, and Amalia Sabiescu (Cham, Switzerland: Springer, 2018), 161.

³⁸ Jasper Visser, "30 Do's for Designing Successful Participatory and Crowdsourcing Projects," The Museum of the Future, August 12, 2011, <http://themuseumofthefuture.com/2011/12/08/30-do%E2%80%99s-for-designing-successful-participatoryand-crowdsourcing-projects/>.

they fit into crowdsourcing and what they can contribute. Staff must integrate into their project a variety of input that can be included, as some visitors are not creators, but have much to give to a project. Visitors should be able to create as a regular part of their museum visit, and if this is not possible, making the project's goal personal will invite them to do so.³⁹ The Museum of Indian Arts and Culture (MIAC) in Santa Fe, New Mexico, implemented a successful current events exhibition in December of 2016 on the topic of the Dakota Access Pipeline (DAPL) and the protests against its installation, mostly by indigenous people, using crowdsourcing and social media.⁴⁰ The Standing Rock exhibition uses crowdsourcing to collect photographs and other media materials, a majority of them coming through Facebook.⁴¹ Social media played a key role in announcing the exhibit, but also accepting materials from emerging artists and protestors. This combination of easily accessible social media and a project based on an emotional, societal topic attracted participants. Crowdsourcing via cellphones in museums is not directly credited in this example, but since many crowdsourcing projects depend on social media as a platform, it is not too far of a reach to see museums turning to mobile technologies to support this type of practice.

Gamification

As museums attempt to make visits both entertaining and educational, programs such as gamification have made their way into the museum context. Within the museum space, gamification can be defined as game design elements in a non-game context to improve user

³⁹ Jasper Visser, "30 Do's for Designing Successful Participatory and Crowdsourcing Projects."

⁴⁰ C. Kieffer and Devorah Romanek, "Crowdsourcing a Current Events Exhibition on Community Activism Against DAPL," *Curator: The Museum Journal* 62, no. 2 (2019): 135, <https://doi.org/10.1111/cura.12302>.

⁴¹ Kieffer and Romanek, "Crowdsourcing a Current Events Exhibition," 139.

experience and engagement.⁴² The inclusion of gamification in tourist attractions has been labeled as a more sustainable approach to tourism growth as sustainable tourism, which is a process that sees that the needs of the present are met without hurting the future generations and their own needs.⁴³ The positive attributes of gamification extend from visitor engagement, interaction, and motivation to actively gain knowledge of exhibits. Museums educators have long been implementing games to engage visitors to exhibits, but the rise of mobile technology has expanded their application.⁴⁴ Gamification has a unique ability to incorporate both the physical cultural content in museums as well as the intangible factors, such as social values, beliefs, or artistic expression.⁴⁵ This feature can be considered attractive to museum professionals who feel that cellphones and mobile apps are a distraction from the physical experience of the museum. To counteract this issue, many examples of games in museums focus on cultural, historical, and heritage awareness, including historical reconstruction⁴⁶ which utilizes the physical culture at an archaeological site or museum. Instances such as these demonstrate that museums can develop a game that cultivates an active learning environment that keeps users motivated and interested in understanding the cultural material incorporated into the game's design. Furthermore, games can instigate not only museum to visitor relations but a sense of teamwork amongst museumgoers.

⁴² Kristina Madsen, "The Gamified Museum: A Critical Literature Review and Discussion of Gamification in Museums," in *Gamescope: The Potential of Gamification in Digital and Analogue Places*, ed. Thessa Jensen, Ole Hansen, and Claus Rosenstand (Aalborg, Denmark: Aalborg Universitetsforlag, 2020), 2.

⁴³ Adina Negrusa et al, "Exploring Gamification Techniques and Applications for Sustainable Tourism," *Sustainability* 7, no. 8 (2015): 1161, <https://doi.org/10.3390/info11010022>.

⁴⁴ Nikoleta Yiannoutsou and Nikolaos Avouris, "Mobile Games in Museums: From Learning through Game Play to Learning through Game Design," *ICOM Education* 23 (2012): 80.

⁴⁵ Michela Mortara et al, "Learning Cultural Heritage by Serious Games," *Journal of Cultural Heritage* 15, no. 3 (2014): 319, <https://doi.org/10.1016/j.culher.2013.04.004>.

⁴⁶Mortara et al, "Learning Cultural Heritage by Serious Games," 319.

Due to the educational nature of museums, previous applications of game-based learning in higher education can easily transfer over to the museum space.⁴⁷

Including gamification in the museum experience is frequently met with indecision since, to make an effective game, a large amount of skill and money must be invested. Furthermore, though the features of these games will hold a visitor's attention, there is no guarantee that this focus will last or will involve the physical institution. In terms of the price of a game app, a game developer company named *Imaginnovation* lists the cost of a simple 2-D game with basic graphics and soundtrack ranging anywhere around \$50,000 to \$100,000. A mid-level game that requires different levels, characters, story, and quality graphics may cost a client \$250,000 to \$700,000.⁴⁸ Though institutions can contract developers such as *Imaginnovation* to create their gamification software, there are cheaper options that can be utilized by museum staff with the right set of skills. Instead of developing the software from scratch, museum staff and professionals can find open-source software, software that can be edited and used by anyone, or software that has a free business model where core functions are free and more specific features that are not required for the game to function can be purchased.⁴⁹ Akin to mobile apps, institutions can incorporate the

⁴⁷ Marijana Cosovic and Belma Brkic, "Game-Based Learning in Museums – Cultural Heritage Applications," *Information* 11, no. 1 (2020), 5, <https://doi.org/10.3390/info11010022>.

⁴⁸ Michael Georgiou, "Game App Development: How Much Does It Really Cost to Create a Mobile Game?," *Imaginnovation*, May 20, 2019, <https://www.imaginnovation.net/blog/mobile-game-app-development-cost/#:~:text=It%20may%20cost%20you%20anywhere,%24700%2C000%20to%20develop%20such%20games.&text=Modern%2Dday%20businesses%20are%20taking,improve%20their%20team%2Dbuilding%20efforts>.

⁴⁹ Catalin Maican, Radu Lixandroi, and Cristinel Constantin, "Interactivia.ro – A Study of a Gamification Framework Using Zero-Cost Tools," *Computers in Human Behavior* 61 (2016): 190, <https://doi.org/10.1016/j.chb.2016.03.023>.

advertisements from selected partners to cover any costs that are required to make the game engaging and motivating.⁵⁰

Regarding the issue of keeping users engaged, an institution needs to become familiar with what attracts visitors to mobile games and gamified elements in the first place. A 2019 study that investigated the use of gamification in Egyptian museums to promote awareness of Egyptian cultural heritage⁵¹ shows that respondents to their survey preferred reward, competitive, and social elements in games. Respondents also noted that they favored puzzle, adventure, role-playing, and strategy games as well.⁵² These answers align with the four core reasons that people play games: to accomplish mastery, to destress, to have fun, and to socialize.⁵³ If an institution takes time to conduct audience research, they will see which of these themes would appeal most to their museumgoers and align with their mission to engage their visitors. According to the motivation preferred by the audience, museums can then base the framework of their mobile game and other gamification elements on these trends and if it is fiscally plausible to make a game that will engage their visitors. It is recommended that cultural institutions that wish to further engage their audiences with the physical institution and culture should incorporate a kind of reward system, either progress or point, that will further motivate guests to complete quests or levels. These points of progression can incorporate elements of the

⁵⁰ Maican et al, “Interactivia.ro,” 190.

⁵¹ This study was conducted by Iten Elrouby and Samar El Kasrawy who are both associate professors in the Tourism Department at Alexandria University in Egypt.

⁵² Iten Elrouby and Samar El Kasrawy, “Applying Gamification to Raise Awareness of Cultural Heritage in Egyptian Museums (Case Study: Alexandria National Museum),” *Journal of the Faculty of Tourism and Hotels* 16, no. 1 (2019): 12, 10.21608/thalexu.2019.53065.

⁵³ Gabe Zichermann and Christopher Cunningham, “Player Motivation,” in *Gamification by Design* (Sebastopol, CA: O’Reilly Media, 2011), 20.

real-world museum, guiding users to different areas to progress in-game. Tracking user interaction with a mobile game allows for a certain level of feedback to an institution. Feedback is crucial to understanding the success of an attempt at gamification.⁵⁴ If a museum chooses to incorporate physical exhibits, sites, or objects into a game, as a particular point of interest at an archaeological site or a permanent exhibition, they can track where a museumgoer is interacting the most, or where others have chosen to not continue playing. Information like this can demonstrate points in a museum or site where there is a lot of interest and where there is none. It can also pinpoint possible problems in a game where it may be too difficult or uninteresting.

The examples listed here only hint at what museums can incorporate into the active and informal learning experiences they can offer to their audiences. Mobile and digital technologies that are integrated into the museumgoer's ever-present cellphone are not meant to stand in place of the conventional museum encounter but expand the museum's parameters. Since these are emerging practices in visitor motivation and engagement, the literature is lacking either specific case studies or cross-institutional analysis. While social media has become a life-line for museums during the COVID-19 pandemic, these institutions are slow to integrate more invasive projects, such as crowdsourcing or gamification, especially via cellphone or mobile technologies that they do not quite trust yet. Through examples such as gamification are a costly endeavor that may exclude some museums, an institution needs to gauge the desires of their audience before dismissing more modern technologies. From these applications, an abundance of literary scholarship will become available that can demonstrate the patterns and trends in what technologies engage audiences the most.

⁵⁴ Gabe Zichermann and Christopher Cunningham, "Game Mechanics and Dynamics in Greater Depth," in *Gamification by Design* (Sebastopol, CA: O'Reilly Media, 2011), 78.

Conclusion & Final Implications

The focus of this thesis was to explore the contemporary uses of mobile technology, in particular cellphones, that museums are utilizing to promote a participatory and inclusive experience for their audiences. Applications of these technologies were investigated to discover an optimal implementation that would benefit audience groups and institutions. Additionally, information was analyzed from over a hundred of the most relevant and recent publications that involve specific technological programs, case studies demonstrating applications of these programs, and contributing scholarship to the framework of these technologies and the museum space. Further cross-institutional analysis, from both larger museums to medium-small institutions, was conducted to collect a broad range of data that applies to a variety of institutions. Within this chapter, conclusions will be made concerning the five lines of inquiry that guided this study as well as implications for both additional research and museum professional practice.

Conclusions

Has the paradigm shift from a collection-based focused to a visitor-based focused museum experience supported the use of a cellphone to encourage a participatory and engaging visitor encounter?

After exploring about a dozen scholarly sources on the paradigm shift and the motivations of museums in around fifty case studies, three repeating factors stood out. Cellphones allow for active and personal meaning-making experiences, open communication with larger, diverse audiences, and permit museums to contend with other entertainment venues. These points show an interesting melding of museum goals and audience motivations to both

enter the museum space and use technology there. Numerous studies focused on one of these subjects while neglecting the other. Regardless, it was clear that institutions are now trying to cater to museumgoers to attract them. The first two points are focused on developing a more powerful role for the museumgoer within the museum. With the aid of tools such as the cellphone, museums are also able to extend this transfer of power to under-represented audience groups, which results in a more inclusive experience. The third factor is more focused on what spurred the paradigm shift, as museums were facing issues of irrelevancy with an audience that was losing interest in the customary museum experience. By rebranding themselves with the aid of mobile technologies, like cellphones, cultural institutions have been able to carve out a spot in the scarce leisure time of their audiences. There are still professionals who maintain that the traditional museum narrative, aesthetic, and experience would be more beneficial to their audiences, but this research has shown how this mindset is an outdated way of thinking.

Are cellphones an appropriate tool to elicit the above-stated experiences, and how have institutions dealt with them in the museum space in the past?

The ubiquitous presence of the cellphone is a repeating factor for why museum professionals and staff are beginning to utilize cellphone-based technology and programs in their institutions. The “Bring Your Own Device” approach to these mobile technology inclusions in the museum allows for the museum to execute contemporary and highly interactive programs with equipment that visitors are already familiar with and proved themselves. Policies that forbade or limited the use of cellphones, or other aspects such as personal photography, began to alienate modern audiences even further from cultural institutions. A negative assumption that

physical institutions are not needed to store information has risen with the digital age.¹ As mobile technologies began to become more widely accepted in museums, applications that brought both entertainment, engagement, and ease of use demonstrated a melding of museums and technology. These digital applications would begin to alter the views visitors have of the modern museum.

Are there specific digital programs (i.e., mobile apps, gamification, or augmented reality) that use cell phones as a platform that are more effective in achieving these experiences?

Mobile apps, such as UCANGO or social media applications like Facebook, have shown to be one of the more popular and stimulating options amongst both museums and their visitors. Museum mobile apps, such as ArtLens, allow for museums to fully perform their educational and informative roles while also giving a great deal of control to the user. Basic details about the museum – such as maps, events, or donations – are readily available for the visitor, but they are given the control to engage with multiple parts of the museum experience at their own pace. Museumgoers can participate in self-representation and develop meanings through a social, and digital, medium such as social media apps or gamification that supports interaction with their physical surroundings. Other digital programs, such as gamification or augmented reality, allows for the museum to educate and present the museum narrative in a more participating manner. Subsequently, though, cultural institutions need to conduct thorough research of the technologies they wish to employ, to understand their many factors. Simultaneously, audience research used

¹ Bob Usherwood, Kerry Wilson, and Jared Bryson, “Relevant Repositories? Libraries, Museums, and Archives in ‘the Information Age’” *Journal of Librarianship and Information Science* 37, no. 2 (2005): 90, <https://doi.org/10.1177%2F0961000605055357>.

to gauge the needs of a museum's pool of visitors will also ensure that mobile technology can be utilized at its full capacity, while also being a wanted addition to the museum experience.

Can cellphones contribute to more inclusivity and accessibility between museums and underrepresented groups such as younger audiences (ages thirteen through nineteen), older adults (sixty-five and above), or those with physical, mental, or developmental disabilities?

Cellphones are already assistive tools for those who are marginalized in present museum audience groups. This research provided case studies that demonstrated how cellphones are used by certain underrepresented groups in museum audience populations, including younger generations, older adults, people with vision impairments, and people with ASD. Cellphones can be used to not only communicate, but to participate in situations where people develop their meanings via personal photography, social media, or digital communications. Cellphones also provide accessibility features, which allow for on-screen magnification, speech-to-text, text-to-speech, and assist in retaining attention for a more in-depth learning experience. Since many visitors enter the museum space with accessibility adjustments already made to their phones, it relieves pressure for institutions to have to compensate when implementing digital technologies. These features also open the line of communication between these underrepresented groups and the museum. The museum can deliver a narrative that is conscious of the various socio-cultural identities that their audience members have, with their efforts being supported by the many features and programs supported by mobile technology.

What are the most effective practices for implementing cellphone-based technologies in the museum context based on successful case studies from a cross-institutional research pool?

There are two reoccurring themes in the successful implementation of cellphone-based technologies: 1.) there is an apparent need by both audiences and institutions that can be met by mobile technologies, and 2.) the programs made available by these technologies take supporting roles for the museum narrative, making it both engaging and inclusive. In turn, though, these tools do not replace the traditional museum experience entirely, nor should they aim to. Whether it is to give visitors a more active experience or to provide accessibility, there must be an interest from the public for these digital inclusions or they will fall into disuse. If these digital tools are not properly engaging or attracting audiences, then the museum suffers from a waste of resources, but it has also been shown that floundering digital programs attract negative attention as much as they attract positive. Museums should evaluate each programs' influence on their unique audiences and their motivations to use them. Aligning this research within the capabilities, goals, and boundaries of their institutions will result in the development of a successful program.

Implications

This research reveals several implications that warrant further study to broaden the scholarship on the subject of mobile technologies having a supportive and pronounced presence in the museum space. The current literature lacks research that first focuses on the motivations and influences of the visitor that would lead them to use mobile tools in the museum space. Information such as this would aid museum professionals in formatting their digital inclusions to stimulate maximum audience participation. Additionally, the topics covered by existing scholars bounce from being specific to a single institution or covering a broad topic that does little to contribute to the aspects of individual application of these technologies. Furthermore, there are additional connotations that deserve consideration regarding the professional practices of the museum field.

Museum professionals and staff are still widely unprepared to take on mobile technological projects, and there are even some who are reluctant to do so. The goal of this research was to demonstrate the benefits and drawbacks of both popular cellphone programs and those that are emerging within museums. While the current pool of literature allowed for a variety of articles and texts discussing these same factors, certain elements of these technologies were either excluded, redundant, or focused on the needs of an institution. This scattered approach to research has restricted the ability of museums to fully grasp the applicability of mobile technologies in the museum context and thus, struggle to incorporate them into the institution.

The research questions that guided this analysis of literature and case studies of mobile technology, focused mostly on how cellphones can contribute to the revolutionizing of the museum experience. Despite there being a somewhat plentiful pool of information from institutions and specific applications of cellphone-based technologies, the literature would continue to benefit from cross-institutional analyses and research on how these technologies function in a museum setting. This data would be an invaluable resource to institutions who wish to implement mobile digital programs into their current narratives and experiences, no matter the size and ability of their institution. Essentially, this study emphasizes the need for scholars to move beyond the baseline debate of whether mobile and digital technologies make good assets to museums and their communities. Instead, a collaboration between many institutions – of various sizes – and ongoing projects focused on digital inclusion would allow for a sharing of data and observations about real-world applications. Additionally, this research outlines the need for museum professionals to re-evaluate the need for mobile technologies in their venues and to incorporate the opinions and suggestions of their various audience groups. Professional practices such as this will give the museumgoer a voice in the designing of the very framework of modern museums while allowing

these same organizations to be able to continue their functions and goals in conjunction with remaining relevant in an ever-changing world.

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Figures



Figure 1. *Five Screens from the UCAN GO App Interface*. Digital Photograph. Created by Calvium. From Calvium website. <https://calvium.com/projects/ucan-go/>.



Figure 2. *QR Code (2D) and EAN-13 (1D) Barcodes Encoding the Same Data (3254565174110)*. Digital Photograph Created by José Rouillard. From José Rouillard, *Contextual QR Codes*, in *Proceedings of the Third International Multi-Conference on Computing in the Global Information Technology* (New York City, New York: IEEE, 2008), 51, figure 1.



Figure 3. *3-D Printed Stone Point with Lanyard Attachment and Wooden "Coin" with QR-Code and Lanyard*. Photograph by Maryland Archaeological Conservation Laboratory. From Cheryl Fogle-Hatch, "Bring Your Own Device' (BYOD) Programming Facilities Accessibility for People Who Are Blind or Have Low Vision." <https://mw20.museweb.net/paper/bring-your-own-device-byod-programming-facilitates-accessibility-for-people-who-are-blind-or-have-low-vision/>, figure 2a and 2b.

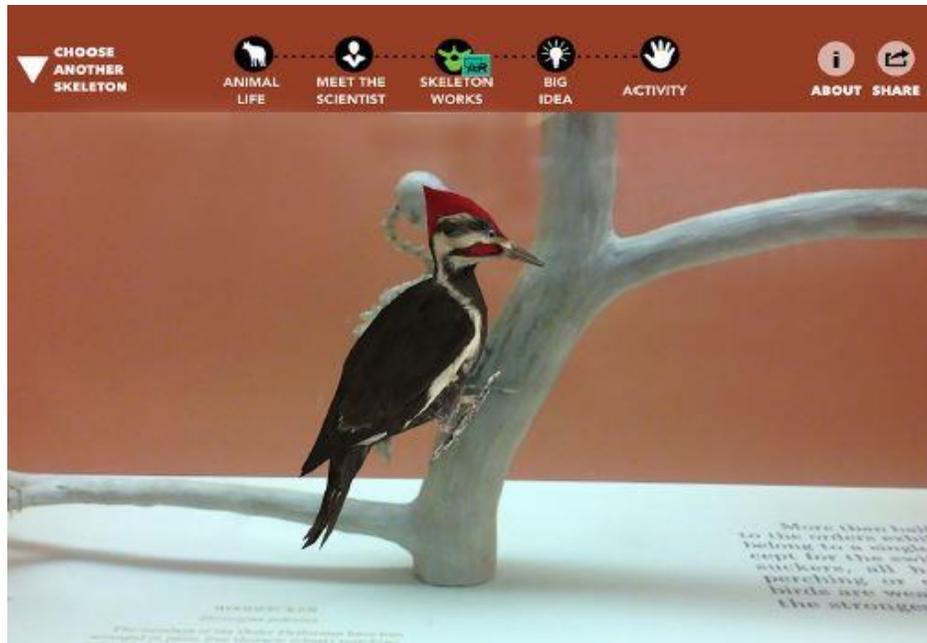


Figure 4. *Skin & Bones Screen Capture of the AR Experience Triggered from the Skeleton of a Pleated Woodpecker*. Digital photograph Diana Marques and Robert Costello. From Diana Marques and Robert Costello, “Concerns and Challenges Developing Mobile Augmented Reality Experiences for Museum Exhibitions,” *Curator: The Museum Journal* 61, no. 4 (2018): 7, figure 2.

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Figure 5. Social Media Post. Created by The Museum of English Rural Unit. From *MuseumNext*, *How Museum Can Use Social Media?*.
<https://www.museumnext.com/article/museums-can-use-social-media/#:~:text=Museums%20have%20been%20keen%20adopters,Tate%20attracting%20millions%20of%20followers.>